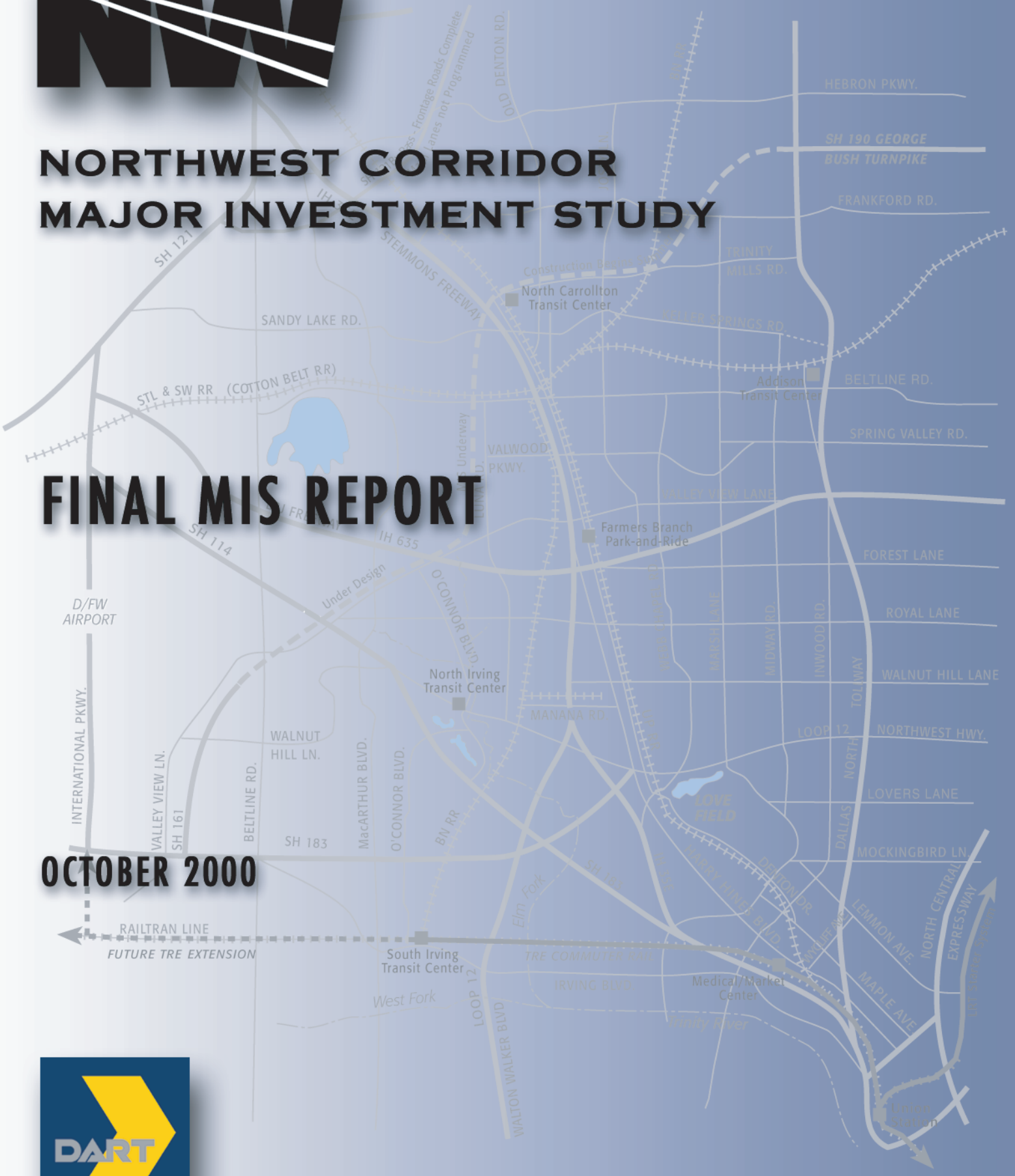
# NORTHWEST CORRIDOR MAJOR INVESTMENT STUDY

# FINAL MIS REPORT

## OCTOBER 2000



Final Report

# Major Investment Study

for the

# DART Northwest Corridor

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# 1.0 Introduction

The Northwest Corridor Major Investment Study (MIS) was initiated by Dallas Area Rapid Transit (DART) in the Spring of 1998. Figure 1-1 illustrates the regional location of the Northwest Corridor. The MIS provides a decision-making process for determining transportation investments in the Northwest Corridor, and facilitates careful consideration of alternatives against a baseline. Furthermore, the MIS is based upon an open process founded upon community and agency input for determining the preferred alternative. Selected transportation improvements will be appropriate to meet future travel needs within the study area as defined in the purpose and need and DART Guiding Principles.

## 1.1 PURPOSE OF REPORT

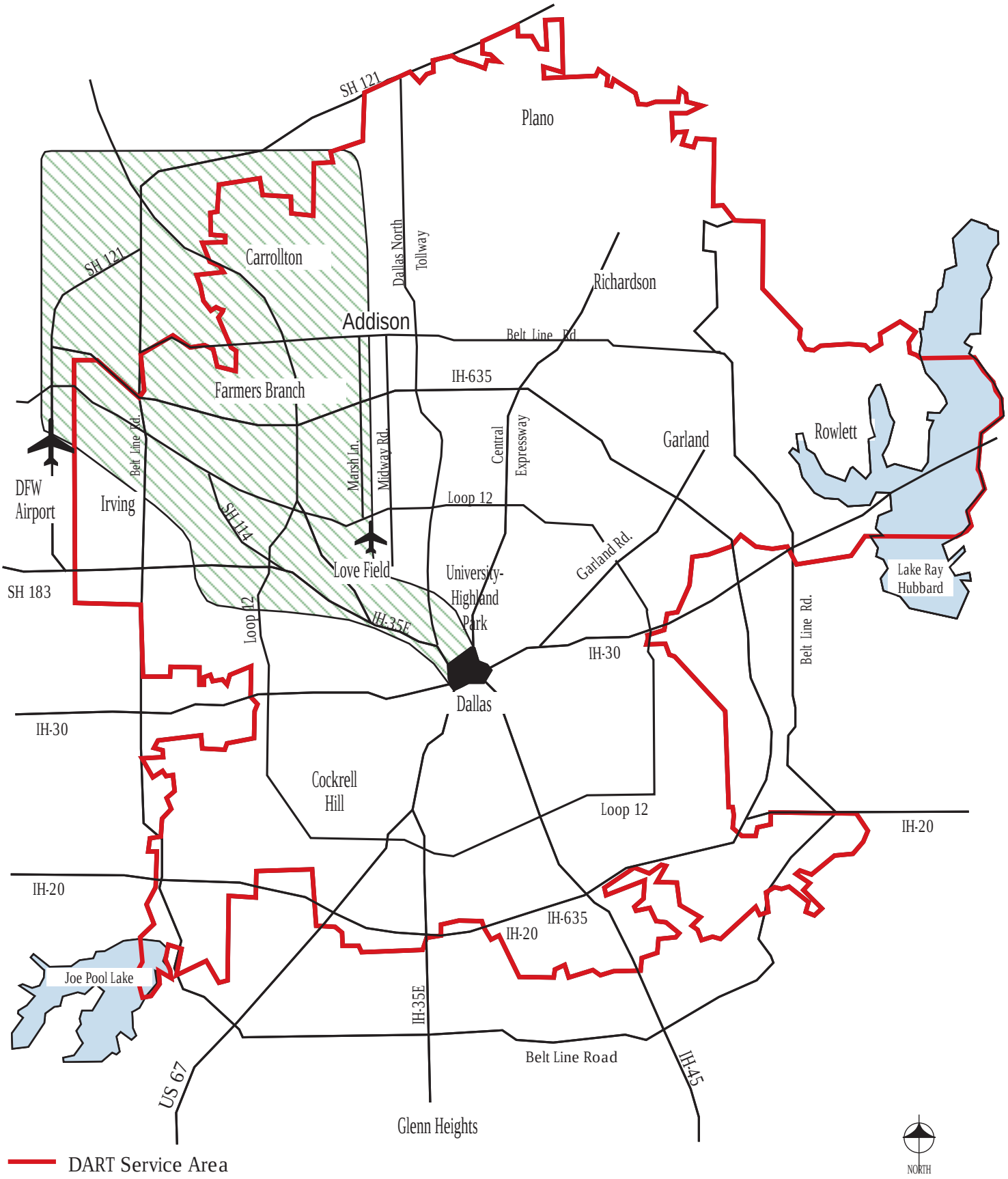
The purpose of this report is to:

- Summarize public and agency involvement in the MIS process;
- Document the evaluation process and alternatives considered in the MIS;
- Document the detailed evaluation results; and,
- Present the elements of the Locally Preferred Investment Strategy (LPIS).

The alternatives defined in this report provide the basis for the evaluation of travel demand and ridership forecasts, costs, cost-effectiveness, community and environmental effects. The purpose of the evaluation is to select the most promising modal and alignment option(s) and recommend a multi-modal improvement strategy for the Northwest Corridor.

## 1.2 PLANNING CONTEXT

Planning efforts for the Northwest Corridor (formerly referred to as Stemmons Corridor) began in 1983 with the DART Final Service Plan. Subsequent planning efforts have refined the potential transportation improvements for this corridor. This planning context is described in the following sections.




NW CORRIDOR MIS

MIS FINAL REPORT

REGIONAL LOCATION OF STUDY AREA

FIGURE 1-1
Source: BRW, Inc.
Date: July 2000

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### 1.2.1 DART System Plan

The ***1983 Final Service Plan*** represented a 160-mile rail system. In this plan, Northwest Corridor rail improvements included a Phase I rail line from downtown Dallas to LBJ Freeway, with Phase II extensions to Belt Line Road and west along Mañana Spur/BN RR to Las Colinas. Another Phase II element was a rail line off the TRE Commuter Rail line to Texas Stadium and continuing Northwest along the Elm Fork to the north Las Colinas area.

The revised ***2010 Service Plan*** (1988) included a reduced, 93-mile rail plan in effect at the time of the 1988 bond election. This plan reflected rail in the Stemmons Corridor along the UP RR to LBJ Freeway, with extensions to Belt Line Road and to the west along Mañana Spur to Las Colinas. When the 1988 bond referendum failed, DART embarked on a "New Directions" campaign to develop cost-effective rail program for its member cities. This new program resulted in a 1989 Transit System Plan.

The ***1989 Transit System Plan*** (approved in June 1989) identified a programmed light rail transit alignment along the UP RR to Valley View Lane in Farmers Branch, and future system expansion to the North Carrollton Transit Center. Light rail transit along the Mañana Spur to the North Irving Transit Center was also identified. DART purchased the UP RR in 1990 for future use of a passenger rail line.

The ***1995 Transit System Plan*** update refined the 1989 plan to further improve both affordability and cost-effectiveness. This plan included 53 miles of LRT and 37 miles of Commuter Rail by 2010. Several potential future expansion corridors were also identified. In the Northwest Corridor, the 1995 Transit System Plan changed the Stemmons Corridor/Mañana Spur alignments to Commuter Rail, and identified the BN RR as a alternative for future study. Figure 1-2 illustrates the 1995 DART Transit System Plan.

### 1.2.2 Regional Mobility 2025 Plan Update

The ***Mobility 2020 Plan*** was updated by the North Central Texas Council of Governments (NCTCOG) during the latter stages of the Northwest Corridor MIS as the ***Mobility 2025 Plan***. The Mobility 2020 Plan rail system generally reflected the 1995 DART Transit System Plan, showing committed Commuter Rail in the Stemmons Corridor to approximately Belt Line Road with an system expansion to the North Carrollton Transit Center pending further study. The BN RR was also shown as a rail system expansion pending further study. The key difference between the two plans was that the Mobility 2020 plan did not show the Mañana Spur to the North Irving Transit Center.

A reconciliation of the Northwest Corridor MIS recommendations and the ***Mobility 2025 Plan*** is provided in Section 6.6.1.

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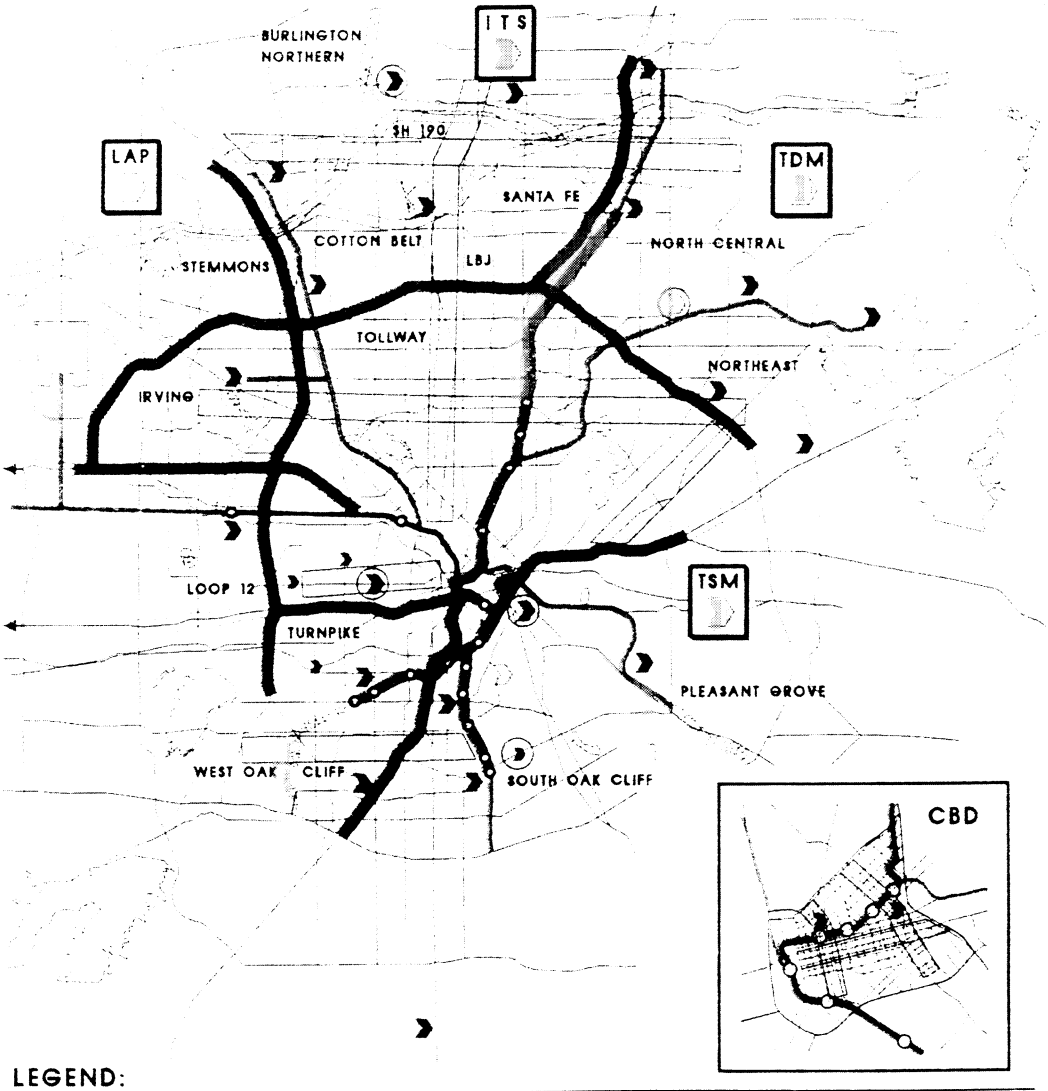
# TRANSIT SYSTEM PLAN YEAR 2010

REVISED 1997
NOVEMBER 1995




## LEGEND:

### RAIL

- STARTER SYSTEM & STATIONS
- LIGHT RAIL (FULL CAPACITY)
- LIGHT RAIL (INTERMEDIATE CAPACITY)
- COMMUTER RAIL
- ALTERNATIVE FOR FUTURE STUDY (MAY REQUIRE SERVICE PLAN AMENDMENT)
- FUTURE SYSTEM EXPANSION
- FUTURE SYSTEM EXPANSION (MAY REQUIRE SERVICE PLAN AMENDMENT)

### HOV LANES

- DART PARTICIPATION
- NO DART PARTICIPATION

### BUS

- TRANSIT CENTER /PARK & RIDE
- PASSENGER TRANSFER LOCATION
- BUS OPERATING FACILITY
- FACILITY LOCATION SUBJECT TO SERVICE PLAN AMENDMENT
- BUS CORRIDORS

### GENERAL MOBILITY

- TSM — TRANSPORTATION SYSTEM MANAGEMENT
- ITS — INTELLIGENT TRANSPORTATION SYSTEMS
- TDM — TRAVEL DEMAND MANAGEMENT
- LAP — LOCAL ASSISTANCE PROGRAM

NW CORRIDOR MIS

MIS FINAL REPORT
DART TRANSIT SYSTEM PLAN

FIGURE 1-2
Source: BRW, Inc.
Date: July 2000

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## 1.3 PURPOSE AND NEED

The Northwest Corridor MIS alternatives have been developed and refined over the course of the study based on the study purpose and need, DART Guiding Principles, input from study Work Groups, and public input received at public meetings. The following sections describes the purpose and need for the project.

### 1.3.1 Northwest Corridor Needs Assessment

The purpose and need for the Northwest Corridor MIS was established in the ***Northwest Corridor Needs Assessment*** *(BRW, Inc.; December 1997).* Based on an analysis of travel patterns and public and agency input, it was determined that the primary travel needs to be addressed by the Northwest Corridor MIS are for north-south and northwest-southwest travel. As stated in the DART Guiding Principles, these two travel patterns address travel needs in the following two subareas:

- The north-south travel pattern addresses needs in the *Carrollton-Farmers Branch Subarea,* which generally parallels IH 35E through downtown Dallas and into Carrollton.

- The northwest-southeast travel pattern addresses needs in the *North Irving Subarea,* generally along the IH 35E/SH 114 travel corridor through downtown Dallas and into North Irving.

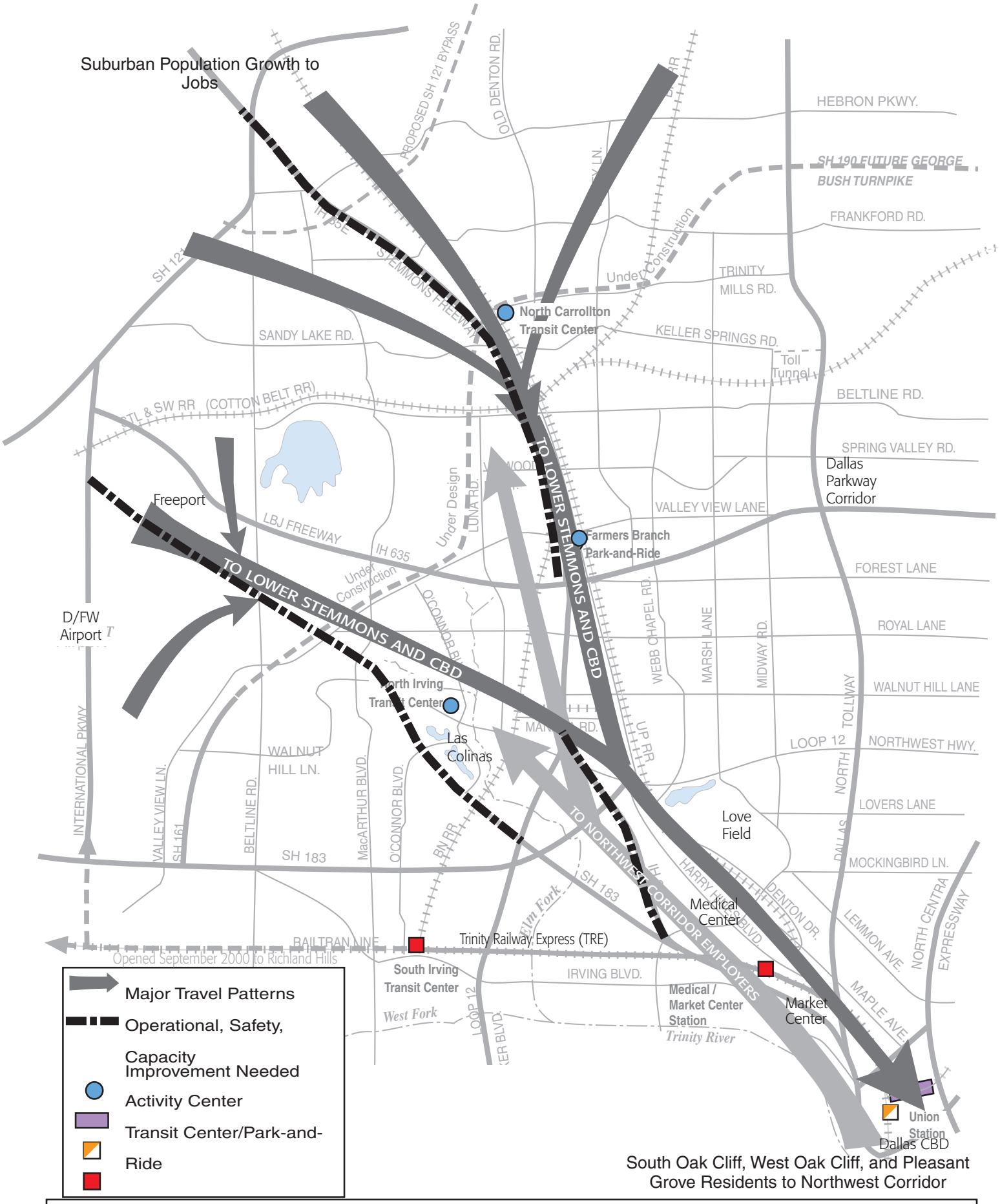
As shown in Figure 1-3, both of these travel patterns address the reverse commute travel needs from south Dallas to employment within the corridor. A transportation improvement strategy should provide a safe and efficient means to serve the identified travel patterns and provide access to the major activity centers within identified subareas. It should also provide opportunities for enhancing quality of life and fostering economic development opportunities.

***The Northwest Corridor Needs Assessment*** *(December 1997)* describes in detail the Purpose and Need for the study. The majority of agency representatives currently involved in the MIS were involved in the Needs Assessment as well, and were consulted as to the transportation needs and deficiencies within their communities.

A brief summary of the purposes for major transportation improvements in the Northwest Corridor is as follows:

- To **enhance mobility** in and to the Study Area by providing more travel choices, especially for residents in the southern sector of Dallas to job opportunities in the Study Area and for north-south and northwest-southeast radial travel from residential areas to major destinations in central Dallas;

- To provide **additional capacity** for travel in the heavily-traveled radial directions;




NW CORRIDOR MIS

# MIS FINAL REPORT

TRANSPORTATION NEEDS

FIGURE 1-3
Source: BRW, Inc.
Date: July 2000

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- To **reduce congestion** by reducing the existing dependence on the automobile for travel to and within the major activity centers in the Study Area;

- To **enhance the quality and reliability of transit service** to existing and potential riders;

- To **improve the safety and operating efficiency** of the major radial roadway facilities, working in cooperation with other studies; and,

- To **strengthen economic conditions** in the Study Area by enhancing transportation service for convention, entertainment and business travel to major destinations.

### 1.3.2 DART Guiding Principles

Another important element of the purpose and need for the project are the DART Guiding Principles. The DART Board of Directors adopted guiding principles in August, 1998 to provide direction on the factors to be considered in the selection of a locally preferred investment strategy and the approach to be used in conducting the MIS. The guiding principles are as follows:

- Achieve Regional Consensus

- Enhance Mobility

- Be Fiscally Responsible

- Consider Appropriate Technologies

- Consider Effects on the Corridor, such as economic development and environmental

## 1.4 ORGANIZATION OF REPORT

Following this introduction, Chapter 2 documents the public and agency involvement program implemented during the MIS process. Chapter 3 summarizes the evaluation process and the alternatives considered throughout each evaluation phase of the MIS. Chapter 4 documents in detail the alternatives forwarded into the detailed evaluation phase and the refinements made to these alternatives. The results of the evaluation of the detailed alternatives are documented in Chapter 5. Chapter 6 summarizes the trade-offs associated with alternatives and the results of sensitivity tests conducted during the MIS. The "building blocks" analysis, which lays the framework for the selection of the elements of a multi-modal transportation improvement strategy to meet corridor travel demand, is discussed in Chapter 7 along with a description of the locally preferred investment strategy.

# 2.0 Public and Agency Involvement Program

Early and continuous involvement of diverse interests is necessary in order to build consensus and support for appropriate transportation solutions and to ensure that the results of the MIS are equitable and effective in meeting the mobility needs in the corridor. To support decision-making and consensus building, DART developed a comprehensive Public and Agency Involvement Program during the Northwest Corridor Needs Assessment. Building and maintaining consensus for the preferred investment strategy can only be achieved though education and understanding. An informed public that understands the range of alternatives and a sound working relationship with implementing agencies is the key to building and maintaining consensus for the preferred investment strategy as it moves towards implementation. In order to achieve this, the program was implemented during the MIS process to provide for the proactive and regular involvement of project stakeholders. A series of agency interviews during the Needs Assessment resulted in the identification of a decision-making structure and potential participants from corridor cities and the community. The following sections describe the decision-making structure and summarize public and agency involvement during the MIS.

## 2.1 DECISION-MAKING STRUCTURE

The mission statement for the Northwest Corridor Public and Agency Involvement Program was defined as follows:

> *"It is the mission of the Public and Agency Involvement Program for the Northwest Corridor Major Investment Study to actively inform, educate and involve the public and implementing agencies in defining, evaluating and selecting appropriate transportation investment strategies for future implementation in the Northwest Corridor. Creating a collective vision for the future will be accomplished by fostering an understanding of all transportation improvement options and by providing people with information and opportunities necessary to select among, prioritize, and recommend investment strategies that promote increased mobility and accessibility in their neighborhoods and in the region."*

Figure 2-1 illustrates the decision-making structure of the Northwest Corridor Public and Agency Involvement Program. As shown, the decision-making framework includes four work groups and the general public providing policy and technical input to the DART Board throughout the planning process. The roles and responsibilities of each group are defined below.

- **Executive Work Group** - This group served as the lead group for the study and consisted of elected officials, policy leaders and senior staff from implementing agencies that have a role in funding decisions for corridor improvements. Their key responsibilities were to:

  a) work toward consensus;
  b) provide policy recommendations affecting project development;
  c) coordinate policy issues within their respective agencies;
  d) provide oversight of major activities associated with the study; and
  e) select organizations to join the Community Work Group.

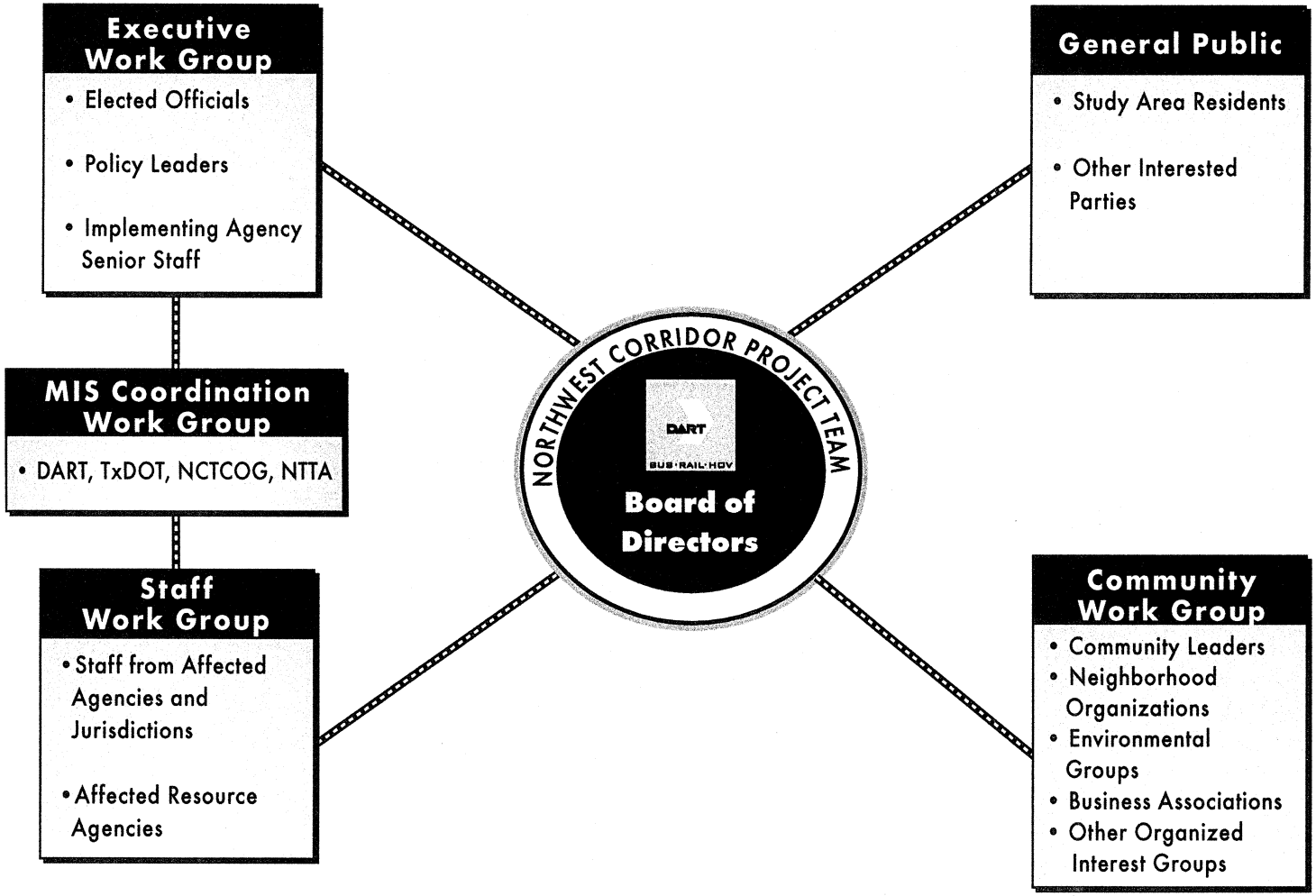
- **Community Work Group** - This work group was comprised of representatives from organized interest groups in the corridor and represented the range of diverse interests in the area. Each organization or City appointed one or more individuals as representatives. These persons volunteered their time to act as liaisons between the project team and their respective organization, and offered input on issues and potential solutions on behalf of their organization. The Community Work Group had the following responsibilities:

  a) monitor the study process from a community perspective;
  b) highlight potential issues and concerns specific to their interest;
  c) coordinate study activities among their groups;
  d) disseminate information and generate study interest in the community; and
  e) offer strategies to resolve issues between competing interests.

- **Staff Work Group** – This group provided technical staff support from a broad range of affected agencies. Staff from local, state and federal implementing agencies and authorities, local jurisdictions, utility companies, affected resource agencies and other interested agencies met regularly to assess project development and review technical findings. In general, the responsibilities of the Staff Work Group were to:

  a) assist in the definition and evaluation of project alternatives;
  b) review technical studies and staff recommendations; and
  c) coordinate agency activities and review functions for the study.

- **MIS Coordination Work Group** – This group was suggested during the early stages of the MIS given the number of other MIS's in or bordering the Northwest Corridor Study Area. The MIS Coordination Work Group met several times, more often during the early stages of the study, to ensure that consistent technical assumptions were used for all studies. Staff from Texas Department of Transportation (TxDOT), NCTCOG and MIS Project Teams participated on the work group.




NW CORRIDOR MIS

MIS FINAL REPORT
DECISION-MAKING STRUCTURE

FIGURE 2-1
Source: BRW, Inc.
Date: July 2000

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- **General Public** – The general public is a diverse and large target audience. The Community Work Group functioned as a broad-based representation of the general public and helped to disseminate information and bring to the process information from their friends and neighbors. Citizens of the Northwest Corridor, however, had several opportunities throughout the planning process to participate in the study. Four rounds of public meetings meetings were held and numerous other outreach methods were used as described in the following sections.

## 2.2 SUMMARY OF PUBLIC/ AGENCY INVOLVEMENT

The following sections summarize the level of public and agency involvement during the MIS process. Appendix A contains a detailed listing of the meeting dates and locations for each of the work groups as well as for other meetings and briefings. A list of Work Group participants is also contained in Appendix A.

### 2.2.1 Work Group Meetings

A summary of meetings for each of the work groups is provided in Table 2.1. Community Work Group meetings were organized to allow for constructive input during the project definition phases, and to provide comprehensive briefings on study results at key milestones. Several of the meetings included group exercises to identify potential alignments and routing options, and to define and assess target station areas for rail alignments. Staff Work Group meetings were generally technical discussions focused on ridership, costs, cost-effectiveness, environmental considerations, and agency coordination. Executive Work Group meetings highlighted study progress and provided a forum for the discussion of policy level issues such as service outside the DART Service Area, air quality and Federal funding.

**TABLE 2.1**
**SUMMARY OF WORK GROUP MEETINGS**

| MEETING | DATE | LOCATION |
|---|---|---|
| **Community Work Group (CWG) Meetings** | | |
| CWG Member Recruitment Neighborhood Representative Meetings | April/May, 1998 | Various corridor locations |
| Nine (9) CWG Meetings | June, 1998 to November, 1999 | Various corridor locations |
| **Staff Work Group (SWG) Meetings** | | |
| Twenty (20) SWG Meetings | May, 1998 to December 1999 | DART |
| **Executive Work Group (EWG) Meetings** | | |
| Ten (10) EWG Meetings | April, 1998 to December 1999 | Various corridor locations |

SOURCE: DART; BRW, Inc.; January 2000.

### 2.2.2 Public Meetings

Table 2.2 provides a summary of public meetings held during the MIS. All of these meetings were scheduled to coincide with a project milestone. The May 1998 meetings obtained information on defining the universe of alternatives to study. The August 1998 meetings presented the results of the Alternatives Selection phase of the evaluation process. The May 1999 meetings presented the Conceptual Evaluation results and the alternatives to be carried into the detailed evaluation. The Fall 1999 public meetings presented the Detailed Evaluation results and summarized the emerging consensus that would be presented to the DART Board for consideration as the Locally Preferred Investment Strategy (LPIS).

**TABLE 2.2**
**SUMMARY OF PUBLIC MEETINGS**

| MEETINGS | SUBJECT | LOCATION | APPROXIMATE ATTENDANCE |
|---|---|---|---|
| **Public Meetings** | | | |
| May 1998 Joint Public Meetings (with SH 183 and Loop 12/IH 35E MIS Teams) | Project Initiation, Universe of Alternatives Input | Irving (Gilbert Elem.) | 50 |
| | | Irving (Wilson World) | 50 |
| | | Farmers Branch | 70 |
| August 1998 Public Meetings | Alternatives Selection Results Input | Irving | 45 |
| | | Farmers Branch | 50 |
| | | Carrollton | 50 |
| | | Dallas | 90 |
| May 1999 Public Meetings | Conceptual Evaluation Results Input | Carrollton | 35 |
| | | Irving | 40 |
| | | Dallas | 20 |
| Fall 1999 Public Meetings | Detailed Evaluation Results Input | Dallas | 80 |
| | | Irving | 110 |
| | | Carrollton | 70 |

SOURCE: BRW, Inc.; DART; January 2000.

### 2.2.3 DART Board and Committee Meetings

During the course of the MIS process, several meetings were held with the DART Planning Committee to brief Board members on the progress of the study. Presentations to the DART Board were made at key decision milestones to approve resolutions. Table 2.3 provides a summary of the meetings and briefings to the DART Board or its committees, including the discussion items addressed.

## TABLE 2.3
## DART BOARD AND COMMITTEE MEETINGS

| MEETING | DATE | DISCUSSION ITEM |
|---|---|---|
| **DART Board Meetings** | | |
| Approval of a Locally Preferred Investment Strategy (LPIS) for the Northwest Corridor | 2/22/00 | LPIS Strategy |
| NW Corridor MIS Guiding Principles | 8/11/98 | Guiding Principles |
| **Committee of the Whole Meetings** | | |
| NW Corridor MIS Conceptual Evaluation of Rail Alternatives | 6/8/99 | Conceptual Evaluation of Rail Alternatives |
| **Planning Committee Meetings** | | |
| Approval of a Modified LPIS for the NW Corridor | 2/22/00 | Modified LPIS |
| Approval of a Locally Preferred Investment Strategy (LPIS) for NW Corridor | 1/25/00 | LPIS |
| NW Corridor MIS Status | 12/14/99 | Status Briefing |
| NW Corridor MIS [Special PCM] | 12/7/99 | Status Briefing |
| NW Corridor MIS Status | 11/23/99 | Status Briefing |
| NW Corridor MIS Status [Special PCM] | 11/9/99 | Status Briefing |
| NW Corridor MIS Status | 10/26/99 | Status Briefing |
| NW Corridor MIS Status [Special PCM] | 10/5/99 | Status Briefing |
| NW Corridor MIS Status | 9/28/99 | Status Briefing |
| NW MIS Status | 8/24/99 | Status Briefing |
| NW MIS Status Re: Light Rail and Commuter Rail Technology | 7/20/99 | LR and CR Technology Briefing |
| MIS Status Re: Ridership Forecasting | 6/22/99 | Ridership Forecasting Briefing |
| MIS Rail Warrants | 5/18/99 | Rail Warrants |
| NW Corridor MIS Conceptual Evaluation of Rail Alternatives | 5/18/99 | Conceptual Evaluation of Rail Alternatives |
| NW Corridor MIS Conceptual Evaluation of Rail Alternatives | 4/27/99 | Conceptual Evaluation of Rail Alternatives |
| NW Corridor MIS Conceptual Evaluation of Rail Alternatives | 3/23/99 | Conceptual Evaluation of Rail Alternatives |
| NW Corridor MIS Review | 1/26/99 | MIS Review |
| Call for Public Hearing for a SPA for a Rail Station at the New Arena | 1/26/99 | Arena Station |

SOURCE: BRW, Inc.; DART; August 2000.

### 2.2.4 Additional Meetings and Briefings

Several additional meetings, or presentations, summarized in Table 2.3, were held to brief various local organizations and citizen groups. These additional meetings also included several meetings with the MIS Coordination Work Group to discuss project interface and technical assumptions.

**TABLE 2.4**
**MISCELLANEOUS MEETINGS AND BRIEFINGS**

| MEETING | DATE | LOCATION |
|---|---|---|
| **Miscellaneous Meetings / Briefings** | | |
| More than 60 meetings with groups such as:<br>- Stemmons Corridor Business Association<br>- Irving Citizens Advisory Commission<br>- DART Citizens Advisory Committee<br>- Irving Chamber of Commerce<br>- DFW Airport / Love Field Airport | April, 1998 to present | Various corridor locations |
| **Agency Coordination Meetings** | | |
| More than 20 meetings such as:<br>- Joint Interagency Coordination Meeting<br>- MIS Coordination Work Group<br>- FTA Briefing on DART MIS projects<br>- TxDOT, TTI Coordination Meetings | March 6, 1998 to December, 1999 | Various corridor locations |

SOURCE: BRW, Inc.; DART; January 2000.

# 3.0 Alternatives Considered

This chapter summarizes the range of alternatives considered in the Northwest Corridor MIS. The alternatives considered were subject to a two-phase evaluation process that reflected the major project milestones and decision-making points. The following sections describe the evaluation process and summarize the alternatives considered and results of each evaluation phase.

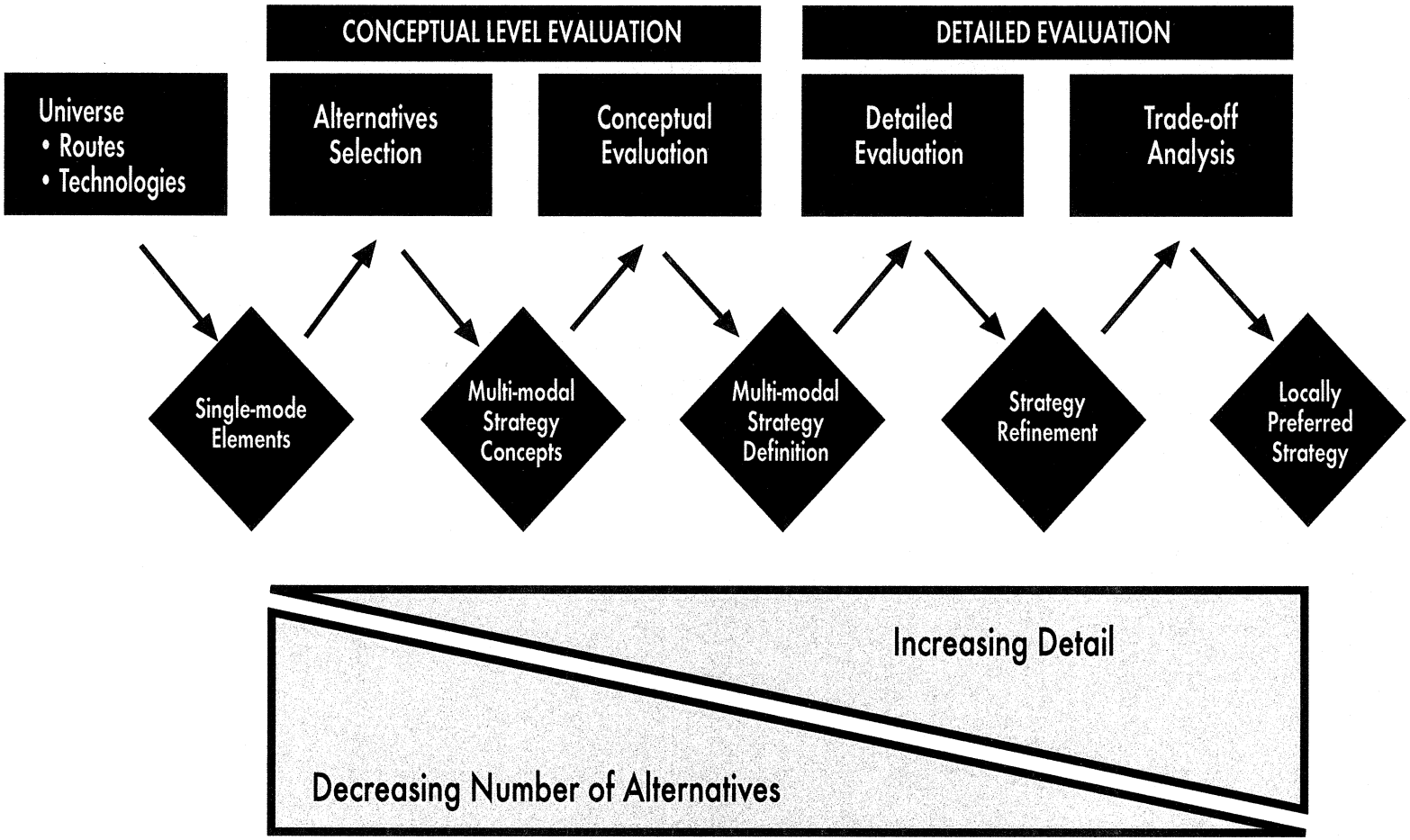
## 3.1 EVALUATION PROCESS

The evaluation process for the Northwest Corridor MIS is shown in Figure 3-1. The process consists of four steps and is divided into two distinct phases:

| PHASE | | TIME FRAME |
|---|---|---|
| **Phase 1** | **Conceptual Level Evaluation** | |
| | a. Alternatives Selection | Fall 1998 |
| | b. Conceptual Level Evaluation | Spring 1999 |
| **Phase 2** | **Detailed Level Evaluation** | |
| | **a.** Detailed Level Evaluation | Fall 1999 |
| | b. Trade Off Analysis | Winter/Spring 1999-2000 |

As shown on Figure 3-1, the evaluation process applied increasingly detailed and comprehensive measures to a decreasing number of alternatives that are identified as the most promising transportation investments. Beginning with a large and diverse number of single-mode elements, each step in the evaluation process was designed to focus the analysis on the opportunities, constraints, and performance of each potential element, and to refine the elements and package them into multi-modal strategies.

The purpose of the evaluation process is to differentiate among the single-mode elements and multi-modal strategies rather than to serve as a comprehensive assessment of impacts. Relative effects of the alternatives on the social, physical and natural environment are documented to highlight potentially significant impacts that will require further analysis is the PE/EIS phase.




NW CORRIDOR MIS

MIS FINAL REPORT
EVALUATION PROCESS

FIGURE 3-1
Source: BRW, Inc.
Date: July 2000

DART

The No-Build and TSM/TDM Alternatives were carried forward through the entire evaluation process. The No-Build is used as a baseline reference for assessing costs and mobility improvements. The TSM/TDM Alternative is used as a secondary reference for assessing the benefits and costs of major investments, relative to incremental improvements to the existing transportation system in the corridor.

## 3.2 INITIAL UNIVERSE OF ALTERNATIVES

The Alternatives Selections step of the evaluation process defined and evaluated a universe of alternatives. The universe of alternatives consisted of several major and supporting transportation elements. These alternatives were the result of agency, public, and community input during the Needs Assessment and project initiation phase, including three joint TxDOT/DART public meetings in May 1998. DART also considered recommendations contained in the ***Mobility 2020 Plan*** and the DART ***Transit System Plan***. The following sections describe the technologies and alignments defined for this step in the process, along with the Alternatives Selection results. The range of alternative transportation elements defined reflects the multi-modal approach to developing a transportation investment strategy in the Northwest Corridor.

### 3.2.1 Technologies

The Alternatives Selection phase defined the following transportation elements and technologies as potential elements of a multi-modal investment strategy for the corridor:

Supporting Elements

- Bicycle and Pedestrian Elements
- Transportation System Management/Travel Demand Management (TSM/TDM)
- Bus Transit Elements

The three elements listed above were not subject to the alternatives selection step, but were carried forward to be combined with the high capacity investments during the conceptual and detailed level evaluations. The primary function of the bicycle and pedestrian improvements would be to provide for safer and more direct access to potential station locations and/or park-and-rides. Similarly, bus transit elements would support a major investment by providing feeder bus service to rail stations, added express bus capacity in HOV lanes, and/or additional service to meet future travel demand.

TSM and TDM strategies can also be applied to support major investments and help in addressing travel problems. The TSM approach stresses low-cost improvements to new and existing facilities of an operational nature. The TDM approach focuses on projects such as car- and van-pool programs, flexible work schedules, new or improved park-and-ride facilities and corresponding bus route changes, and parking pricing to modify user demand and driver behavior to reduce drive alone travel and peak period travel. As discussed in the following chapter, the NCTCOG has developed a Congestion Mitigation System (CMS) baseline of improvements that have been agreed upon by local jurisdictions and are programmed for

implementation. This CMS baseline is included in the No-Build Alternative. Additional, TSM and TDM strategies were developed to form a TSM Alternative.

Major Transportation Investment Elements

Major investment elements and technologies considered in this step of the process included:

- *Roadway Improvements* – High Occupancy Vehicle (HOV) and/or general purpose lanes.
- *Light Rail Transit* – Rail service identical to that used for the DART LRT Starter System.
- *Self-Propelled Commuter Rail* – Rail service similar to the existing Trinity Railway Express (TRE) commuter rail service.
- *Self-Propelled Light Rail* – Also known as new lightweight commuter rail diesel multiple units (DMU), a new technology that is a hybrid between LRT and Commuter Rail.
- *Monorail Technology* – Elevated rail transit that is fully grade separated.
- *High Speed Magnetic Levitation (Maglev) Technology* – Elevated rail transit technology similar to Monorail, but that can travel at much higher speeds.

The development of roadway alternative elements continued throughout the evaluation process to address issues identified by the ***Freeway Geometric and Operational Analysis*** and to define the size of facilities to meet future travel demand. Thus, they were not subject to the Alternatives Selection process until detailed travel demand forecasting could be conducted.

As shown above, five rail transit technologies were defined as part of the universe of alternatives. Table 3.1 summarizes the characteristics of each of the technologies. This information formed the basis for the evaluation of technologies.

### 3.2.2 Alignments

The definition of alignments for roadway improvements were coordinated with TxDOT through the MIS Coordination Work Group. Given that several highway major investment studies were ongoing in or bounding the study area, the Northwest Corridor roadway improvement elements were defined to focus on the following facilities:

- SH 114 from SH 183 to SH 121
- IH 35E from SH 183 to Loop 12 and from IH 635 to the SH 121 By-pass

Rail transit alignments were defined based on input from participating agencies and corridor cities (Dallas, Irving, Farmers Branch, Carrollton and Addison), the public, and Northwest Corridor work groups. Alignments were also developed based on a review of the regional ***Mobility 2020 Plan*** and the ***DART Transit System Plan***.

Figure 3-2 illustrates the range of rail segments defined. The segments were combined to form alignments. The above technologies were then combined with the potential route alignments to form alternative single-mode elements. A total of 24 alignments and three possible connections to the Irving/Las Colinas area were defined. The ***Alternative Selection Results Report*** (*BRW, Inc.; November 1998*) describes the range of alignment and technology alternatives developed in detail. The following section describes the results of the Alternatives Selection evaluation step.

NW CORRIDOR MIS

# MIS FINAL REPORT

RAIL TRANSIT SEGMENTS
Alternatives Selection Phase

FIGURE 3-2
Source: BRW, Inc.
Date: July 2000

DART

## TABLE 3.1
## SUMMARY OF RAIL TECHNOLOGY CHARACTERISTICS

| Characteristic | Light Rail Transit | Commuter Rail | Self-Propelled Light Rail | Monorail | High Speed Magnetic Levitation |
|---|---|---|---|---|---|
| **Physical Requirements** | | | | | |
| General Profile | At-Grade with some elevated and/or tunnel sections | At-grade; follows existing railroad track profile | At-grade similar to LRT, or use of existing railroad track (if vehicle compliant with Federal Railroad Administration safety rules) | Elevated/fully grade separated | Elevated/fully grade separated |
| Typical Capital Cost per Mile | $25-35 million | $8-12 million | $12 million (new track) | $70-100 million | $80-120 million (estimated) |
| Physical Requirements | Can operate at-grade, within or share street Right of Way, elevated or tunnel; requires 18' separation from freight tracks | FRA compliant vehicles can share existing freight tracks with additional passing sidings as necessary. Appropriate freight operator agreements must be negotiated. | Self-propelled light rail vehicles may be able to share existing freight track if: vehicle is found to be compliant with FRA regulations; or separate from freight by time of day | Must have a special grade separated guideway. | Must have a grade separated guideway with special power source. Stations would be elevated with appropriate design. |
| Power Source | Electric from overhead catenary | Diesel engines | Diesel engines | Electric from third rail or guideway | Electric from guideway |
| **Proven Technology** | | | | | |
| Proven Technology | Yes – national experience; existing DART service | Yes – existing DART service | Yes - in Europe only; demonstrations in North America | Yes – limited with special purpose applications/activity centers | No – limited experience with test tracks; planned for operation in Germany |
| Availability of Rolling Stock | Yes | Yes – may require some refurbishment if pre-used or non-FRA compliant | Yes – but no current size vehicle orders made in U.S. Vehicles may need work to ensure FRA compliance. Could impact schedule. | Yes – but no current orders for corridor-wide application. Typically smaller applications. Could impact schedule. | No – limited application and unknown impacts to schedule. |
| Ability to meet applicable design standards | Yes | Yes | Yes | Yes | Unknown |
| **Operating and Physical Characteristics/ Suitability** | | | | | |
| Typical Operating Speed | 40 mph | 45 mph | 45 mph | 20 mph | Up to 250 mph |
| Maximum Speed | 60 mph | 60 mph | 60 mph | 40 to 50 | 300 or more mph |
| Typical Station Spacing | 1-3 miles | 3-10 miles | 2-5 (varies with operating plan) | 0.5 –1 miles | 25 or more miles |

| Characteristic | Light Rail Transit | Commuter Rail | Self-Propelled Light Rail | Monorail | High Speed Magnetic Levitation |
|---|---|---|---|---|---|
| Typical Operating Environment | Medium to high density corridors | Line-haul city to suburb with limited stops | Low density, line-haul corridors; city to suburb | Dense, urban areas | High speed service between major cities |
| General Trip Type Served | Short local and commute | Commute | Short local and commute (varies with operating plan) | Short – within or between activity centers | Long haul trips between major cities |
| Passenger Carrying Capacity (per vehicle) | 74 seated / 76 standing – 200 crush load (DART LRT) | 96 seated (DART Trinity Railway Express service) | 74 seated / 100 standing (Siemens Regiosprinter) | 8-40 (varies by vehicle manufacturer) | 98 (Budd TransRapid) |
| Peak hour capacity in peak direction (typical operations) | 3,600 (3-car train with 10-minute headways) | 730 (2-car train with 30-minute headways) | Similar to Commuter Rail with operating plan like Trinity Railway Express | Varies by vehicle type and train configuration | Similar to commuter rail. |

Source: BRW, Inc.; August 1998

### 3.2.3 Alternatives Selection Results

The universe of rail alternatives was subject to the first step of the conceptual evaluation – Alternatives Selection. This initial step was intended to "flag" potential issues associated with the various technologies or alignments and to set aside those elements that do not meet defined criteria. The criteria used during the alternative selection step represented fundamental questions related to the objectives of the study. The ***Alternatives Selection Results Report*** *(BRW, Inc.; October 1998)* contains a detailed matrix with both quantitative data and qualitative scoring to represent the performance of each rail element relative to the criteria and measures.

A summary of the results of the Alternatives Selection is as follows:

Technologies

- Carry forward Light Rail Transit and Commuter Rail, both of which are proven technologies and offer the greatest potential to connect with the existing and planned regional rail system.

- Maintain the self-propelled light rail technology as an option. However, additional study should be done to address its suitability for use by DART in the Northwest or other planned rail transit corridors.

- Set aside Monorail and MagLev technology – not suitable for the corridor.

Alignments

The staff analysis recommended that the following alignments be set aside:

- Webb Chapel Alignments (alignments using Segment C5)

- BN Alignments south of Belt Line Road (alignments using combination of H1, H2, plus H3). Recommended to retain in system planning efforts as potential future rail corridor.

- Extensions to drop from consideration:
  - IH 635 to DFW (Segment I2)
  - Cottonbelt RR to DFW (Segment I3)

While staff analysis recommended that the following segments and alignments be dropped from further consideration in the MIS, the Staff, Executive and Community work groups recommended additional study be done on the BN alignment during the Conceptual Evaluation phase:

- North Irving/Las Colinas Connector using the BN South (Segment H1) – Work groups requested this be studied further as a potential Commuter Rail spur to link South and North Irving.

- Split UP/BN Alignments (alignments using a combination of B segments, G1 or G2, plus H2) – Work groups requested that additional analysis be conducted to confirm that these options be dropped. Additional analysis confirmed the staff recommendation to drop this alignment based on the predominant travel pattern being toward the downtown Dallas, and significantly lower ridership on a split UP/BN alignment as opposed to a UP RR alignment.

### 3.2.4 BNRR Supplemental Analysis

Prior to initiating the Conceptual Level Evaluation described in Section 3.3, the Northwest Corridor Work Groups requested that additional analysis be conducted to determine how the BN RR should be addressed in the Northwest Corridor MIS. The NCTCOG undertook a task at that time to support the three ongoing MIS's in the Northwest Corridor area (SH 183/West Fork, Loop 12/IH 35E, and Northwest). The purpose of the task was to clarify the BN's relationship to the purpose and need for each MIS.

The Staff Work Group discussed the BN RR at several meetings in Fall 1998. A memorandum prepared by the NCTCOG on January 20, 1999 summarized the findings of their analysis. The general conclusions of the analysis were:

- The BN RR is a Northwest Corridor MIS issue.
- The UP RR in the Northwest Corridor is the dominant rail alignment. Forecast rail volumes are higher on the UP than on the BN in all scenarios tested. CBD bound trips from the Farmers Branch/Carrollton area would be taken out of their most direct path if made via the BN RR.
- The southern segment of the BN RR shows some promise and needs further study in the NW MIS in terms of access to Las Colinas via a UP/Manana route, or a TRE/BN route.
- The middle segment of the BN (Las Colinas to Belt Line Road) does not show as much promise as either the UP RR or the southern segment of the BN RR. This is because most trips from the north are bound to downtown Dallas.

Because the above analysis used Year 2020 demographics and the Mobility 2020 zone structure, the middle section of the BN RR was re-visited in Summer 1999 to reconfirm the results. This latter analysis used the Northwest Corridor No Build zone structure, 2025 demographics, and Northwest Corridor MIS No Build highway and bus networks. Based on the Summer 1999 analysis, the findings stated above were reconfirmed. Thus, the middle section of the BN RR was not considered further. However, the BN South and northern portion of the BN to Legacy were carried into the next phases of the study.

## 3.3 CONCEPTUAL ALTERNATIVES

The following sections summarize the conceptual alternatives and the results of the Conceptual Evaluation.

### 3.3.1 Summary of Conceptual Alternatives

Based on the results of the Alternatives Selection step, a base alignment and several routing options within defined decision areas were identified in fall 1998. Descriptions of the base alignments and routing options by decision area are provided below.

LRT Alternatives

The continued development of LRT alternatives led to the definition of an additional route to connect to the Irving/Las Colinas area, termed the Texas Stadium option. This option was not identified in the Alternatives Selection phase. Figure 3-3 illustrates the base alignments and routing option areas carried into the Conceptual Evaluation step for LRT. Figures 3-4 through 3-6 illustrate the routing options considered.

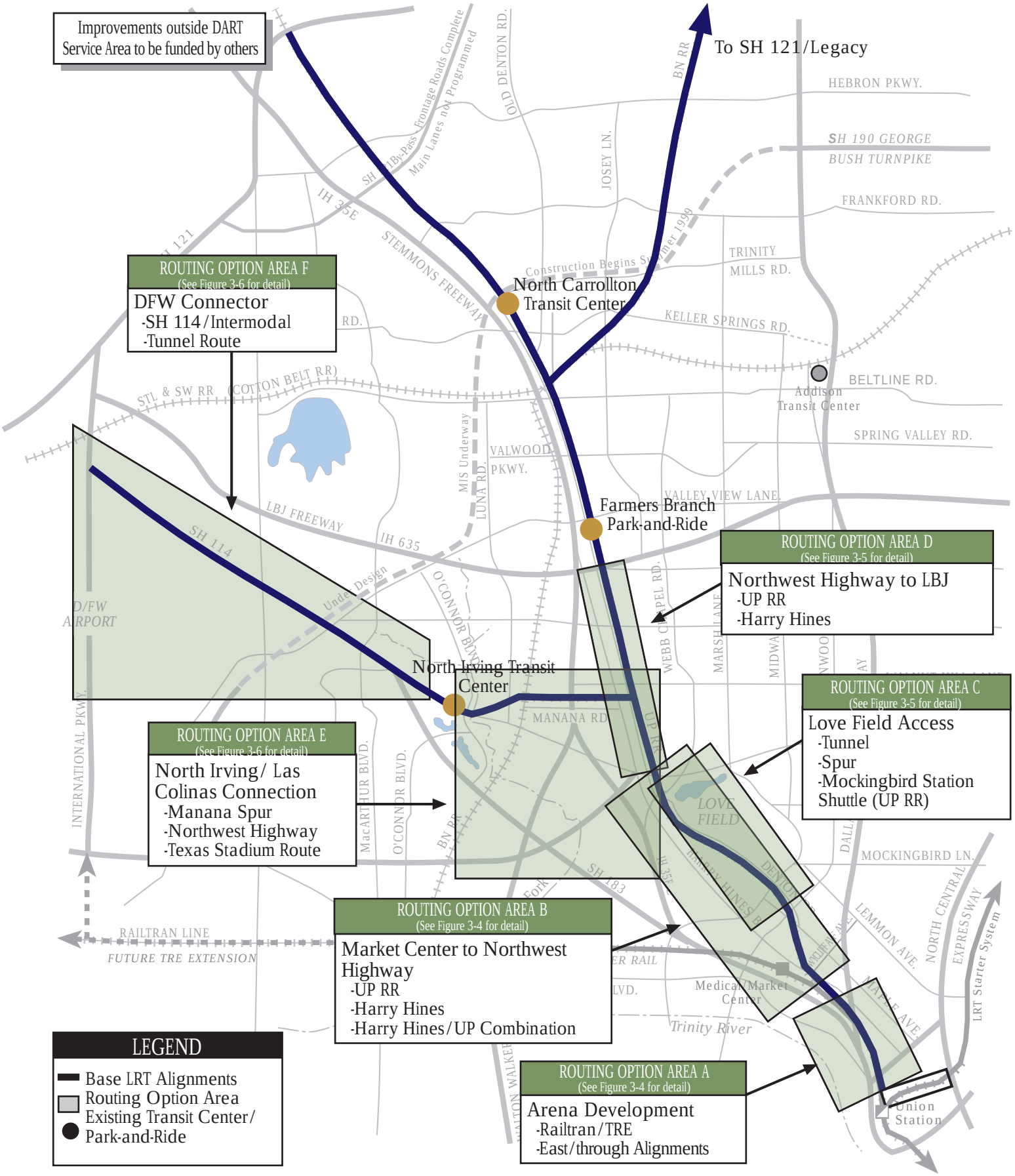
- **A – North End/ Oak Lawn** (Figure 3-4) – The base alignment in this routing option area follows the existing RAILTRAN right-of-way used for the TRE commuter rail service. DART and the Hillwood Team developed several other preliminary routing options during the Houston Street right-of-way discussions in late 1998. These options are described in detail *in the* ***Conceptual Definition of Alternatives and Conceptual Evaluation Results Report*** *(BRW, Inc.; March 1999).*

- **B – Market Center to Northwest Highway** (Figure 3-4) – In addition to the UP RR base alignment, two alternative routing options were identified:
  - Harry Hines Boulevard
  - Harry Hines/UP Combination

- **C – Love Field Access** (Figure 3-5) – The base UP option to serve Love Field would provide for shuttle or bus service from the Mockingbird Station to and from the terminal. Two additional options to serve Love Field were defined:
  - Love Field Tunnel with terminal station
  - Love Field People-Mover Spur

- **D – Northwest Highway to LBJ Freeway** (Figure 3-5) – As an option to the UP RR, Harry Hines Boulevard was examined. This option would allow for more direct access and potentially greater economic development opportunities for the Harry Hines corridor.

- **E – North Irving/ Las Colinas Connector** (Figure 3-6) – Two alternatives to the base connector, which uses the Mañana Spur, were identified:
  - Northwest Highway
  - Texas Stadium



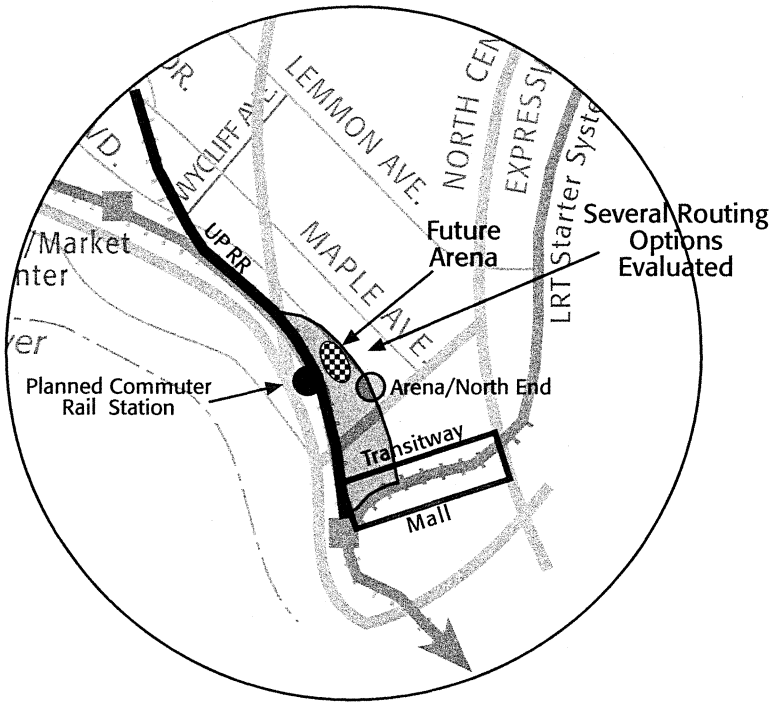

NW CORRIDOR MIS

MIS FINAL REPORT

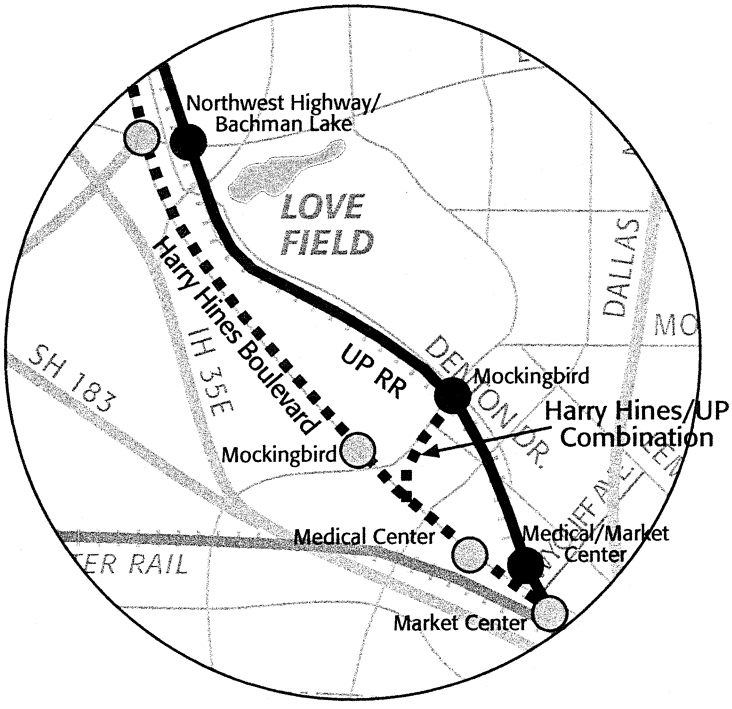
LRT ROUTING OPTION AREAS

FIGURE 3-3
Source: BRW, Inc.
Date: July 2000

DART




A - NORTH END / OAK LAWN




**LEGEND**

- Base LRT Alignments
- Routing Option
- Target LRT Station Area
- LRT Station Option

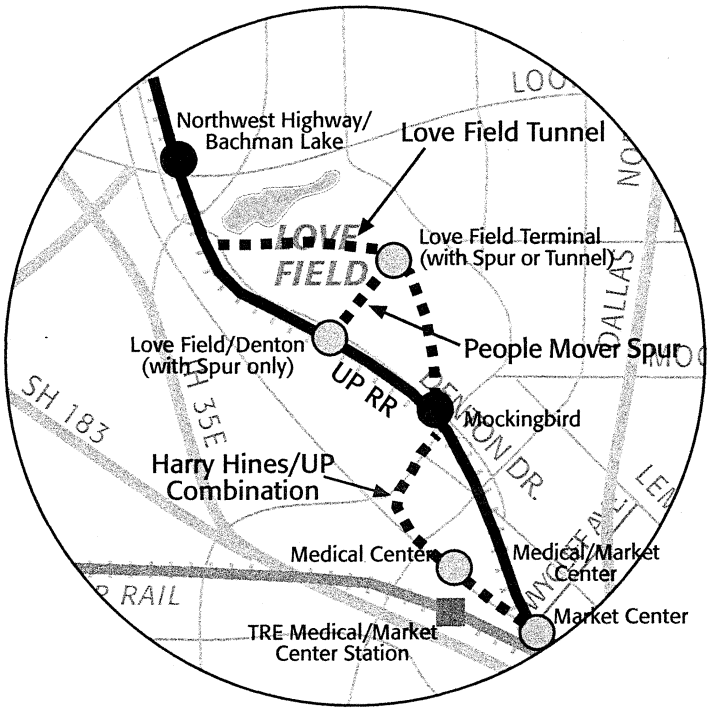
B - MARKET CENTER TO NORTHWEST HIGHWAY

NW CORRIDOR MIS

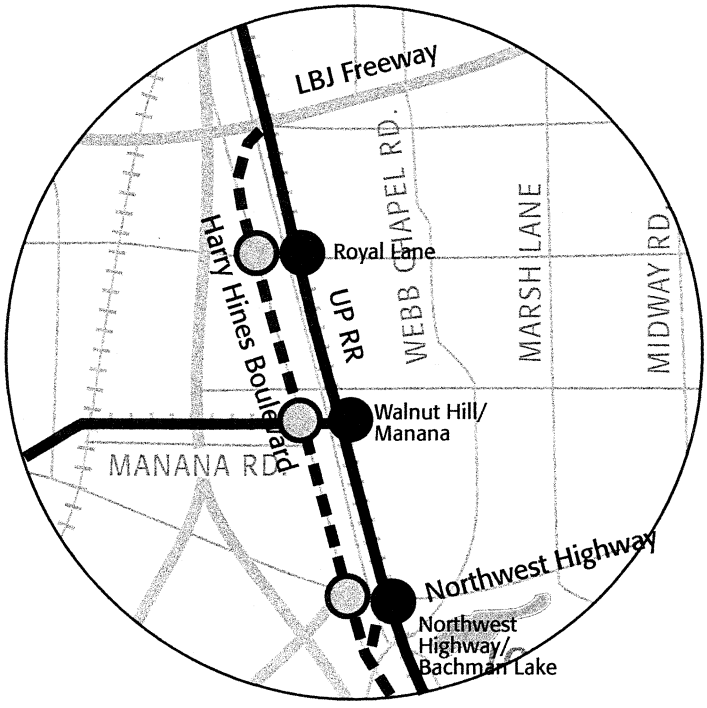
MIS FINAL REPORT
LRT ROUTING OPTIONS DETAIL

FIGURE 3-4
Source: BRW, Inc.
Date: July 2000

DART




C - LOVE FIELD ACCESS




D - NORTHWEST HIGHWAY TO LBJ

**LEGEND**

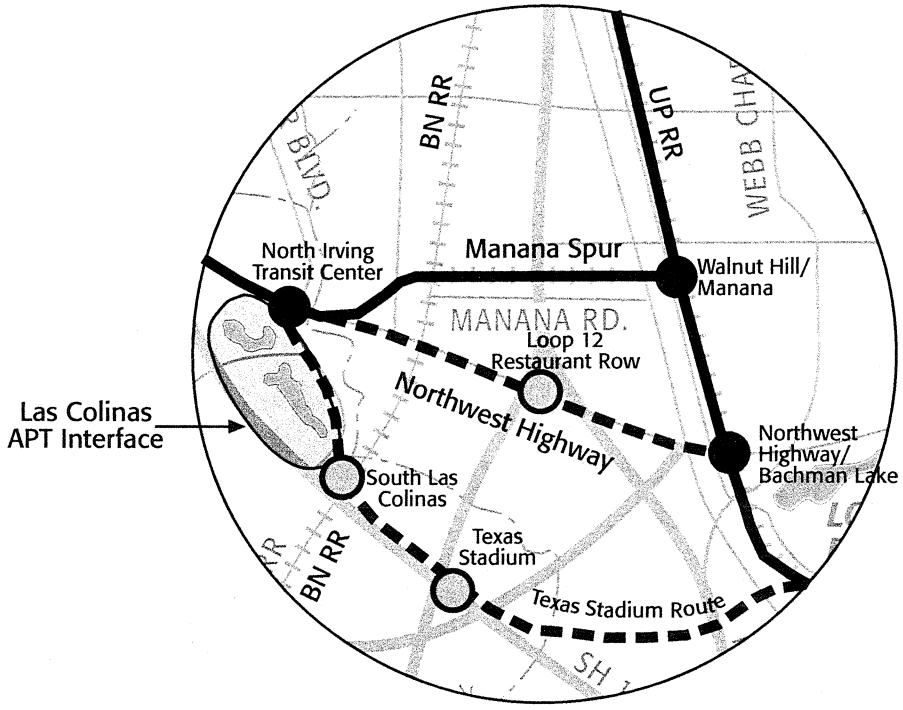
- Base LRT Alignments
- Routing Option
- Target LRT Station Area
- LRT Station Option

NW CORRIDOR MIS

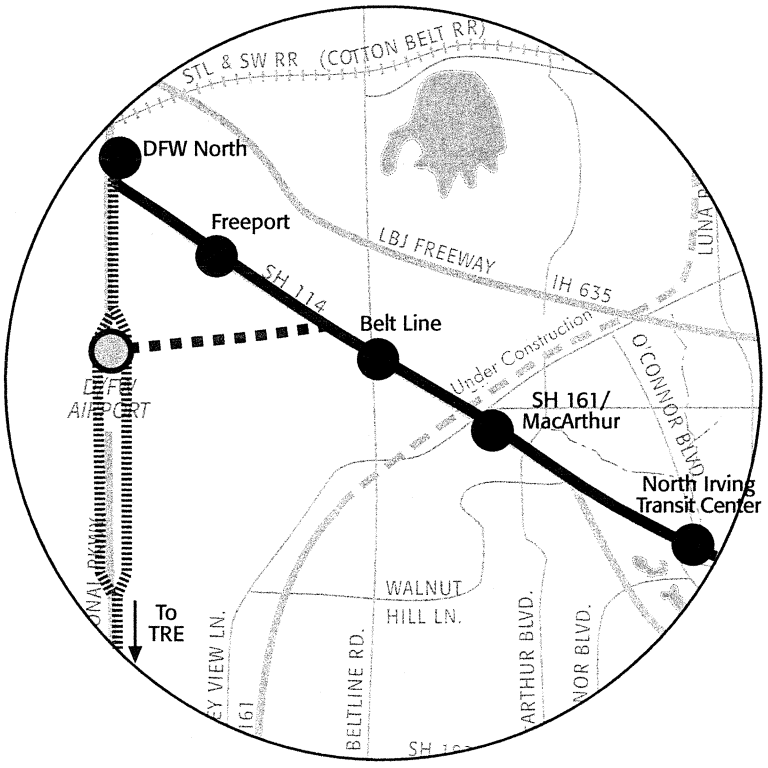
MIS FINAL REPORT
LRT ROUTING OPTIONS DETAIL

FIGURE 3-5
Source: BRW, Inc.
Date: July 2000

DART




## E - NORTH IRVING/LAS COLINAS CONNECTOR




**LEGEND**

- Base LRT Alignments
- Routing Option
- Target LRT Station Area
- LRT Station Option

## F - DFW AIRPORT ACCESS

NW CORRIDOR MIS

MIS FINAL REPORT
LRT ROUTING OPTIONS DETAIL

FIGURE 3-6
Source: BRW, Inc.
Date: July 2000

DART

- **F – DFW Airport Access** (Figure 3-6) – Two options were identified to provide service to DFW Airport including the base SH 114 alignment. The tunnel option would continue under DFW Airport to the center terminal and connect to the airport's people mover system.

Commuter Rail Alternatives

Commuter Rail alternatives generally stay within existing railroad right-of-way. Figure 3-7 shows the base Commuter Rail alternatives and the routing options in two decision areas. The only option that would leave the railroad right-of-way was identified at Love Field to directly access the terminal. Routing options considered in the Conceptual Evaluation step included:

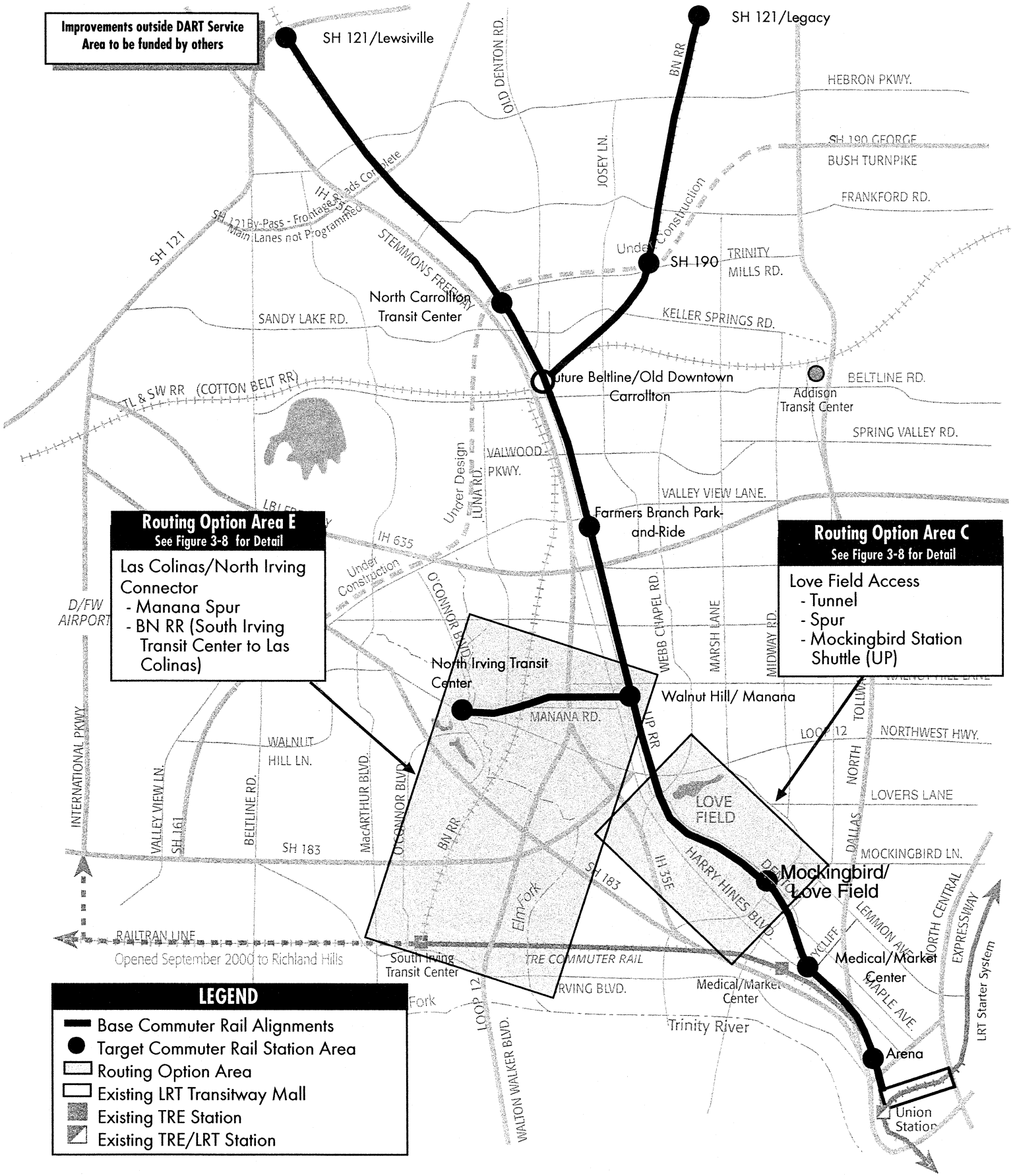
- **C – Love Field Access** (Figure 3-8) – The base option to serve Love Field would provide for shuttle or bus service from the Medical/Market Center Station to and from the terminal. Two additional options to serve Love Field will be evaluated:
  - Love Field Tunnel with terminal station.
  - Love Field People-Mover Spur

- **E – North Irving/ Las Colinas Connector** (Figure 3-8) – One commuter rail option to the base connector using the Mañana Spur has been identified:
  - BN Railroad to the South Las Colinas Station.

### 3.3.2 Conceptual Evaluation Results

As noted previously, the No Build, TSM/TDM and Highway/HOV alternatives were forwarded into the detailed evaluation. The Conceptual Evaluation focused on the LRT and Commuter Rail alternatives. In order to focus the evaluation on performance of the base alignment and routing options, the Conceptual Evaluation evaluated each routing option area in terms of the following:

- Travel time
- Ridership potential
- Residents/employees/trips within ½ mile of station areas (Years 1995/2020)
- Low-income households within ½ mile of access points
- Ability to serve travel markets
- Estimated capital cost, annualized capital cost per annual rider, and capital cost per mile
- Social-Economic – Effects of adjacent land uses
- Environmental – Effects on environmentally sensitive areas/parklands/cultural resources
- Public and agency support to date
- Other – Ease of implementation and operations

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## COMMUTER RAIL ROUTING OPTION AREAS

FIGURE 3-7
Source: BRW, Inc.
Date: July 2000

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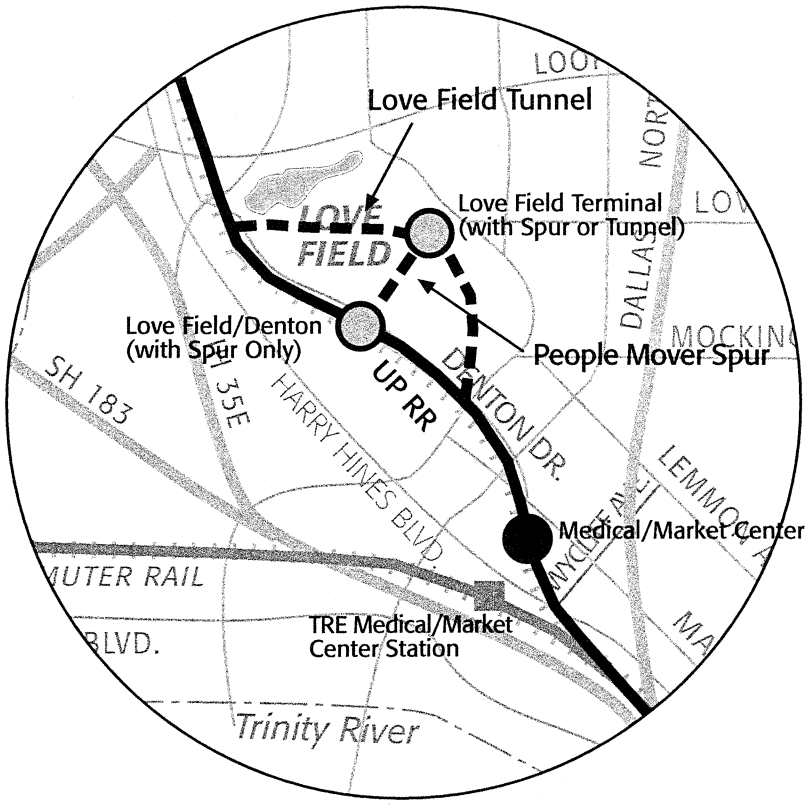
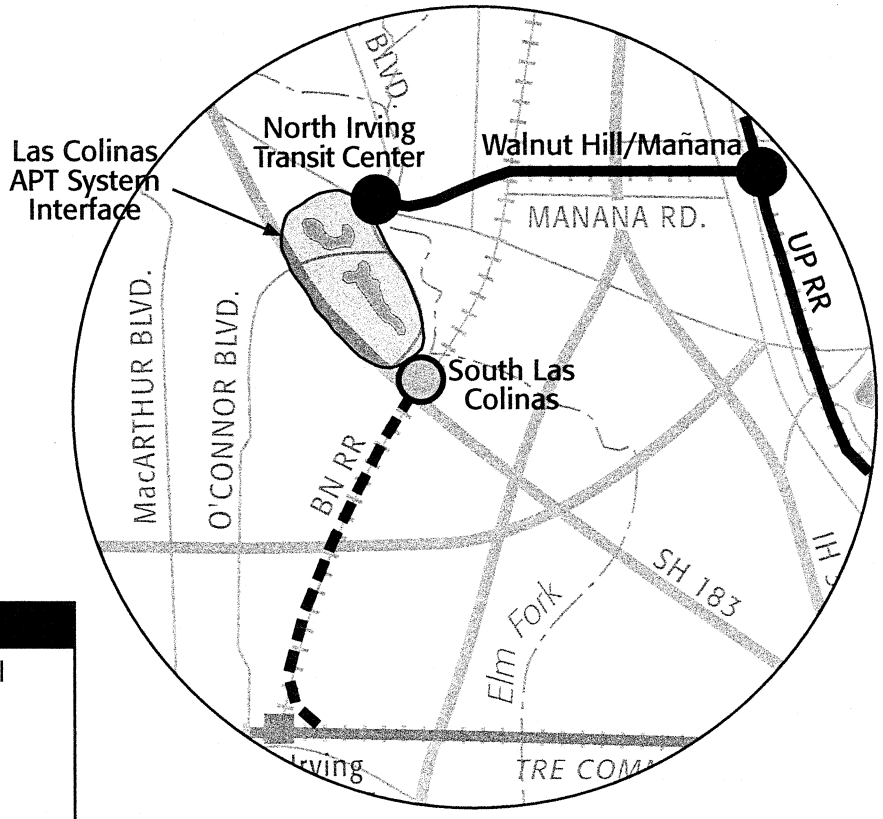



C - LOVE FIELD ACCESS




E - NORTH IRVING/LAS COLINAS CONNECTOR

**LEGEND**

- Base Commuter Rail Alignments
- Routing Option
- Target Station Area
- Station Option

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COMMUTER RAIL ROUTING OPTIONS DETAIL

FIGURE 3-8
Source: BRW, Inc.
Date: July 2000

DART

The results of the Conceptual Evaluation are described in detail in the ***Conceptual Definition of Alternatives and Conceptual Evaluation Results Report*** *(BRW, Inc.; March 1999).* Based on the evaluation criteria and discussions with the Northwest Corridor Work Groups, the following recommendations were made by decision area.

LRT Alternatives

- **A – North End/ Oak Lawn**: Carry the TRE/Railtran base option, and refine a "through" and "east" alignment during the detailed evaluation phase.

- **B – Market Center to Northwest Highway**: Carry the UP RR, and refine the Harry Hines/UP RR combination alignment as the preferred base option. Drop Harry Hines north of Mockingbird Lane in order to better access Love Field.

- **C – Love Field Access**: Carry the shuttle bus from UP/Mockingbird station forward as the base option. Study the tunnel option further and drop the people mover spur option.

- **D – Northwest Highway to LBJ**: Carry the UP RR forward; drop Harry Hines option.

- **E – North Irving/ Las Colinas Connector**: Carry Mañana Spur as the base option. Drop Northwest Highway option, and continue to refine the Texas Stadium route.

- **F – DFW Airport Access**: Carry both options into detailed evaluation until more detailed costs and ridership information is available.

Commuter Rail Alternatives

- **C – Love Field Access**: Carry the shuttle bus from UP/Mockingbird station forward as the base option. Drop the tunnel and people mover spur options.

- **E – North Irving/ Las Colinas Connector**: Carry Mañana Spur as the base option; continue to study the BN RR south option in the detailed evaluation as a possible addition to a Commuter Rail or LRT Alternative.

## 3.4 DETAILED ALTERNATIVES

Based on the results of the Conceptual Evaluation, a range of alternatives were defined in June/July 1999 for travel demand forecasting and cost estimating purposes. The detailed evaluation of these 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.

Table 3.2 summarizes the base alternatives defined for the detailed evaluation. Key assumptions and major capital improvements associated with each alternative are contained in the table. The following chapter, Chapter 4, describes these alternatives in detail. Chapter 4 also describes the refinements made to the base alternatives. Chapter 5, the detailed evaluation, contains information on all alternatives and refinements, and includes the results of sensitivity tests conducted to support the development of LPIS packages. Chapter 6 presents the final evaluation and trade-off analysis of the final multi-modal LPIS packages.

**TABLE 3.2**
**SUMMARY OF BASE ALTERNATIVES FOR DETAILED EVALUATION***

| No | Description | Key Assumptions | Major Capital Improvements |
|---|---|---|---|
| 1 | No-Build | True No Build with no major transit improvements in Northwest or Southeast corridors. Bus transit improvements are consistent with the DART Five-Year Plan. | • Expansion of TRE service to Fort Worth<br>• New SH 114 Park-and-Ride near DFW/Freeport<br>• Extension of LRT Starter System 12.3 miles to Plano (North Central) and 10.3 miles to Garland (Northeast) |
| 2 | No-Build/CMS | No-Build with regional Congestion Mitigation Strategy (CMS) improvements. | Same as above. |
| 3 | Transportation System Management/Travel Demand Management (TSM/TDM) | Emphasis on low-cost capital TSM improvements, enhanced bus service, bicycle and pedestrian improvements, freeway bottleneck removal projects, Advanced Transportation Management projects, and TDM strategies such as employer trip reduction programs. | Same as above.<br>• Improvements emphasize low-cost TSM improvements<br>• Bus system enhanced to improve headways, service area coverage |
| 4A | High Occupancy Vehicle (HOV) Lanes – IH 35E<br><br>- 4A1 (HOV on Loop 12 and Lower Stemmons)<br><br>- 4A2 (HOV on Lower Stemmons and not on Loop 12) | Added capacity for multi-occupant vehicles and buses, with enhanced express bus service to take advantage of travel time savings. | • 2 reversible HOV lanes from SH 121 by-pass to IH 635<br>• Directional ramps to/from north-to-east at IH 635 interchange<br>• Direct connection from IH 35E/Loop 12 HOV lanes to IH 35E south of Northwest Hwy (coordinate with Loop 12/IH 35E MIS)<br>• 2 reversible HOV lanes from Northwest Hwy to SH 183<br>• Direct connection to SH 183/Lower Stemmons HOV lanes (coordinate with SH 183 MIS)<br>• HOV Drop Ramps at:<br>- North Carrollton Transit Center (planned)<br>- Valwood Park-and-Ride (proposed) |
| 4B | High Occupancy Vehicle (HOV) Lanes – SH 114 | Added capacity for multi-occupant vehicles and buses, with enhanced express bus service to take advantage of travel time savings. | • 2 reversible HOV lanes from International Pkwy to SH 183<br>• Direct connection to SH 183 HOV lanes to south<br>• HOV Drop Ramps at:<br>- SH 114 Park-and-Ride (planned)<br>- MacArthur Park-and-Ride (proposed) |

| No | Description | Key Assumptions | Major Capital Improvements |
|---|---|---|---|
| | | | |
| 5A | IH35E Highway Widening | Added capacity for general traffic; uses same bus network as TSM/TDM Alternative. | • Add 2 general purpose lanes in each direction from SH 121 bypass to IH 635<br>• Add 2 general purpose lanes in each direction from Loop 12 to SH 183<br>• Complete frontage road system (3 lanes each direction) |
| 5B | SH 114 Highway Widening | Added capacity for general traffic; uses same bus network as TSM/TDM Alternative | • Add 2 general purpose lanes in each direction from International Parkway to Northwest Highway<br>• Add 3 general purpose lanes in each direction from Northwest Highway to SH 183<br>• Complete frontage road system (3 lanes each direction) |
| 6 | Commuter Rail to SH 121 with Mañana Spur | Commuter Rail service on UP RR to SH 121 with shuttle service on Mañana Spur; 20/60 peak/off-peak headways | • Upgrade of UP RR as single CR track plus passing sidings as required for operations<br>• 9 new stations |
| 7 | Commuter Rail to Legacy with BN RR south | Commuter Rail service on UP/BN to SH 121/Legacy Park with shuttle service on BN south segment; 20/60 peak/off-peak headways | • Upgrade of UP and BN RR as single CR track plus passing sidings as required for operations<br>• 9 new stations |
| 8 | LRT to SH 121 with Mañana/SH 114 | LRT service on TRE/Harry Hines/UP to SH 121 and DFW North via Mañana Spur; 10/20 peak/off-peak headways | • New double-track LRT alignment adjacent to existing UP freight track.<br>• 18 new stations |
| 9 | LRT to Legacy with Mañana/SH 114 | LRT service on Griffin/Harry Hines/UP/BN with Love Field tunnel to SH 121/Legacy Park and to DFW North via Mañana Spur; 10/20 peak/off-peak headways | • New double-track LRT alignment adjacent to existing UP freight track.<br>• 19 new stations |
| 10 | LRT to SH 121 with Texas Stadium/SH 114/DFW Spine | LRT service on Griffin/Harry Hines/UP with Love Field Tunnel to SH 121 and to DFW North via Texas Stadium route, plus DFW spine; 10/20 peak/off-peak headways | • New double-track LRT alignment adjacent to existing UP freight track.<br>• 25 new stations |
| 11 | LRT to SH 121 with Mañana/SH 114/DFW Tunnel | LRT service on Griffin/Harry Hines/UP with Love Field Tunnel to SH 121 and to DFW via Mañana/DFW tunnel route; 10/20 peak/off-peak headways | • New double-track LRT alignment adjacent to existing UP freight track.<br>• 19 new stations |

*Refinements to the base alternatives are discussed in section 4.5.3 and table 4.13

SOURCE: BRW, Inc.; November 1999.

# 4.0 Detailed Definition of Alternatives

This chapter provides a detailed description of the alternatives defined for the detailed evaluation phase. Each section provides an overview of the service concept, operations, transit improvements, and capital improvements associated with the alternative.

## 4.1 NO-BUILD ALTERNATIVE

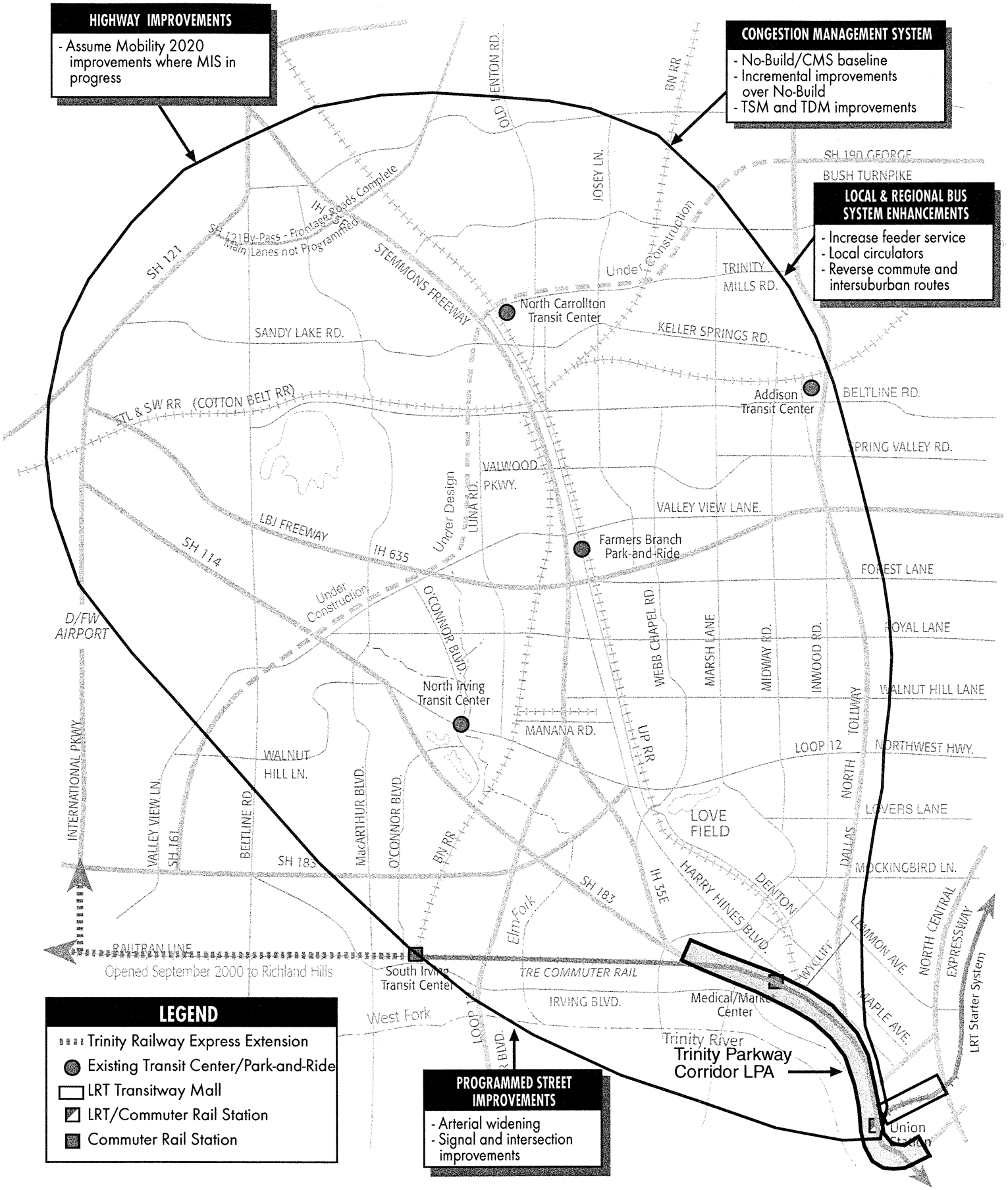
The following sections describe the No-Build and No-Build/CMS Alternatives. The No-Build Alternative serves as the baseline for comparison for all project alternatives, as it incorporates only those changes in the study area transportation network which are already approved or programmed by the Year 2020. The following sections provide an overview of the service concept, planned bus and rail transit improvements and programmed capital improvements contained within the No-Build Alternative

### 4.1.1 Overview of Service Concept

Figure 4-1 illustrates the improvements associated with this alternative. The No-Build includes no major capital investments in the Northwest Corridor for transit facilities, as well as for the freeway segments under study. Major investments contained within the Mobility 2020 Plan outside of the study area are included in the No-Build Alternative network.

The No-Build Alternative does not assume the existing bus system will be unchanged. It does assume that bus transit improvements will keep pace with population and employment growth and will be incremental and consistent with current trends in the study area. A key component of the No-Build Alternative is the continuation of route modifications to feed LRT and Commuter Rail extensions as they are completed. These changes reflect the principles of the DART *Bus/ Rail Interface Plan for the Light Rail Starter System* (August, 1994).

In order to understand the influence of regional CMS improvements on transportation performance, two separate definitions of the No-Build were developed, and are described below.




NW CORRIDOR MIS

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## NO-BUILD ALTERNATIVE

FIGURE 4-1
Source: BRW, Inc.
Date: July 2000

DART

**No-Build Alternative – Alternative 1**

The No-Build reflects a true No-Build scenario. The word "true" indicates that this is the worst-case scenario for the Northwest Corridor. No major capital improvements are assumed in the Northwest Corridor or in the Southeast Corridor, where DART has also conducted a MIS. While ***Mobility 2020*** improvements are assumed outside of the corridor, this true No-Build does not include any of the federally mandated CMS improvements as described below.

**No-Build/ CMS Alternative – Alternative 2**

The Dallas-Fort Worth metropolitan area was recently downgraded by the Environmental Protection Agency (EPA) from a "moderate" non-attainment area for ozone, to a "serious" non-attainment area. Ozone is a pollutant formed by emissions from cars and trucks when oxides of nitrogen and hydrocarbons in the air are catalyzed by sunlight. If ozone levels are not reduced, the metropolitan area could lose Federal highway funding and be required to implement a travel reduction program. In response to guidance from the ***Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991,*** and the ***Transportation Efficiency Act for the 21st Century*** (TEA-21), NCTCOG is required to incorporate a range of Congestion Mitigation Strategy (CMS) improvements into their regional planning efforts.

Because the improvements are important to understand, the NCTCOG applies the CMS program to the true No-Build to reflect the No-Build/CMS Baseline. CMS improvements attempt to systematically address congestion and improve air quality through projects such as low-cost intersection and signal improvements, TDM strategies, advanced transportation management projects, and HOV/express lanes lanes. These projects are incorporated into the Transportation Improvement Program (TIP). The No-Build/CMS network includes adjustments to trip tables and network speeds in order to evaluate the effects of CMS on the transportation network and air quality.

### 4.1.2 Planned Transit Improvements

**Planned Bus Improvements**

The DART ***Five Year Action Plan,*** completed in July 1998, is included in the No Build. This plan defines improvements required to ensure that transit services keep pace with expected population and employment growth over a five-year period.

The ***Five Year Action Plan*** includes three categories of bus service improvements:

- General System Enhancements - these improvements enhance transit service on all levels. Projects emphasize additional weekend and evening service, and increased frequencies on existing routes. Pilot projects, such as cellular dispatch or other demand-responsive services, are also included.

- Regional System Enhancements - these projects focus on increasing ridership by serving major travel patterns. In the Northwest Corridor study area, recommended projects include:
  - Reverse commute route [Inner City (South Dallas, oak Cliff, Pleasant Grove) to Freeport/D/FW Airport);
  - Intersuburban express route (North Irving to Farmers Branch and Addison).

- Local System Enhancements - these enhancements will focus on improving cost-effectiveness and reorientation of bus routes as feeder service and local circulators. In the Northwest Corridor, local projects include:

  - Stemmons Corridor local service;
  - Enhancement of service to Farmers Branch/Addison;
  - Bus corridor development along Harry Hines/Webb Chapel Road;
  - North Irving circulator;
  - Employer shuttle in West Plano/Legacy; and,
  - East transfer center to Medical/Market Center.

Table 4.1 summarizes No-Build bus route characteristics in terms of changes to existing routes. Modifications were made to the No-Build routes for the TSM/TDM Alternative and major investment strategies.

**Planned Rail Transit Improvements**

The following rail transit improvements are included in the No-Build Alternative. These projects are in final design and are key elements of the regional rail system:

- North Central Corridor LRT extension north of Park Lane to Parker Road in Plano;

- Northeast Corridor LRT extension from Mockingbird Station to Garland Central Transit Center; and

- Trinity Railway Express extension from the South Irving Transit Center to downtown Fort Worth on the RAILTRAN line.

DART is also conducting the Southeast Corridor MIS at this time. In order to fully understand the costs and benefits of an improvement in the Northwest Corridor, this corridor is not reflected in the No-Build Alternative. However, as discussed in Chapter 6, a sensitivity test was conducted to assess the impacts of interlining the Northwest Corridor with the Southeast and other LRT lines. In addition, DART is continuing to assist the NCTCOG with the study of alignment and mode alternatives for the east-west oriented North Crosstown Corridor north of the LBJ Freeway. This possible future project is not included in the No-Build because no Locally Preferred Alternative (LPA) has been identified.

## TABLE 4.1
## NO-BUILD ALTERNATIVE – SUMMARY OF BUS SERVICE

| ROUTE/ LINE | ROUTE NAME | CHANGE FROM EXISTING | NO BUILD HEADWAY | |
|---|---|---|---|---|
| | | | Peak | Base |
| *Local Routes* | | | | |
| 26/121 | Hines | Eliminate short trips (26M); replace with increased service on 26C and 26R branches | 20 | 40 |
| 26/122 | Hines | | 20 | -- |
| 26/139 | Hines | | -- | 40 |
| 29/21 | Maple | | 22 | 41 |
| 29/150 | Maple | | 22 | 41 |
| 39/36 | Love Field | | 17 | 31 |
| 44/13 | Bexar St | Extend to Brookhaven Junior College from existing terminus at LBJ Frwy. | 22 | 37 |
| 44/15 | Bexar St | | 22 | 37 |
| 49/16 | Brook Hollow | | 15 | 37 |
| 51/142 | Walnut Hill/Bickers | | 41 | 57 |
| 51/145 | Walnut Hill/Bickers | | 39 | 64 |
| 59/55 | West Dallas | | -- | 42 |
| 59/75 | West Dallas | | 31 | 47 |
| 59/85 | West Dallas Express | | 26 | -- |
| 59/196 | West Dallas | | 34 | 60 |
| 63/22 | Industrial | | 10 | 34 |
| *Express Routes* | | | | |
| 202/118 | N Irving-Las Colinas/MacArthur | | 39 | -- |
| 202/119 | N Irving-Las Colinas/DFW | | 28 | 53 |
| 204/32 | N Carrollton | | 12 | 46 |
| 204/48 | N Carrollton | | | |
| 204/49 | N Carrollton | | | |
| 234/44 | East Plano/Las Colinas | Extend to DFW South Shuttle Lot from current terminus at Decker/O'Conner | 60 | -- |
| 247/40 | Farmers Branch Park & Ride,Downtown | | 36 | -- |
| *Suburban Routes* | | | | |
| 300A/64 | DFW/S Irving Station | New route - DFW to South Shuttle Lot to South Irving Station (replaces portion of Route 409 | 30 | 45 |
| 300B/104 | Story Rd/Walnut Hill | New route - Skyway Circle to South Irving Station (replaces portion of Route 409) | -- | 60 |
| 301&307/65 | Walnut Hill/S Irving/W Irving | Combine and reconfigure Routes 301 and 307 to serve South Irving and West Irving Stations | 30 | 50 |
| 302/66 | Story | | 30 | 60 |
| 303/197 | N Irving TC/Karahan Pkwy | Change to run north and south on MacArthur from Cowboys Pkwy to South Irving Station with deviation to North Irving Transit Center | 45 | 45 |
| 305/69 | Rochelle | Change to a two way loop from West Irving Station to Texas Stadium via | 30 | 60 |

| ROUTE/ LINE | ROUTE NAME | CHANGE FROM EXISTING | NO BUILD HEADWAY | |
|---|---|---|---|---|
| | | | Peak | Base |
| | | South Irving Station and Rochelle. (Combination of 305 and 306) | | |
| 305/70 | Rochelle | | 30 | 60 |
| 309/73 | South Irving TC | New loop route from South Irving Station to the south. Covers part of 308. | 47 | 57 |
| 310/67 | Freeport/Irving Mall | Extend from North Irving Transit Center to South Irving Station. | 30 | 60 |
| 321/77 | Valley View | | 30 | 60 |
| 322/78 | Prestonwood Transfer Point/ Farmers Branch Park & Ride | Extend past Hutton to Luna Rd. | 30 | -- |
| 331/81 | Josey | | 35 | 60 |
| 333A/83 | Addison TC/N Carrollton TC | Split Route 333 into 333A, 333B (from Addison Transit Center to North Carrollton TC) | 30 | 60 |
| 333B/234 | Frankford-Midway/N Carrollton TC | Split Route 333 into 333A, 333B (from Frankford/Midway to North Carrollton TC) | 30 | 60 |
| 341/87 | Dallas Pkwy and Rosemead | End route at Midway/Rosemeade instead of North Carrollton TC | 30 | 60 |
| *Crosstown Routes* | | | | |
| 400/112 | Beltline Crosstown | | 30 | 60 |
| 404/68 | West Side Crosstown | Reroute north end to West Irving Station - does not go to South Irving Station or North Irving Station | 20 | 30 |
| 405/132 | Parkland/Ledbetter | | 30 | 40 |
| 409/198 | King Center-Irving-DFW | Delete portion west of South Irving Station (replaced by Route 300) | 30 | 45 |
| 428/156 | N Irving | | 30 | 60 |
| 428/173 | Medical Market | | 30 | 60 |
| 453/37 | Medical Center - SW Center Mall | | 10 | 30 |
| 486/159 | Garland Central/Farmers Branch | | 20 | 30 |
| *Rail Feeder Routes* | | | | |
| 539/100 | Motor St/Harry Hines | | 30 | 40 |
| *Trolley Routes* | | | | |
| 704A/222 | Las Colinas | | 30 | 30 |
| 704B/223 | Las Colinas | | 30 | 30 |

SOURCE: LKC Consulting; DART Service Planning; DART 5-Year Action Plan (1998-2002)

Note: Route changes were determined by comparing current route maps to the No-Build bus network dated 5-25-99 that was sent to LKC by DART Planning and Development.

### 4.1.3 Programmed Capital Improvements

The following sections describe programmed improvements in the Northwest Corridor.

**Transit Facility Improvements**

The No-Build Alternative includes the following new transit facilities as reflected in the *Five Year Action Plan*:

- SH 114 Park-and-Ride facility (near DFW/Freeport to serve Routes 202, 310, 311)
- West Plano Park-and-Ride facility (near Tollway/Parker)

**Street and Highway Improvements**

Street and highway improvements programmed for implementation over the next nine years are contained in the Transportation Improvement Program (TIP). Table 4.2 summarizes some of the major improvements contained in the TIP within the Northwest Corridor. Several additional projects are reflected in the No-Build network.

Certain improvements under consideration by ongoing TxDOT major investment studies are also included in the No-Build Alternative. The network assumptions for these studies (Loop 12/IH 35E, SH 183/West Fork, Segment IV of President George Bush Turnpike, IH 35E North, and SH 121/114 MIS's) reflect the most probable level of improvement.

## TABLE 4.2
## SUMMARY OF PROGRAMMED STREET AND HIGHWAY PROJECTS
### 1998 Transportation Improvement Program

| FACILTY | SEGMENT | IMPROVEMENT | LETTING DATE* |
|---|---|---|---|
| **FEDERALLY AND STATEFUNDED ROADWAY PROJECTS** | | | |
| IH 35E | Various | Concrete traffic barrier, ramp reversals and sign | 1998 |
| CS | Trinity Mills to Midway Road | Widen 4-lane facility to 6-lane facility | 1998 |
| CS | Rochelle Road, O'Connor to Leonne | Widen 3-lane to 6-lane facility | 1998 |
| IH 35E | IH 35E at Beltline Road | Intersection Improvement | 1998 |
| IH635 | .4 km east of MacArthur Blvd to 1.6 km east of Beltline | Construct frontage roads and interchange | 1998 |
| SH 161 | South of SH 183 to North of SH 183 | Construct Interchange | 1997 |
| CS | On Denton Drive, Lombardy Lane in farmers Branch | Widen 2 lane facility to 4 lane | 1999 |
| I35E | From Marsalis to Industrial | Construct HOV Lane – Phase II | 1998 |
| IH 35E | At .5 mi south of Trinity Mills | Ramp to Park-n-Ride | 1998 |
| Cs | On Motor Street, Harry Hines Boulevard to Maple Avenue | Widen 2 lane facility to 4 lane facility | 2001 |
| Loop 354 | Harry Hines from Royal Lane to Dallas North city limit | Reconstruct existing 4 lane roadway to 6 lane divided urban | 2000 |
| MH | In Carrollton from Luna Road from Belt Line Road to Old Denton Road | Extend Luna Road on new as 6 lane divided | 1999 |
| **LOCALLY FUNDED, REGIONALLY SIGNIFICANT ROADWAY PROJECTS** | | | |
| 190 Turnpike | SH 5 to Shiloh Rd | Phase 2A | 1998 |
| 190 Turnpike | SH 289 to Alma Road | Phase 1B | 1998 |
| 190 Turnpike | Midway Road to SH 289 | Phase 1A | 1998 |
| 190 Turnpike | Shiloh to Brand | Phase 2B | 1998 |
| 190 Turnpike | Midway to IH35E | Phase 3 | 1997 |
| 190 Turnpike | IH35E to IH 635 | Phase 4 | 2000 |
| Belt Line Road | Perry Road to IH 35E | Add left turn and right turn lanes | 1999 |
| Belt Line Road | Metrocrest Pkwy to Perry Road | Add left turn and right turn lanes | 1998 |
| Northgate Road | Northgate Road | Grade Separation | 1998 |
| Valley View Lane | Luna Rd. to C.R.I.P. RR | Major construction, major rehab., signals | 2000 |

SOURCE: 1998 Transportation Improvement Program; NCTCOG

NOTES: CS – City Streets (Typically 2-4 lanes); MH- Metropolitan Highway (Collector streets, typically 4-6 lanes)

## 4.2 TSM/ TDM ALTERNATIVE

This section describes the Transportation System Management/Travel Demand Management (TSM/TDM) Alternative (referred to as Alternative 3). This alternative is intended to improve the overall performance of the transportation system without a major investment, focusing on operational and low-cost transportation improvements. The following sections provide an overview of the service concept and describe the range of elements associated with the alternative.

### 4.2.1 Overview of Service Concept

The TSM/TDM Alternative represents an improved transportation system and transit network without a large capital investment in a fixed guideway transit or highway widening projects. This alternative emphasizes improved mobility and enhanced air quality through the following:

- Enhanced bus service
- Signal improvements
- Intersection improvements
- Arterial widening/extensions
- Advanced Transportation Management (ATM)
- Bicycle and pedestrian improvements
- Freeway bottleneck removal projects
- Employee trip reduction programs

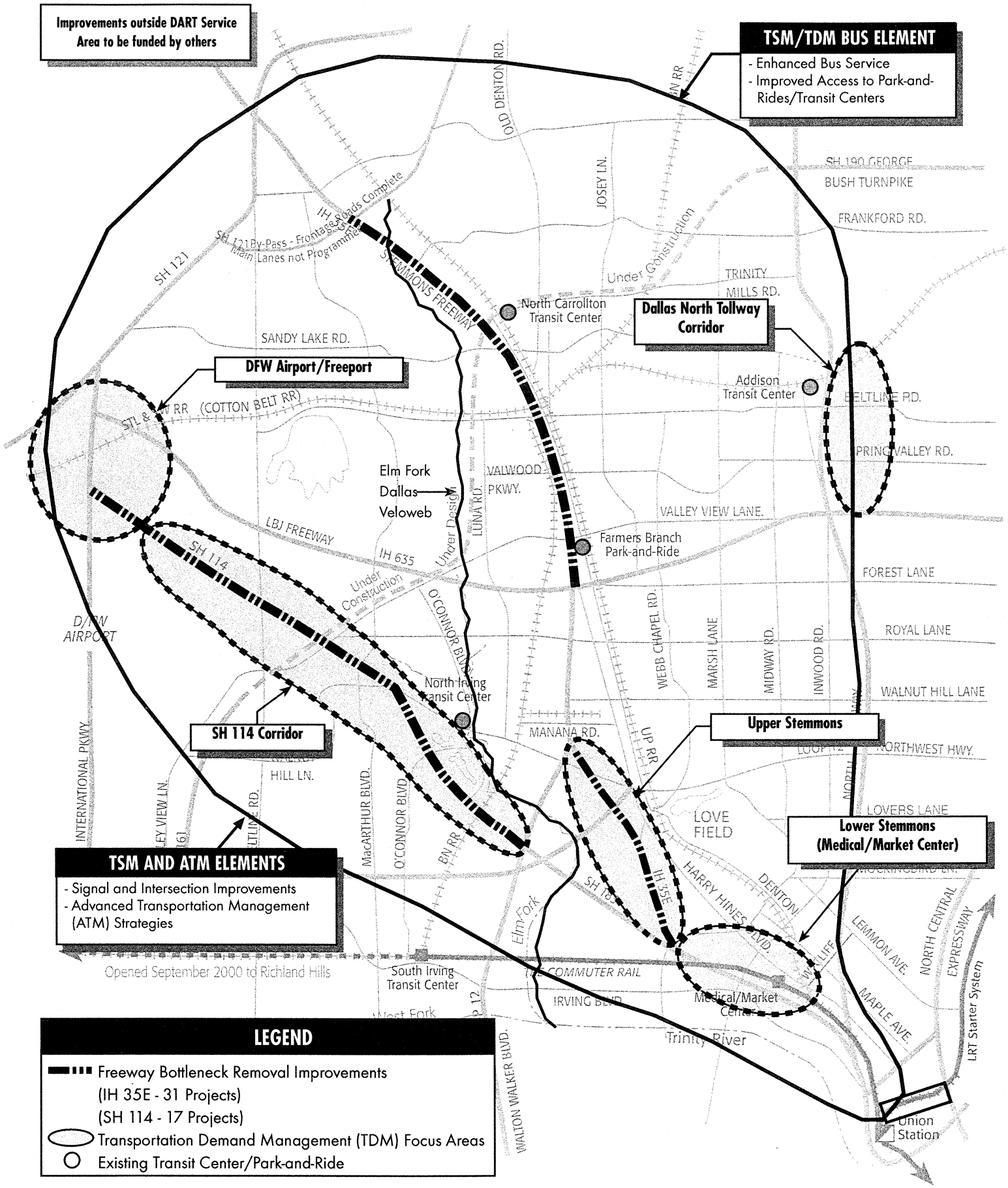
Figure 4-2 illustrates the general types of improvements associated with this alternative. The TSM/TDM Alternative includes all elements of the No-Build Alternative, including CMS baseline improvements. Due to increasing air quality concerns, a key objective of the TSM/TDM alternative is to provide a rigorous level of improvement that can enhance transportation network operations, supported by TDM strategies aimed at reducing single-occupant vehicle (SOV) trips.

### 4.2.2 Transit Improvements

The following sections describe transit improvements, both rail and bus, assumed for the TSM/TDM Alternative. Improvements to the No-Build bus network were focused on better meeting the trip patterns in the Northwest Corridor study area

**Improvements to No-Build Bus Service**

Table 4.3 summarizes the TSM/TDM bus network in terms of improvements to the No-Build bus network. Only those routes with changes are included in Table 4.3.

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TSM/TDM ALTERNATIVE

FIGURE 4-2
Source: BRW, Inc.
Date: July 2000

DART

## TABLE 4.3
## TSM/ TDM ALTERNATIVE – CHANGES TO NO-BUILD BUS ROUTES

| ROUTE/ LINE | ROUTE NAME | CHANGES/ IMPROVEMENTS |
|---|---|---|
| 44/13 | Bexar St | Extend RHD branch north on Webb Chapel to Belt Line. |
| 51/145 | Walnut Hill/Bickers | Remove service from Walnut Hill/Marsh intersection to the N Irving TC. Extend north to Belt Line via Marsh. |
| 63/22 | Industrial | Extend to S Irving TC via Irving Blvd. |
| 234/44 | East Plano/Las Colinas | Add stop at North Central TC. |
| 302/66 | Story | Extend north on O'Connor from N Irving TC to Royal Ln and east on Royal Ln to Midway. |
| 304 | **New Route:** N Irving TC to Carrollton TC | From N Irving TC to Northwest Hwy to Luna, to Belt Line, to Broadway, to N Carrollton TC. |
| 322/78 | Prestonwood Transfer Point/Farmers Branch Park & Ride | Add midday service, using peak alignment. |
| 400/112 | Belt Line Crosstown | Change weekday routing to access Farmers Branch P&R; route diverts on Valley View to go to P&R, then returns to original alignment. |
| 402 | **New Route:** Walnut Hill Crosstown | N Irving TC to S Garland TC via: Northwest Hwy, Spangler, Mañana, Stemmons Service Rd, Walnut Hill, North Central Expressway Service Rd, Park Lane LRT Station, Greenville Ave, Walnut Hill, Kingsley, Shiloh Rd. |

SOURCE: LKC Consulting; DART; BRW; September 1999.

Table 4.4 summarizes the improvements to No-Build bus route headways. These improved headways are intended to provide an enhanced level of service to existing bus riders, as well as offer additional service to encourage new riders.

**TABLE 4.4**
**TSM/ TDM ALTERNATIVE – IMPROVEMENTS TO NO-BUILD BUS ROUTE HEADWAYS**

| ROUTE/ LINE | ROUTE NAME | NO BUILD HEADWAY | | TSM/ TDM HEADWAY | |
|---|---|---|---|---|---|
| | | Peak | Base | Peak | Base |
| *Local Routes* | | | | | |
| 51/142 | Walnut Hill/Bickers | 41 | 57 | 30 | 60 |
| 51/145 | Walnut Hill/Bickers | 39 | 64 | 30 | 60 |
| *Express Routes* | | | | | |
| 202/118 | N Irving-Las Colinas/MacArthur | 39 | -- | 30 | 60 |
| 202/119 | N Irving-Las Colinas/DFW | 28 | 53 | 15 | 30 |
| 204/48 | N Carrollton | -- | 46 | -- | 30 |
| 204/49 | N Carrollton | 17 | -- | 12 | -- |
| 234/44 | East Plano/Las Colinas | 60 | -- | 30 | 60 |
| 247/40 | Farmers Branch Park & Ride,Downtown | 36 | -- | 20 | -- |
| *Suburban Routes* | | | | | |
| 300/64 | DFW/S Irving Station | 30 | 45 | 15 | 30 |
| 301&307/65 | Walnut Hill/S Irving/W Irving | 30 | 50 | 15 | 30 |
| 302/66 | Story | 30 | 60 | 15 | 30 |
| 303/197 | N Irving TC/Karahan Pkwy | 45 | 45 | 30 | 45 |
| 304 | **New Route:** N Irving TC to Carrollton TC | n/a | n/a | 20 | 30 |
| 309/73 | South Irving TC | 47 | 57 | 15 | 30 |
| 310/67 | Freeport/Irving Mall | 30 | 60 | 15 | 30 |
| 321/77 | Valley View | 30 | 60 | 15 | 30 |
| 322/78 | Prestonwood Transfer Point/Farmers Branch Park & Ride | 30 | -- | 15 | 30 |
| 331/81 | Josey | 35 | 60 | 20 | 30 |
| 333A/83 | Addison TC/N Carrollton TC | 30 | 60 | 20 | 30 |
| 333B/234 | Frankford-Midway/N Carrollton TC | 30 | 60 | 20 | 30 |
| 341/87 | Dallas Pkwy and Rosemead | 30 | 60 | 20 | 30 |
| *Crosstown Routes* | | | | | |
| 400/112 | Beltline Crosstown | 30 | 60 | 20 | 30 |
| 402 | **New Route:** Walnut Hill Crosstown | n/a | n/a | 15 | 30 |
| 404/68 | West Side Crosstown | 20 | 30 | 15 | 30 |
| 409/198 | King Center-Irving-DFW | 30 | 45 | 15 | 30 |
| 428/156 | N Irving | 30 | 60 | 30 | 60 |
| 428/173 | Medical Market | 30 | 60 | 30 | 60 |
| 453/37 | Medical Center - SW Center Mall | 10 | 30 | 10 | 30 |
| 486/159 | Garland Central/Farmers Branch | 20 | 30 | 20 | 30 |
| 704A/222 | Las Colinas | 30 | 30 | 30 | 30 |
| 704B/223 | Las Colinas | 30 | 30 | 30 | 30 |

SOURCE: LKC Consulting; DART; BRW; September 1999.

**New Bus Transit Routes**

As shown in Tables 4.3 and 4.4, the majority of bus route changes proposed with this alternative relate to minor route modifications and improved headways. However, two new bus routes are proposed under the TSM/TDM Alternative:

- Route 304 – To serve intersuburban travel needs from North Irving/Las Colinas to North Carrollton.

- Route 402 – To enhance east-west serve in the core of the Northwest Corridor study area along Walnut Hill.

**Rail Transit Improvements**

Rail transit improvements under the TSM/TDM Alternative are the same as those proposed for the No-Build Alternative.

### 4.2.3 Capital Improvements

Capital improvements for the TSM/TDM Alternative include low-cost street and highway improvements, Advanced Transportation Management (ATM) improvements, TDM strategies, and pedestrian and bicycle facility improvements. All of these improvements are envisioned to work jointly to provide an improved and more efficient transportation network. A summary of street and highway projects is provided below.

**Transportation System Management (TSM) Improvements**

Low-cost TSM improvements can help to ensure that traffic operations are efficient and that transit service can continue to operate effectively. These improvements range from new signals, signal timing, and hardware upgrades to arterial roadway extensions or minor widening projects intended to fill in the "gaps" in the transportation network. A comprehensive list of improvements proposed in this alternative was generated based on input from local jurisdictions. Based on discussions with the NCTCOG a limited number of improvements were modeled as part of the TSM/TDM Alternative. Appendix B contains the full list of improvements included in this alternative as documented by NCTCOG in their ***Mobility 2025 Plan***.

**Freeway Bottleneck Removal Improvements**

A range of freeway bottleneck removal projects are included in the TSM/TDM Alternative to improve safety and levels of service along SH 114 and IH 35E. The ***Freeway Bottleneck Removal Report*** *(BRW, Inc.; October 1999)* documents the development and feasibility of these improvements. Based on coordination with TxDOT, all freeway bottleneck improvements projects were found to be beneficial to the Northwest Corridor in terms of safety and operational improvements. Many of these projects can be integrated into projects already programmed in the TIP. A list of these projects is also contained in Appendix B.

**Advanced Transportation Management (ATM) Improvements**

The ATM improvements included in the TSM/TDM Alternative are largely related to the signal improvements associated with this alternative. Many of the ATM improvements planned for the region by DART and TxDOT are already programmed and contained in the No-Build Alternative.

### 4.2.4 Transportation Demand Management (TDM) Improvements

Travel Demand Management improvements are associated with the Transportation Management Association (TMA) areas previously defined by NCTCOG. Regional Employee Trip Reduction (ETR) factors were adjusted in the travel demand forecast for the TSM Alternative to account for a moderate level of bus transit service in the corridor.

As shown in Figure 4-2, five TDM focus areas were identified for the study area. These focus areas serve as targeted locations for the establishment of a TMA or for the implementation of programs to reduce SOV travel.

### 4.2.5 Non-Motorized Facility Improvements (Bicycle and Pedestrian)

Pedestrian improvements associated with this alternative generally consist of sidewalk improvements where intersection or street improvement projects are proposed. A more comprehensive list of bicycle facility improvements is proposed in the TSM/TDM Alternative to encourage bicycling as an alternative mode while creating a network of shared bicycle/street lanes and off-street paths in the Northwest Corridor. The major bicycle element is the Elm Fork veloweb as shown in Figure 4-2. Several additional bicycle improvements were developed based on discussions with local agencies. They are summarized below:

**Regional Improvements**
- Elm Fork Dallas Veloweb
- Lewisville-Denton Veloweb

**Farmers Branch**
- Rawhide Creek Bike/Pedestrian Off-Street Path – Brookhaven Club to Denton Drive
- Farmers Branch Creek Bike/Pedestrian Off-Street Path – Marsh Lane to Denton Drive
- Valley View Shared Bike Lane (on-street) – Denton/Valley View to Elm Fork Veloweb
- Josey Lane Shared Bike Lane (on-street) – Valwood to LBJ Freeway (to Rawhide Creek Path)

**Carrollton**
- Furneaux Creek/Greenbelt Park Bike Path – Hebron Parkway to Elm Fork Veloweb
- Hutton Branch/Cottonbelt Bike Path – Trinity Mills to Elm Fork Veloweb
- Josey/Dennis Shared Bike Lane (on-street) – Frankford to Valwood

**Dallas**

- Loop 12/Northwest Highway Bike/Pedestrian Bridge over Northwest Highway
- Denton Drive Shared Bike Lane (on-street) – Rossford (Farmers Branch) to Maple/Fairmont
- Luna Road Shared Bike Lane (on-street) – Hutton Branch (Farmers Branch) to California Crossing
- California Crossing/Manana/Lombardy Shared Bike Lane (on-street) – Luna to Brockbank (connect to Denton and Brockbank routes)
- Rebuild Proctor Street Bridge over Elm Fork – Proctor to Regal Row
- Regal Row/Burbank Shared Bike Lane (on-street) – Houston Street to Irving Boulevard (connect to Irving Boulevard via Hi Line and Turtle Creek)

**Irving**

- Royal Lane Shared Bike Lane (on-street) – Belt Line Road to O'Connor
- MacArthur/Las Colinas Boulevard Shared Bike Lane (on-street) – Valley Ranch Parkway to Campion Trail (connect to Campion Trail system)

## 4.3 HIGHWAY/ HOV ALTERNATIVES

This section describes the Highway Widening Alternatives and High Occupancy Vehicle (HOV) Lane Alternatives.

### 4.3.1 Overview of Service Concept

The following sections describe the service concept and proposed capital improvements associated with each of the Highway Widening and HOV Alternatives. These alternatives were developed to test their ability to meet travel demands. Based on the evaluation in Chapter 5.0 and the report ***Definition of Highway and HOV Concepts for the Northwest Corridor*** (BRW, Inc.; July 2000), revised functional concepts were developed to be part of a multi-modal investment strategy.

**IH 35E HOV Alternative – Alternative 4A**

Figure 4-3 illustrates the general improvements associated with the IH 35E HOV Alternative (referred to as Alternative 4A). This alternative focuses on capacity improvements for multi-occupant vehicles such as carpools, vanpools, and buses. This alternative supports trip reduction programs and can help reduce SOV travel by providing travel time savings for HOVs. Key improvements associated with this alternative are:

- SH 121 By-pass to IH 635
  - Add 2 HOV lanes in each direction

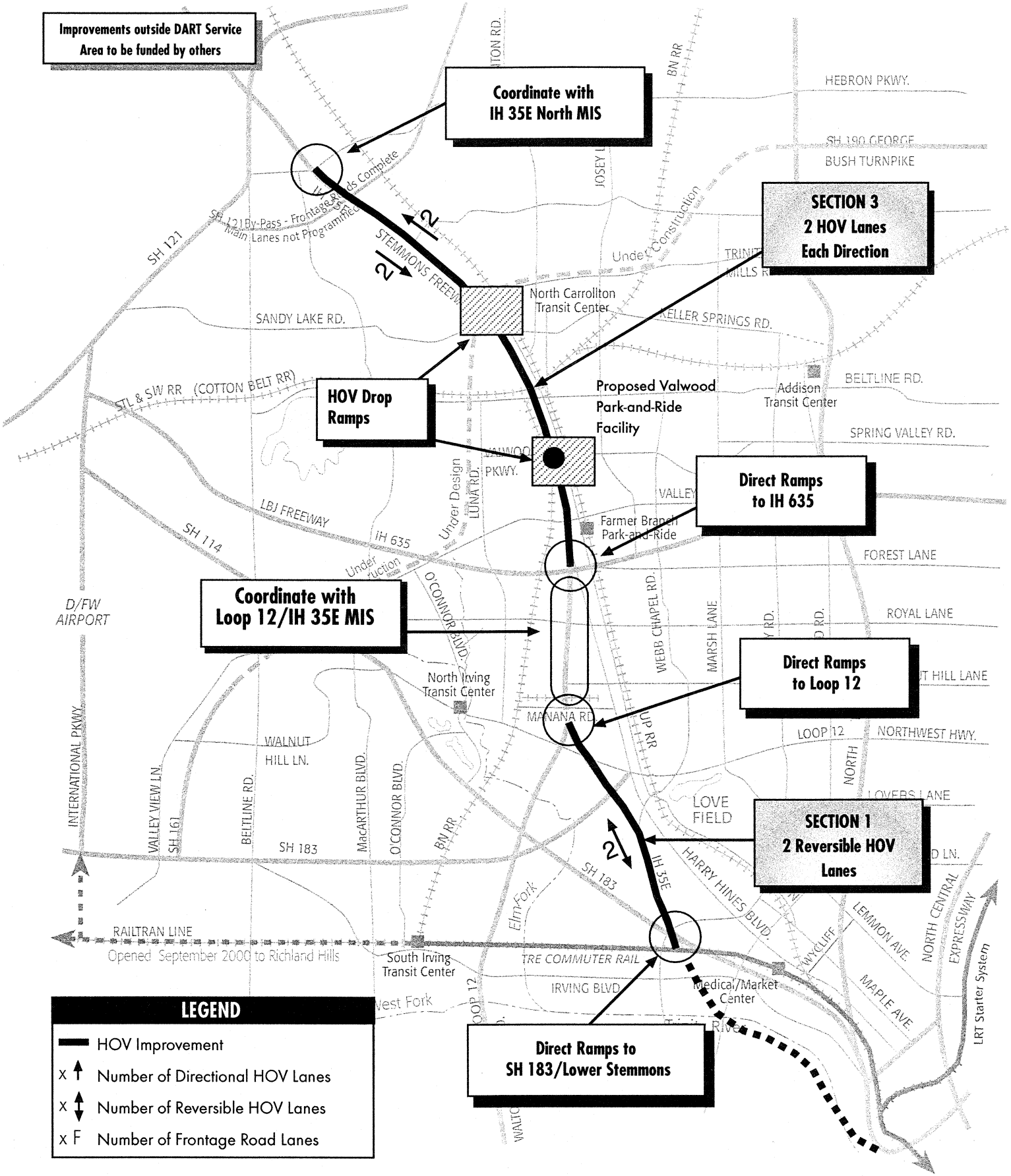
- IH 635 Interchange
  - Provide directional ramps to/from north-to-east

- IH 635 to Loop 12/Northwest Highway
  - Provide same number of lanes recommended by TXDOT Loop 12/IH 35E MIS (2 HOV lanes in each direction plus ramp connection)

- Loop 12/Northwest Highway
  - Provide continuous HOV lanes from TXDOT project to median of IH 35E south of Northwest Highway (could require fly-over ramps depending upon design concept from Loop 12 MIS)

- Northwest Highway to SH 183
  - Provide 2 reversible HOV lanes

- SH 183/Trinity Parkway Interchange
  - Provide direct fly-over ramps from IH 35E north of SH 183 to connect to SH 183/Lower Stemmons HOV lanes (space will be needed for reversible gate operations)




NW CORRIDOR MIS

MIS FINAL REPORT

IH 35E HOV ALTERNATIVE 4A

FIGURE 4-3

Source: BRW, Inc.

Date: July 2000

DART

- HOV Drop Ramps
  - North Carrollton Transit Center (planned improvement)
  - Proposed Valwood Parkway Park-and-Ride

The proposed park-and-ride HOV drop ramp is described in Section 4.3.3.

Two different scenarios were tested in the corridor to demonstrate affects on HOV demand with or without HOV on Loop 12 Walton Walker south of the IH 35E junction:

- Alternative 4A-1: HOV on IH 35E with no HOV on Loop 12
- Alternative 4A-2: HOV on IH 35E with no HOV on Lower Stemmons (Loop 12 to SH 183) and with HOV on Loop 12

The ***Definition of Highway and HOV Improvements for the Northwest Corridor*** *(BRW, Inc.; July 2000)* documents the development and refinement of Highway and HOV Alternatives, including cross sections.

**SH 114 HOV Alternative – Alternative 4B**

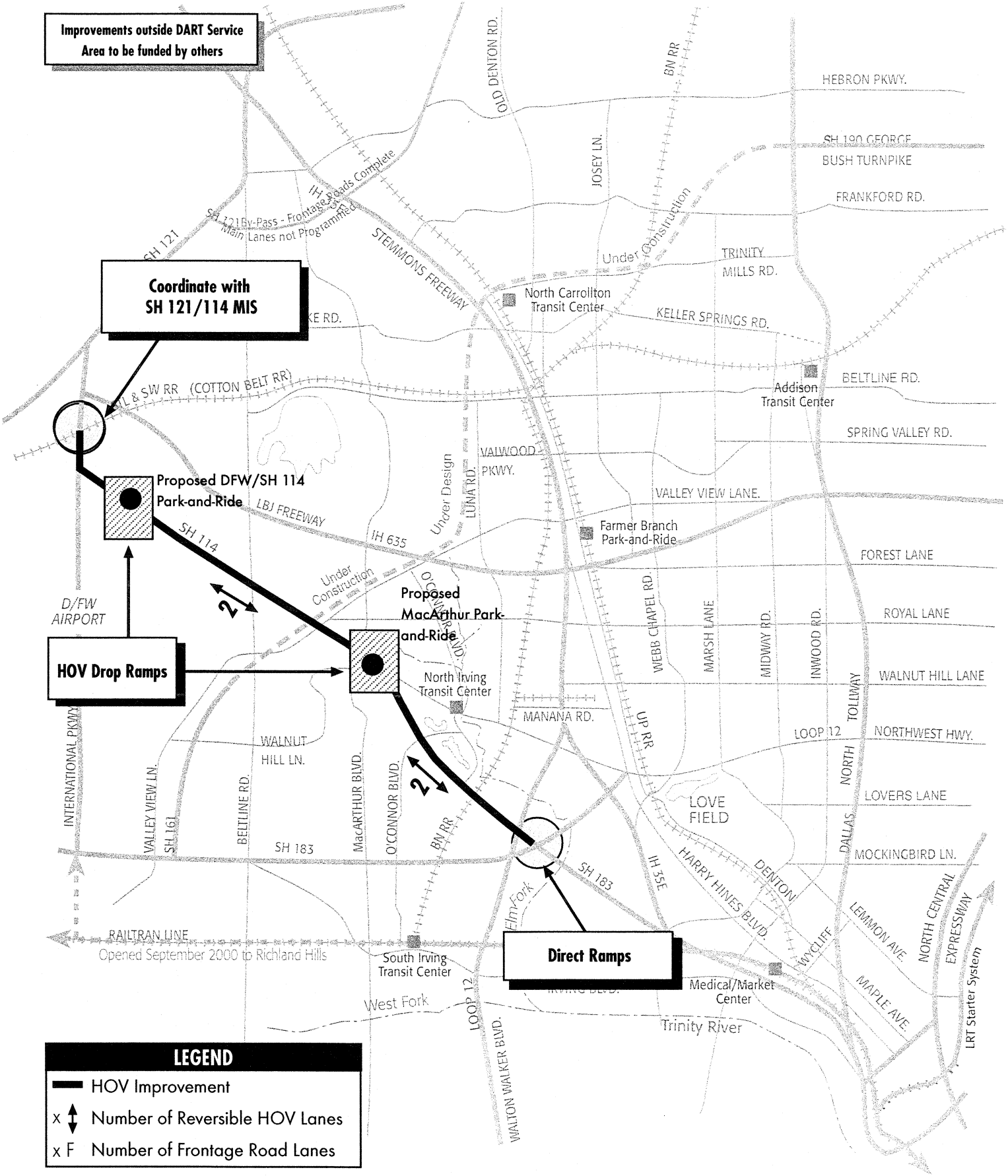
Figure 4-4 illustrates the general improvements associated with Alternative 4B, the SH 114 HOV Alternative. As with the HOV improvements in Alternative 4A, this alternative also focuses on capacity improvements to accommodate multi-occupant vehicles in an effort to reduce SOV travel. Key improvements are:

- International Parkway to SH 183
  - Provide 2 reversible HOV lanes

- SH 183 Interchange
  - Provide direct connection fly-over ramps to HOV lanes on SH 183 to the south as described in TXDOT MIS (space will be needed for reversible gate operation)

- HOV Drop Ramps
  - Planned DFW/SH114 Park-and-Ride
  - Proposed MacArthur Road Park-and-Ride

Typical cross sections of proposed improvements in the SH 114 corridor are contained in the ***Definition of Highway and HOV Improvements for the Northwest Corridor*** *(BRW, Inc.; July 2000).*




NW CORRIDOR MIS

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SH 114 HOV ALTERNATIVE 4B

FIGURE 4-4
Source: BRW, Inc.
Date: July 2000

DART

**IH 35E Highway Widening Alternative – Alternative 5A**

Improvements associated with Alternative 5A, the IH 35E Highway Widening Alternative, are shown in Figure 4-5. The highway widening alternatives add general lane capacity to the freeway corridors to accommodate travel demand. Key improvements are summarized below:

- SH 121 By-pass to IH 635
  - Add 2 new lanes for a total of 5 in each direction on mainline
  - Provide 3 lanes on each existing frontage road

- Loop 12 to SH 183
  - Add 2 new lanes for a total of 5 in each direction on Mainline.
  - Provide 3 lanes on each existing frontage road.

The ***Definition of Highway and HOV Improvements for the Northwest Corridor*** *(BRW, Inc.; July 2000)* illustrates the typical cross-sections for the IH 35E corridor.

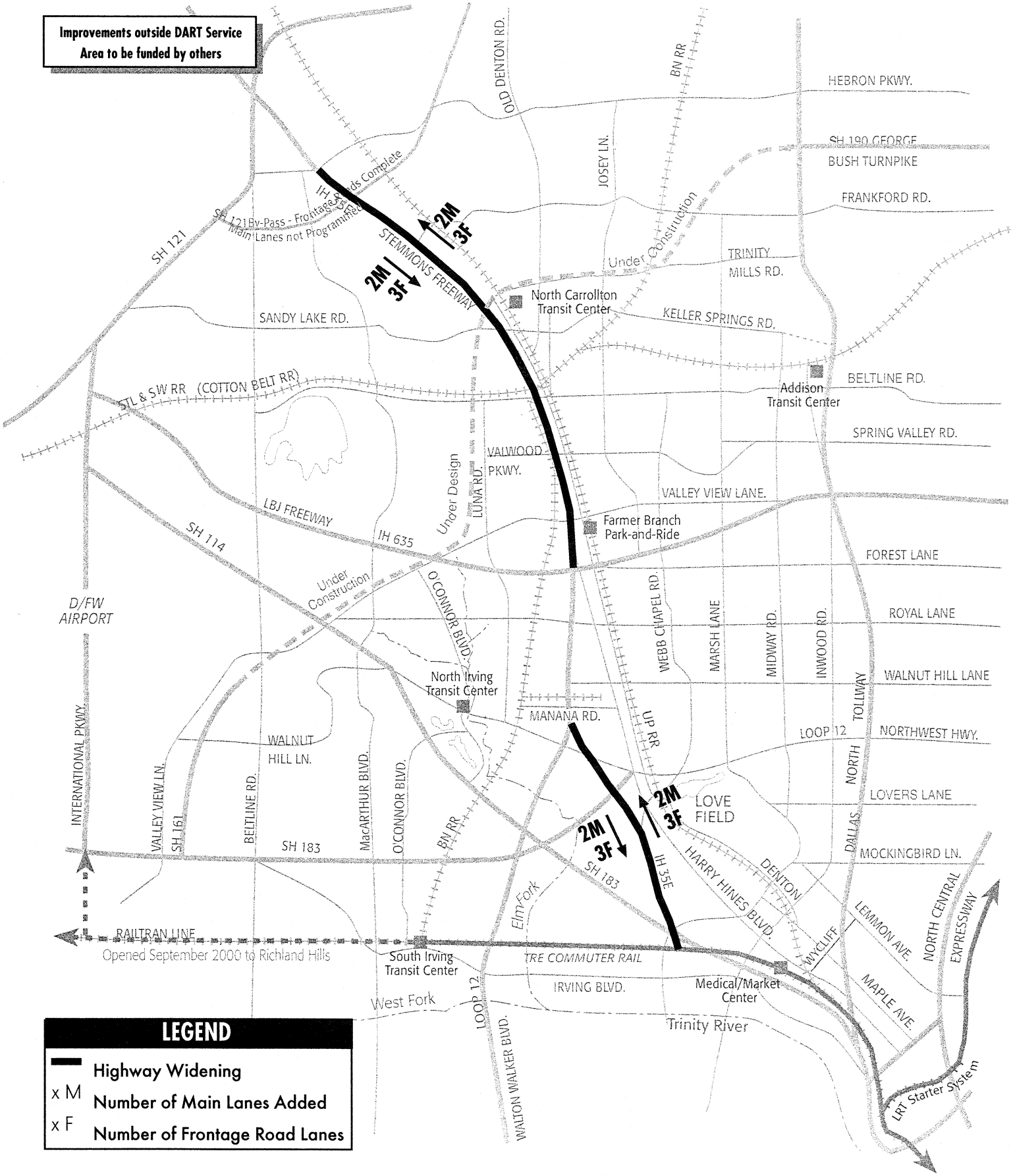
**SH 114 Highway Widening Alternative – Alternative 5B**

Figure 4-6 illustrates the improvements associated with Alternative 5B, SH 114 Highway Widening Alternative. As with Alternative 5A, this alternative adds capacity to the SH 114 with the addition of general purpose lanes. Improvements are as follows:

- County Line to SH 161/Northwest Highway
  - Add 2 new lanes in each direction for a total of 5
  - Provide 3 frontage road lanes

- SH 161/Northwest Highway to SH 183
  - Add 3 new lanes in each direction for a total of 5
  - Provide 3 frontage road lanes

The ***Definition of Highway and HOV Imrprovements for the Northwest Corridor*** *(BRW, Inc.; July 2000)* illustrates the typical cross-sections of the proposed highway widening improvements along SH 114.

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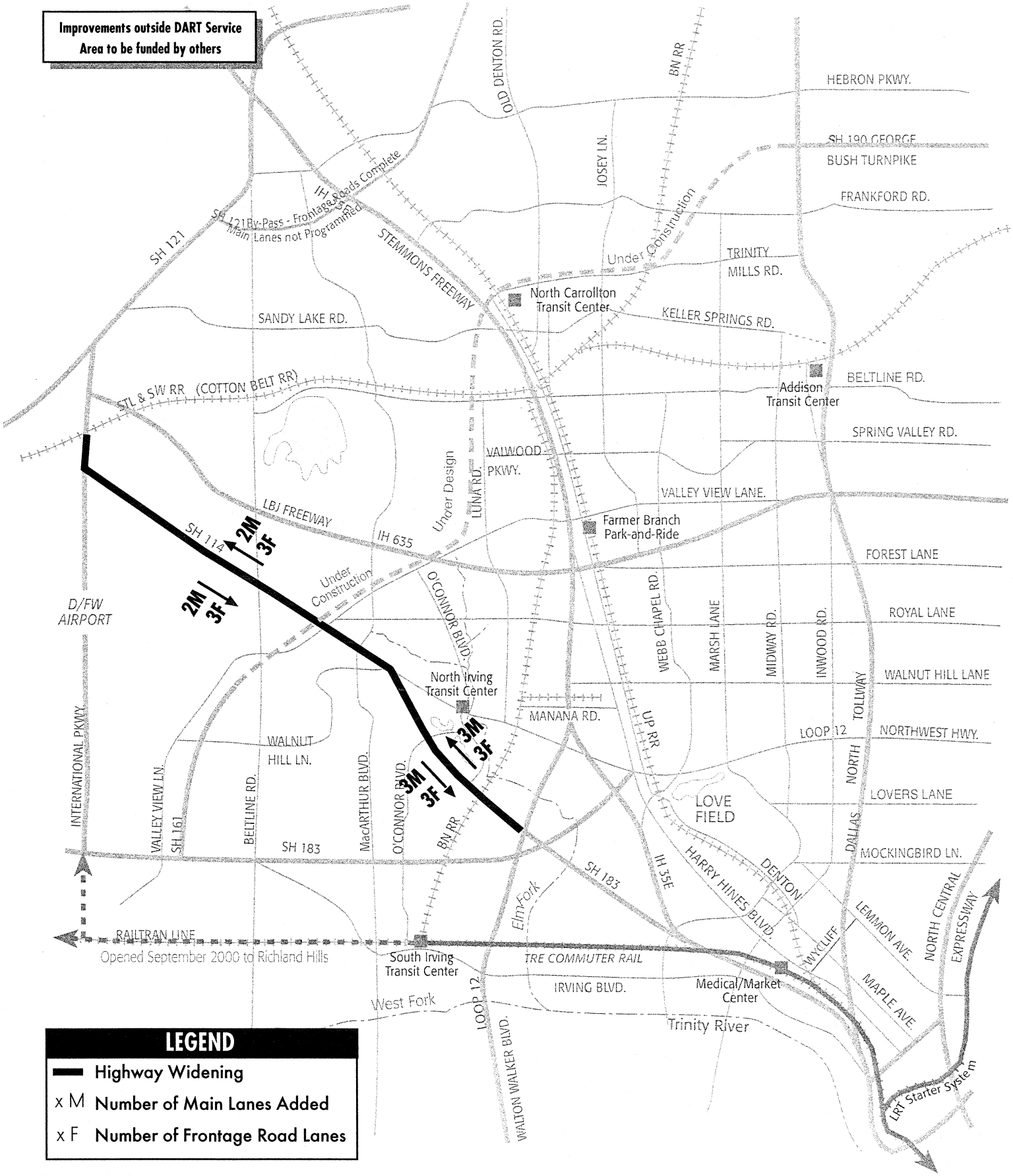
IH 35E HIGHWAY WIDENING ALTERNATIVE 5A

FIGURE 4-5
Source: BRW, Inc.
Date: July 2000

DART




NW CORRIDOR MIS

MIS FINAL REPORT

SH 114 HIGHWAY WIDENING ALTERNATIVE 5B

FIGURE 4-6

Source: BRW, Inc.

Date: July 2000

DART

### 4.3.2 Transit Improvements

The following sections describe the bus and rail transit improvements associated with the Highway and HOV Alternatives. Bus network improvements for the Highway Widening Alternatives is assumed to be the same as those for the TSM/TDM Alternatives. The HOV Alternatives propose additional changes to the No-Build bus network to take advantage of travel time savings associated with proposed HOV lanes on IH 35E and SH 114.

**Improvements to No-Build Bus Routes**

Table 4.5 summarizes changes to the No-Build bus routes under the IH 35E HOV Alternative. Table 4.6 summarizes the improvements to bus headways. Most of the bus route changes relate to utilization of the HOV lanes and minor routing changes to access the proposed Valwood Park-and-Ride. Furthermore, the majority of route headways were improved to enhance service and increase ridership.

**TABLE 4.5**
**IH 35E HOV ALTERNATIVE – CHANGES TO NO-BUILD BUS ROUTES**

| ROUTE/ LINE | ROUTE NAME | CHANGES/ IMPROVEMENTS |
|---|---|---|
| 44/13 | Bexar St | Extend RHD branch north on Webb Chapel to Belt Line. |
| 51/145 | Walnut Hill/Bickers | Remove service from Walnut Hill/Marsh intersection to the N Irving TC. Extend north to Belt Line via Marsh. |
| 59/55,75,& 196 | West Dallas | Extend route to the new Valwood P&R. |
| 59/85 | West Dallas Express | Use new I-35 HOV lanes. Stop at new Valwood P&R. |
| 63/22 | Industrial | Extend to S Irving TC via Irving Blvd. |
| 204/32 | N Carrollton | Use new I-35 HOV lanes. No change |
| 204/48 | N Carrollton | Use new I-35 HOV lanes. Eliminate Farmers Branch stop. |
| 204/49 | N Carrollton | Use new I-35 HOV lanes. Eliminate Farmers Branch stop. |
| 234 | East Plano/Las Colinas | Add stop at North Central TC. |
| 247 | Farmers Branch Park & Ride,Downtown | Use new I-35 HOV lanes. |
| 302/66 | Story | Extend north on O'Connor from N Irving TC to Royal Ln and east on Royal Ln to Midway. |
| 303/197 | N Irving TC/Karahan Pkwy | No change |
| 304 | **New Route:** N Irving TC to Carrollton TC | From N Irving TC to Northwest Hwy to Luna, to Belt Line, to Broadway, to N Carrollton TC. |
| 321/77 | Valley View | Add stop at new Valwood P&R. |
| 322/78 | Prestonwood Transfer Point/Farmers Branch Park & Ride | Add midday service, using peak alignment. Add stop at new Valwood P&R. |
| 331/81 | Josey | Add stop at new Valwood P&R. |
| 400/112 | Belt Line Crosstown | Change weekday routing to access new Valwood P&R. Route diverts on Valwood to go to P&R, then returns to original alignment. |
| 402/68 | **New Route:** Walnut Hill Crosstown | Irving TC to S Garland TC via: Northwest Hwy, Spangler, Mañana, Stemmons Service Rd, Walnut Hill, North Central Expressway Service Rd, Park Lane LRT Station, Greenville Ave, Walnut Hill, Kingsley, Shiloh Rd. |
| 486/159 | Garland Central/Farmers Branch | Add stop at new Valwood P&R. |

SOURCE: LKC Consulting, BRW, Inc; September 1999.

## TABLE 4.6
## IH 35E HOV ALTERNATIVE – IMPROVEMENTS TO NO-BUILD BUS ROUTE HEADWAYS

| ROUTE/ LINE | ROUTE NAME | NO BUILD HEADWAY | | IH-35E HEADWAY | |
|---|---|---|---|---|---|
| | | Peak | Base | Peak | Base |
| *Local Routes* | | | | | |
| 51/142 | Walnut Hill/Bickers | 41 | 57 | 30 | 60 |
| 51/145 | Walnut Hill/Bickers | 39 | 64 | 30 | 60 |
| 59/85 | West Dallas Express | 26 | -- | 20 | -- |
| *Express Routes* | | | | | |
| 202/118 | N Irving-Las Colinas/MacArthur | 39 | -- | 39 | -- |
| 204/32 | N Carrollton | 10 | -- | 8 | -- |
| 204/48 | N Carrollton | -- | 46 | -- | 20 |
| 204/49 | N Carrollton | 17 | -- | 12 | -- |
| 234/44 | East Plano/Las Colinas | 60 | -- | 30 | 60 |
| 247/40 | Farmers Branch Park & Ride,Downtown | 36 | -- | 20 | 40 |
| *Suburban Routes* | | | | | |
| 300/64 | DFW/S Irving Station | 30 | 45 | 15 | 30 |
| 301&307/65 | Walnut Hill/S Irving/W Irving | 30 | 50 | 15 | 30 |
| 302/66 | Story | 30 | 60 | 15 | 30 |
| 303/197 | N Irving TC/Karahan Pkwy | 45 | 45 | 30 | 45 |
| 304 | **New Route:** N Irving TC to Carrollton TC | n/a | n/a | 20 | 30 |
| 309/73 | South Irving TC | 47 | 57 | 15 | 30 |
| 310/67 | Freeport/Irving Mall | 30 | 60 | 15 | 30 |
| 321/77 | Valley View | 30 | 60 | 15 | 30 |
| 322/78 | Prestonwood Transfer Point/Farmers Branch Park & Ride | 30 | -- | 15 | 30 |
| 331/81 | Josey | 35 | 60 | 20 | 30 |
| 333A/83 | Addison TC/N Carrollton TC | 30 | 60 | 20 | 30 |
| 333B/234 | Frankford-Midway/N Carrollton TC | 30 | 60 | 20 | 30 |
| 341/87 | Dallas Pkwy and Rosemead | 30 | 60 | 20 | 30 |
| *Crosstown Routes* | | | | | |
| 400/112 | Beltline Crosstown | 30 | 60 | 20 | 30 |
| 402 | **New Route:** Walnut Hill Crosstown | n/a | n/a | 15 | 30 |
| 404/68 | West Side Crosstown | 20 | 30 | 15 | 30 |
| 409/198 | King Center-Irving-DFW | 30 | 45 | 15 | 30 |
| 428/156 | N Irving | 30 | 60 | 30 | 60 |
| 428/173 | Medical Market | 30 | 60 | 30 | 60 |
| 453/37 | Medical Center - SW Center Mall | 10 | 30 | 10 | 30 |
| 486/159 | Garland Central/Farmers Branch | 20 | 30 | 20 | 30 |
| 704A/222 | Las Colinas | 30 | 30 | 30 | 30 |
| 704B/223 | Las Colinas | 30 | 30 | 30 | 30 |

SOURCE: LKC Consulting, BRW, Inc; September 1999.

Tables 4.7 and 4.8 summarizes bus route changes for the SH 114 HOV Alternative. As with the IH 35E HOV Alternative, most of the bus route changes relate to utilization of the HOV lanes and minor routing changes to access the proposed park-and-ride lots. The majority of route headways were improved to enhance service and increase ridership.

## TABLE 4.7
## SH 114 HOV ALTERNATIVE – CHANGES TO NO-BUILD BUS ROUTES

| ROUTE/ LINE | ROUTE NAME | CHANGES/ IMPROVEMENTS |
|---|---|---|
| 44/13 | Bexar St | Extend RHD branch north on Webb Chapel to Belt Line. |
| 51/145 | Walnut Hill/Bickers | Remove service from Walnut Hill/Marsh intersection to the N Irving TC. Extend north to Belt Line via Marsh. |
| 63/22 | Industrial | Extend to S Irving TC via Irving Blvd. |
| 202 | **New Route:** HOV Express | Follows SH114 to DFW with stop at new MacArthur P&R. Does not stop at N Irving TC. |
| 234/44 | East Plano/Las Colinas | Add stops at the new MacArthur P&R and at the North Central TC. |
| 301&307/65 | Walnut Hill/S Irving/W Irving | Stop at new MacArthur P&R via Walnut Hill. Then south on MacArthur to Walnut Hill to continue route. |
| 302/66 | Story | Extend north on O'Connor from N Irving TC to Royal Ln and east on Royal Ln to Midway. |
| 303/197 | N Irving TC/Karahan Pkwy | No change |
| 304 | **New Route:** N Irving TC to Carrollton TC | From N Irving TC to Northwest Hwy to Luna, to Belt Line, to Broadway, to N Carrollton TC. |
| 322/78 | Prestonwood Transfer Point/Farmers Branch Park & Ride | Add midday service, using peak alignment. |
| 400/112 | Belt Line Crosstown | Change weekday routing to access Farmer's Branch P&R. Route diverts on Valley View to go to P&R, then returns to original alignment. |
| 402 | **New Route:** Walnut Hill Crosstown | Irving TC to S Garland TC via: Northwest Hwy, Spangler, Mañana, Stemmons Service Rd, Walnut Hill, North Central Expressway Service Rd, Park Lane LRT Station, Greenville Ave, Walnut Hill, Kingsley, Shiloh Rd. |

SOURCE: LKC Consulting, BRW, Inc; September 1999.

## TABLE 4.8
## SH 114 HOV ALTERNATIVE – IMPROVEMENTS TO NO-BUILD BUS ROUTE HEADWAYS

| ROUTE/ LINE | ROUTE NAME | NO BUILD HEADWAY | | SH114 HEADWAY | |
|---|---|---|---|---|---|
| | | Peak | Base | Peak | Base |
| *Local Routes* | | | | | |
| 59/55 | Walnut Hill/Bickers | 41 | 57 | 30 | 60 |
| 59/75 | Walnut Hill/Bickers | 41 | 57 | 30 | 60 |
| 59/85 | Walnut Hill/Bickers | 41 | 57 | 30 | 60 |
| 59/196 | Walnut Hill/Bickers | 41 | 57 | 30 | 60 |
| 51/145 | Walnut Hill/Bickers | 39 | 64 | 30 | 60 |
| *Express Routes* | | | | | |
| 202/118 | N Irving-Las Colinas/MacArthur | 39 | -- | 30 | 60 |
| 202 | **New Route:** HOV Express | N/A | N/A | 15 | 30 |
| 204/48 | N Carrollton | -- | 46 | -- | 30 |
| 204/49 | N Carrollton | 17 | -- | 12 | -- |
| 234/44 | East Plano/Las Colinas | 60 | -- | 30 | 60 |
| 247/40 | Farmers Branch Park & Ride,Downtown | 36 | -- | 20 | -- |
| *Suburban Routes* | | | | | |
| 300/64 | DFW/S Irving Station | 30 | 45 | 15 | 30 |
| 301&307/65 | Walnut Hill/S Irving/W Irving | 30 | 50 | 15 | 30 |
| 302/66 | Story | 30 | 60 | 15 | 30 |
| 303/197 | N Irving TC/Karahan Pkwy | 45 | 45 | 30 | 45 |
| 304 | **New Route:** N Irving TC to Carrollton TC | N/A | N/A | 20 | 30 |
| 309/73 | South Irving TC | 47 | 57 | 15 | 30 |
| 310/67 | Freeport/Irving Mall | 30 | 60 | 15 | 30 |
| 321/77 | Valley View | 30 | 60 | 15 | 30 |
| 322/78 | Prestonwood Transfer Point/Farmers Branch Park & Ride | 30 | -- | 15 | 30 |
| 331/81 | Josey | 35 | 60 | 20 | 30 |
| 333A/83 | Addison TC/N Carrollton TC | 30 | 60 | 20 | 30 |
| 333B/234 | Frankford-Midway/N Carrollton TC | 30 | 60 | 20 | 30 |
| 341/87 | Dallas Pkwy and Rosemead | 30 | 60 | 20 | 30 |
| *Crosstown Routes* | | | | | |
| 400/112 | Beltline Crosstown | 30 | 60 | 20 | 30 |
| 402 | **New Route:** Walnut Hill Crosstown | N/A | N/A | 15 | 30 |
| 404/68 | West Side Crosstown | 20 | 30 | 15 | 30 |
| 409/198 | King Center-Irving-DFW | 30 | 45 | 15 | 30 |
| 428/156 | N Irving | 30 | 60 | 30 | 60 |
| 428/173 | Medical Market | 30 | 60 | 30 | 60 |
| 453/37 | Medical Center - SW Center Mall | 10 | 30 | 10 | 30 |
| 486/159 | Garland Central/Farmers Branch | 20 | 30 | 20 | 30 |
| 704A/222 | Las Colinas | 30 | 30 | 30 | 30 |
| 704B/223 | Las Colinas | 30 | 30 | 30 | 30 |

SOURCE: LKC Consulting, BRW, Inc; September 1999.

**New Transit Routes**

New transit routes for the Highway Widening Alternatives would be the same as those described for the TSM/TDM Alternative.

Two new bus routes are proposed under the HOV Alternatives:

- Route 304: North Irving Transit Center to North Carrollton Transit Center
- Route 402: Walnut Hill Crosstown

The SH 114 HOV Alternative proposes one additional new route to provide express service between DFW Airport and the downtown Dallas using the new HOV lanes. A stop would be provided at the proposed MacArthur Park-and-Ride.

**Rail Transit Improvements**

Rail transit improvements would be the same as those described under the No-Build Alternative.

### 4.3.3 CAPITAL IMPROVEMENTS

The following sections describe additional capital improvements associated with the Highway Widening and HOV Alternatives.

**Transit/ Park-and-Ride Facility Improvements**

The Highway/HOV Alternatives include those transit/park-and-ride facility improvements described in the No-Build Alternative. The HOV Alternatives propose the following additional park-and-ride facilities to promote use of new HOV lanes:

- **Valwood Park-and-Ride and HOV drop ramp** – This facility is proposed as part of the IH 35E HOV Alternative and would be located north of Valwood Road and east of IH 35E.

- **MacArthur Park-and-Ride and HOV drop ramp** – This park-and-ride is proposed as part of the SH 114 HOV improvements.

**Street and Highway Improvements**

In addition to the proposed highway improvements associated with each alternative, the Highway Widening/HOV Alternatives also include street and highway improvements contained in the No-Build Alternative, and those contained within the 1998 ***Transportation Improvement Program***.

## 4.4 COMMUTER RAIL ALTERNATIVES

This section describes the Commuter Rail Alternatives defined for the detailed evaluation. An overview of the service concept, operations and technology assumptions, alignment descriptions, target station locations, and supporting transit and capital improvements are also described.

### 4.4.1 Overview of Service Concept

The Commuter Rail Alternatives would provide medium-haul service in the Northwest Corridor, focusing on meeting commuter needs from northern suburbs to the Dallas CBD. Service would also be provided to other major activity centers, including the Medical/Market Center, Love Field Airport, and Las Colinas. The Commuter Rail Alternatives would begin at Union Station in downtown Dallas and extend north into Carrollton, Farmers Branch, North Irving, and possibly into Lewisville and Legacy Park. Feeder buses would provide service to Commuter Rail Stations from adjacent neighborhoods and commercial areas. Station spacing would range from 2 to 5 miles to reach higher speeds but also provide access to key activity centers.

Commuter Rail alternatives would generally operate within existing railroad rights-of-way and involve the construction of a new single track alongside the existing freight track. The existing freight track would be upgraded to serve as a passing track, needed to maintain peak headways.

### 4.4.2 Base Alternatives 6 and 7

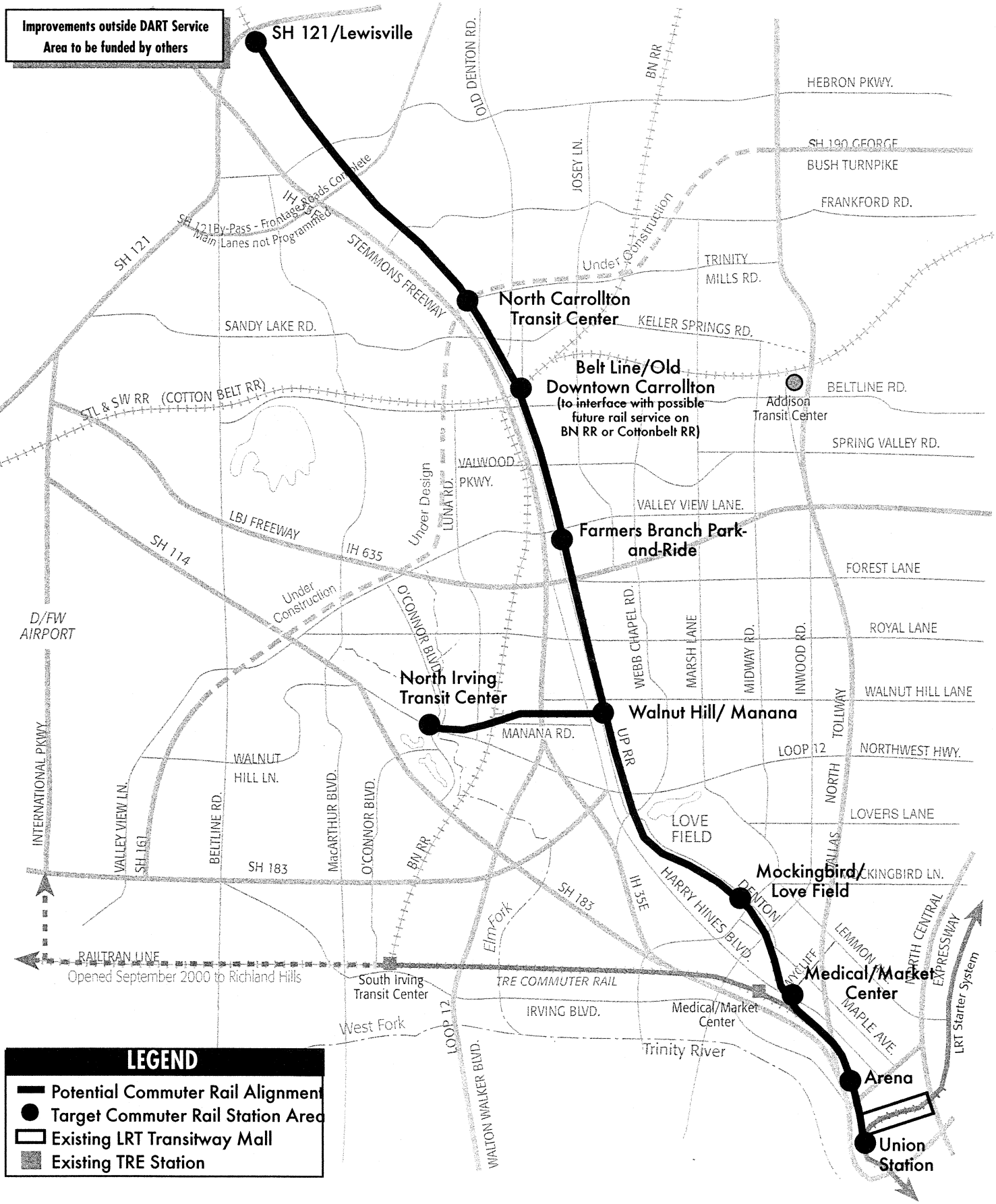
For the purposes of the detailed evaluation, two base Commuter Rail Alternatives were defined. These alternatives are described below.

**Alternative 6 – Commuter Rail to SH 121 with Mañana**

Alternative 6, shown in Figure 4-7 begins at Union Station and proceeds north along the UP RR right-of-way to SH 121. Commuter rail shuttle service between the North Irving Transit Center and the Walnut Hill/Mañana Station would be provided along the Mañana Spur.

**Alternative 7 – Commuter Rail to Legacy Park with BN RR**

Figure 4-8 illustrates Commuter Rail Alternative 7. This alternative would also begin at Union Station in downtown Dallas and follow the UP RR. At Belt Line Road, the alignment would continue northeasterly along the BN RR right-of-way to SH 121 in the Legacy Park area. As part of this alternative, commuter rail shuttle service would be provided along the south segment of the BN RR from the Trinity Railway Express station at the South Irving Transit Center to the North Irving Transit Center.

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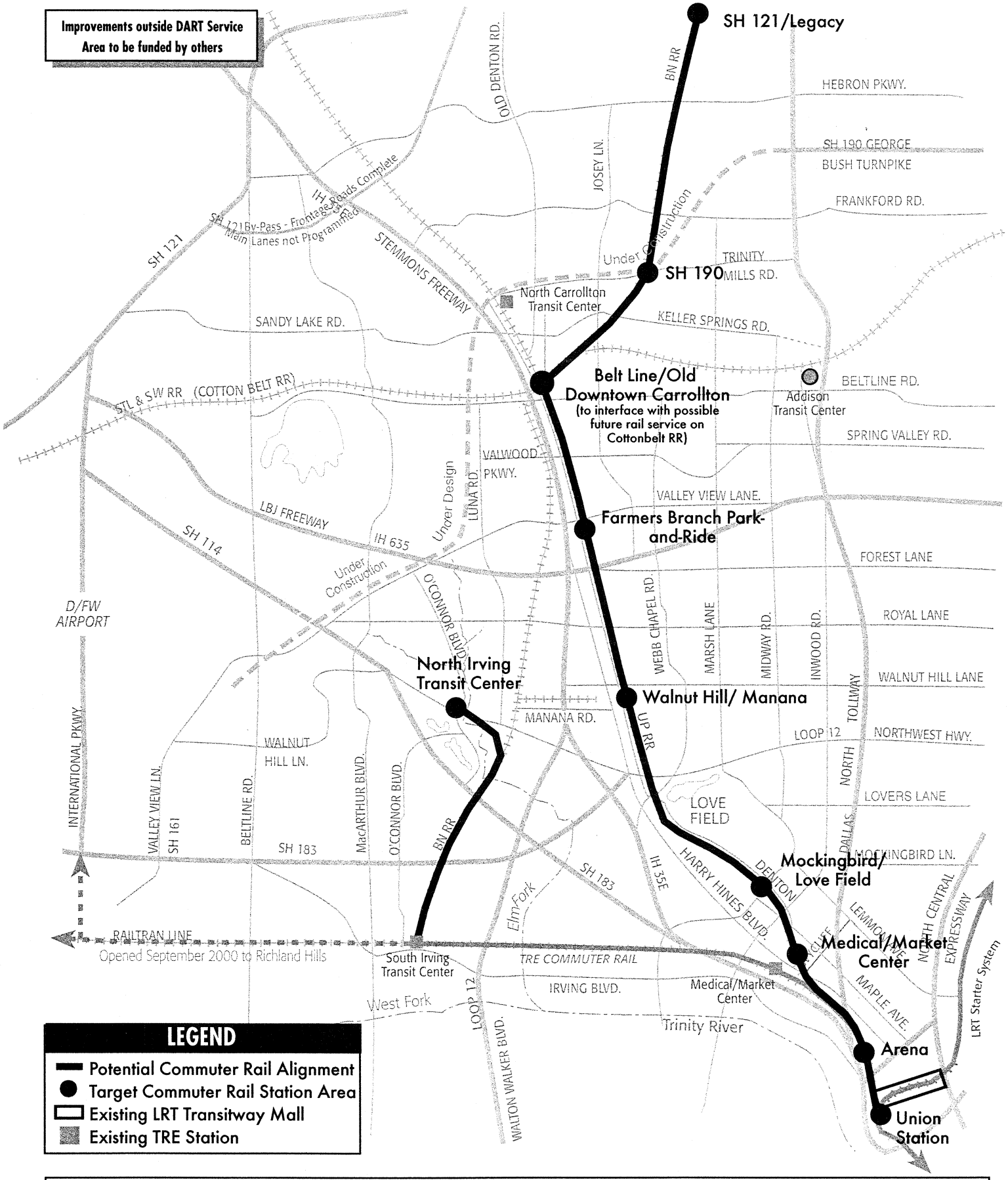
COMMUTER RAIL BASE ALTERNATIVE 6

FIGURE 4-7

Source: BRW, Inc.

Date: July 2000

DART

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COMMUTER RAIL BASE ALTERNATIVE 7

FIGURE 4-8

Source: BRW, Inc.

Date: July 2000

DART

### 4.4.3 Refinements to Base Alternatives

During the detailed evaluation process, minor refinements to the Commuter Rail Alternatives were made to test different end-of-line options and how the BN South segment would operate with the Mañana Spur option. These refinements are shown in Figures 4-9 and 4-10 and are summarized as follows:

- **Refined CR 6/ SH 121** – Changes to base CR Alternative 6 included:
  - Added the BN south segment from the South Irving T.C. to a South Las Colinas station to test *with* Commuter Rail on the Mañana Spur.
  - This refinement helped to determine ridership and cost effects of adding Commuter Rail on BN south with Mañana Spur

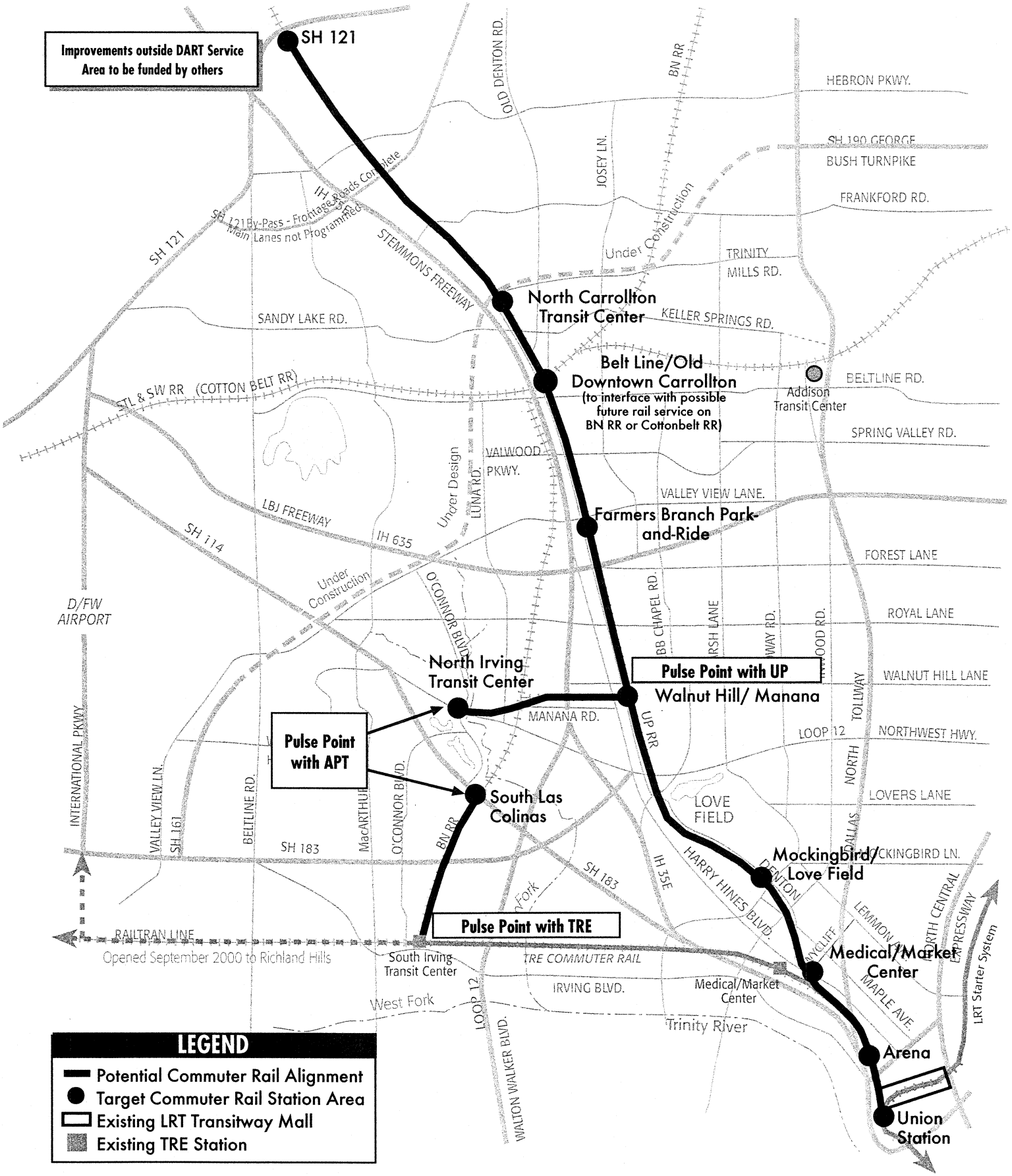
- **Refined CR 6/ Frankford** - Changes to base CR Alternative 6 included:
  - Truncated the UP RR at Frankford and placed a station at this location.
  - Added the BN south segment from the South Irving T.C. to a South Las Colinas station to test *with* the Mañana Spur.
  - This refinement helped to understand effects of truncating CR at Frankford.

### 4.4.4 Target Station Locations

Target station locations are shown on the above figures. Table 4.9 summarizes target station areas and mode of access characteristics for the base alternatives. While some stations may have many modes of access available, the primary function of some stations will focus on one mode of access such as park-and-ride (e.g. SH 121/Lewisville).

**Station Site Requirements**

The proposed location, size, and site layout for each station allows for the investigation of potential environmental issues in and around stations. While only target areas have been identified at this stage in the MIS, a target platform location has been identified based on the current level of engineering detail. During the PE/EIS phase, a more detailed analysis of candidate sites within each target area will be undertaken for the selected rail alternative to confirm the station location and determine the most appropriate site for a necessary station facilities (park-and-ride, kiss-and-ride, bus bays, etc.).

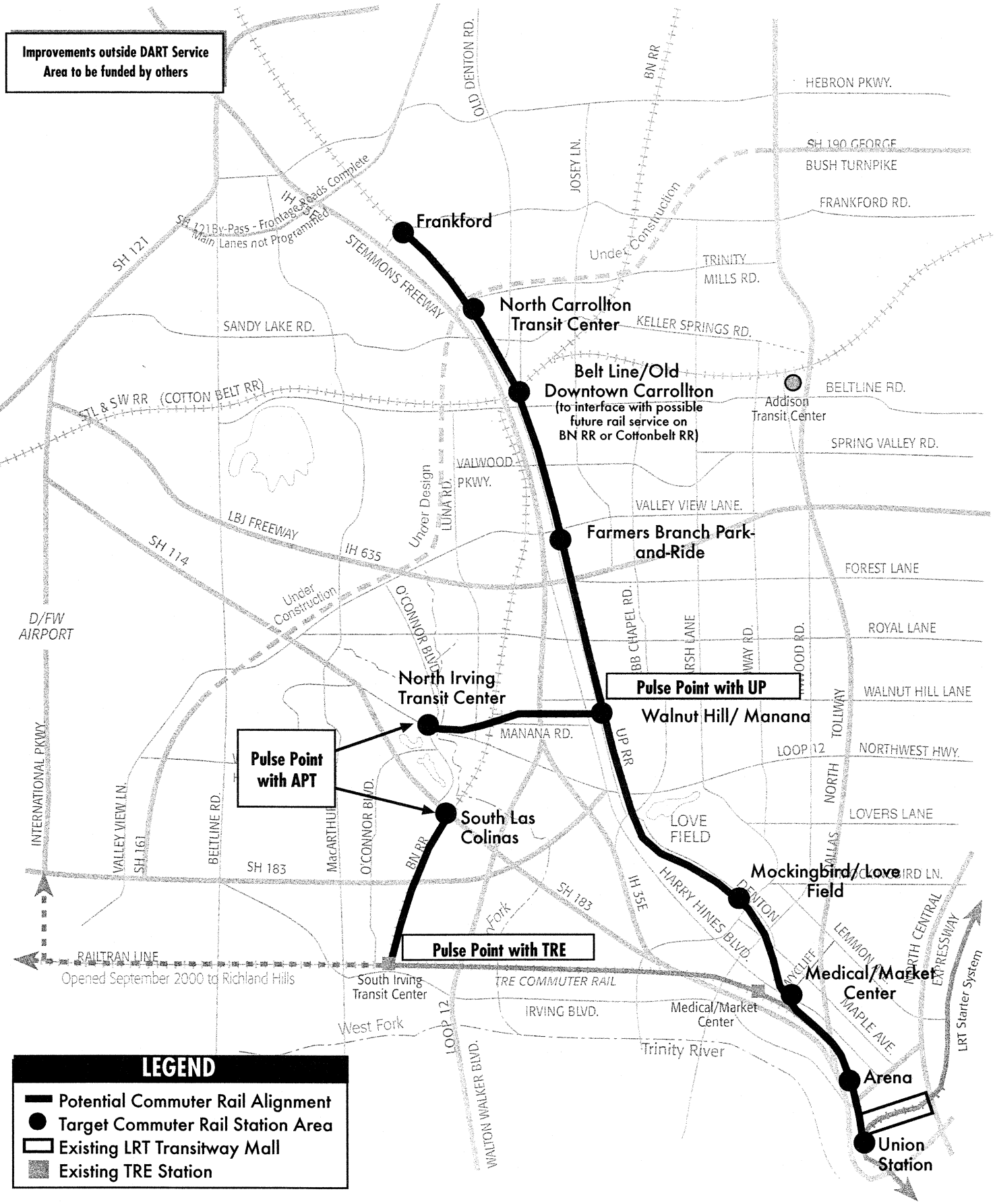



NW CORRIDOR MIS

MIS FINAL REPORT
REFINED COMMUTER RAIL 6 TO SH 121

FIGURE 4-9
Source: BRW, Inc.
Date: July 2000

DART BUS·RAIL·HOV




NW CORRIDOR MIS

MIS FINAL REPORT

REFINED COMMUTER RAIL 6 TO FRANKFORD

FIGURE 4-10
Source: BRW, Inc.
Date: July 2000

DART BUS·RAIL·HOV

**TABLE 4.9**
**COMMUTER RAIL ALTERNATIVES – TARGET STATION CHARACTERISTICS**

| Target Station Area | Alternative | | Mode Type | | | | |
|---|---|---|---|---|---|---|---|
| | 6 | 7 | Park-and-Ride | Bus Transfer | Kiss-and-Ride | Rail Transfer | Walk/Bicycle |
| Union Station[1] | ✔ | ✔ | | ■ | ■ | ■ | ■ |
| Arena[2] | ✔ | ✔ | | ■ | | | ■ |
| Medical/Market Center | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| Mockingbird/Love Field | ✔ | ✔ | | ■ | ■ | | ■ |
| Walnut Hill/Mañana Station | ✔ | ✔ | ■ | ■ | ■ | ■ | ■ |
| Farmers Branch Park-and-Ride[3] | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| Beltline/Old Downtown Carrollton[4] | ✔ | ✔ | ■ | ■ | ■ | ■ | ■ |
| North Carrollton T.C.[3] | ✔ | | ■ | ■ | ■ | | ■ |
| SH 121/Lewisville | ✔ | | ■ | ■ | ■ | | ■ |
| SH 190 /BN | | ✔ | ■ | ■ | ■ | | ■ |
| SH 121/Legacy | | ✔ | ■ | ■ | ■ | | ■ |
| North Irving T.C. (Las Colinas APT)[5] | ✔ | ✔ | ■ | ■ | ■ | ■ | ■ |
| South Irving T.C. | | ✔ | ■ | ■ | ■ | ■ | ■ |

SOURCE: BRW, Inc.; December 1998.

Notes:
1 Existing commuter rail station; additional track may be need to accommodate operations.
2 The arena station is planned for current Trinity Railway Express service. New commuter rail service would also use this station.
3 Existing bus transit center/park-and-ride.
4 A station in this vicinity would provide the opportunity for a future rail transfer with potential rail lines along the Cotton Belt RR and the BN RR.
5 Possible rail transfer with the Las Colinas APT fixed-guideway system if extended to rail station.

### 4.4.5 Operations and Technology

#### Operations

Commuter rail service would operate similar to the existing and planned Trinity Railway Express commuter rail service. The alternatives would provide trunk service from Union Station in downtown Dallas to the north at 20-minute headways during peak periods. Off-peak service would be at 60-minute headways. Under Alternative 6, the service on the Mañana Spur would be provided as a separate shuttle service operating between the North Irving Transit Center the Walnut Hill/Mañana Station. A pulse point at the Walnut Hill/Mañana Station would be provided to match headways on the trunk line, and minimize waiting time. Passengers would off load on to the trunk service trains at the Walnut Hill/Mañana station to access North Irving/Las Colinas.

Under Alternative 7, the service on the south segment of the BN RR would operate under the same guidelines. A pulse point would be provided at South Irving Transit Center to match

headways on the Dallas-Fort Worth TRE service, and minimize wait time for transferring passengers.

This operating concept would provide a passenger capacity of approximately 2,600 passengers daily during the peak periods and a total daily capacity of over 8,000 in each direction.

**Technology**

The Commuter Rail vehicles would be the same as those used for the current TRE service. The TRE uses self-propelled rail diesel cars (RDC's) that carry 96 passengers per car. A diesel motor on each car supplies power. The RDCs operate in pairs, and are coupled as 2 or 4 depending on ridership demands.

**Loading Standards**

Loading standards would be consistent with those of the TRE service. The fares for commuter rail service in the Northwest Corridor would be consistent with those used for the Trinity Railway Express service.

### 4.4.6 Transit Improvements

This section provides a detailed description of the Commuter Rail and LRT system network. Feeder bus routes proposed for Commuter Rail stations, as well as improvements to the No-Build bus routes are also described.

**Commuter Rail and LRT System Network**

The Commuter Rail alternatives would become an integral part of the DART rail transit system as outlined in the DART ***Transit System Plan***. The Northwest Corridor Commuter Rail alternatives would extend north from Union Station. At Union Station, the Commuter Rail Alternatives would interface with the DART LRT system, providing linkages to Plano, Garland, South Oak Cliff and West Oak Cliff, as well as with the Trinity Railway Express Commuter Rail line between Dallas and Fort Worth. The LRT extension to Plano is expected to be complete by June 2003. The extension to Garland will be complete by November 2002. The TRE extension to Fort Worth is scheduled for completion in 2001.

**Feeder Bus Service Concept**

The proposed Commuter Rail bus network is based on the No-Build bus network with appropriate modifications to reflect the addition of Commuter Rail service. Bus route modifications are based on the feeder bus service concept, and follow these principles as set forth in the ***DART Bus/ Rail Interface Plan***:

- Utilize local bus routes as Commuter Rail feeders where feasible. Some detours to serve rail stations are acceptable, in accordance with the guidelines from the DART Bus/Rail Interface Plan.

- Delete superfluous bus routes, especially express routes that could duplicate Commuter Rail service to the CBD.

- Truncate routes at Commuter Rail stations where a portion of the route is no longer needed.

- Extend existing routes to rail stations where the extension is short and ridership is likely to benefit.

- Preserve existing bus route structure as much as possible to avoid inconveniencing local riders who will not use new rail service. Maintain the level of bus service and geographic coverage provided under the No-Build.

- Improve service on feeder routes.

Table 4.10 summarizes the proposed feeder bus routes to serve Commuter Rail stations under Alternatives 6 and 7.

**TABLE 4.10**
**COMMUTER RAIL STATIONS – PROPOSED FEEDER BUS SERVICE**

| STATION | ALTERNATIVE | | ROUTES SERVING STATION |
|---|---|---|---|
| | 6 | 7 | |
| Medical Market | ✔ | ✔ | 26, 405, 428, 453 |
| Mockingbird/Love Field | ✔ | ✔ | 29, 39, 539 |
| Walnut Hill/Mañana | ✔ | ✔ | 44, 59, 316, 402 |
| Farmers Branch | ✔ | ✔ | 59, 314, 321, 322, 331, 486 |
| Belt Line/ Old Downtown Carrollton | ✔ | ✔ | 400 |
| North Carrollton TC | ✔ | | 312, 313, 333A, 333B |
| SH 190 | | ✔ | 312, 313, 333A, 333B |
| SH 121/Legacy | | ✔ | 397, 807 |
| North Irving TC | ✔ | ✔ | 202, 234, 301/307, 302, 310, 315, 400, 428, 704A, 704B |

SOURCE: LKC Consulting; August 1999.

Note: No service is proposed for stations outside the DART Service Area.

**Improvements to No-Build Bus Routes**

Table 4.11 summarizes routes modifications to serve the Commuter Rail Alternatives. The majority of bus route changes are the same for Alternatives 6 and 7. Differences between the alternatives are most apparent in the northern segment north of Belt Line Road. Routes that are not proposed to change from the No-Build network are not listed.

Table 4.12 summarizes improvements to bus headways from the No-Build bus network. Many of the headway improvements are proposed to enhance timed transfer opportunities at Commuter Rail stations, which would have service headways of 20/60 (peak/base) minutes.

## TABLE 4.11
## COMMUTER RAIL ALTERNATIVES – CHANGES TO NO-BUILD BUS ROUTES

| ROUTE/ LINE | ROUTE NAME | CHANGES/ IMPROVEMENTS | |
|---|---|---|---|
| | | Alternative 6 | Alternative 7 |
| 29/21 | Maple | Deviate to Mockingbird/Love Field station | Same |
| 29/150 | Maple | Deviate to Mockingbird/Love Field station | Same |
| 39/36 | Love Field | Deviate to Mockingbird/Love Field station | Same |
| 44/13 | Bexar St | Deviate to Walnut Hill/Mañana station | Same |
| 59/55 | West Dallas | Deviate to Walnut Hill/Mañana station | Same |
| 59/75 | West Dallas | Deviate to Walnut Hill/Mañana station | Same |
| 59/85 | West Dallas Express | Eliminate Route | Same |
| 59/196 | West Dallas | Deviate to Walnut Hill/Mañana station | Same |
| 202/118 | N Irving-Las Colinas/MacArthur | Change End of Line from Downtown to the North Irving Transit Center | Same |
| 202/119 | N Irving-Las Colinas/DFW | Change End of Line from Downtown to the North Irving Transit Center | Same |
| 204/32, 48, 49 | N Carrollton | Eliminate Route | Same |
| 234 | East Plano/Las Colinas | Add stop at LBJ/Central Station | Same |
| 247 | Farmers Branch Park & Ride,Downtown | Eliminate Route | Same |
| 312 | **New Route**: North Carrollton Feeder | From N Carrollton TC via: Trinity Mills, Old Denton Rd, Rosemead Pkwy, Kelly, Petters Colony, Old Denton Rd, Trinity Mills to N Carrollton TC. | From SH 190 Station via: Trinity Mills, Josey Ln, Peters Colony, Old Denton Rd, Rosemead Pkwy, Kelly, Peters Colony, Josey Ln, Trinity Mills to SH 190 Station. |
| 313 | **New Route**: North Carrollton Feeder | From N Carrollton TC via: Trinity Mills, Old Denton Rd, Jackson, Josey Ln, Sherwood, Perry, Ryan, Denton Dr, Whitlock Ln, Broadway to N Carrollton TC. | From SH 190 Station via: Trinity Mills, Scott Mill, Jackson, Josey Ln, Sherwood, Perry, Ryan, Denton Dr, Whitlock Ln, Broadway to N Carrollton TC, Trinity Mills, Old Denton Rd, Jackson, Scott Mill, Trinity Mills to SH 190 Station. |
| 314 | **New Route**: Farmers Branch Feeder | From Farmers Branch station via: Valley View, Webb Chapel, Belt Line Rd, Kelly to Keller Springs Rd. | Same |
| 315 | **New Route**: North Irving Feeder | From North Irving TC via: NW Highway, Hidden Ridge, MacArthur Blvd, North Lake Junior College, Walnut Hill, Gateway, Belt Line Rd, Premier, Commerce, Gateway, Walnut Hill, North Lake Junior College, MacArthur Blvd, Hidden Ridge, NW Highway to North Irving TC. | Same |
| 316 | **New Route**: Walnut Hill/Mañana Feeder | From Walnut Hill/Mañana station via: Harry Hines, Southwell, Shady Trail, Merrell, Goodnite, Joe Field, | Same |

| ROUTE/ LINE | ROUTE NAME | CHANGES/ IMPROVEMENTS | |
|---|---|---|---|
| | | Alternative 6 | Alternative 7 |
| | | Newkirk, Crown, Reeder Dr, Royal Ln, Harry Hines to Walnut Hill/Mañana station. | |
| 333A/83 | Addison TC/N Carrollton TC | No change | Deviate to SH 190 Station on Trinity Mills. |
| 333B/234 | Frankford-Midway/N Carrollton TC | Route stays on Trinity Mills between Old Denton and Josey Ln. instead of going south to Jackson. | Route stays on Trinity Mills between Old Denton and Josey Ln. instead of going south to Jackson. Add stop at SH 190 Station. |
| 397/238 | Tollway P&R Feeder | N/A | Deviate to SH 121/Legacy Station via: Legacy Dr, SH 121 |
| 400/112 | Belt Line Crosstown | Add stop at Belt Line/Carrollton station | Same |
| 402 | **New Route:** Walnut Hill Crosstown | Walnut Hill/Mañana Station to S Garland TC via: Walnut Hill, North Central Expressway Service Rd, Park Lane LRT Station, Greenville Ave, Walnut Hill, Kingsley, Shiloh Rd. | N Irving TC to S Garland TC via: Northwest Hwy, Spangler, Mañana, Stemmons Service Rd, Walnut Hill to Walnut Hill/Mañana Station, Walnut Hill, North Central Expressway Service Rd, Park Lane LRT Station, Greenville Ave, Walnut Hill, Kingsley, Shiloh Rd. |
| 405/132 | Parkland/Ledbetter | Deviate to Medical/Market CR station | Same |
| 453/37 | Medical Center - SW Center Mall | Deviate to Medical/Market CR station | Same |
| 539/100 | Motor St/Harry Hines | Add stop at Mockingbird/Love Field station | Same |
| 807/57 | Legacy Park | N/A | Deviate to SH 121/Legacy Station via: Legacy Dr, SH 121 |

SOURCE: LKC Consulting; July 1999.

## TABLE 4.12
## COMMUTER RAIL ALTERNATIVES – IMPROVEMENTS TO NO-BUILD BUS HEADWAYS

| ROUTE/ LINE | ROUTE NAME | NO-BUILD HEADWAY | | ALTERNATIVE 6 HEADWAY | | ALTERNATIVE 7 HEADWAY | |
|---|---|---|---|---|---|---|---|
| | | Peak | Base | Peak | Base | Peak | Base |
| *Express Routes* | | | | | | | |
| 202/118 | N Irving-Las Colinas/MacArthur | 39 | -- | 40 | -- | 40 | -- |
| 202/119 | N Irving-Las Colinas/DFW | 28 | 53 | 20 | 60 | 20 | 60 |
| *Suburban Routes* | | | | | | | |
| 300/64 | DFW/S Irving Station | 30 | 45 | 30 | 45 | 20 | 60 |
| 301&307/65 | Walnut Hill/S Irving/W Irving | 30 | 50 | 20 | 50 | 20 | 50 |
| 302/66 | Story | 30 | 60 | 20 | 60 | 20 | 60 |
| 303/197 | N Irving TC/Karahan Pkwy | 45 | 45 | 40 | 45 | 40 | 45 |
| 305/69 | Rochelle | 30 | 60 | 30 | 60 | 20 | 60 |
| 305/70 | Rochelle | 30 | 60 | 30 | 60 | 20 | 60 |
| 309/73 | South Irving TC | 47 | 57 | 47 | 57 | 40 | 60 |
| 310/67 | Freeport/Irving Mall | 30 | 60 | 20 | 60 | 20 | 60 |
| 312 | **New Route**: North Carrollton Feeder | N/A | N/A | 20 | 60 | 20 | 60 |
| 313 | **New Route**: North Carrollton Feeder | N/A | N/A | 20 | 60 | 20 | 60 |
| 314 | **New Route**: Farmers Branch Feeder | N/A | N/A | 20 | 60 | 20 | 60 |
| 315 | **New Route**: North Irving Feeder | N/A | N/A | 20 | 60 | 20 | 60 |
| 316 | **New Route**: Walnut Hill/ Mañana Feeder | N/A | N/A | 20 | 60 | 20 | 60 |
| 321/77 | Valley View | 30 | 60 | 20 | 60 | 20 | 60 |
| 322/78 | Prestonwood Transfer Point/ Farmers Branch Park & Ride | 30 | -- | 20 | -- | 20 | -- |
| 331/81 | Josey | 35 | 60 | 20 | 60 | 20 | 60 |
| 333A/83 | Addison TC/N Carrollton TC | 30 | 60 | 20 | 60 | 20 | 60 |
| 333B/234 | Frankford-Midway/N Carrollton TC | 30 | 60 | 20 | 60 | 20 | 60 |
| 397/238 | Tollway P&R Feeder | 10 | 40 | 10 | 40 | 10 | 30 |
| *Crosstown Routes* | | | | | | | |
| 400/112 | Beltline Crosstown | 30 | 60 | 20 | 60 | 20 | 60 |
| 402 | **New Route:** Walnut Hill Crosstown | N/A | N/A | 20 | 60 | 20 | 60 |
| 428/156 | N Irving | 30 | 60 | 20 | 60 | 20 | 60 |
| 428/173 | Medical Market | 30 | 60 | 20 | 60 | 20 | 60 |
| *Rail Feeder Routes* | | | | | | | |
| 539/100 | Motor St/Harry Hines | 30 | 40 | 20 | 40 | 20 | 40 |
| *Trolley Routes* | | | | | | | |
| 704A/222 | Las Colinas | 30 | 30 | 20 | 30 | 20 | 30 |
| 704B/223 | Las Colinas | 30 | 30 | 20 | 30 | 20 | 30 |
| *800 Series Routes* | | | | | | | |
| 807/57 | Legacy Park | 30 | -- | 30 | -- | 20 | 60 |

SOURCE: LKC Consulting; July 1999.

**New Bus Routes**

As shown in Tables 4.11 and 4.12, six new bus routes are proposed under the Commuter Rail Alternatives. All six bus routes are envisioned to enhance feeder service to new Commuter Rail stations. The new bus routes are summarized below:

- Routes 312/313: North Carrollton Feeder – These new feeder routes would enhance service to proposed Commuter Rail stations at the North Carrollton Transit Center (Alternative 6) or the SH 190 Station (Alternative 7).

- Route 314: Farmers Branch Feeder – This feeder route would supplement feeder bus service to the Farmers Branch station under both alternatives.

- Route 315: North Irving Feeder – This route would supplement feeder bus service to the North Irving Transit Center.

- Route 316: Walnut Hill/Mañana Feeder – This route would feed the Walnut Hill/Mañana station from areas in North Dallas.

- Route 402: Walnut Hill Crosstown – This route is proposed as a new crosstown route from the North Irving Transit Center (Alternative 7) or the Walnut Hill/Mañana station (Alternative 6) to the South Garland Transit Center.

### 4.4.7 Capital Improvements

This section describes capital improvements associated with the implementation of either of the Commuter Rail Alternatives.

**Transit Facility Improvements**

Transit facility improvements include the construction of the Commuter Rail stations previously described. The Farmers Branch Park-and-Ride, North Carrollton Transit Center, North Irving Transit Center, and/or the South Irving Transit Center would be improved to accommodate Commuter Rail operations. No additional transit facility improvements are planned beyond those included in the No-Build Alternative.

**Street and Highway Improvements**

Street and highway improvements would be the same as those described under the No-Build Alternative and as contained in the 1998 ***Transportation Improvement Program*** (TIP). The Commuter Rail Alternative network also includes the regional CMS baseline improvements.

## 4.5 LIGHT RAIL TRANSIT ALTERNATIVES

This section describes in detail the four base LRT Alternatives and the subsequent refinements to these alternatives. An overview of the service concept, alignments descriptions, target station characteristics, operations and technology, and proposed transit and capital improvements are described. Conceptual plan and profile schematics for the LRT alternatives are contained in the *Draft LRT Alignments Report* (BRW, Inc.; August 1999).

### 4.5.1 Overview of Service Concept

The LRT Alternatives represent new radial high capacity transit corridors to serve major activity and employment centers in the study area. The LRT alternatives would provide service from downtown Dallas. The LRT alignments would serve as an extension from the existing LRT transitway mall north into the Carrollton/Farmers Branch area, and northwest into the Irving/SH 114 corridor.

As with Commuter Rail, feeder buses would provide service to LRT stations from adjacent neighborhoods and commercial areas. Station spacing would range from 1 to 3 miles to provide access to key activity centers.

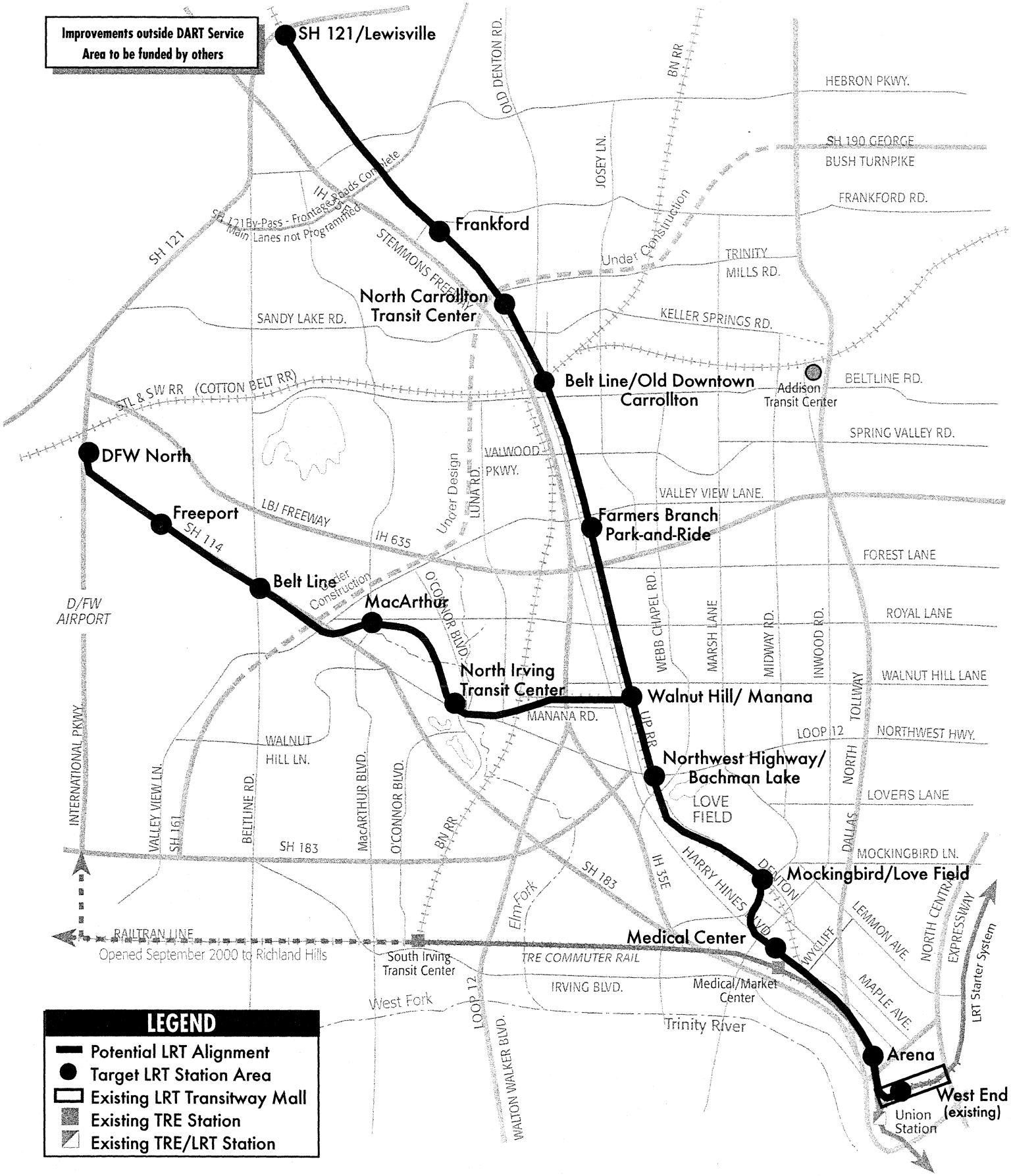
LRT alternatives would generally operate within existing railroad rights-of-way and involve the construction of a new double track alongside the existing freight track. Due to railroad regulations and safety considerations, the LRT tracks require an 18 foot buffer from the freight tracks.

### 4.5.2 Base Alternatives 8 through 11

The following sections describe the four base alternatives defined for the detailed evaluation. Section 4.5.3 describes subsequent refinements to these alternatives.

**Alternative 8 – LRT to SH 121 with Mañana/ SH 114**

Alternative 8, shown in Figure 4-11 would provide double-track LRT service from the existing LRT transitmall and share the Trinity Railway Express (TRE) corridor to the vicinity of Market Center. At this point it would diverge from the TRE corridor and follow Harry Hines Boulevard. The alignment would continue north through the Medical Center, transitioning to the UP RR south of Mockingbird Lane. The alignment would continue on the UP RR to SH 121 in Carrollton. Access to Las Colinas and DFW would be provided via the Mañana Spur and an alignment generally paralleling SH 114 to a DFW North station.

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## LRT BASE ALTERNATIVE 8

Harry Hines/UP to Lewisville with Mañana/SH 114

FIGURE 4-11

Source: BRW, Inc.

Date: July 2000

DART

**Alternative 9 - LRT to Legacy with Mañana/ SH 114**

As shown in Figure 4-12, LRT Alternative 9 incorporates several changes to Alternative 8. This alternative would provide double-track service along a Griffin alignment, which would diverge from the LRT transitmall near the West End station. The alignment would then pass through the new Arena development north of Woodall Rodgers Freeway and return to the TRE corridor, transitioning to Harry Hines near the Market Center. South of Mockingbird Lane, the alignment would leave Harry Hines and turn east and continue into Love Field via a tunnel to provide direct service to the terminal. The alignment would then return to the UP RR and follow the railroad corridor Belt Line Road. At Belt Line Road, the alignment would transition to the BN RR and follow that corridor to SH 121 near Legacy Park.

Access to Las Colinas and DFW would be provided via the Mañana Spur and an alignment generally paralleling SH 114 to a DFW North station.

**Alternative 10 – LRT to SH 121 with UD/ Texas Stadium/ SH 114/ DFW Spine**

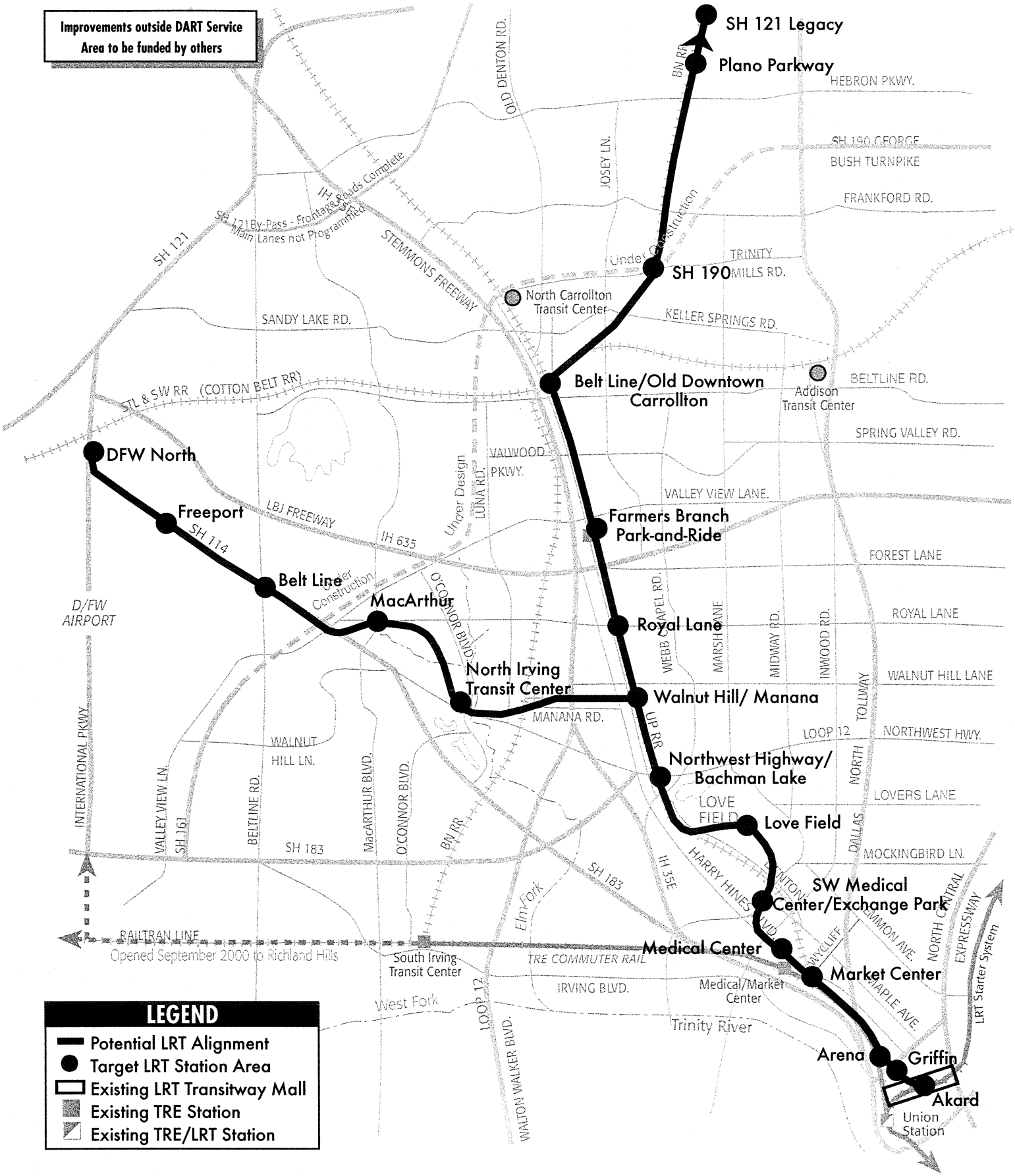
LRT Alternative 10, illustrated in Figure 4-13, would provide double-track service along the Griffin and Harry Hines alignments with a Love Field tunnel as described above. Upon leaving Love Field, the alignment would continue along the UP RR to SH 121.

Access to Las Colinas and DFW would be via the University of Dallas/Texas Stadium route. The alignment would then follow SH 114 to DFW North and continue south into DFW Airport to meet the TRE Centreport station.

**Alternative 11 - LRT to SH 121 with Mañana/ SH 114/ DFW Tunnel**

Figure 4-14 illustrates Alternative 11. This alternative would follow the same alignment to SH 121 as described for Alternatives 9 and 10 (Griffin, Harry Hines and Love Field Tunnel).

Access to Las Colinas and DFW Airport would be provided along the Mañana Spur and the SH 114 alignment. At Belt Line Road, the SH 114 alignment would transition to a tunnel route to access the future international terminal of DFW airport.

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## LRT BASE ALTERNATIVE 9

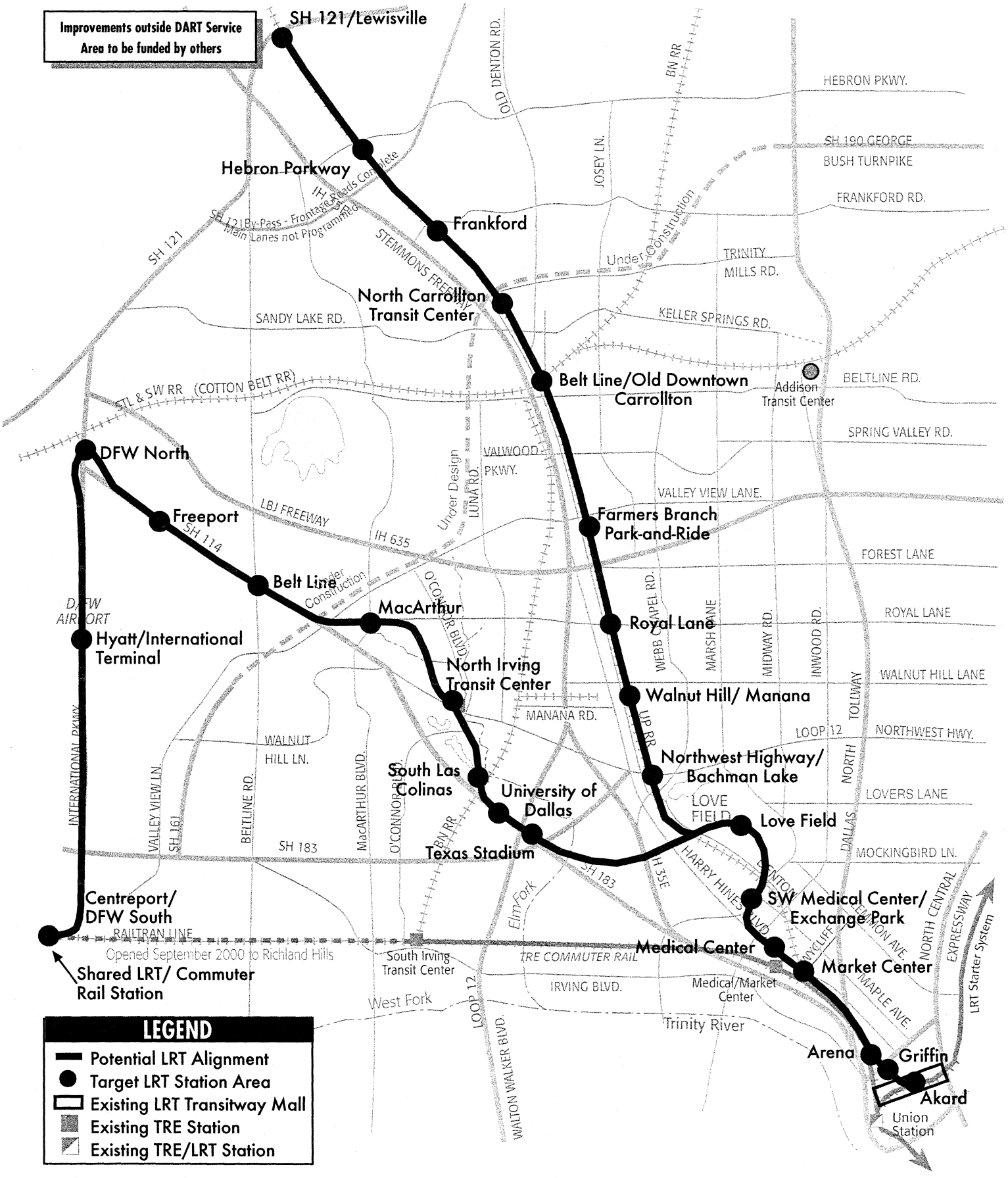
Harry Hines/UP/BN to Legacy with Mañana/SH114

FIGURE 4-12

Source: BRW, Inc.

Date: July 2000

DART


Improvements outside DART Service Area to be funded by others
SH 121/Lewisville
Hebron Parkway
Frankford
North Carrollton Transit Center
Belt Line/Old Downtown Carrollton
Addison Transit Center
DFW North
Freeport
Belt Line
MacArthur
Farmers Branch Park-and-Ride
Royal Lane
Walnut Hill/ Manana
Northwest Highway/ Bachman Lake
Love Field
SW Medical Center/ Exchange Park
Medical Center
Market Center
Arena
Griffin
Akard
Union Station
Hyatt/International Terminal
North Irving Transit Center
South Las Colinas
University of Dallas
Texas Stadium
Centreport/ DFW South
Shared LRT/ Commuter Rail Station
South Irving Transit Center
Medical/Market Center
SH 121 By-Pass - Frontage Roads Complete Main Lanes not Programmed
Under Construction
Under Design
HEBRON PKWY.
SH 190 GEORGE BUSH TURNPIKE
FRANKFORD RD.
TRINITY MILLS RD.
KELLER SPRINGS RD.
SANDY LAKE RD.
BELTLINE RD.
SPRING VALLEY RD.
VALWOOD PKWY.
VALLEY VIEW LANE.
FOREST LANE
ROYAL LANE
WALNUT HILL LANE
NORTHWEST HWY.
LOVERS LANE
MOCKINGBIRD LN.
IRVING BLVD.
LBJ FREEWAY
IH 635
SH 114
SH 183
SH 161
STEMMONS FREEWAY
STL & SW RR (COTTON BELT RR)
BN RR
UP RR
TRE COMMUTER RAIL
RAILTRAN LINE
Opened September 2000 to Richland Hills
West Fork
Trinity River
LEGEND
Potential LRT Alignment
Target LRT Station Area
Existing LRT Transitway Mall
Existing TRE Station
Existing TRE/LRT Station
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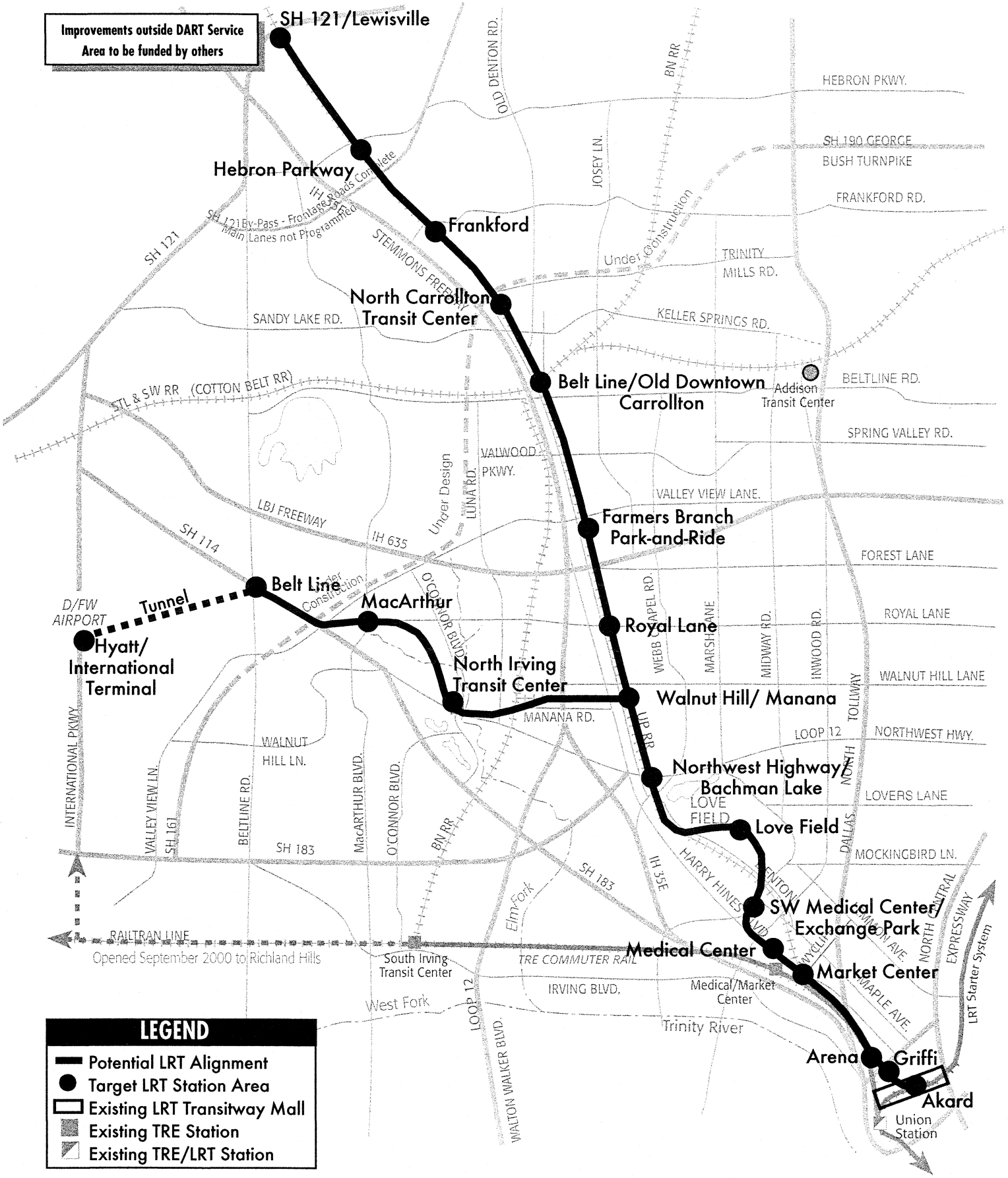
LRT BASE ALTERNATIVE 10
Harry Hines/UP to Lewisville with Texas Stadium/SH 114 through DFW
FIGURE 4-13
Source: BRW, Inc.
Date: July 2000
DART




NW CORRIDOR MIS

# MIS FINAL REPORT

## LRT BASE ALTERNATIVE 11

Harry Hines/UP to Lewisville with Mañana/DFW Tunnel

FIGURE 4-14

Source: BRW, Inc.

Date: July 2000

DART

### 4.5.3 Refinements to Base Alternatives

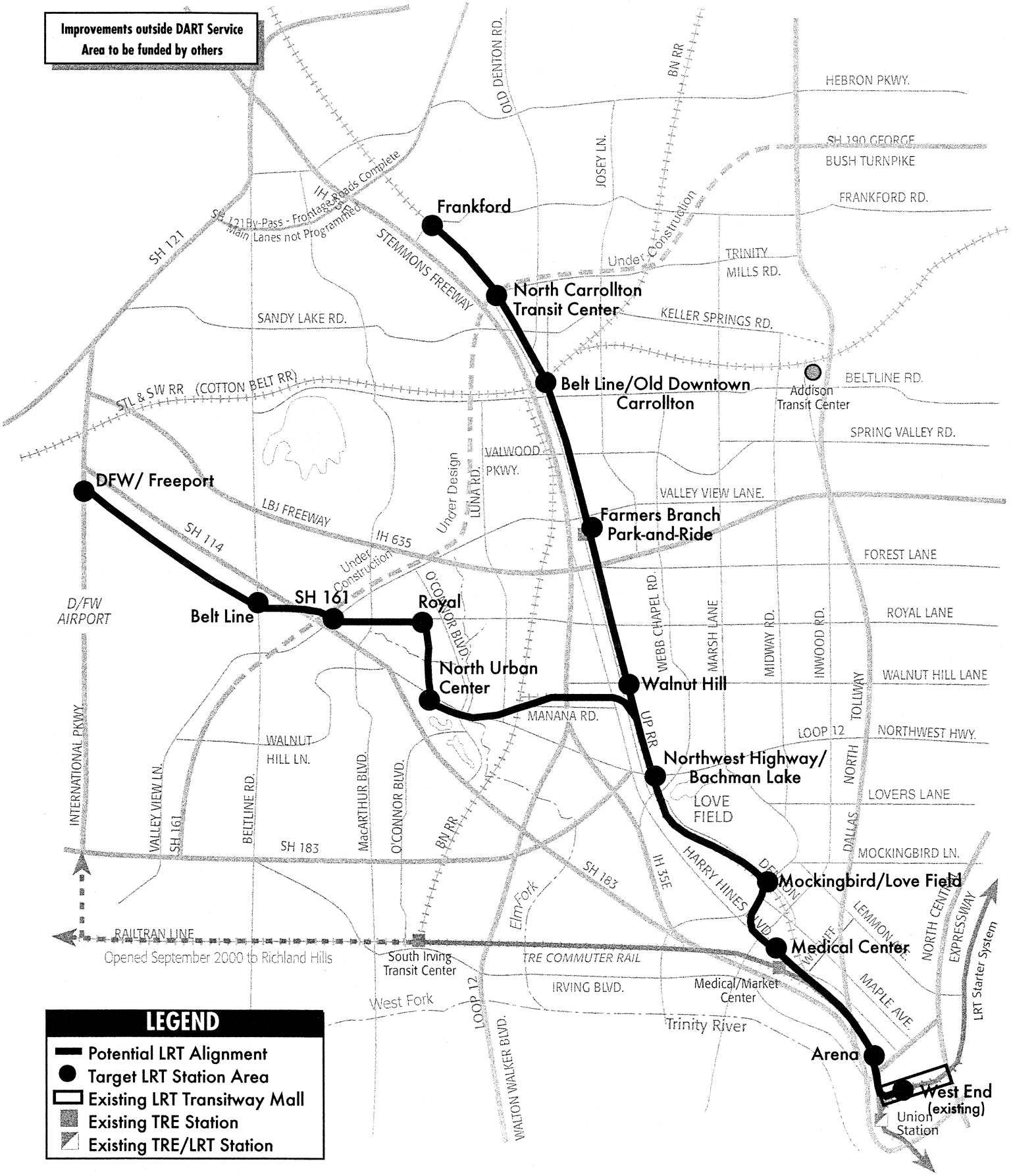
During the detailed evaluation process, several refinements were made to the base LRT alternatives to test different end-of-line options, different station locations, and minor alignment changes. A summary of the refinements is provided in Table 4.13. Figures 4-15 through 4-19 illustrate the refinements.

**TABLE 4.13**
**SUMMARY OF REFINEMENTS TO LRT ALTERNATIVES**

| Alternative | Changes to Base Alternative | Purpose |
|---|---|---|
| **LRT 12**<br>LRT to Frankford and DFW North via Mañana Spur option<br>(Figure 4-15) | Changes to base LRT Alternative 8:<br>- Truncated the line at Frankford within the DART Service Area<br>- Deleted the Market and Royal Lane Stations on the UP RR<br>- Used the Mañana Spur option to a North Urban Center Station south of Northwest Highway, rather than to the North Irving T.C.<br>- Incorporated a new SH 114/DFW alignment that uses DFW property and Irving road right-of-way to reduce cost<br>- Replaced the MacArthur, Belt Line, Freeport and DFW North stations with the Royal, SH 161, Belt Line and DFW North/Freeport stations | • Understand effects of truncating at Frankford<br>• Delete stations to speed up travel times and determine if adjacent stations could absorb riders<br>• Determine if North Urban Center station performs better than North Irving T.C.<br>• Test cost-effectiveness of new SH 114/DFW alignment with revised stations |
| **LRT 12A**<br>Same as above<br>(Figure 4-16) | Same as above except:<br>- Added the Market Center and Royal Lane stations back in | • Retain station ridership |
| **LRT 12B**<br>Same as above<br>(Figure 4-16) | Same as above except:<br>- Added the Market Center and Royal Lane stations back in<br>- Used Mañana Spur to NITC | • Retain station ridership<br>• Test NITC vs. NUC |
| **Refined LRT 10**<br>LRT to Frankford and DFW North via UD/Texas Stadium option<br>(Figure 4-17) | Changes to base LRT Alternative 10:<br>- Truncated the line at Frankford within the DART Service Area<br>- Deleted Love Field tunnel and DFW Spine segment<br>- Deleted the Market and (Dallas) Royal Lane Stations on the UP RR to speed up travel times and determine if adjacent stations could absorb these riders<br>- Used the Texas Stadium option to a North Urban Center Station south of Northwest Highway, rather than to the North Irving T.C.<br>- Deleted the Texas Stadium station and combined it with the University of Dallas station<br>- Incorporated a new SH 114/DFW alignment that uses DFW property and Irving road right-of-way to reduce cost | Same as above plus:<br>• Compare ridership and costs to Alternative 12 (ie. UD/Texas Stadium option vs. Mañana Spur option) |

| Alternative | Changes to Base Alternative | Purpose |
|---|---|---|
| | - Replaced the MacArthur, Belt Line, Freeport and DFW North stations with the Royal, SH 161, Belt Line and DFW North/Freeport stations | |
| **LRT 10A**<br>Same as above (Figure 4-18) | Same as above except:<br>- Added the Market Center and (Dallas) Royal Lane stations back in | • Retain station ridership |
| **LRT 10B**<br>Same as above (Figure 4-18) | Same as above except:<br>- Added the Market Center and Royal Lane stations back in<br>- Used the UD/Texas Stadium route via NITC | • Retain station ridership<br>• Test NITC vs. NUC |
| **LRT 8/ BN**<br>LRT to Frankford and the North Irving T.C. via the Mañana Spur (Figure 4-19) | Changes to base LRT Alternative 8:<br>- Truncated the line at Frankford within the DART Service Area<br>- Add the BN south segment from South Irving T.C. to a South Las Colinas station as Commuter Rail to test *with* LRT on the Mañana Spur | • To provide a direct mode to mode comparison with Commuter Rail Refined Alternative 6 to Frankford as described above<br>• Determine ridership and cost effects of adding Commuter Rail on BN south with Mañana Spur |

SOURCE: BRW, Inc.; November 1999.




NW CORRIDOR MIS

# MIS FINAL REPORT

## LRT ALTERNATIVE 12 (REFINEMENT) - HARRY HINES/UP TO FRANKFORD

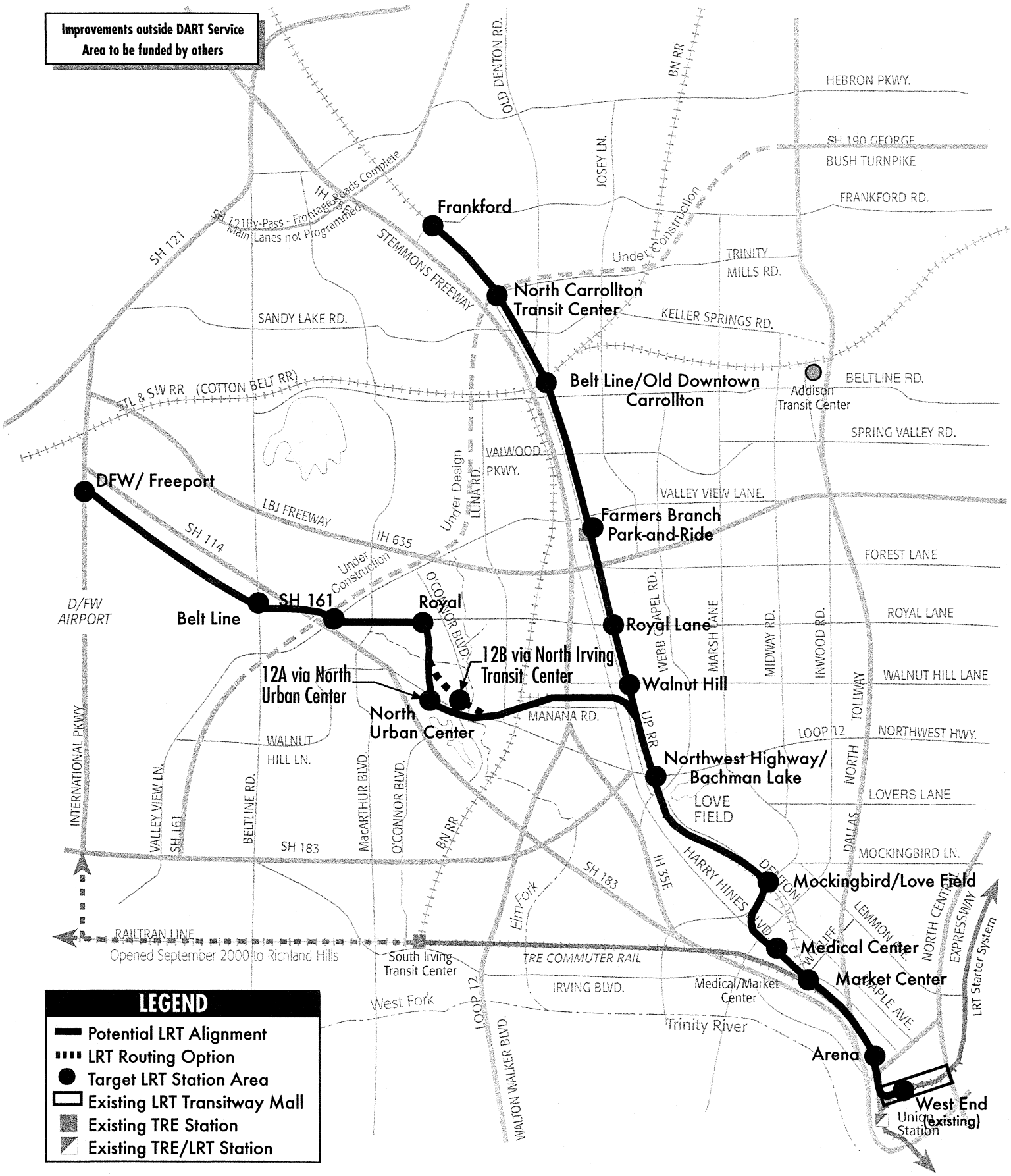
With Mañana to DFW via North Urban Center

FIGURE 4-15

Source: BRW, Inc.

Date: July 2000

DART




NW CORRIDOR MIS

# MIS FINAL REPORT

## LRT ALTERNATIVES 12A & 12B (REFINEMENTS) - HARRY HINES/UP TO FRANKFORD

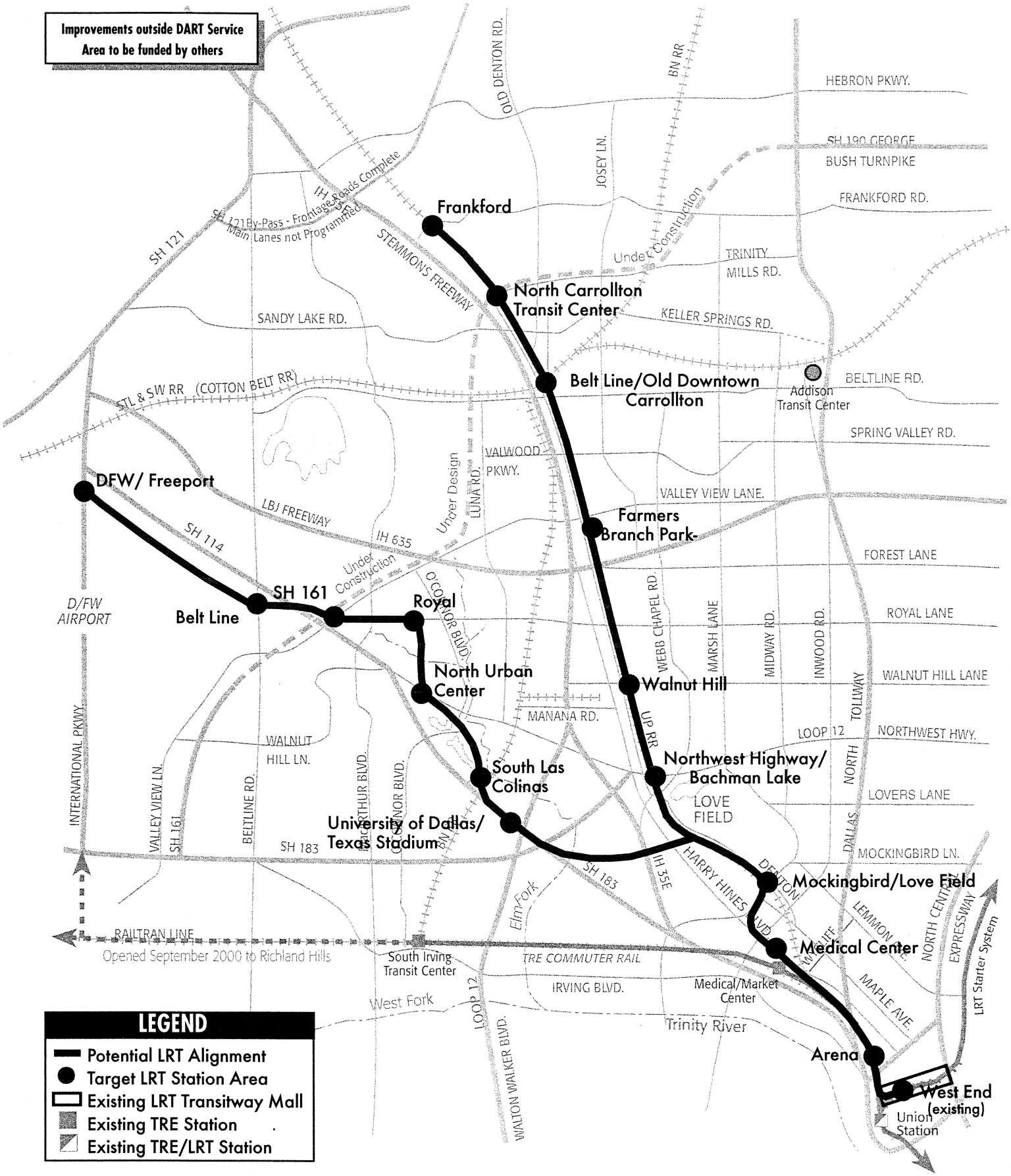
With Mañana to DFW

FIGURE 4-16

Source: BRW, Inc.

Date: July 2000

DART




NW CORRIDOR MIS

# MIS FINAL REPORT

## LRT ALTERNATIVE 10 REFINED (REFINEMENT) - HARRY HINES/UP TO FRANKFORD

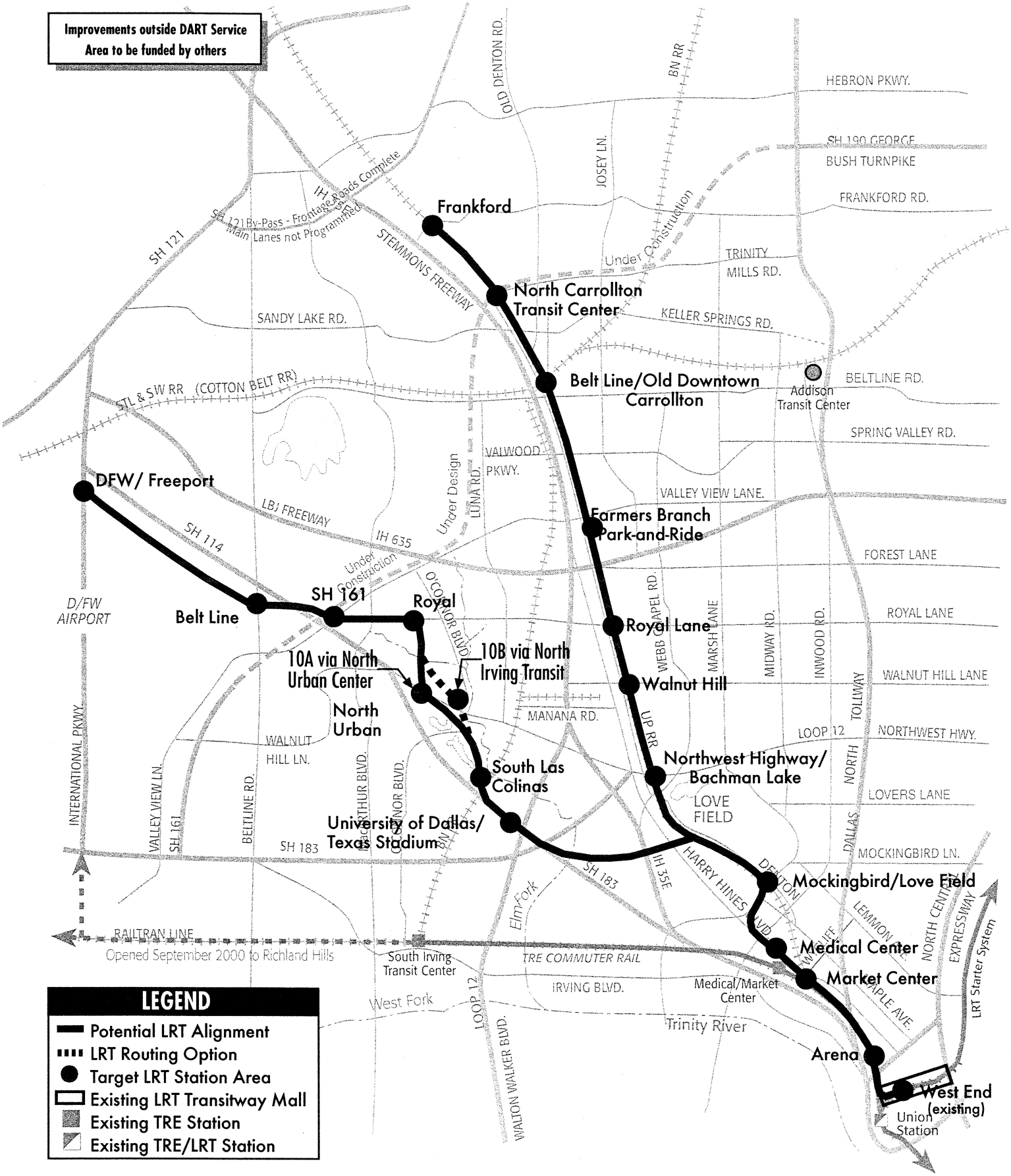
With UD/Texas Stadium Option to DFW via North Urban Center

FIGURE 4-17

Source: BRW, Inc.

Date: July 2000

DART



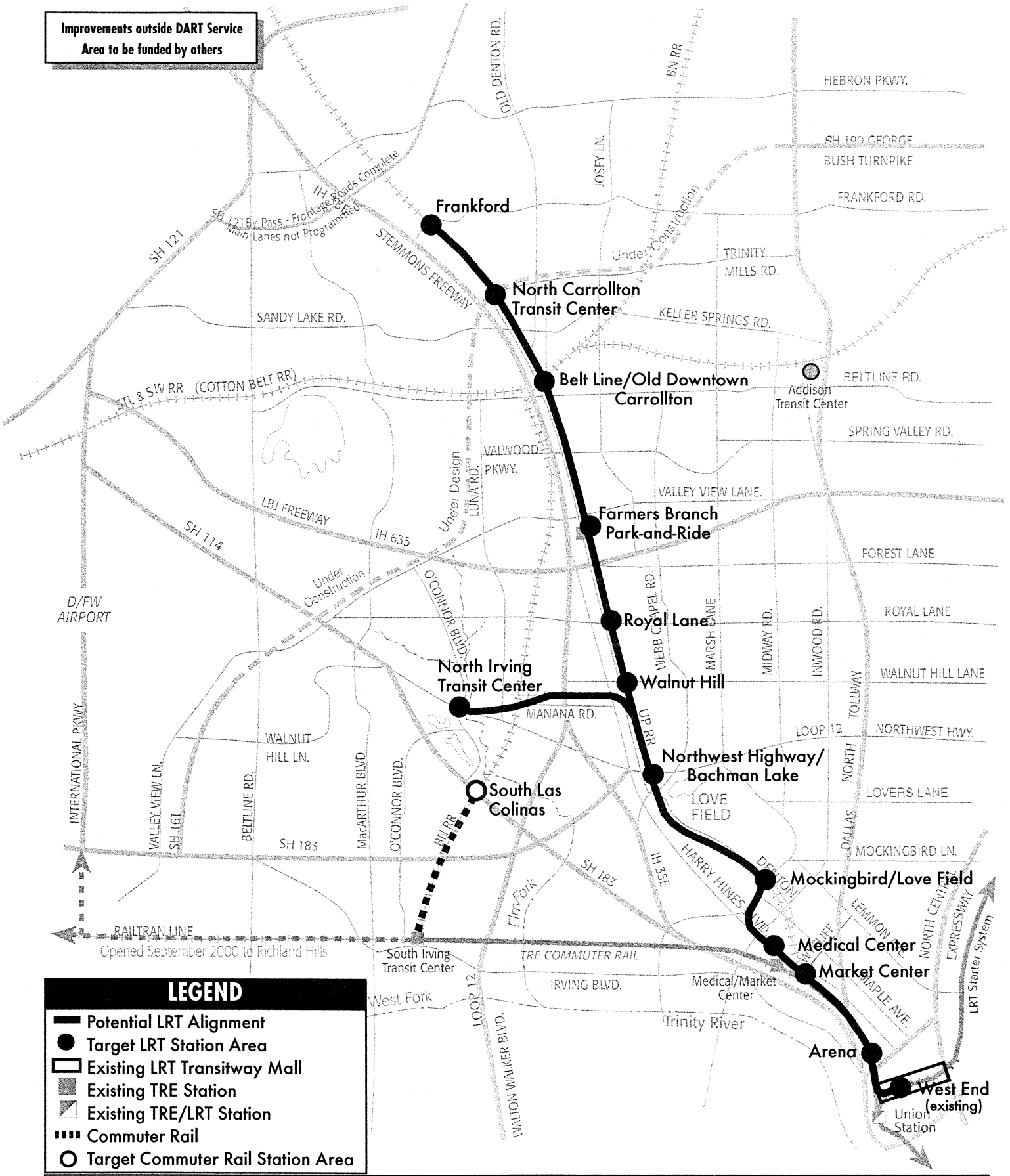

NW CORRIDOR MIS

# MIS FINAL REPORT

## LRT ALTERNATIVE 10A & 10B (REFINEMENTS) - HARRY HINES/UP TO FRANKFORD With UD/Texas Stadium Option to DFW

FIGURE 4-18
Source: BRW, Inc.
Date: July 2000

DART




NW CORRIDOR MIS

## MIS FINAL REPORT

LRT ALTERNATIVE 8/BN (REFINEMENT) - HARRY HINES/UP TO FRANKFORD

Mañana to North Irving Plus BN South Commuter Rail

FIGURE 4-19

Source: BRW, Inc.

Date: July 2000

DART

### 4.5.4 Target Station Locations

Table 4.14 summarizes the proposed target station locations and mode of access characteristics for base alternatives, including the anticipated modes of access to each station. As shown in the table, many stations have several modes of access available. Others have a limited mode of access such as the Love Field Terminal (walk access only).

**TABLE 4.14**
**LRT BASE ALTERNATIVES – TARGET STATION AREA CHARACTERISTICS**

| Target Station Area | | | | | Mode Type | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 8 | 9 | 10 | 11 | Park-and-Ride | Bus Transfer | Kiss-and-Ride | Rail Transfer | Walk/Bicycle |
| Transitway Mall[1] | ✔ | ✔ | ✔ | ✔ | | ■ | | ■ | ■ |
| Griffin | | ✔ | ✔ | ✔ | | ■ | | | ■ |
| Arena[2] | ✔ | ✔ | ✔ | ✔ | | ■ | | | ■ |
| Market Center | ✔ | ✔ | ✔ | ✔ | | ■ | ■ | | ■ |
| Medical Center | ✔ | ✔ | ✔ | ✔ | | ■ | | | ■ |
| SW Medical/Exchange Park | | ✔ | ✔ | ✔ | | ■ | ■ | | ■ |
| Mockingbird Lane/Love Field | ✔ | | | | | ■ | ■ | | ■ |
| Love Field Terminal | | ✔ | ✔ | ✔ | | | | | ■ |
| Northwest Highway/Bachman Lake | ✔ | ✔ | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| Walnut Hill/Mañana Station | ✔ | ✔ | ✔ | ✔ | ■ | ■ | ■ | ■ | ■ |
| Royal Lane | ✔ | ✔ | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| Farmers Branch Park-and-Ride[3] | ✔ | ✔ | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| Beltline/Old Downtown Carrollton[4] | ✔ | ✔ | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| North Carrollton T.C.[3] | ✔ | | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| Frankford | ✔ | | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| Hebron Parkway/Vista Ridge | ✔ | | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| SH 121/Lewisville | ✔ | | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| SH 190 /BN | | ✔ | | | ■ | ■ | ■ | | ■ |
| Plano Parkway/BN | | ✔ | | | ■ | ■ | ■ | | ■ |
| SH 121/Legacy | | ✔ | | | ■ | ■ | ■ | | ■ |
| Texas Stadium | | | ✔ | | ■ | ■ | ■ | | ■ |
| University of Dallas | | | ✔ | | ■ | | ■ | | ■ |
| South Las Colinas[4,5] | | | ✔ | | ■ | ■ | ■ | ■ | ■ |
| North Irving T.C. (Las Colinas APT)[5] | ✔ | ✔ | ✔ | ✔ | ■ | ■ | ■ | ■ | ■ |
| MacArthur | ✔ | ✔ | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| Beltline Road | ✔ | ✔ | ✔ | ✔ | ■ | ■ | ■ | | ■ |
| Freeport | ✔ | ✔ | ✔ | | ■ | ■ | ■ | | ■ |
| DFW North | ✔ | ✔ | ✔ | | ■ | ■ | ■ | | ■ |
| DFW (Hyatt/International) Terminal[6] | | | ✔ | ✔ | | | | ■ | ■ |
| Centreport/DFW South (TRE)[6] | | | ✔ | | ■ | ■ | ■ | ■ | ■ |

SOURCE: BRW, Inc.; December 1998.

Notes: [1] Existing LRT Starter System station(s); only Alternative 8 would access the West End Station, in addition to Akard, St. Paul and Pearl stations. Alternatives 9, 10, 11 would only access the latter three stations.
[2] Shared platform with the planned Trinity Railway Express commuter rail station.
[3] Existing bus transit center/park-and-ride.
[4] Although not modeled as part of the alternatives,, these stations offer an opportunity for future rail transfer with potential rail lines along the Cotton Belt RR and/or the BN RR.
[5] Rail transfer with the Las Colinas APT system.

### Station Area Refinements

The above target station areas were defined for the base alternatives. Subsequent refinements to Alternative 8 and 10, specifically, variations to Alternative 10 Refined and Alternative 12, follow a slightly different alignment from Las Colinas to DFW Airport. This refined alignment resulted in new target station areas for these alternatives as illustrated in Figures 4-15 through 4-19. A summary is as follows:

- **UD/ Texas Stadium** – Base Alternative 10 had separate stations serving Texas Stadium and the University of Dallas. To reduce cost, the alignment was refined through this area and these two stations were combined at the UD station. This results in a walk or shuttle bus distance of approximately 2/3 mile to Texas Stadium for special events.

- **North Urban Center** – This station area was developed as an alternative to the North Irving Transit Center. The North Urban Center station would be located south of Northwest Highway closer to the more densely developed portion of the Urban Center. The City of Irving has also indicated that this area could be planned as a Transit-Oriented Development. Limited parking could be provided.

- **Royal Lane** – With the refined alignment through Irving, the (Irving) Royal Lane station would be located near commercial developments along Las Colinas Boulevard and Royal Lane.

- **SH 161** – The SH 161 station would replace the MacArthur station in order to better capture commuters at a rail park-and-ride lot.

- **Belt Line** – With the refined alignment, the Belt Line station shifts to the south side of SH 114. At this point, the alignment continues westerly within DFW airport right-of-way to reduce costs. The Freeport station would be deleted and be served from both Belt Line and DFW North.

- **DFW North** – This station area moves west to the DFW North shuttle parking lot. An eventual people mover connection, and interim bus shuttle service to airport terminals could be provided.

### 4.5.5 Operations and Technology

The LRT Alternatives would operate similar to the existing and planned LRT system. LRT Alternatives would operate on 10-minute peak headways, with a 20-minute off-peak schedule. The DART Starter System operates from 5:30 am to 12:30 am.

The operating concept is to operate two lines from downtown Dallas, one which will continue north into Carrollton, and one of which would turn west at the Mañana Spur or UD/Texas Stadium alignment option, continuing through Irving and possibly to DFW Airport. The LRT lines would share a common alignment south of where the Irving line would diverge. This operating scenario would result in an effective 5-minute peak and 10-minute off-peak headway on the common segment south of this point. Movements between Carrollton/Farmers Branch area and Irving would have to transfer at a station common to both lines (ie. Northwest Highway for Mañana, Mockingbird for UD/Texas Stadium).

For the purpose of the detailed evaluation, the LRT Alternatives are assumed to terminate at the Pearl Street Station. Interlining possibilities are discussed in the trade-off analysis of Chapter 6. Interlining the trains would require them to travel through the downtown transitway mall. The capacity of the transitway mall in the Dallas CBD is currently being examined by DART. That investigation will address in part, capacity issues within the transitway mall. The issue of capacity relates directly to the number of trains that the transitway mall can accommodate without exceeding the minimum headway threshold of 2.5 minutes as established by the City of Dallas for traffic impacts. If thresholds are exceeded, alternative operating plans, TSM, small scale capital improvements, or a downtown subway will be examined.

#### Technology

The Light Rail Vehicles (LRVs) would be identical to those being used for the existing LRT Starter System. The LRVs are electrically driven, using a Direct Current power source of 750 volts.

Power is supplied through an overhead catenary system. Electricity would be supplied by the Texas Utilities Electric Company (TXU). In order to convert the power to the 750 volts D.C. needed, substations would be provided at approximately one mile intervals. These facilities would have switch gear and other electric components, and must be housed in a same structure. Typical substation size is 30 by 30 feet.

#### Loading Standards

Loading standards would be consistent with those of the Starter System. Vehicle person capacity of the DART light rail vehicles used on the Starter System is 76 seated and 152 seated and standing. The fares for LRT service in the Northwest Corridor would be consistent with those used on the LRT Starter System

### 4.5.6 Transit Improvements

The following sections describe the proposed transit improvements under each LRT Alternative.

**LRT System Network**

An LRT Alternative in the Northwest Corridor would become an integral part of the DART LRT system network. While the DART ***Transit System Plan*** identifies the Northwest Corridor as Commuter Rail, an LRT improvement would provide interlining options not available with Commuter Rail. The current LRT Starter System provides LRT service to Park Lane along the North Central line, and to South Oak Cliff and West Oak Cliff. The Garland line is currently under construction to extend northeast from the North Central line just north of the Mockingbird Station. The Garland line is expected to be complete by November 2002. An extension of the North Central line from Park Lane to Parker Road in Plan is planned to be complete by June 2003.

The Southeast Corridor MIS was recently completed, and examined an extension of LRT into the Pleasant Grove area from the LRT transitway mall.

**Feeder Bus Service Concept**

The proposed bus networks for each of the LRT Alternatives modify the No-Build bus network to reflect LRT service in the corridor. The modifications are based on the guidelines contained in the ***DART Bus/ Rail Interface Plan,*** previously described for the Commuter Rail alternatives. These same guidelines apply to the LRT Alternatives.

One of the key elements of the route modifications is feeder bus service to proposed LRT stations. Feeder bus service can enhance access to stations and increase transit system ridership. Table 4.15 summarizes the feeder routes proposed to serve stations associated with the LRT Alternatives.

## TABLE 4.15
## LRT ALTERNATIVES – PROPOSED FEEDER BUS SERVICE

| STATION | ALTERNATIVE | | | | ROUTES SERVING STATION |
|---|---|---|---|---|---|
| | 8 | 9 | 10 | 11 | |
| Griffin St | | ✔ | ✔ | ✔ | All routes that stop at the West End Transit Center |
| Arena | ✔ | ✔ | ✔ | ✔ | 21 |
| Market Center | ✔ | ✔ | ✔ | ✔ | 26, 44 |
| Medical Center | ✔ | ✔ | ✔ | ✔ | 405, 409, 428, 453, 539 |
| SW Medical/Exchange Park | | ✔ | ✔ | ✔ | 26, 29, 539 |
| Mockingbird/Love Field | ✔ | | | | 29, 39, 539 |
| Love Field Terminal | | ✔ | ✔ | ✔ | 39, 539 |
| Northwest Hwy/Bachman Lake | ✔ | ✔ | ✔ | ✔ | 44, 428 |
| Walnut Hill/Mañana | ✔ | ✔ | ✔ | ✔ | 59, 402 |
| Royal Lane | ✔ | ✔ | ✔ | ✔ | 59, 314 |
| Farmers Branch | ✔ | ✔ | ✔ | ✔ | 59, 317, 321, 322, 331, 486 |
| Belt Line/Old Downtown Carrollton | ✔ | ✔ | ✔ | ✔ | 313, 400 |
| North Carrollton Transit Center | ✔ | | ✔ | ✔ | 333A, 333B |
| Frankford | ✔ | | ✔ | ✔ | 312 |
| SH 190 | | ✔ | | | 312, 333A, 333B |
| Plano Parkway | | ✔ | | | 331 |
| Texas Stadium | | | ✔ | | Special event only |
| University of Dallas | | | ✔ | | 305 |
| South Las Colinas | | | ✔ | | 704A, 704B |
| North Irving TC | ✔ | ✔ | ✔ | ✔ | 234, 301/307, 302, 310, 400, 428, 704A, 704B |
| MacArthur | ✔ | ✔ | ✔ | ✔ | 303, 310 |
| Belt Line | ✔ | ✔ | ✔ | ✔ | 315 |
| Freeport[1] | ✔ | ✔ | ✔ | | 316 |

SOURCE: LKC Consulting; July 1999.

Note: No service is proposed for stations outside the DART Service Area.
[1] Route 316 – Freeport Feeder is deviated to the Belt Line Station under Alternative 11.

### Improvements to No-Build Bus Routes

Tables 4.16 and 4.17 summarize the proposed route and headway changes to the No-Build bus network under each of the base LRT Alternatives. The most notable routing differences are evident in areas where the LRT Alternatives different significantly, such as north of Belt Line Road, and how access to the Las Colinas area or DFW Airport is achieved. Bus route changes are similar under the refined alternatives.

## TABLE 4.16
## LRT ALTERNATIVES – CHANGES TO NO-BUILD BUS ROUTES (Alternatives 8 and 9)

| ROUTE/ LINE | ROUTE NAME | CHANGES/ IMPROVEMENTS | |
|---|---|---|---|
| | | Alternative 8 | Alternative 9 |
| 21/34 | Kiest | Add stop at Arena station | Deviate to Arena station |
| 26/121 | Hines | Deviate to Market Center station | Deviate to Market Center station |
| 26/122 | Hines | Deviate to Market Center station | Deviate to Market Center station and SW Medical Center/Exchange Park station |
| 26/139 | Hines | Deviate to Market Center station | Deviate to Market Center station and SW Medical Center/Exchange Park station |
| 29/21 | Maple | Deviate to Mockingbird/Love Field station | Deviate to SW Medical Center/Exchange Park station |
| 29/150 | Maple | Deviate to Mockingbird/Love Field station | Deviate to SW Medical Center/Exchange Park station |
| 39/36 | Love Field | Deviate to Mockingbird/Love Field station | Add stop at Love Field Terminal station |
| 44/13 | Bexar St | Deviate to Market Center station and Northwest Hwy/Bachman Lake station | Deviate to Market Center station and Northwest Hwy/Bachman Lake station |
| 44/15 | Bexar St | Deviate to Market Center station | Deviate to Market Center station |
| 59/55 | West Dallas | Deviate to Walnut Hill/Mañana station and Royal Land station | Deviate to Walnut Hill/Mañana station and Royal Lane station |
| 59/75 | West Dallas | Deviate to Walnut Hill/Mañana station and Royal Land station | Deviate to Walnut Hill/Mañana station and Royal Lane station |
| 59/85 | West Dallas Express | Eliminate Route | Eliminate Route |
| 59/196 | West Dallas | Deviate to Walnut Hill/Mañana station and Royal Land station | Deviate to Walnut Hill/Mañana station and Royal Lane station |
| 202/118 | N Irving-Las Colinas/MacArthur | Eliminate Route | Eliminate Route |
| 202/119 | N Irving-Las Colinas/DFW | Eliminate Route | Eliminate Route |
| 204 | N Carrollton | Eliminate Route | Eliminate Route |
| 234 | East Plano/Las Colinas | Add stop at LBJ/Central Station. | Add stop at LBJ/Central Station. |
| 247 | Farmers Branch Park & Ride,Downtown | Eliminate Route | Eliminate Route |
| 305/69 | Rochelle | No change | No change |
| 305/70 | Rochelle | No change | No change |
| 310/67 | Freeport/Irving Mall | End route at MacArthur station | End route at MacArthur station |
| 312 | **New Route**: North Carrollton Feeder | From Frankford station via: Frankford Rd, FM 2281, Rosemead Pkwy, Furneaux Dr, Peters Colony, FM 2281, Frankford Rd to Frankford station | From SH 190 Station via: Trinity Mills, Josey Ln, Peters Colony, Old Denton Rd, Rosemead Pkwy, Kelly, Peters Colony, Josey Ln, Trinity Mills to SH 190 Station. |
| 313 | **New Route**: Belt Line/Old | From Belt Line/Old DowntownCarrollton station via: Belt | From Belt Line/Old Downtown Carrollton station via: Belt |

| ROUTE/ LINE | ROUTE NAME | CHANGES/ IMPROVEMENTS | |
|---|---|---|---|
| | | Alternative 8 | Alternative 9 |
| | Downtown Carrollton Feeder | Line Rd, Luna Rd, I-35 Frontage, Belt Line Rd to Belt Line/Old Downtown Carrollton station, Belt Line Rd, Denton Dr, Ryan Ave, Perry Rd, Belt Line Rd to Belt Line/Old Downtown Carrollton Station. | Line Rd, Luna Rd, I-35 Frontage, Belt Line Rd to Belt Line/Old Downtown Carrollton station, Belt Line Rd, Denton Dr, Ryan Ave, Perry Rd, Belt Line Rd to Belt Line/Old Downtown Carrollton Station. |
| 314 | **New Route**: Royal Lane Feeder | From Royal Lane station via: Royal Lane, Newkirk St, Crown St, Reeder Rd, Royal Lane to Royal Lane station. | From Royal Lane station via: Royal Lane, Newkirk St, Crown St, Reeder Rd, Royal Lane to Royal Lane station. |
| 315 | **New Route**: North Irving Feeder | From Beltline station via: Beltline Rd, Regent Blvd, Royal Ln, Beltline Rd, Valley View Ln, Gateway Dr, Beltline Rd to Beltline station. | From Beltline station via: Beltline Rd, Regent Blvd, Royal Ln, Beltline Rd, Valley View Ln, Gateway Dr, Beltline Rd to Beltline station. |
| 316 | **New Route**: Freeport Feeder | From Freeport station via: Freeport Pkwy, Royal Ln, Esters Rd, Royal Ln, Freeport Pkwy, N Airfield Dr to DFW, N Airfield Dr to Freeport station. | From Freeport station via: Freeport Pkwy, Royal Ln, Esters Rd, Royal Ln, Freeport Pkwy, N Airfield Dr to DFW, N Airfield Dr to Freeport station. |
| 317 | **New Route**: Farmers Branch Feeder | From Farmers Branch station via: Valley View, Webb Chapel, Belt Line Rd, Kelly to Keller Springs Rd. | From Farmers Branch station via: Valley View, Webb Chapel, Belt Line Rd, Kelly to Keller Springs Rd. |
| 331/81 | Josey | No change | Extend to Plano Parkway station |
| 333A/83 | Addison TC/N Carrollton TC | Stop at N. Carrollton Transit Center/Station | Deviate to SH 190 Station on Trinity Mills. |
| 333B/234 | Frankford-Midway/N Carrollton TC | Stop at N. Carrollton Transit Center/Station | Add stop at SH 190 Station. |
| 397/238 | Tollway P&R Feeder | N/A | Deviate to SH 121/Legacy Station via: Legacy Dr, SH 121 |
| 400/112 | Belt Line Crosstown | Add stop at Belt Line/Old Downtown Carrollton station | Add stop at Belt Line/Old Downtown Carrollton station |
| 402 | **New Route:** Walnut Hill Crosstown | Walnut Hill/Mañana Station to S Garland TC via: Walnut Hill, North Central Expressway Service Rd, Park Lane LRT Station, Greenville Ave, Walnut Hill, Kingsley, Shiloh Rd. | Walnut Hill/Mañana Station to S Garland TC via: Walnut Hill, North Central Expressway Service Rd, Park Lane LRT Station, Greenville Ave, Walnut Hill, Kingsley, Shiloh Rd. |
| 405/132 | Parkland/Ledbetter | Deviate to Medical Center station | Deviate to Medical Center station |
| 409/198 | King Center-Irving-DFW | Deviate to Medical Center station | Deviate to Medical Center station |
| 428/156 | N Irving | Add stop at Northwest Hwy/Bachman Lake station | Add stop at Northwest Hwy/Bachman Lake station |
| 428/173 | Medical Market | Deviate to Medical Center station | Deviate to Medical Center station |
| 453/37 | Medical Center - SW Center Mall | Deviate to Medical Center station | Deviate to Medical Center station |
| 486/159 | Garland Central/Farmers Branch | No change | No change |
| 539/100 | Motor St/Harry Hines | Add stop at Mockingbird/Love Field station and Medical Center station | Add stop at Love Field Terminal station, SW Medical Ctr/Exchange Park station and Medical Center station |
| 704A/222 | Las Colinas | No change | No change |
| 704B/223 | Las Colinas | No change | No change |
| 807/57 | Legacy Park | N/A | Deviate to SH 121/Legacy Station via: Legacy Dr, SH 121 |

SOURCE: LKC Consulting; DART; September 1999.

**TABLE 4.16 (Continued)**
**LRT ALTERNATIVES – CHANGES TO NO-BUILD BUS ROUTES (Alternatives 10 and 11)**

| ROUTE/ LINE | ROUTE NAME | CHANGES/ IMPROVEMENTS | |
|---|---|---|---|
| | | Alternative 10 | Alternative 11 |
| 21/34 | Kiest | Deviate to Arena station | Deviate to Arena station |
| 26/121 | Hines | Deviate to Market Center station | Deviate to Market Center station |
| 26/122 | Hines | Deviate to Market Center station and SW Medical Center/Exchange Park station | Deviate to Market Center station and SW Medical Center/Exchange Park station |
| 26/139 | Hines | Deviate to Market Center station and SW Medical Center/Exchange Park station | Deviate to Market Center station and SW Medical Center/Exchange Park station |
| 29/21 | Maple | Deviate to SW Medical Center/Exchange Park station | Deviate to SW Medical Center/Exchange Park station |
| 29/150 | Maple | Deviate to SW Medical Center/Exchange Park station | Deviate to SW Medical Center/Exchange Park station |
| 39/36 | Love Field | Add stop at Love Field Terminal station | Add stop at Love Field Terminal station |
| 44/13 | Bexar St | Deviate to Market Center station and Northwest Hwy/Bachman Lake station | Deviate to Market Center station and Northwest Hwy/Bachman Lake station |
| 44/15 | Bexar St | Deviate to Market Center station | Deviate to Market Center station |
| 59/55 | West Dallas | Deviate to Walnut Hill/Mañana station and Royal Lane station | Deviate to Walnut Hill/Mañana station and Royal Lane station |
| 59/75 | West Dallas | Deviate to Walnut Hill/Mañana station and Royal Lane station | Deviate to Walnut Hill/Mañana station and Royal Lane station |
| 59/85 | West Dallas Express | Eliminate Route | Eliminate Route |
| 59/196 | West Dallas | Deviate to Walnut Hill/Mañana station and Royal Lane station | Deviate to Walnut Hill/Mañana station and Royal Lane station |
| 202/118 | N Irving-Las Colinas/MacArthur | Eliminate Route | Eliminate Route |
| 202/119 | N Irving-Las Colinas/DFW | Eliminate Route | Eliminate Route |
| 204 | N Carrollton | Eliminate Route | Eliminate Route |
| 234 | East Plano/Las Colinas | Add stop at LBJ/Central Station. | Add stop at LBJ/Central Station. |
| 247 | Farmers Branch Park & Ride,Downtown | Eliminate Route | Eliminate Route |
| 305/69 | Rochelle | Add stop at University of Dallas station | No change |
| 305/70 | Rochelle | Add stop at University of Dallas station | No change |
| 310/67 | Freeport/Irving Mall | End route at MacArthur station | End route at MacArthur station |
| 312 | **New Route**: North Carrollton Feeder | From Frankford station via: Frankford Rd, FM 2281, Rosemead Pkwy, Furneaux Dr, Peters Colony, FM 2281, Frankford Rd to Frankford station | From Frankford station via: Frankford Rd, FM 2281, Rosemead Pkwy, Furneaux Dr, Peters Colony, FM 2281, Frankford Rd to Frankford station |
| 313 | **New Route**: Belt Line/Old Downtown Carrollton Feeder | From Belt Line/Old DowntownCarrollton station via: Belt Line Rd, Luna Rd, I-35 Frontage, Belt Line Rd to Belt Line/Old Downtown Carrollton station, Belt Line Rd, Denton Dr, Ryan Ave, Perry Rd, Belt Line Rd to Belt Line/Old Downtown | From Belt Line/Old DowntownCarrollton station via: Belt Line Rd, Luna Rd, I-35 Frontage, Belt Line Rd to Belt Line/Old Downtown Carrollton station, Belt Line Rd, Denton Dr, Ryan Ave, Perry Rd, Belt Line Rd to Belt Line/Old Downtown |

| ROUTE/ LINE | ROUTE NAME | CHANGES/ IMPROVEMENTS | |
|---|---|---|---|
| | | Alternative 10 | Alternative 11 |
| | | Carrollton Station. | Carrollton Station. |
| 314 | **New Route**: Royal Lane Feeder | From Royal Lane station via: Royal Lane, Newkirk St, Crown St, Reeder Rd, Royal Lane to Royal Lane station. | From Royal Lane station via: Royal Lane, Newkirk St, Crown St, Reeder Rd, Royal Lane to Royal Lane station. |
| 315 | **New Route**: North Irving Feeder | From Beltline station via: Beltline Rd, Regent Blvd, Royal Ln, Beltline Rd, Valley View Ln, Gateway Dr, Beltline Rd to Beltline station. | From Beltline station via: Beltline Rd, Regent Blvd, Royal Ln, Beltline Rd, Valley View Ln, Gateway Dr, Beltline Rd to Beltline station. |
| 316 | **New Route**: Freeport Feeder | From Freeport station via: Freeport Pkwy, Royal Ln, Esters Rd, Royal Ln, Freeport Pkwy, N Airfield Dr to DFW, N Airfield Dr to Freeport station. | From Beltline station via: Belt Line Rd, Royal Ln, Esters Blvd, Royal Ln, Belt Line Rd to Beltline station. |
| 317 | **New Route**: Farmers Branch Feeder | From Farmers Branch station via: Valley View, Webb Chapel, Belt Line Rd, Kelly to Keller Springs Rd. | From Farmers Branch station via: Valley View, Webb Chapel, Belt Line Rd, Kelly to Keller Springs Rd. |
| 331/81 | Josey | No change | No change |
| 333A/83 | Addison TC/N Carrollton TC | Stop at N. Carrollton Transit Center/station | Stop at N. Carrollton Transit Center/station |
| 333B/234 | Frankford-Midway/N Carrollton TC | Stop at N. Carrollton Transit Center/station | Stop at N. Carrollton Transit Center/station |
| 397/238 | Tollway P&R Feeder | N/A | N/A |
| 400/112 | Belt Line Crosstown | Add stop at Belt Line/Old Downtown Carrollton station | Add stop at Belt Line/Old Downtown Carrollton station |
| 402 | **New Route:** Walnut Hill Crosstown | Walnut Hill/Mañana Station to S Garland TC via: Walnut Hill, North Central Expressway Service Rd, Park Lane LRT Station, Greenville Ave, Walnut Hill, Kingsley, Shiloh Rd. | Walnut Hill/Mañana Station to S Garland TC via: Walnut Hill, North Central Expressway Service Rd, Park Lane LRT Station, Greenville Ave, Walnut Hill, Kingsley, Shiloh Rd. |
| 405/132 | Parkland/Ledbetter | Deviate to Medical Center station | Deviate to Medical Center station |
| 409/198 | King Center-Irving-DFW | Deviate to Medical Center station | Deviate to Medical Center station |
| 428/156 | N Irving | Add stop at Northwest Hwy/Bachman Lake station | Add stop at Northwest Hwy/Bachman Lake station |
| 428/173 | Medical Market | Deviate to Medical Center station | Deviate to Medical Center station |
| 453/37 | Medical Center - SW Center Mall | Deviate to Medical Center station | Deviate to Medical Center station |
| 486/159 | Garland Central/Farmers Branch | No change | No change |
| 539/100 | Motor St/Harry Hines | Add stop at Love Field Terminal station, SW Medical Ctr/Exchange Park station and Medical Center station | Add stop at Love Field Terminal station, SW Medical Ctr/Exchange Park station and Medical Center station |
| 704A/222 | Las Colinas | Deviate to South Las Colinas station via: Rochelle Blvd and Leone | No change |
| 704B/223 | Las Colinas | Deviate to South Las Colinas station via: Rochelle Blvd and Leone | No change |
| 807/57 | Legacy Park | N/A | N/A |

SOURCE: LKC Consulting; DART; September 1999.

## TABLE 4.17
## LRT ALTERNATIVES – IMPROVEMENTS TO NO-BUILD BUS HEADWAYS

| ROUTE/ LINE | ROUTE NAME | NO BUILD HEADWAY | | ALTERNATIVE 8 HEADWAY | | ALTERNATIVE 9 HEADWAY | | ALTERNATIVE 10 HEADWAY | | ALTERNATIVE 11 HEADWAY | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Peak | Base | Peak | Base | Peak | Base | Peak | Base | Peak | Base |
| *Suburban Routes* | | | | | | | | | | | |
| 301&307/65 | Walnut Hill/S Irving/W Irving | 30 | 50 | 20 | 40 | 20 | 40 | 20 | 40 | 20 | 40 |
| 302/66 | Story | 30 | 60 | 20 | 40 | 20 | 40 | 20 | 40 | 20 | 40 |
| 303/197 | N Irving TC/Karahan Pkwy | 45 | 45 | 30 | 60 | 30 | 60 | 30 | 60 | 30 | 60 |
| 310/67 | Freeport/Irving Mall | 30 | 60 | 20 | 40 | 20 | 40 | 20 | 40 | 20 | 40 |
| 312 | **New Route**: North Carrollton Feeder | N/A | N/A | 20 | 40 | 20 | 40 | 20 | 40 | 20 | 40 |
| 313 | **New Route**: Belt Line/Carrollton Feeder | N/A | N/A | 20 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| 314 | **New Route**: Royal Lane Feeder | N/A | N/A | 20 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| 315 | **New Route**: North Irving Feeder | N/A | N/A | 20 | 40 | 20 | 40 | 20 | 40 | 20 | 40 |
| 316 | **New Route**: Freeport Feeder | N/A | N/A | 20 | 40 | 20 | 40 | 20 | 40 | 20 | 40 |
| 317 | **New Route**: Farmers Branch Feeder | N/A | N/A | 20 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| 321/77 | Valley View | 30 | 60 | 20 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| 322/78 | Prestonwood Transfer Point/Farmers Branch Park & Ride | 30 | -- | 20 | -- | 20 | -- | 20 | -- | 20 | -- |
| 331/81 | Josey | 35 | 60 | 35 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| 333A/83 | Addison TC/N Carrollton TC | 30 | 60 | 20 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| 333B/234 | Frankford-Midway/N Carrollton TC | 30 | 60 | 20 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| *Crosstown Routes* | | | | | | | | | | | |
| 400/112 | Beltline Crosstown | 30 | 60 | 20 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| 402 | **New Route:** Walnut Hill Crosstown | N/A | N/A | 20 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| 409/198 | King Center-Irving-DFW | 30 | 45 | 30 | 40 | 30 | 40 | 30 | 40 | 30 | 40 |
| 428/156 | N Irving | 30 | 60 | 20 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| 428/173 | Medical Market | 30 | 60 | 20 | 60 | 20 | 60 | 20 | 60 | 20 | 60 |
| *Rail Feeder Routes* | | | | | | | | | | | |
| 539/100 | Motor St/Harry Hines | 30 | 40 | 20 | 40 | 20 | 40 | 20 | 40 | 20 | 40 |
| *Trolley Routes* | | | | | | | | | | | |
| 704A/222 | Las Colinas | 30 | 30 | 20 | 30 | 20 | 30 | 20 | 30 | 20 | 30 |
| 704B/223 | Las Colinas | 30 | 30 | 20 | 30 | 20 | 30 | 20 | 30 | 20 | 30 |
| *800 Series Routes* | | | | | | | | | | | |
| 807/57 | Legacy Park | 30 | -- | 30 | -- | 20 | 60 | 30 | -- | 30 | -- |

SOURCE: LKC Consulting; July 1999.

**New Bus Routes**

As shown in Tables 4.16 and 4.17, seven new bus routes are proposed under the LRT Alternatives. All seven bus routes are envisioned to enhance feeder service to new LRT stations. The new bus routes are summarized below:

- Route 312: North Carrollton Feeder – New feeder service to proposed Frankford LRT station under Alternatives 8,10, and 11. Service to the SH 190 LRT Station under Alternative 9.

- Route 313: Belt Line/Old Downtown Carrollton Feeder – Service to the proposed Belt Line/Old Downtown Carrollton station under all LRT Alternatives.

- Route 314: Royal Lane Feeder – Additional route to supplement feeder bus service to the Royal Lane station under all alternatives.

- Route 315: North Irving Feeder – New feeder bus service to the Belt Line station under all alternatives.

- Route 316: DFW/Freeport Feeder – New route to feed the proposed Freeport Station under alternatives 8, 9, and 10, or DFW North station under refined alternatives.

- Route 317: Farmers Branch Feeder – Additional route to supplement feeder bus service to the Farmers Branch LRT station under all alternatives.

- Route 402: Walnut Hill Crosstown – New crosstown route from the Walnut Hill/Mañana station to the South Garland Transit Center.

### 4.5.7 CAPITAL IMPROVEMENTS

This section provides a description of the capital improvements associated with the LRT Alternatives. Transit facility and street and highway improvements are described.

**Transit Facility Improvements**

The LRT Alternatives include improvements to the existing Farmers Branch Park-and-Ride, North Carrollton Transit Center, and North Irving Transit Center to accommodate LRT operations. All other stations associated with the LRT Alternatives would be newly constructed. Under refined alternatives using the North Urban Center station, the existing North Irving Transit Center would be related to the SH 161 station to serve as a park-and-ride. The North Urban Center would incorporate no or limited parking and accommodate transit-oriented development. No additional transit facility improvements would be made beyond those included in the No-Build Alternative.

### Street and Highway Improvements

Street and highway improvements would be the same as those described under the No-Build Alternative and as contained in the 1998 ***Transportation Improvement Program*** (TIP). The Commuter Rail Alternative network also includes the regional CMS baseline improvements.

# 5.0 Evaluation Results

This chapter presents the detailed evaluation results of the base and refined alternatives. Alternatives evaluated in this chapter include:

- No Build Alternative
- TSM/TDM Alternative
- Highway/HOV Alternatives
- Commuter Rail Alternatives 6, 7, 6 Refined to Frankford, 6 Refined to SH 121
- LRT Alternatives 8, 9, 10, 11, 12, 10 Refined, 10A, 12A, and 8/BN

The following sections describe the mobility effects, costs, cost-effectiveness, socio-economic effects, and environmental effects of the alternatives. Public and agency support for alternatives is also documented. Criteria associated with the FTA New Starts Criteria are highlighted.

Further refinements to the most promising rail alignments and modes will be discussed in chapter 6 under the sensitivity and trade-off analysis.

## 5.1 MOBILITY EFFECTS

This section provides a summary-level comparison of the mobility effects of the Northwest Corridor alternatives, focusing on ridership (systemwide and corridor-level), transit mode share, travel time, equity and intermodal connectivity.

### 5.1.1 Ridership

The ridership evaluation compares the number of daily transit riders using each alternative for the forecast year 2025. This ridership value represents "linked" transit trips. A linked trip only accounts for a rider one time, from an origin boarding to a destination deboarding, regardless of how many modes or transfers are used to complete the trip. The following sections compare ridership for the following items:

- Total Systemwide Daily Ridership
- Corridor-level daily transit ridership
- Ridership between major activity centers and the Dallas CBD

### Systemwide Daily Ridership (2025)

Table 5.1 shows systemwide daily ridership for the base alternatives and refinements. The No-Build Alternative has system ridership of 175,500. The CMS baseline improvements have a significant effect on systemwide riders, increasing trips by 9,900 as compared to the No-Build. The TSM/TDM Alternative has forecast ridership of 188,800. The FTA measures added trips against the TSM/TDM Alternative. As shown in Table 5.1, there are no added trips for the Commuter Rail Alternatives or HOV on IH 35E; rather, there is a loss of from 400 to 800 riders. HOV on SH 114 results in added trips of 1,800 riders. For LRT Alternatives, added trips range from a high of 4,800 for Alternative 10, and a low of 2,000 for Alternative 8/BN.

**TABLE 5.1**
**YEAR 2025 DAILY SYSTEMWIDE TRANSIT RIDERS (LINKED TRIPS)**

| Alternative | System Riders | Change vs. No Build | Change vs. TSM/ TDM (Added Riders) |
|---|---|---|---|
| | | | |
| No Build | 175,500 | -- | -- |
| No Build/CMS | 185,400 | 9,900 | -- |
| TSM/TDM | 188,800 | 13,300 | -- |
| IH 35E HOV 4A | 188,300 | 12,800 | -500 |
| SH 114 HOV 4B | 190,600 | 15,100 | 1,800 |
| **Commuter Rail Alternatives** | | | |
| CR 6 | 188,000 | 12,500 | -800 |
| ▪ Refined CR 6/SH 121 | 188,400 | 12,900 | -400 |
| ▪ Refined CR 6/ Frankford | 188,100 | 12,600 | -700 |
| CR 7 | 188,400 | 12,900 | -400 |
| **LRT Alternatives** | | | |
| LRT 8 | 192,800 | 17,300 | 4,000 |
| ▪ LRT 12 (similar to LRT 8) | 191,100 | 15,900 | 2,600 |
| ▪ LRT 12A | 191,600 | 16,100 | 2,800 |
| ▪ LRT 8/BN | 190,800 | 15,300 | 2,000 |
| LRT 9 | 192,500 | 17,000 | 3,700 |
| LRT 10 | 193,600 | 18,100 | 4,800 |
| ▪ Refined LRT 10 | 191,400 | 15,900 | 2,600 |
| ▪ LRT 10A | 191,100 | 15,600 | 2,300 |
| LRT 11 | 193,200 | 17,700 | 4,400 |

SOURCE: BRW, Inc.; Urban Analytics; NCTCOG Model Runs; DART; February 2000

### Corridor-Level Rail Ridership (Year 2025)

Table 5.2 summarizes corridor-level rail ridership for the Commuter Rail and LRT Alternatives. The table also describes the changes made to the base alternatives to lend insight as to why the corridor ridership changed among alternatives.

**TABLE 5.2**
**2025 DAILY CORRIDOR RAIL RIDERSHIP**

| Alternative | Corridor Riders | Changes to Base Alternative |
|---|---|---|
| **Commuter Rail Alternatives** | | |
| CR 6 | 10,900 | Base |
| ▪ Refined CR 6/SH 121 | 10,900 | - Add BN South to S. Las Colinas |
| ▪ Refined CR 6/ Frankford | 10,250 | - Truncate at Frankford<br>- Add BN South |
| CR 7 | 7,500 | Base |
| **LRT Alternatives** | | |
| LRT 8 | 24,300 | Base |
| ▪ LRT 12 (similar to LRT 8) | 21,500 | - Deleted Market & Royal (UP) stations<br>- Truncate at Frankford<br>- New DFW alignment<br>- Replace NITC with North Urban Center |
| ▪ LRT 12A | 24,200 | Same as above, plus:<br>- Added Market & Royal (UP) stations<br>- Adjusted Harry Hines/UP alignment |
| ▪ LRT 8/BN | 20,300 | - Truncate LRT 8 at Frankford & NITC<br>- Add BN South to S. Las Colinas |
| LRT 9 | 23,700 | Base |
| LRT 10 | 23,600 | Base |
| ▪ Refined LRT 10 | 21,600 | - Truncated at Frankford & DFW<br>- New DFW alignment<br>- Reduced UD/TX alignment cost<br>- Deleted Market & Royal (UP) stations<br>- Combined UD and Texas Stadium stations at UD<br>- Deleted Love Field tunnel<br>- Replaced NITC with NUC |
| ▪ LRT 10A | 24,100 | Same as above, plus:<br>- Added Market & Royal (UP) stations<br>- Adjusted HH/UP alignment<br>- Reduced UD/TX alignment cost further |
| LRT 11 | 23,100 | Base |

SOURCE: BRW, Inc.; Urban Analytics; NCTCOG Model Runs; DART; February 2000

The Commuter Rail Alternatives have daily corridor ridership ranging from 7,500 for Alternative 7 to 10,900 for Alternative 6. Alternative 7 is lower because the ridership from the Las Colinas area along the BN South Segment is lower than that along the Manana Spur option under Alternative 6. Adding the BN South to Alternative 6 did not affect ridership, and truncating the line at Frankford resulted in a loss of 650 riders.

Corridor rail ridership for LRT Alternatives is highest under LRT Alternative 8 (24,300) which uses the Manana Spur alignment. Refined Alternative 10A, which uses the UD/Texas Stadium option, has a similar corridor-level ridership of 24,100. LRT Alternative 12, which modified

Alternative 8 by truncating at Frankford and deleting the Market Center and Royal Lane stations, resulted in a drop in 2,800 riders. This was because the riders from the two deleted stations were not absorbed by adjacent stations as expected. Refined alternative 12A retained these two stations and resulted in a ridership of 24,200.

### 5.1.2 Mode Share

Overall, transit accounts for approximately 5% of all work trips, and only 2-3% of all trips made in the entire DFW metropolitan region. While this may seem low, the most important element of a transit improvement is that it effectively serves major destinations, such as the Dallas CBD, Medical/Market Center, and Las Colinas. Examining mode share among transit trips can indicate which alternatives are most effective in moving transit riders onto a new capital investment such as a rail extension. Table 5.3 summarizes the mode share among different classes of transit (local bus, express bus, LRT, Commuter Rail) for all alternatives.

**TABLE 5.3**
**SYSTEMWIDE TRANSIT MODE SHARE (LINKED TRIPS) – YEAR 2025**

| Alternative | Local Bus | Express Bus | LRT | Commuter Rail | Total Rail | TOTAL |
|---|---|---|---|---|---|---|
| No Build | 133,900 | 5,900 | 29,800 | 5,900 | 35,700 | 175,500 |
| No Build/CMS | 139,100 | 6,500 | 33,600 | 6,200 | 39,800 | 185,400 |
| TSM/TDM | 142,800 | 7,000 | 33,700 | 5,300 | 39,000 | 188,800 |
| IH 35E HOV 4A | 143,200 | 5,900 | 33,700 | 5,500 | 39,200 | 188,300 |
| SH 114 HOV 4B | 144,800 | 7,200 | 33,400 | 5,200 | 38,600 | 190,600 |
| **Commuter Rail Alternatives** | | | | | | |
| CR 6 | 141,300 | 2,600 | 33,400 | 10,700 | 44,100 | 188,000 |
| ▪ Refined CR 6/SH 121 | 141,500 | 2,500 | 33,400 | 11,000 | 44,400 | 188,400 |
| ▪ Refined CR 6/ Frankford | 141,500 | 2,600 | 33,300 | 10,700 | 44,000 | 188,100 |
| CR 7 | 142,600 | 2,400 | 32,700 | 10,700 | 43,400 | 188,400 |
| **LRT Alternatives** | | | | | | |
| LRT 8 | 139,200 | 2,700 | 45,600 | 5,300 | 50,900 | 192,800 |
| ▪ LRT 12 (similar to LRT 8) | 140,300 | 2,300 | 43,300 | 5,200 | 48,500 | 191,100 |
| ▪ LRT 12A | 140,200 | 2,400 | 44,000 | 5,000 | 49,000 | 191,600 |
| ▪ LRT 8/BN | 140,600 | 2,700 | 41,900 | 5,600 | 47,500 | 190,800 |
| LRT 9 | 138,900 | 2,500 | 45,700 | 5,400 | 51,100 | 192,500 |
| LRT 10 | 139,200 | 2,500 | 46,800 | 5,100 | 51,900 | 193,600 |
| ▪ Refined LRT 10 | 140,400 | 2,400 | 43,800 | 4,800 | 48,600 | 191,400 |
| ▪ LRT 10A | 139,200 | 2,400 | 44,800 | 4,700 | 49,500 | 191,100 |
| LRT 11 | 139,300 | 2,600 | 45,800 | 5,500 | 51,300 | 193,200 |

SOURCE: BRW, Inc.; Urban Analytics; NCTCOG Model Runs; DART; February 2000

As shown in the above table, express bus ridership is highest among the HOV and TSM/TDM Alternatives, all of which enhance express bus service to take advantage of improved travel times and network improvements. Duplicative express bus service is removed under the rail alternatives, so rail transit trips increase under the rail alternatives.

For Commuter Rail Alternatives, commuter rail trips are highest under Refined CR 6 to SH 121, which includes the BN south shuttle service. Total rail trips are also highest under this alternative. For LRT Alternatives, the base alternatives, which have the most service miles and highest costs, have the highest LRT and total rail riders. Of the refined LRT alternatives, which truncate LRT lines to within the DART Service Area, Alternative 10A has the highest LRT mode share and total rail trips.

### 5.1.3 Travel Time Benefits

Travel time simulations were conducted for all rail alternatives to determine the in-vehicle travel time from station to station. In addition to the in-vehicle travel time, transit riders often experience longer wait, access and transfer times as compared to an automobile trip. Automobile trips typically have shorter wait and access times given that automobiles can more directly access certain destinations, so out-of-vehicle travel times are typically lower than transit. In-vehicle plus out-of-vehicle travel time constitutes a total door-to-door travel time which is often helpful in seeing travel time benefits of a major investment.

Table 5.4 summarizes the in-vehicle travel time for a rail trip under various alternatives to the Dallas CBD West End Station or Union Station (Commuter Rail only). Estimated in-vehicle travel time for an automobile trip is also presented. As shown, the automobile will still offer a more attractive travel time, primarily because out-of-vehicle time is much lower than for a transit alternative, which includes wait, access and transfer times. Commuter Rail travel times are generally comparable to LRT. LRT Alternatives are generally within a few minutes of each other. The largest time difference is seen with Alternative 10A, which includes additional feeder bus time and is a slightly longer route to downtown Dallas.

**TABLE 5.4**
**IN-VEHICLE TRAVEL TIME TO DALLAS CBD (WEST END TC)**
**(Minutes From...)**

| Alternative/ Mode | North Carrollton T.C. | Walnut Hill | Love Field | DFW North | North Irving T.C. |
|---|---|---|---|---|---|
| No Build (Auto) | 29 | 17 | 14 | 31 | 18 |
| TSM/TDM (Bus) | 44 | 28 | 25 | 57 | 26 |
| Commuter Rail Alternative 6 | 35 | 21 | 25 | 50 | 27 |
| LRT Alternative 8 | 36 | 23 | 16 | 45 | 29 |
| LRT Alternative 10 | 38 | 25 | 19 | 49 | 34 |
| LRT Alternative 12A | 36 | 28 | 18 | 50 | 28 |
| LRT Alternative 10A | 38 | 28 | 18 | 63 | 33 |

Source: Urban Analytics; NCTCOG; July 2000.

Notes:
In-vehicle time only, including feeder bus time(s) for the rail alternatives
Transit out-of-vehicle time not included (eg. Wait time, transfer time, access/egress time)
Auto terminal times not included.

### 5.1.4 Equity

Equity addresses New Starts Criteria related to the mobility improvements of low-income, transit-dependent populations. Table 5.5 presents information relative to the income (households under poverty level and median income) and auto ownership of households within ½ mile of the stations associated with base alternatives.

**TABLE 5.5**
**LOW-INCOME AND ZERO-CAR HOUSEHOLDS**

| Area | Households within ½ mile | % Households under Poverty Status within ½ mile | Median Income (Average) | Zero-Car Housing Units [1] | % Zero-Car Housing Units |
|---|---|---|---|---|---|
| Study Area | 213,594 | 7.1% | $23,930 | 12,354 | 4.3% |
| Dallas County | 703,789 | 11.5% | $22,180 | 55,029 | 6.9% |
| Station Areas: | | | | | |
| Arena | 427 | 32.3% | $16,650 | 60 | 50% |
| Market Center | 1,454 | 34.6% | $15,530 | 191 | 21% |
| Medical Center | 630 | 27.9% | $14,370 | 83 | 31% |
| SW Medical/Exchange Park | 1,217 | 16.9% | $24,480 | 36 | 11% |
| Medical/Market Center | 2,696 | 32.3% | $15,690 | 236 | 21% |
| Mockingbird Lane/Love Field | 851 | 19.4% | $24,350 | 13 | 6% |
| Love Field Terminal | 655 | 19.2% | $25,100 | 13 | 32% |
| Northwest Highway | 3,793 | 18.7% | $20,030 | 277 | 10% |
| Walnut Hill/Manana Station | 3,030 | 8.7% | $25,160 | 43 | 5% |
| Royal Lane | 2,565 | 7.8% | $23,760 | 44 | 7% |
| Farmers Branch Park-and-Ride | 1,794 | 7.0% | $24,930 | 34 | 7% |
| Beltline/Old Carrollton | 1,751 | 11.9% | $26,480 | 27 | 4% |
| North Carrollton T.C. | 1,742 | 5.0% | $18,900 | 0 | 0% |
| Frankford | 2,534 | 5.9% | $23,100 | 7 | 1% |
| Hebron Parkway | 683 | 10.0% | $21,180 | 0 | 0% |
| SH 121/Lewisville | 748 | 11.9% | $22,810 | 7 | 5% |
| SH 190 /BN | 7,439 | 3.5% | $24,670 | 30 | 1% |
| Plano Parkway/BN | 570 | 1.2% | $23,330 | 0 | 0% |
| SH 121/Legacy | 1,789 | 1.4% | $23,330 | 1 | 1% |
| Texas Stadium | 619 | 32.6% | $20,780 | 9 | 9% |
| University of Dallas | 1,047 | 25.4% | $21,490 | 18 | 11% |
| South Las Colinas | 1,558 | 15.5% | $20,090 | 8 | 4% |
| North Irving T.C. | 1,009 | 4.4% | $26,730 | 1 | 1% |
| South Irving T.C. | 4,411 | 15.3% | $22,750 | 106 | 8% |
| MacArthur | 1,753 | 4.3% | $26,480 | 6 | 4% |
| Beltline Road | 2,048 | 4.5% | $24,320 | 1 | 0% |
| Freeport | 1,190 | 0.8% | N/A | 0 | 0% |
| DFW North | 1,807 | 1.8% | N/A | 0 | 1% |
| DFW Terminal | 1,745 | 1.4% | N/A | 1 | 2% |
| Centreport/DFW South (TRE) [6] | 1,493 | 3.1% | $27,800 | 3 | 1% |

SOURCE: 1990Census Data; BRW, Inc.; September 1999.

[1] The number of housing units is greater than households.

As shown in Table 5.5, the greatest percentage of low-income households is located within ½ mile of stations south of Northwest Highway. LRT Alternatives, because they have a greater number of access points, provide the highest equity benefit to low-income households. The TSM/TDM Alternative, with enhanced bus service, also provides enhanced mobility for low-income populations. However, a rail transit improvement can provide a more reliable means of transportation as it operates within exclusive right-of-way on consistent schedules.

The percentage of zero-car housing units is also greatest at those stations south of Northwest Highway. Northwest Highway and Medical/Market Center area stations have the highest number and percentage of zero-car housing units. Coupled with a lower median income and higher poverty level, this area has the highest concentration of transit-dependent population. The next highest number of zero-car housing units is found at the South Irving Transit Center.

### 5.1.5 Intermodal Connectivity

The No Build, TSM/TDM and Highway Widening Alternatives would not significantly enhance intermodal connectivity in the Northwest Corridor. While the TSM/TDM Alternative would enhance bus service and connectivity in the corridor it would only incrementally improve connectivity among different modes.

The HOV Alternatives would enhance intermodal connectivity by implementing park-and-rides and HOV direct connectors to improve the single occupant to bus or carpool transfer.

Commuter Rail Alternatives would improve intermodal connectivity in that they would extend rail service from Union Station into the Northwest Corridor. At Union Station, Commuter Rail would interface with other Commuter Rail lines (TRE to Fort Worth), LRT service on the Red and Blue lines, and Amtrak service. Commuter Rail would require that a mode transfer be made at this location if a person wanted to continue their trip into the downtown transit mall or to other areas of the DART rail system. Commuter Rail Alternative 7 would provide an opportunity to connect to the existing TRE line at the South Irving Transit Center, which is planned to extend to Fort Worth by the end of year 2000.

LRT Alternatives would provide the greatest level of intermodal connectivity to the regional rail system by allowing for seamless travel through the transit mall and into other areas of the DART service area, depending on the operating plan. Because the Northwest Corridor would have two separate LRT lines, one to Carrollton and one to Irving/DFW, there are opportunities to interline with two existing LRT lines and reduce transfers between different LRT lines. LRT station areas also provide the greatest opportunity to connect with feeder buses.

All rail alternatives offer the opportunity to connect to a future rail line in the Cottonbelt Corridor, providing east-west access in and through communities north of LBJ Freeway.

## 5.2 COST-EFFECTIVENESS/ AFFORDABILITY

Cost-effectiveness and affordability, particularly as it relates to the financial ability and commitment of DART, are both key measures associated with the FTA New Starts Criteria. The following sections document the capital cost, annualized capital cost, and annual O&M costs of Northwest Corridor Alternatives.

### 5.2.1 Capital Costs and Annualized Capital Costs

Capital costs were estimated using a methodology outlined in the Capital Costing Methodology Report (BRW; August 1999). This methodology is consistent with FTA guidelines. Unit prices are based on actual construction and bid prices associated with the TRE Commuter Rail Service and the LRT Starter System. Capital costs for the TSM/TDM and Highway/HOV Alternatives are consistent with TxDOT unit costs and bid prices.

The cost estimate for the LRT Alternatives utilizes unit costs and special conditions costs, such as street reconstruction, major utility relocations, existing bridge modification, and unique station-related costs and special amenities for the majority of the cost effort. The unit costs are an estimate developed for each element (at-grade, elevated structure, stations, etc.) included in a typical cross section for a unit of measurement (route feet each). The unit cost is then multiplied by the total length of the alternative.

A contingency factor of 10% was applied to construction costs, and a 30% design contingency was included. Add-on factors such as engineering, construction management administration, start-up and insurance were also included as a 45% contingency.

A summary of capital costs and annualized capital costs for each alternative is provided in Table 5.6.

The No Build Alternatives includes only those projects planned and programmed by the Year 2025. No new costs would be incurred. Capital costs of $99.9 million for the TSM/TDM Alternative include $50.1 million for freeway bottleneck improvements, and $26 million for buses. Another $24 million is associated with signal, intersection and roadway improvements.

Capital costs for Highway or HOV improvements to IH 35E are approximately $530 million. Improvements to SH 114 are lower given that the freeway is planned for expansion. These costs range from $294 million for HOV improvements to $319 million for highway widening.

Commuter Rail Alternatives 6 and 7 would cost approximately $652 to $676 million. Refined Commuter Rail 6 to SH 121 includes the BN south segment as commuter rail and thus costs an additional $45 million.

**TABLE 5.6**
**CAPITAL COST – NORTHWEST CORRIDOR ALTERNATIVES**

| Alternative | Capital Cost ($1999M) | Annualized Capital Cost ($1999M) |
|---|---|---|
| TSM/TDM Alternative | $99.9 | $11.57 |
| **Highway/ HOV Alternatives** | | |
| HOV IH 35E 4A | $532.7 | -- |
| HOV SH 114 4B | $294.5 | -- |
| Highway Widening IH 35E 5A | $530.3 | -- |
| Highway Widening SH 114 5B | $319.2 | -- |
| **Commuter Rail Alternatives** | | |
| CR 6 | $652.5 | $50.5 |
| ▪ Refined CR 6/SH 121 | $698.2 | $54.0 |
| ▪ Refined CR 6/ Frankford | $630.1 | $48.7 |
| CR 7 | $676.3 | $51.8 |
| **LRT Alternatives** | | |
| LRT 8 | $1,397.1 | $114.3 |
| ▪ LRT 12 (similar to LRT 8) | $1,242.5 | $101.7 |
| ▪ LRT 12A | $1.265.6 | $103.8 |
| ▪ LRT 8/BN | $1,005.28 | $82.6 |
| LRT 9 | $1,769.4 | $145.6 |
| LRT 10 | $2,254.3 | $186.6 |
| ▪ Refined LRT 10 | $1,371.6 | $112.4 |
| ▪ LRT 10A | $1,394.6 | $114.3 |
| LRT 11 | $1,917.4 | $158.8 |

SOURCE: BRW, Inc; Carter-Burgess; Wendy Lopez & Associates; November, 1999

LRT Alternatives are generally about twice the cost of Commuter Rail, due to the greater service coverage and trackwork requirements. The highest cost alternative is LRT Alternative 10 due to the fact that it extends south from DFW North through the airport to Centreport. Refined LRT Alternative 10 truncated this alternative to a more reasonable alignment and refined the UD/Texas Stadium alignment to reduce cost. LRT Alternatives using the Manana Spur option (such as 12A) rather than the UD/Texas Stadium option (10A) to access Las Colinas are approximately $130 million less expensive. The Love Field tunnel adds about $246 million to the project cost.

LRT Alternative 8/BN which provides the same termini as Refined Commuter Rail 6 to Frankford allows a direct comparison of LRT to Commuter Rail. As shown, LRT 8/BN would cost $1,039 million, compared to $630 million for Commuter Rail to the same end points.

### Annualized Capital Costs

Table 5.6 also summarizes annualized capital costs. Annualized capital costs were calculated based on FTA guidance using a standard discount rate of 7 percent and useful lifetimes of the cost components of the alternatives. Annualized costs of the No Build Alternative are already assumed to be included in the region's transportation finance program.

As shown in Table 5.6, the TSM/TDM Alternative has an annualized capital cost of $11.57 million. Commuter Rail annualized capital costs range from $48.7 to $54.0 million, while LRT Alternatives range from a low of $82.6 for the 8/BN Alternative, to a high of $186.6 for LRT 10, which includes the rail spine into DFW Airport.

### 5.2.2 Annual Operating and Maintenance (O&M) Costs

Annual operating and maintenance (O&M) costs also play a role in the evaluation and ultimate selection of the preferred alternative, particularly in terms of refining the operating plans to reflect a high level of operating efficiency. O&M costs were estimated using a cost model based on DART experience with labor cost and items such as fuel, equipment and supplies. O&M cost inputs were generated based on the operating statistics of each alternative and are summarized in Table 5.7. Costs represent the entire DART system.

**TABLE 5.7**
**TOTAL DART SYSTEM O&M COSTS – NORTHWEST CORRIDOR ALTERNATIVES**

| Alternative | O&M Cost ($1999M) |
|---|---|
| No Build Alternative | $290.52 |
| TSM/TDM Alternative | $306.12 |
| **Highway/ HOV Alternatives** | |
| HOV IH 35E 4A | $307.74 |
| HOV SH 114 4B | $307.36 |
| Highway Widening IH 35E 5A | $306.12 |
| Highway Widening SH 114 5B | $306.12 |
| **Commuter Rail Alternatives** | |
| CR 6 | $314.74 |
| ▪ Refined CR 6/SH 121 | $319.84 |
| ▪ Refined CR 6/ Frankford | $318.36 |
| CR 7 | $319.52 |
| **LRT Alternatives** | |
| LRT 8 | $326.48 |
| ▪ LRT 12 (similar to LRT 8) | $320.36 |
| ▪ LRT 12A | $321.19 |
| ▪ LRT 8/BN | $320.01 |
| LRT 9 | $328.26 |
| LRT 10 | $334.65 |
| ▪ Refined LRT 10 | $320.55 |
| ▪ LRT 10A | $321.23 |
| LRT 11 | $325.72 |

SOURCE: Manuel Padron & Associates; LKC Consulting; February 2000.

The annual O&M costs for the No Build Alternative is estimated to be $290 million, and does not represent any additional costs beyond those planned and programmed in the DART service area. This cost reflects $226 million for bus and paratransit service, $54.5 million for LRT service, and $10.4 million for Commuter Rail operations.

The TSM/TDM and HOV Alternatives, which include additional local and express bus service in the Northwest Corridor, increase the annual O&M cost by approximately $16 million and $17 million, respectively. Rail system O&M cost remain the same as the No-Build Alternative.

O&M costs for the Commuter Rail alternatives range from $312 to $319 million. These alternatives result in a decrease in bus O&M costs from the TSM/TDM Alternative, and an increase in Commuter Rail costs. This is because duplicative express bus service is removed, and local routes are restructured to serve as feeder routes.

The LRT Alternatives have O&M costs of approximately $320 million for LRT 8/BN (which truncates at Frankford and the NITC), as well as for LRT 12A and LRT 10A (which truncate at Frankford and DFW). The base alternatives have a higher O&M cost, particularly Alternative 10, which would extend LRT through the spine of DFW Airport to Centreport. As with Commuter Rail, the LRT Alternatives see a corresponding decrease of bus O&M costs and a higher portion of cost attributable to LRT. For example, LRT Alternative 12 has bus costs slightly higher than the No-Build Alternative, and LRT costs of nearly $80 million, approximately $25 million more than the No-Build Alternative.

Operating efficiencies are discussed in greater detail in Section 5.2.5.

### 5.2.3 Affordability

Affordability examines the ability of DART to fund improvements proposed for the Northwest Corridor. DART recently completed its ***FY 2000 Financial Plan***. This plan demonstrates DART's financial capacity to operate its bus, rail, HOV and paratransit services, and complete programmed capital improvements by outlining the sources and uses of cash.

As did previous financial plans, the ***FY 2000 Financial Plan*** assumes that the Northwest Corridor would be a Commuter Rail corridor. The Southeast Corridor MIS, also recently completed, was assumed to be intermediate-capacity LRT. The DART Board recently approved the Southeast Corridor as double-track LRT.

The ***FY 2000 Financial Plan*** includes $249 million in capital costs (as a placeholder) for Commuter Rail in the Northwest Corridor. This would fund a project from Union Station to the North Carrollton Transit Center, with a spur to the North Irving Transit Center along the Manana spur. Opening dates would be FY 2006 to Farmers Branch/Carrollton, and FY 2007 to Irving. The assumed Federal funding share for the Northwest (Stemmons) Corridor has generally been at 25%. The FY 2000 plan identifies a New Starts contribution of $9.5 million through FY 2004 for the Northwest Corridor.

The plan states DART has sufficient financing capacity in FY 2004 through FY 2008 to build the Northwest and Southeast Corridors as originally assumed. However, the plan states that the decisions for these corridors may differ from that assumed in the financial plan. The plan states

*"..., if the Board chooses the double track light rail option in both corridors, there may be insufficient capacity (assuming short-term debt) to build these lines in the timeframes outlined above. This issue will be discussed in detail over the coming months. If the Board makes changes to the System plan ...as part of this process, the FY 2000 Budget and Financial Plan will need to be amended."*

The Commuter Rail cost estimate in the financial plan is significantly lower than the estimated capital cost for the Commuter Rail (approximately $650 million) and the LRT Alternatives ($1.3 billion plus). In order to avoid delays to the planned revenue service dates to Northwest Corridor communities for LRT Alternatives, DART would have to revisit long-term financing options, or consider delaying service to certain areas of the corridor.

### 5.2.4 Cost-Effectiveness

Cost-effectiveness allows for a comparison of the costs of the Northwest Corridor alternatives to the expected benefits that may occur as a result of the investment. Cost-effectiveness is one of the key indices used by the FTA to evaluate New Starts projects. The section summarizes the cost-effectiveness of alternatives using the following measure:

- Annualized Capital Cost per Annual Rider

Table 5.8 presents the annualized capital cost per annual rider. This cost-effectiveness measure examines the cost per rider per year over the life of the project by annualizing both cost and riders. As shown, among the Commuter Rail alternatives, Alternative 6 has the lowest annualized cost per rider. This alternatives performs better than the Refined CR6/Frankford, which truncates the line at Frankford and includes the BN south segment. This indicates that for Commuter Rail, extending the line to SH 121 is more effective. LRT 8/BN which is comparable to CR 6/Frankford has a cost-effectiveness ratio of $13.47, indicating that LRT is more cost-effective than Commuter Rail.

LRT 8/BN is also the most cost-effective option for LRT, given that it truncates the alignment at Frankford and at the North Irving Transit Center. Truncating at North Irving Transit Center is the element that enhances cost-effectiveness, given that many riders can be retained by using a park-and-ride at that location, without having the cost of extending a new rail line to DFW Airport.

LRT Alternative 12A is the next most cost-effective option at $14.20 per rider. This alternative uses the Manana Spur and truncates the line at Frankford and DFW Airport. For Alternatives using the UD/TX alignment option, Alternative 10A has the best annualized capital cost per rider ($15.70). The worst cost-effectiveness is found with Alternatives 10 and 11, which extend the lines to DFW Airport via a spine on International Parkway or a tunnel from SH 114, respectively.

**TABLE 5.8**
**ANNUALIZED CAPITAL COST PER ANNUAL RIDER**

| Alternative | Annualized Capital Cost ($1999) | Annual Riders (millions) | Annualized Capital Cost per Annual Rider |
|---|---|---|---|
| **Commuter Rail Alternatives** | | | |
| CR 6 | $50.45 | 2,953,900 | $17.08 |
| ▪ Refined CR 6/SH 121 | $54.0 | 2,953,900 | $18.28 |
| ▪ Refined CR 6/ Frankford | $48.7 | 2,777,750 | $17.53 |
| CR 7 | $51.8 | 2,032,500 | $25.49 |
| **LRT Alternatives** | | | |
| LRT 8 | $114.3 | 7,338,600 | $15.58 |
| ▪ LRT 12 (similar to LRT 8) | $101.7 | 6,493,000 | $15.66 |
| ▪ LRT 12A | $103.8 | 7,308,400 | $14.20 |
| ▪ LRT 8/BN | $82.6 | 6,130,600 | $13.47 |
| LRT 9 | $145.6 | 7,157,400 | $20.34 |
| LRT 10 | $186.6 | 7,127,200 | $26.18 |
| ▪ Refined LRT 10 | $112.4 | 6,523,200 | $17.23 |
| ▪ LRT 10A | $114.3 | 7,278,200 | $15.70 |
| LRT 11 | $158.8 | 6,976,200 | $22.76 |

SOURCE: BRW, Inc; February 2000.

DART annualization factors: 302=LRT; 271=CR

### 5.2.5 Operating Efficiencies

Operating efficiencies are important to consider as they compare the performance of moving people and the resources required to move them. It is important to assess these differences because the addition of operating resources will require additional expenditures. The desire is to select a transit investment that not only increases ridership, but that also results in the same or better operating productivity. The following sections describe various measures of operating efficiency. Highway alternatives have the same O&M statistics as the TSM Alternative; thus, only the HOV Alternatives are discussed.

#### Change in O&M Cost per Passenger Mile

Change in operating cost per passenger mile (shown in Table 5.9) is one of the FTA New Starts Criteria, and alternatives are compared to the TSM and No-Build Alternatives. As shown in Table 5.9, all alternatives result in a slightly reduced O&M cost per passenger mile as compared to the No Build and TSM Alternatives. Rail alternatives result in slightly greater efficiences as compared to stand-alone HOV and express bus improvements. Commuter Rail and LRT result in similar efficiencies,m with the Refined Commuter Rail alternatives, and LRT Alternatives 12, 12A, 8/BN and 10A having the greatest change in O&M cost per passenger mile (savings of $0.05 per passenger mile).

**TABLE 5.9**
**CHANGE IN O&M COST PER PASSENGER MILE**

| Alternative | O&M Cost ($1999M) | Annual Passenger Miles | O&M Cost per Annual Pass. Mile | Change vs. NB | Change vs. TSM |
|---|---|---|---|---|---|
| No Build Alternative | $290.52 | 406.00 | $0.716 | -- | -- |
| TSM/TDM Alternative | $306.12 | 442.76 | $0.691 | ($0.02) | |
| **Highway/ HOV Alternatives** | | | | | |
| HOV IH 35E 4A1 | $307.74 | 443.48 | $0.694 | ($0.02) | $0.00 |
| HOV SH 114 4B | $307.36 | 442.96 | $0.694 | ($0.02) | $0.00 |
| **Commuter Rail Alternatives** | | | | | |
| CR 6 | $314.74 | 465.37 | $0.676 | ($0.04) | ($0.02) |
| ▪ Refined CR 6/SH 121 | $319.84 | 481.66 | $0.664 | ($0.05) | ($0.03) |
| ▪ Refined CR 6/ Frankford | $318.36 | 477.56 | $0.667 | ($0.05) | ($0.02) |
| CR 7 | $319.52 | 473.86 | $0.674 | ($0.04) | ($0.02) |
| **LRT Alternatives** | | | | | |
| LRT 8 | $326.48 | 483.12 | $0.676 | ($0.04) | ($0.02) |
| ▪ LRT 12 (similar to LRT 8) | $320.36 | 483.53 | $0.663 | ($0.05) | ($0.03) |
| ▪ LRT 12A | $321.19 | 482.27 | $0.666 | ($0.05) | ($0.03) |
| ▪ LRT 8/BN | $320.01 | 481.40 | $0.665 | ($0.05) | ($0.03) |
| LRT 9 | $328.26 | 484.54 | $0.677 | ($0.04) | ($0.01) |
| LRT 10 | $334.65 | 487.89 | $0.686 | ($0.03) | ($0.01) |
| ▪ Refined LRT 10 | $320.55 | 460.33 | $0.696 | ($0.02) | $0.00 |
| ▪ LRT 10A | $321.23 | 481.08 | $0.668 | ($0.05) | ($0.02) |
| LRT 11 | $325.72 | 484.95 | $0.672 | ($0.04) | ($0.02) |

SOURCE: BRW, Inc.; Manuel Padron & Associates; LKC Consulting; February 2000.

Notes: Passenger miles annualized using average annualization factor of 291.

### O&M Cost per First Boarding (Linked passengers)

Table 5.10 summarizes the annual O&M costs per annualized first boarding. As shown the HOV Alternatives have a slightly lower O&M cost per first boarding than the TSM Alternative. Rail alternatives have a higher O&M cost per first boarding. LRT Alternatives 12, 12A, 8/BN, 10 Refined, and 10A have ratios equal to or lower than the best performing Commuter Rail Alternative (Alternative 6).

**TABLE 5.10**
**ANNUAL O&M COSTS PER FIRST BOARDING**

| Alternative | O&M Cost ($1999M) | First Boardings (Linked Trips) | O&M Cost per First Boarding |
|---|---|---|---|
| No Build Alternative | $290.52 | 51.121 | $5.68 |
| TSM/TDM Alternative | $306.12 | 55.012 | $5.56 |
| **Highway/ HOV Alternatives** | | | |
| HOV IH 35E 4A1 | $307.74 | 55.045 | $5.59 |
| HOV SH 114 4B | $307.36 | 55.528 | $5.54 |
| **Commuter Rail Alternatives** | | | |
| CR 6 | $314.74 | 54.814 | $5.74 |
| ▪ Refined CR 6/SH 121 | $319.84 | 54.928 | $5.82 |
| ▪ Refined CR 6/ Frankford | $318.36 | 54.842 | $5.81 |
| CR 7 | $319.52 | 54.930 | $5.82 |
| **LRT Alternatives** | | | |
| LRT 8 | $326.48 | 56.450 | $5.78 |
| ▪ LRT 12 (similar to LRT 8) | $320.36 | 55.946 | $5.73 |
| ▪ LRT 12A | $321.19 | 56.100 | $5.73 |
| ▪ LRT 8/BN | $320.01 | 55.822 | $5.73 |
| LRT 9 | $328.26 | 56.369 | $5.82 |
| LRT 10 | $334.65 | 56.707 | $5.90 |
| ▪ Refined LRT 10 | $320.55 | 56.044 | $5.72 |
| ▪ LRT 10A | $321.23 | 55.969 | $5.74 |
| LRT 11 | $325.72 | 56.568 | $5.76 |

SOURCE: BRW, Inc.; Manuel Padron & Associates; LKC Consulting; February 2000.

### Operating Statistics and Efficiency Measures

Operating statistics are compared among alternatives for the following items:

- Peak Vehicles (Table 5.11) - to estimate fleet requirements and added capital costs.
- Vehicle Hours (Table 5.12) – peak and off-peak vehicle hours by alternative
- Vehicle Miles (Table 5.13) – peak and off-peak vehicle miles by alternative

To view efficiency measures per vehicle-hour and vehicle-mile, the total boardings (unlinked trips) and first boardings (unlinked trips – riders less transfers) are compared per vehicle-mile and vehicle-hour. Tables 5.14 and 5.15 summarize the following:

- Total Boardings (unlinked passengers) per Vehicle-Hour
- First Boardings (linked passengers) per Vehicle-Hour

- Total Boardings (unlinked passengers) per Vehicle-Mile
- First Boardings (linked passengers) per Vehicle-Mile

## TABLE 5.11
## COMPARISON OF PEAK VEHICLE REQUIREMENTS

| Alternative | Peak Vehicles – Change vs. No Build | | | |
|---|---|---|---|---|
| | Bus | Express Bus | LRT | CR |
| No Build Alternative | 773 | 69 | 78 | 12 |
| TSM/TDM Alternative | +74 | +7 | 0 | 0 |
| **Highway/ HOV Alternatives** | | | | |
| HOV IH 35E 4A1 | +78 | +10 | 0 | 0 |
| HOV SH 114 4B | +75 | +14 | 0 | 0 |
| **Commuter Rail Alternatives** | | | | |
| CR 6 | +45 | (18) | 0 | +30 |
| ▪ Refined CR 6/SH 121 | +45 | (18) | 0 | +31 |
| ▪ Refined CR 6/ Frankford | +45 | (18) | 0 | +26 |
| CR 7 | +56 | (18) | 0 | +23 |
| **LRT Alternatives** | | | | |
| LRT 8 | +43 | (23) | +40 | 0 |
| ▪ LRT 12 (similar to LRT 8) | +43 | (23) | +36 | 0 |
| ▪ LRT 12A | +44 | (23) | +38 | 0 |
| ▪ LRT 8/BN | +35 | (20) | +30 | +1 |
| LRT 9 | +51 | (23) | +42 | 0 |
| LRT 10 | +44 | (23) | +54 | 0 |
| ▪ Refined LRT 10 | +39 | (23) | +38 | 0 |
| ▪ LRT 10A | +40 | (23) | +40 | 0 |
| LRT 11 | +44 | (23) | +42 | 0 |

SOURCE: BRW, Inc.; Manuel Padron & Associates; LKC Consulting; February 2000.

## TABLE 5.12
## VEHICLE-HOURS BY ALTERNATIVE (AVERAGE WEEKDAY)

| | PEAK | | | | OFF-PEAK | | | | TOTAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bus | Express Bus | LRT | CR | Bus | Express Bus | LRT | CR | Bus | Express Bus | LRT | CR |
| No Build Alternative | 4,242 | 334 | 468 | 72 | 3,606 | 102 | 400 | 19.5 | 7,849 | 436 | 868 | 91.5 |
| TSM/TDM Alternative | 4,663 | 361 | 468 | 72 | 3,915 | 163 | 400 | 19.5 | 8,578 | 523 | 868 | 91.5 |
| **Highway/ HOV Alternatives** | | | | | | | | | | | | |
| HOV IH 35E 4A1 | 4,684 | 378 | 468 | 72 | 3,931 | 190 | 400 | 19.5 | 8,614 | 568 | 868 | 91.5 |
| HOV SH 114 4B | 4,669 | 401 | 468 | 72 | 3,904 | 194 | 400 | 19.5 | 8,573 | 594 | 868 | 91.5 |
| **Commuter Rail Alternatives** | | | | | | | | | | | | |
| CR 6 | 4,498 | 247 | 468 | 252 | 3,691 | 73 | 400 | 94 | 8,189 | 321 | 868 | 346 |
| ▪ Refined CR 6/SH 121 | 4,498 | 247 | 468 | 258 | 3,691 | 73 | 400 | 105.5 | 8,189 | 321 | 868 | 363.5 |
| ▪ Refined CR 6/ Frankford | 4,498 | 247 | 468 | 228 | 3,691 | 73 | 400 | 105.5 | 8,189 | 321 | 868 | 333.5 |
| CR 7 | 4,561 | 247 | 468 | 210 | 3,721 | 73 | 400 | 78 | 8,281 | 321 | 868 | 288 |
| **LRT Alternatives** | | | | | | | | | | | | |
| LRT 8 | 4,487 | 222 | 707 | 72 | 3,702 | 63 | 620 | 19.5 | 8,189 | 285 | 1,327 | 91.5 |
| ▪ LRT 12 | 4,486 | 222 | 687 | 72 | 3,691 | 63 | 600 | 19.5 | 8,177 | 285 | 1,287 | 91.5 |
| ▪ LRT 12A | 4,492 | 222 | 697 | 72 | 3,711 | 63 | 620 | 19.5 | 8,204 | 285 | 1,317 | 91.5 |
| ▪ LRT 8/BN | 4,441 | 239 | 648 | 78 | 3,666 | 73 | 580 | 31 | 8,107 | 313 | 1,228 | 109 |
| LRT 9 | 4,532 | 222 | 723 | 72 | 3,747 | 63 | 640 | 19.5 | 8,279 | 285 | 1,363 | 91.5 |
| LRT 10 | 4,492 | 222 | 795 | 72 | 3,709 | 63 | 700 | 19.5 | 8,201 | 285 | 1,495 | 91.5 |
| ▪ Refined LRT 10 | 4,464 | 222 | 697 | 72 | 3,677 | 63 | 600 | 19.5 | 8,141 | 285 | 1,297 | 91.5 |
| ▪ LRT 10A | 4,469 | 222 | 707 | 72 | 3,689 | 63 | 620 | 19.5 | 8,158 | 285 | 1,327 | 91.5 |
| LRT 11 | 4,492 | 222 | 723 | 72 | 3,709 | 63 | 640 | 19.5 | 8,201 | 285 | 1,363 | 91.5 |

SOURCE: BRW, Inc.; Manuel Padron & Associates; LKC Consulting; February 2000.

## TABLE 5.13
## VEHICLE-MILES BY ALTERNATIVE (AVERAGE WEEKDAY)

| | PEAK | | | | OFF-PEAK | | | | TOTAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bus | Express Bus | LRT | CR | Bus | Express Bus | LRT | CR | Bus | Express Bus | LRT | CR |
| No Build Alternative | 54,159 | 7,880 | 9,301 | 1,325 | 52,364 | 2,636 | 7,751 | 359 | 106,523 | 10,516 | 17,052 | 1,684 |
| TSM/TDM Alternative | 60,069 | 8,473 | 9,301 | 1,325 | 58,265 | 4,034 | 7,751 | 359 | 118,334 | 12,507 | 17,052 | 1,684 |
| **Highway/ HOV Alternatives** | | | | | | | | | | | | |
| HOV IH 35E 4A1 | 60,413 | 8,807 | 9,301 | 1,325 | 58,408 | 4,838 | 7,751 | 359 | 118,821 | 13,645 | 17,052 | 1,684 |
| HOV SH 114 4B | 60,156 | 9,436 | 9,301 | 1,325 | 58,103 | 4,920 | 7,751 | 359 | 118,259 | 14,355 | 17,052 | 1,684 |
| **Commuter Rail Alternatives** | | | | | | | | | | | | |
| CR 6 | 57,354 | 5,750 | 9,301 | 5,820 | 53,451 | 1,842 | 7,751 | 1,943 | 110,805 | 7,593 | 17,052 | 7,763 |
| ▪ Refined CR 6/SH 121 | 57,383 | 5,750 | 9,301 | 5,947 | 53,475 | 1,842 | 7,751 | 2,185 | 110,858 | 7,593 | 17,052 | 8,133 |
| ▪ Refined CR 6/ Frankford | 57,349 | 5,750 | 9,301 | 5,162 | 53,452 | 1,842 | 7,751 | 1,946 | 110,801 | 7,593 | 17,052 | 7,108 |
| CR 7 | 58,233 | 5,750 | 9,301 | 4,446 | 53,966 | 1,842 | 7,751 | 1,683 | 112,199 | 7,593 | 17,052 | 6,128 |
| **LRT Alternatives** | | | | | | | | | | | | |
| LRT 8 | 57,211 | 5,321 | 15,350 | 1,325 | 53,704 | 1,643 | 12,792 | 359 | 110,914 | 6,964 | 28,142 | 1,684 |
| ▪ LRT 12 | 57,165 | 5,333 | 14,543 | 1,325 | 53,652 | 1,643 | 12,119 | 359 | 110,817 | 6,976 | 26,661 | 1,684 |
| ▪ LRT 12A | 57,391 | 5,333 | 14,543 | 1,325 | 53,892 | 1,643 | 12,119 | 359 | 111,283 | 6,976 | 26,661 | 1,684 |
| ▪ LRT 8/BN | 56,855 | 5,590 | 13,389 | 1,452 | 53,376 | 1,877 | 11,158 | 602 | 110,230 | 7,467 | 24,547 | 2,053 |
| LRT 9 | 57,739 | 5,321 | 15,731 | 1,325 | 54,322 | 1,643 | 13,109 | 359 | 112,061 | 6,964 | 28,839 | 1,684 |
| LRT 10 | 57,243 | 5,321 | 16,906 | 1,325 | 53,727 | 1,643 | 14,088 | 359 | 110,970 | 6,964 | 30,994 | 1,684 |
| ▪ Refined LRT 10 | 57,017 | 5,333 | 14,564 | 1,325 | 53,532 | 1,643 | 12,137 | 359 | 110,549 | 6,976 | 26,701 | 1,684 |
| ▪ LRT 10A | 57,051 | 5,333 | 14,564 | 1,325 | 53,547 | 1,643 | 12,137 | 359 | 110,598 | 6,976 | 26,701 | 1,684 |
| LRT 11 | 57,232 | 5,321 | 15,359 | 1,325 | 53,719 | 1,643 | 12,799 | 359 | 110,951 | 6,964 | 28,158 | 1,684 |

SOURCE: BRW, Inc.; Manuel Padron & Associates; LKC Consulting; February 2000.

## TABLE 5.14
## TOTAL BOARDINGS (UNLINKED PASSENGERS) PER VEHICLE-HOUR (AVERAGE WEEKDAY)

| | TOTAL | | | |
|---|---|---|---|---|
| | Bus | Express Bus | LRT | CR |
| No Build Alternative | 23.0 | 21.1 | 74.8 | 111.5 |
| TSM/TDM Alternative | 23.5 | 20.8 | 78.6 | 104.9 |
| **Highway/ HOV Alternatives** | | | | |
| HOV IH 35E 4A1 | 23.5 | 16.5 | 78.7 | 109.3 |
| HOV SH 114 4B | 23.4 | 19.0 | 78.2 | 103.8 |
| **Commuter Rail Alternatives** | | | | |
| CR 6 | 24.3 | 10.3 | 85.9 | 68.8 |
| ▪ Refined CR 6/SH 121 | 24.4 | 9.7 | 87.9 | 75.9 |
| ▪ Refined CR 6/ Frankford | 24.3 | 10.3 | 87.1 | 80.1 |
| CR 7 | 24.2 | 9.7 | 86.3 | 83.3 |
| **LRT Alternatives** | | | | |
| LRT 8 | 23.7 | 11.9 | 70.5 | 106.0 |
| ▪ LRT 12 | 23.9 | 10.2 | 70.2 | 108.2 |
| ▪ LRT 12A | 23.7 | 10.2 | 70.5 | 98.4 |
| ▪ LRT 8/BN | 24.1 | 12.8 | 73.5 | 123.9 |
| LRT 9 | 23.3 | 10.5 | 67.9 | 108.2 |
| LRT 10 | 23.5 | 11.2 | 62.7 | 100.5 |
| ▪ Refined LRT 10 | 23.9 | 10.2 | 69.2 | 96.2 |
| ▪ LRT 10A | 23.7 | 10.2 | 69.7 | 94.0 |
| LRT 11 | 23.5 | 11.2 | 59.9 | 109.3 |

SOURCE: BRW, Inc.; Manuel Padron & Associates; LKC Consulting; February 2000.

## TABLE 5.15
## FIRST BOARDINGS (LINKED PASSENGERS) PER VEHICLE-HOUR
## (AVERAGE WEEKDAY)

| | TOTAL | | | |
|---|---|---|---|---|
| | Bus | Express Bus | LRT | CR |
| No Build Alternative | 17.1 | 13.5 | 34.3 | 64.5 |
| TSM/TDM Alternative | 16.6 | 13.4 | 38.8 | 57.9 |
| **Highway/ HOV Alternatives** | | | | |
| HOV IH 35E 4A1 | 16.6 | 10.4 | 38.8 | 60.1 |
| HOV SH 114 4B | 16.9 | 12.1 | 38.5 | 56.8 |
| **Commuter Rail Alternatives** | | | | |
| CR 6 | 17.3 | 8.1 | 38.5 | 30.9 |
| ▪ Refined CR 6/SH 121 | 17.3 | 7.8 | 38.5 | 30.3 |
| ▪ Refined CR 6/ Frankford | 17.3 | 8.1 | 38.4 | 32.1 |
| CR 7 | 17.2 | 7.5 | 37.7 | 37.2 |
| **LRT Alternatives** | | | | |
| LRT 8 | 17.0 | 9.5 | 34.4 | 57.9 |
| ▪ LRT 12 | 17.2 | 8.1 | 33.6 | 56.8 |
| ▪ LRT 12A | 17.1 | 8.4 | 33.4 | 54.6 |
| ▪ LRT 8/BN | 17.3 | 8.6 | 34.1 | 51.4 |
| LRT 9 | 16.8 | 8.8 | 33.5 | 59.0 |
| LRT 10 | 17.0 | 8.8 | 31.3 | 55.7 |
| ▪ Refined LRT 10 | 17.2 | 8.4 | 33.8 | 52.5 |
| ▪ LRT 10A | 17.1 | 8.4 | 33.8 | 51.4 |
| LRT 11 | 17.0 | 9.1 | 33.6 | 60.1 |

SOURCE: BRW, Inc.; Manuel Padron & Associates; LKC Consulting; February 2000.

## TABLE 5.16
## TOTAL BOARDINGS (UNLINKED PASSENGERS) PER VEHICLE-MILE (AVERAGE WEEKDAY)

| | TOTAL | | | |
|---|---|---|---|---|
| | Bus | Express Bus | LRT | CR |
| No Build Alternative | 1.69 | 0.87 | 3.81 | 6.06 |
| TSM/TDM Alternative | 1.70 | 0.87 | 4.00 | 5.70 |
| **Highway/ HOV Alternatives** | | | | |
| HOV IH 35E 4A1 | 1.70 | 0.69 | 4.01 | 5.94 |
| HOV SH 114 4B | 1.69 | 0.79 | 3.98 | 5.64 |
| **Commuter Rail Alternatives** | | | | |
| CR 6 | 1.79 | 0.43 | 4.37 | 3.07 |
| ▪ Refined CR 6/SH 121 | 1.80 | 0.41 | 4.47 | 3.39 |
| ▪ Refined CR 6/ Frankford | 1.80 | 0.43 | 4.43 | 3.76 |
| CR 7 | 1.79 | 0.41 | 4.39 | 3.92 |
| **LRT Alternatives** | | | | |
| LRT 8 | 1.75 | 0.49 | 3.33 | 5.76 |
| ▪ LRT 12 | 1.77 | 0.42 | 3.39 | 5.88 |
| ▪ LRT 12A | 1.75 | 0.42 | 3.48 | 5.34 |
| ▪ LRT 8/BN | 1.77 | 0.54 | 3.67 | 6.58 |
| LRT 9 | 1.72 | 0.43 | 3.21 | 5.88 |
| LRT 10 | 1.74 | 0.46 | 3.02 | 5.46 |
| ▪ Refined LRT 10 | 1.76 | 0.42 | 3.36 | 5.23 |
| ▪ LRT 10A | 1.75 | 0.42 | 3.46 | 5.11 |
| LRT 11 | 1.74 | 0.46 | 2.90 | 5.94 |

SOURCE: BRW, Inc.; Manuel Padron & Associates; LKC Consulting; February 2000.

## TABLE 5.17
## FIRST BOARDINGS (LINKED PASSENGERS) PER VEHICLE-MILE
## (AVERAGE WEEKDAY)

| | TOTAL | | | |
|---|---|---|---|---|
| | Bus | Express Bus | LRT | CR |
| No Build Alternative | 1.26 | 0.56 | 1.75 | 3.50 |
| TSM/TDM Alternative | 1.21 | 0.56 | 1.98 | 3.15 |
| **Highway/ HOV Alternatives** | | | | |
| HOV IH 35E 4A1 | 1.21 | 0.43 | 1.98 | 3.27 |
| HOV SH 114 4B | 1.22 | 0.50 | 1.96 | 3.09 |
| **Commuter Rail Alternatives** | | | | |
| CR 6 | 1.28 | 0.34 | 1.96 | 1.38 |
| ▪ Refined CR 6/SH 121 | 1.28 | 0.33 | 1.96 | 1.35 |
| ▪ Refined CR 6/ Frankford | 1.28 | 0.34 | 1.95 | 1.51 |
| CR 7 | 1.27 | 0.32 | 1.92 | 1.75 |
| **LRT Alternatives** | | | | |
| LRT 8 | 1.26 | 0.39 | 1.62 | 3.15 |
| ▪ LRT 12 | 1.27 | 0.33 | 1.62 | 3.09 |
| ▪ LRT 12A | 1.26 | 0.34 | 1.65 | 2.97 |
| ▪ LRT 8/BN | 1.28 | 0.36 | 1.71 | 2.73 |
| LRT 9 | 1.24 | 0.36 | 1.58 | 3.21 |
| LRT 10 | 1.25 | 0.36 | 1.51 | 3.03 |
| ▪ Refined LRT 10 | 1.27 | 0.34 | 1.64 | 2.85 |
| ▪ LRT 10A | 1.26 | 0.34 | 1.68 | 2.79 |
| LRT 11 | 1.26 | 0.37 | 1.63 | 3.27 |

SOURCE: BRW, Inc.; Manuel Padron & Associates; LKC Consulting; February 2000.

Observations from Tables 5.14 through 5.17 indicate the following in terms of operating efficiency (passengers per unit of service):

- The TSM/TDM and HOV Alternatives result in slightly better LRT productivity as compared to the No Build Alternative.

- The Commuter Rail Alternatives result in higher productivity for both local bus and LRT as compared to both the No Build and TSM/TDM Alternatives.

- Commuter Rail productivity is reduced by 40-50% under all Commuter Rail alternatives, indicating significant inefficiencies with extensions of this mode. Express bus productivity also is reduced with Commuter Rail Alternatives.

- LRT Alternatives generally result in higher local bus productivity, particularly LRT Alternatives 12, 8/BN and 10 Refined.

- LRT Alternatives result in a slightly lower productivity for the LRT mode. LRT Alternatives 10 and 11 generally have the highest level of inefficiency per unit of service.

- For remaining LRT Alternatives, reduced productivity for the LRT mode as compared to the No Build ranges from:

  - Less than 1% to 9% (total boardings per vehicle-hour) with LRT 8/BN, 12A and 8 having the best productivity.

  - 0% to 3% (first boardings per vehicle-hour) with LRT 8, 8/BN, 10A and 10 Refined having the best productivity

  - 4% to 16% (total boardings per vehicle-mile) with LRT 8/BN, 12A and 10A having the best productivity.

  - 2% to 10% (first boardings per vehicle-mile) with LRT 8/BN, 10A, and 12A having the best productivity.

## 5.3 SOCIO-ECONOMIC EFFECTS

The following sections compare the socio-economic effects among alternatives. This section focuses on the key differences among alternatives and effects around station areas. Much of the information used for the basis of this evaluation is contained in the ***Environmental Baseline Report*** (BRW, Inc.; January 2000) and the *Environmental Checklist*, included as an appendix to the ***Environmental Baseline Report.***

### 5.3.1 Land Use Compatibility

The following sections discuss the alternatives land use compatibility with respect to:

- Compatibility with Land Use Plans
- Right-of-way Acquisition
- Residential Displacements
- Business Displacements

**Compatibility with Plans**

The No Build Alternative is not compatible with local and regional land use and transportation plans as all plans include a transit improvement in the Northwest Corridor. The TSM/TDM, HOV and Highway Widening Alternatives are generally compatible with plan goals related to enhanced capacity and traffic flow. However, these alternatives have a limited ability to influence land use patterns and support development initiatives.

The Commuter Rail, and particularly the LRT Alternatives, have the highest potential to foster the land use patterns desired by local plans and guidelines. Although the Manana Spur routing option to Irving has been included in past planning efforts, alternatives that use the UD/Texas Stadium routing option (Alternatives 10, 10A) are most compatible with the City of Irving's future land use planning efforts. Comprehensive plans for Dallas, Farmers Branch and Carrollton take into account and plan for a rail investment within their community. As such, many of their plans land use decisions are based on the presence of this future rail line (i.e. Farmers Branch station).

**ROW Acquisition**

Alternatives that will possibly require right-of-way (ROW) acquisitions are the HOV, Commuter Rail, and LRT Rail Alternatives. The No Build would not require any additional right-of-way beyond that already needed for programmed improvements. The TSM/TDM Alternative will contain most improvements within existing ROW, but could require minor ROW acquisitions. The Highway Widening Alternative is assumed to take place within existing ROW but could possibly require additional ROW. HOV Alternatives will require ROW for park-and-rides at Valwood and MacArthur should TxDOT proceed with these park-and-rides. HOV lane improvements would generally take place within existing right-of-way.

The Commuter and LRT Alternatives will both require ROW acquisition for station locations and for portions of the alignment outside of the existing DART-owned UP RR corridor ROW. All LRT Alternatives using the Harry Hines Boulevard alignment would require ROW acquisition through this area. With the exception of the Arena Station, all Commuter Rail and LRT stations would require land for park-and-ride lots, bus bays and/or kiss-and-ride areas. Commuter Rail Alternatives 7 and LRT Alternative 9 would require the use or acquisition of portions of the BN RR.

The extent of negative impact will depend on the amount and the location of land to be acquired for the selected alternative. These impacts will be assessed with the development of greater engineering detail and will be reported during the PE/EIS phase.

**Residential Displacements**

The No Build, TSM/TDM, HOV, and Highway Widening Alternatives will not have an impact on residential displacements because improvements will be made within existing street/highway ROW. Two park-and-rides for the HOV Alternatives are proposed in locations where no residential uses are located. No residential displacements are expected for the Commuter Rail and LRT Alternatives. However, this will be determined during the PE/EIS phase when more detailed planning and design on final station placement will be conducted. This more detailed work will determine the need for and type of displacement.

**Business Displacements**

The No-Build Alternative will not result in business displacements. In general, TSM/TDM and Highway Widening improvements will be made within existing street/highway ROW and will not result in displacements. The Valwood Park-and-Ride facility proposed with IH 35E HOV improvements will likely displace businesses.

For the Commuter Rail and LRT Alternatives, the placement of the stations and possibly portions of new LRT rail alignments outside DART-owned ROW will require the acquisition of businesses. More detailed planning and design on final station placement and rail alignments will be necessary to determine the need for and type of displacement that may occur.

### 5.3.2 Transit-Supportive Development

The following section discusses transit-oriented development with respect to:

- Supports Development Goals
- Joint Development Potential at Stations/Facilities
- Effect on Pedestrian Environment
- Potential to Induce Development

**Supports Development Goals**

The No Build Alternative negatively impacts development goals because growth is impeded by worsening congestion and potential deterioration in quality of life and air quality, which can affect business and residential location decisions. The TSM/TDM and HOV Alternatives have limited potential to enhance transit-supportive development goals through enhanced transit service and trip reduction programs. Highway Widening does not support transit-supportive development and is not applicable to this development goal.

Alternatives that have the greatest potential to support development goals are the Commuter Rail and LRT Alternatives. The rail stations can act as a catalyst for new development and redevelopment in the vicinity of the station sites. This has been demonstrated by the DART Starter System. Additionally, many cities have been planning and have begun to incorporate rail into their future land use and development goals.

**Joint Development Potential**

Alternatives that do not have potential to create joint development are the No Build, TSM/TDM, and Highway Widening. The HOV Alternative could also provide limited joint development opportunities in the vicinity of the park-and-ride stations; however, this is not likely.

Alternatives with the greatest joint development potential are the LRT Alternatives. Recent studies for the DART LRT Starter System have shown a significant economic development impact. This impact is evidenced by transit-oriented developments underway at Starter System LRT stations including commercial and high density residential development. Opportunity for joint development and private/public partnerships would result from opportunities to redevelop and develop station areas using transit-supportive guidelines. Joint development potential results from land use decisions and zoning initiated by cities in their development goals to attract transit-supportive development. All stations demonstrate opportunity for joint or redevelopment. Commuter Rail has less joint development potential than LRT due to its service characteristics.

DART has included in the PE/EIS phase scope of work, a process for developing corridor and station plans. Thee plans would include analyses of potential joint development and transit-supportive land uses.

**Pedestrian Environment**

The No Build and Highway Widening Alternatives would not enhance the pedestrian environment along the corridor because these alternatives do not include elements that would support pedestrian improvements. The TSM/TDM Alternative includes pedestrian and bicycle improvement elements, and could potentially benefit the pedestrian environment. The HOV Alternatives include two new park-and-rides and new feeder bus service to these facilities. Due to the location of these park-and-ride facilities, the impact on the pedestrian environment would be limited.

The greatest potential to increase the pedestrian environment would result from the LRT and Commuter Rail Alternatives. With rail alternatives, the pedestrian environment could be enhanced through new and improved sidewalks and linkages to the rail stations to and from surrounding neighborhoods and activity centers.

**Induce Development**

The HOV Alternative includes two new park-and-rides that could potentially induce development in the vicinity of these facilities. The No Build, TSM/TDM, and Highway Widening Alternatives will not induce any additional development than those already planned.

Alternatives with the greatest potential to induce development are those that provide a rail transit investment (LRT and Commuter Rail Alternatives). Transit-oriented development (TOD) could result from the creation of station sites, particularly as cities explore potential changes in their land use plans to support a transit investment.

### 5.3.3 Social and Economic

The social and economic evaluation focuses on the ability of alternatives to affect future levels of population and employment in the corridor study area, as well environmental justice considerations. Highlights for each alternative and refinements are discussed in the following sections with respect to:

- Population
- Employment
- Environmental Justice

**Population**

The No Build Alternative could possibly have a negative affect on projected population in the Corridor by not providing alternatives to single occupant vehicle travel and insufficient transit service expansion to address the needs of the transit dependent. The lack of travel options could potentially increase roadway congestion and provide a disincentive for new residents or businesses wishing to locate/relocate in the Corridor. The HOV Alternative would encourage ridesharing and provide travel-time savings. The TSM/TDM Alternatives and Highway Widening Alternatives could have an impact on projected population growth by providing options that could potentially decrease roadway congestion, initially. However, as the population increases, these alternatives may become insufficient to meet the needs of the growing population.

The Commuter Rail, and LRT Alternatives could potentially have a positive affect on future population growth by providing alternative modes of transportation into and out of the Corridor. The Commuter Rail and LRT Alternatives would offer better access and mobility opportunities for area residents.

### Employment

The No Build Alternative could possibly have a negative affect on projected employment in the Corridor by not providing alternatives to single occupant vehicle travel and insufficient transit service expansion to address the needs of the transit dependent. The lack of travel options could potentially increase roadway congestion and provide a disincentive for new employers wishing to locate/relocate in the Corridor. The HOV Alternative would encourage ridesharing and provide travel-time savings. The TSM/TDM Alternatives and Highway Widening Alternatives could have an impact on projected employment growth by providing capacity improvements that could potentially decrease roadway congestion, initially. However, as employment continues to grow, these alternatives may not be sufficient to meet the needs of the population.

The Commuter Rail, and LRT Alternatives could potentially have a positive affect on future employment growth by providing alternative modes of transportation into and out of the Corridor. The Commuter Rail and LRT Alternatives would increase accessibility to area employment centers around the Corridor.

### Environmental Justice

The environmental justice assessment attempts to identify if project alternatives will have a disproportionately high and adverse effects among minority and low-income communities. This consideration was established by:

- Executive Order 12898 – "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations", signed by President Clinton in February 1994.

Table 5.18 summarizes environmental justice characteristics in the Study Area, along primary alignments, and around station areas.

The No-Build, TSM/TDM, and Highway/HOV Alternatives will not result in environmental justice concerns as they will be done within existing street or highway rights-of-way and would not disproportionately affect low-income or minorities communities.

The Commuter Rail and LRT Alternatives have the potential to benefit low-income or minority communities by providing increased mobility and accessibility. No rail alternatives appear to have a disproportionate effect on low-income or minority populations when compared to Dallas County. Minority and lower-income populations are more prevalent along the alternative alignments than in the study area, particularly in the southern part of the study area in Dallas. However, potential impacts associated with the rail alternatives would not be disproportionate in this area. Many stations, particularly those in Dallas, have a higher percentage of low-income households under the poverty level. However, stations areas are not expected to displace these residents. Stations will enhance access and mobility for these households, providing an overall benefit.

## TABLE 5.18
## ENVIRONMENTAL JUSTICE CHARACTERISTICS

| Area | Households within ½-mile | % Households under Poverty Status within ½-mile | Race (% breakdown within ½-mile) | | | Median Income (Average) |
|---|---|---|---|---|---|---|
| | | | White | Black | Hispanic Origin | |
| Study Area | 213,594 | 7.1% | 75.9 | 3.6 | 10.6 | $23,930 |
| Dallas County | 703,789 | 11.5% | 67.1 | 20.0 | 16.6 | $22,180 |
| Within ½ mile of Alignment: | | | | | | |
| CR Alternative 6 | 30,353 | 14.5% | 59.2 | 16.3 | 33.9 | $21,390 |
| CR Alternative 7 | 54,093 | 11.4% | 68.3 | 11.7 | 25.8 | $21,670 |
| LRT Alternative 8 | 34,352 | 12.5% | 62.5 | 15.1 | 30.6 | $21,750 |
| LRT Alternative 9 | 48,457 | 9.3% | 68.9 | 13.8 | 22.0 | $21,090 |
| LRT Alternative 10 | 39,557 | 11.1% | 64.8 | 16.4 | 25.7 | $21,690 |
| LRT Alternative 11 | 31,362 | 12.6% | 60.4 | 18.3 | 29.0 | $21,390 |
| Station Areas: | | | | | | |
| Arena | 427 | 32.3% | 42.1 | 48.1 | 17.4 | $16,650 |
| Market Center | 1454 | 34.6% | 28.0 | 25.5 | 60.6 | $15,530 |
| Medical Center | 630 | 27.9% | 31.1 | 59.4 | 13.6 | $14,370 |
| SW Medical/Exchange Park | 1217 | 16.9% | 42.6 | 25.0 | 52.4 | $24,480 |
| Medical/Market Center | 2696 | 32.3% | 36.6 | 26.0 | 48.1 | $15,690 |
| Mockingbird Lane/Love Field | 851 | 19.4% | 52.8 | 4.2 | 71.3 | $24,350 |
| Love Field Terminal | 655 | 19.2% | 32.4 | 2.0 | 81.0 | $25,100 |
| Northwest Highway/Bachman Lake | 3793 | 18.7% | 40.4 | 29.6 | 44.3 | $20,030 |
| Walnut Hill/Manana Station | 3030 | 8.7% | 62.9 | 21.2 | 32.0 | $25,160 |
| Royal Lane | 2565 | 7.8% | 70.5 | 12.0 | 25.2 | $23,760 |
| Farmers Branch Park-and-Ride | 1794 | 7.0% | 79.9 | 3.9 | 19.2 | $24,930 |
| Beltline/Old Downtown Carrollton | 1751 | 11.9% | 80.1 | 3.1 | 17.7 | $26,480 |
| North Carrollton T.C. | 1742 | 5.0% | 88.0 | 3.3 | 3.9 | $18,900 |
| Frankford | 2534 | 5.9% | 86.8 | 5.1 | 7.4 | $23,100 |
| Hebron Parkway/Vista Ridge | 683 | 10.0% | 86.6 | 4.4 | 9.0 | $21,180 |
| SH 121/Lewisville | 748 | 11.9% | 84.7 | 10.4 | 12.5 | $22,810 |
| SH 190 /BN | 7439 | 3.5% | 85.1 | 6.1 | 6.9 | $24,670 |
| Plano Parkway/BN | 570 | 1.2% | 89.6 | 5.3 | 7.2 | $23,330 |
| SH 121/Legacy | 1789 | 1.4% | 88.1 | 4.8 | 9.5 | $23,330 |
| Texas Stadium | 619 | 32.6% | 75.0 | 3.2 | 11.3 | $20,780 |

| Area | Households within ½-mile | % Households under Poverty Status within ½-mile | Race (% breakdown within ½-mile) | | | Median Income (Average) |
|---|---|---|---|---|---|---|
| University of Dallas | 1047 | 25.4% | 74.1 | 3.1 | 18.3 | $21,490 |
| South Las Colinas | 1558 | 15.5% | 79.4 | 3.7 | 13.1 | $20,090 |
| North Irving T.C. | 1009 | 4.4% | 88.1 | 3.4 | 9.2 | $26,730 |
| South Irving T.C. | 4411 | 15.3% | 71.8 | 6.3 | 27.2 | $22,750 |
| MacArthur | 1753 | 4.3% | 77.3 | 14.2 | 6.6 | $26,480 |
| Beltline Road | 2048 | 4.5% | 80.7 | 11.9 | 5.4 | $24,320 |
| Freeport | 1190 | 0.8% | 87.7 | 5.7 | 3.7 | N/A |
| DFW North | 1807 | 1.8% | 90.7 | 3.8 | 4.9 | N/A |
| DFW (Hyatt/International) Terminal | 1745 | 1.4% | 91.4 | 6.0 | 4.9 | N/A |
| Centreport/DFW South (TRE) [6] | 1493 | 3.1% | 78.8 | 15.3 | 6.8 | $27,800 |

SOURCE: 1990Census Data; BRW, Inc.; September 1999.

### 5.3.4 Visual and Aesthetic Resources

The following section discusses visual and aesthetic resources with respect to:

- Effect on Existing Views/Visual Resources
- Potential for Visual Intrusion/Privacy

**Existing Views/ Resources**

Due to the industrial and commercial nature of the corridor, visual impacts will largely be limited to potential indirect visual impacts to parks and cultural resources. The primary existing visual resource of the corridor is the Elm Fork River and greenbelt. The No Build and Highway Widening Alternatives will not affect existing views or visual resources. The TSM/TDM (minor grade separations and bicycle/pedestrian bridges) and HOV Alternatives (direct access ramps to HOV lanes from park-and-rides) could potentially affect or block views from automobiles or surrounding neighborhoods by introducing a new element.

Commuter Rail Alternatives could possibly affect views due to new grade separations and structures. LRT Alternatives will introduce new grade separations and an overhead catenary system. The greatest potential for negative visual impacts is with LRT Alternative 10 (and its subsequent refinements), which will cross the Elm Fork of the Trinity River on a bridge structure.

**Visual Intrusion/ Privacy**

The potential for visual intrusion/privacy impacts occurs when passengers have the ability to view into private residences from passing vehicles. The No Build, TSM/TDM, HOV and Highway Widening Alternatives are not expected to result in visual intrusion impacts as improvements will generally be within existing street or highway rights-of-way and will not introduce elements not already present in the area.

The majority of rail alternatives pass through primarily commercial and industrial areas with limited potential for visual intrusion impacts. The highest potential for visual intrusion or privacy impacts is associated with Commuter Rail Alternative 7 and LRT Alternative 9, both of which follow the BN RR. The BN RR segment through South Irving and the upper segment of the BN RR north of Belt Line Road, pass through largely single-family family residential areas. LRT Alternative 8 also passes adjacent to a single-family residential area west of Love Field and may result in visual intrusion impacts.

### 5.3.5 Safety

The following section discusses safety with respect to the Northwest Corridor alternatives.

The No-Build Alternative does not include any elements to enhance safety within the corridor. The TSM/TDM Alternative incorporates low-cost safety improvements to freeways, and

includes signal/arterial, pedestrian and bicycle improvements to enhance safety. The HOV and Highway Widening Alternatives can potentially enhance corridor safety by enhancing freeway-to-freeway connections and improving capacity.

While the Commuter Rail and LRT Alternatives would introduce a safe method of travel using exclusive rail right-of-way, these alternatives would also introduce a new element of frequent passenger rail service along existing or new rail corridors that may be crossed at informal locations by pedestrians. During the PE/EIS phase the need for safety fencing along the alignment and the effect of alignments on school attendance zones will be analyzed in greater detail for the preferred alternative. Safety associated with at-grade crossings will be controlled by standard crossing devices (gates, warning lights, whistles).

## 5.4 ENVIRONMENTAL EFFECTS

This section evaluates alternatives based on their potential environmental effects on the following:

- Parks and Recreation Lands
- Cultural Resources
- Noise and Vibration
- Air Quality
- Ecosystems
- Water Resources
- Hazardous/Regulated Materials
- Energy

### 5.4.1 Parks and Recreation Lands

Potential effects on parks and recreational lands are examined in accordance with the following regulations:

- Department of Transportation Act of 1966 (49 U.S.C. 303) / Section 4(f)
- Texas Parks and Wildlife Code / Chapter 26
- Land and Water Conservation Fund Act (Public Law 88-578 Section 6(f)

These regulations and an inventory of parks and recreational lands present in the Northwest Corridor are described in detail in the ***Environmental Baseline Report*** (BRW, Inc., January 2000). The inventory includes neighborhood, community, regional, and special use parks, a municipal golf course, and publicly-owned greenbelt areas. The inventory also includes school playgrounds because they are publicly-owned and often used after-hours by community groups for local sports activities. No wildlife or waterfowl refuges that are protected under the regulating legislation were identified within the study area. A total of 28 public parks and recreation lands are located within proximity of the proposed alignments, which includes resources a distance of approximately 500 feet. Resources at a distance of approximately 700 feet were included for Commuter Rail and LRT alternatives, if the alternative included elevated structures near the resource.

Direct impacts and the type and extent of indirect impacts cannot be definitively determined at this time. A more comprehensive analysis of the potential impacts of the preferred alternative will be conducted during the PE/EIS phase. A summary of key differences among alternatives in support of the evaluation is provided below.

No impacts are expected for the No-Build or No-Build/CMS Alternatives. Impacts are unlikely under the TSM/TDM Alternative, as most improvements are minor and take place within existing street ROW. No direct or indirect impacts are anticipated with HOV Alternatives as lanes would be added within an existing roadway, and no resources are located near proposed park-and-ride locations.

The IH 35E Highway Widening Alternative has potential indirect impacts (noise, vibration, and safety) to five park and recreational resources: LB Houston Nature Trail, Farmers Branch Historical Park, Downtown Square Park, Pioneer Park, and Ken Good Park. No resources were identified along the SH 114 Highway Widening Alternative.

**Commuter Rail Alternatives**

The Commuter Rail UP RR alignment would use existing railroad corridor with the exception of station locations and ROW required to complete the Mañana Spur or BN RR connection to the North Irving Transit Center (NITC). Key observations are noted below:

- Right-of-way acquisitions for the Mañana Spur to the NITC (CR Alternative 6) would directly affect California Crossing Park and Bird Fort Trail Park. Indirect impacts could include noise, vibration and safety.
- Right-of-way acquisitions for the BN RR to the NITC (CR Alternative 7) could indirectly affect LB Houston Nature Trail. Indirect impacts could include noise, vibration and safety.
- Station improvements at NITC could directly and/or indirectly affect California Crossing and Bird Fort Trail Park for both alternatives.
- The proposed North Carrollton Transit Center station would likely indirectly affect Ken Good Park.
- The UP RR alignment, which is used for both alternatives south of Belt Line Road, would likely indirectly affect six resources:
  - Bachman Lake Park
  - Farmers Branch Historical Park
  - Downtown Square Park
  - Pioneer Park
  - Ken Good Park
  - Indian Creek Municipal Golf Course.
- Both alternatives may directly affect Weichsel Park and Rusk Middle School in the northeast corner of Denton Drive and Inwood Road.
- Elevated Commuter Rail track in the vicinity of Perry Park (located approximately 700 feet from the proposed alignment) could cause an impact to the park's visual resources.

- Alternative 7, which follows the BN RR north of Belt Line Road would likely indirectly affect eight resources:
  - Thomas Park
  - Jimmy Porter Park
  - Josey Ranch Park
  - Carrollton Amphitheater
  - Mill Valley Park
  - Ward Steenson Park
  - Long Junior High
  - Furneaux Elementary
- The BN RR south segment to the NITC (Alternative 7) would likely indirectly affect three resources: LB Houston Nature Trail, Elm Fork Greenbelt, and Greenbelt Park.

**LRT Alternatives**

LRT Alternatives would require additional right-of-way in a number of areas, which creates the potential for a direct impact to any park or protected resource located on the land to be acquired. Key observations are noted below:

- The LRT overhead catenary system and substations could result in visual impacts greater than those associated with other technologies.
- LRT Alternatives which would follow the TRE corridor from the downtown transit mall could have direct impacts to Dealey Plaza Annex.
- Reverchon Park (portion west of Tollway) would likely be directly affected by all the LRT alignments.
- Bachman Lake Park is adjacent to all alignments and could potentially be directly affected.
- For all LRT Alternatives, the Farmers Branch Station could potentially have direct impacts to Farmers Branch Historical Park and Pioneer Park; the Beltline/Old Downtown Carrollton Station could have indirect impacts to Downtown Square Park if located south of Belt Line.
- Alternatives that continue north along the UP RR and could directly affect Ken Good Park and indirectly affect the Indian Creek Municipal Golf Course.
- Alternatives using the Mañana Spur to Las Colinas could directly affect Bird Fork Trail Park.
- Alternatives using the UD/Texas Stadium option to Las Colinas (10,10 Refined, 10A) would directly impact LB Houston Nature Trail as it crosses the Elm Fork.
- Alternative 9 uses the BN RR alignment northeast of the UP RR. Six resources would be directly affected:
  - Thomas Park
  - Jimmy Porter Park
  - Josey Ranch Park
  - Mill Valley Park
  - Ward Steenson Park

- Long Junior High.

Three resources would be indirectly affected: Carrollton Amphitheater, Furneaux Elementary, and Greenbelt Park due to an elevated section of the LRT.

**Manana Spur vs. UD/ Texas Stadium Route**

A more detailed examination of the Manana Spur and the UD/Texas Stadium routing options is provided in Table 5.19, as these are the two primary ways to access Irving and the Las Colinas area. Making this decision became a crucial aspect of reaching consensus on the LPIS. Thus, several of the succeeding criteria will be described for these two options.

**TABLE 5.19**
**SUMMARY OF PARKLAND CHARACTERISTICS AND POTENTIAL ACQUISITION AREA**

| Routing Option | Park | City | Size (acres) | Estimated Area of Proposed Acquisition* | Activities |
|---|---|---|---|---|---|
| Manana Spur | Bird's Fort Trail Park | Dallas | 56.0 | 0.7 acres | Fishing, Canoeing, Hiking, Rollerblading, Bike Trails, Equestrian Trails |
| UD/Texas Stadium | L.B. Houston Nature Trail | Irving | 298.56 | 1.72 acres | Nature area, Shooting Range, Tennis Center, Golf Course |

SOURCE: Myra L. Frank & Associates; November 1999.

* Area of proposed acquisition based on 50 foot ROW requirement.

As shown, the Manana Spur would require less parkland acquisition to accommodate an LRT alignment. Additional engineering details will be developed during the PE/EIS phase. At that time, a more detailed assessment of potential impacts and mitigation options will be documented.

### 5.4.2 Cultural Resources

The potential effects of project alternatives on cultural resources must be considered in accordance with the following regulations:

- National Historic Preservation Act of 1966 (16 U.S.C. 470), as amended / Section 106
- Department of Transportation Act of 1966 (49 U.S.C. 303) / Section 4(f)
- Texas Parks and Wildlife Code / Chapter 26
- Antiquities Code of Texas (Texas Natural Resources Code of 1977, Title 9, Heritage, Chapter 191)
- Dallas Development Code / Historic resource overlay district ordinance (§51A-4.501)

These regulations and a preliminary overview of cultural resources in the Northwest Corridor are described in detail in the ***Environmental Baseline Report*** (BRW, Inc., January 2000). A summary of key differences among alternatives in support of the evaluation is provided below.

No impacts are expected for the No-Build or No-Build/CMS Alternatives. Impacts are unlikely under the TSM/TDM Alternative, as most improvements are minor and take place within existing street ROW. No impacts are expected with HOV Alternatives as improvements are assumed to take place within existing freeway ROW and there are no resources at proposed park-and-ride locations.

IH 35E Highway widening improvements could have potential indirect effects on historic resources in the vicinity of the downtown Carrollton Square south of Belt Line Road. No effects are expected with the SH 114 Highway widening alternative.

**Commuter Rail Alternatives**

The Commuter Rail Alternatives pass through or adjacent to several areas rich in history, including the West End Historic District, Farmers Branch, and old Downtown Carrollton. Key observations and comparisons between Alternatives 6 and 7 are noted below:

- Several isolated historic resources are located near the tracks near Love Field.
- All resources located within one block could be indirectly affected.
- The Farmers Branch Station (an existing park-and-ride lot) is near one historic resource, the Fred Marsh Automotive Building. The proposed Belt Line/Old Downtown Carrollton station site is adjacent to the Carrollton Depot, which is a City of Carrollton Landmark and potentially eligible for the National Register. These stations would likely have an indirect impact on the historic resources.
- Elevated tracks near the Carrollton Depot increase the potential for indirect impacts.
- The BN RR option (Alternative 7) could potentially have a direct impact to the Depot
- Further northeast, Alternative 7 passes near several resources associated with the early development of Carrollton.
- The BN RR southern segment associated with Alternative 7 passes near four historic residential resources in Irving.
- Alternative 7 could have an indirect effect on all historic resources located within one block of the proposed alignment.
- Further evaluation would be required when appropriate technical analyses (e.g., noise, vibration, visual, land use) are completed during the PE/EIS phase.

**LRT Alternatives**

The LRT Alternatives also pass through or adjacent to the West End Historic District, Farmers Branch, and old Downtown Carrollton. All LRT Alternatives would likely have an indirect effect on historic resources located within one block of the proposed alignment, and beyond one block in the areas where elevated tracks are proposed. Special consideration to potential historic resources should be considered where additional ROW is required to accommodate

LRT. Furthermore, the overhead catenary system and electrical substations could result in additional indirect visual impacts not seen with Commuter Rail.

Key observations and differences among alternatives are noted below:

- Alternative 8, which follows the TRE corridor out of downtown Dallas, runs through a portion of the West End Historic District, a National Register-listed resource. As proposed, direct effects on any buildings in the district are unlikely, but there could be indirect effects on resources proximate to the tracks.
- Alternatives 9 through 11 would use Griffin Street and continue north on Griffin to the Arena site. Although Griffin Street is outside the boundary of the West End Historic District, it runs directly through the proposed North End Historic District, a group of early 20th century brick commercial buildings similar to those found in the West End. To date, the North End has not been officially nominated for city, state, or federal recognition. Nevertheless, the City of Dallas considers the buildings in this area to have historic significance and is interested in their preservation. Any right-of-way acquisition could directly affect buildings in the North End. Even if within existing street right-of-way, it would likely have an indirect impact on the resources in the North End. It should be noted that development associated with the new Arena has already resulted in the demolition of some buildings in this area.
- North of the Central Business District, all of the LRT alternatives pass under the CRI & PR RR Bridge, a resource identified in a previous survey. Additional right-of-way may be required along this segment of track, having a direct effect on the bridge.
- Right-of-way may also required on the west side of Harry Hines Boulevard for all alternatives. This would not directly affect any historic resources, but could indirectly affect the Turtle Creek Pump Station, a state and city landmark that appears to be eligible for the National Register of Historic Places.
- Near Love Field, all LRT alternatives run within one block of 7 historic resources. Of these resources, 4 appear to be eligible for the National Register, pending further investigation and evaluation. LRT Alternative 8 is also adjacent to another resource (Obadiah Knight School), that appears to be eligible for the National Register.
- Potential right-of-way needs for all LRT alternatives may directly affect 2 resources: Bachman Substation and Old Letot School. Further, if the Northwest Highway/Bachman Lake Station site is located north of Northwest Highway, it would be within one block of the Old Ritz Theater and might have an indirect effect on that resource.
- All LRT Alternatives pass through the communities of Farmers Branch and Carrollton, both of which are discussed above in the Commuter Rail section.
- LRT elevated over Valley View Lane could cause indirect visual effects on the Fred Marsh Automotive Building. Proposed plans also indicate that the LRT tracks would be elevated over Belt Line Road in the vicinity of Old Downtown Carrollton and the Carrollton Crossing Depot, creating a potential for increased indirect impacts.
- As mentioned above for Commuter Rail, the Depot and railroad crossing are historically significant at a local level. Plans for the Beltline/Old Carrollton station

(for all alternatives) and the UP to BN connection associated with LRT Alternative 9 would need to be carefully engineered to avoid any direct effect on this resource.

**Archaeological Resources**

There are 41 known sites within ½-mile of the routes identified for all alternatives. The No Build, TSM, and HOV Alternatives will not impact any known sites as improvements would be limited within existing ROW. Known sites could potentially be impacted by remaining alternatives.

The LRT Alternatives have highest potential to impact known archaeological sites due to their proximity to waterways, ROW requirements, and indirect construction impacts. The number of potential sites that could be affected for Alternatives 8 through 11 are 33, 31, 35,and 35, respectively. The Highway Widening and Commuter Rail Alternatives would potentially impact fewer known sites because the alternatives are limited to areas that are existing transportation corridors. The IH 35E Highway Widening alternative could impact 11 sites, while the SH 114 Alternative could impact 10 sites. Commuter Rail Alternative 6 could potentially impact 13 known sites, while Alternative 7 could impact 10 sites.

### 5.4.3 Noise and Vibration

**Noise**

Potential noise receptors include residences, churches, and noise sensitive businesses within 200 feet of the proposed actions of each alternative. No negative impacts are anticipated for the No Build, TSM or HOV Alternatives. Additionally, no potentially adverse impacts due to noise are anticipated for the IH 35E Highway Widening Alternative due to its commercial and industrial nature. However, potential adverse noise impacts could occur on the SH 114 Widening Alternative due to the proximity of hotels near Esters Road, and apartments along the corridor.

For the Rail Alternatives, the majority of potential noise receptors are classified as residential (individual homes and apartment complexes). All Commuter Rail and LRT Alternatives have the potential for noise impacts. The highest potential for noise impacts is under Commuter Rail Alternative 7 and LRT Alternative 9, both of which would be implemented in the upper BN RR segment (north of Belt Line Road) adjacent to several residential neighborhoods and parks. Other locations for potential impacts include the area near Love Field and near the Northwest Highway station.

**Vibration**

Sensitive vibration receptors include residences, institutional land uses, and businesses where low vibration is essential for interior operations. No vibration impacts are anticipated for the No-Build, TSM/TDM, HOV, or Highway Widening Alternatives.

For the Commuter Rail and LRT Alternatives, the number of vibration receptors is dependent upon local geology, speed and type of train, and location of crossovers and is thus unknown at

this stage in the study. A detailed analysis of soils and geology along the locally preferred alternative will be conducted during the PE/EIS phase.

### 5.4.4 Air Quality

#### Air Quality Plans

The Dallas-Fort Worth region has been designated "serious" non-attainment for ozone by the EPA. The No Build and Highway Widening Alternatives do not conform with the State Implementation Plan's goals for attainment with Federal air quality standards as they do not encourage the reduction of single occupant vehicle (SOV) trips through increased transit use, car pooling, etc. The TSM/TDM and HOV Alternatives could help potentially reduce the number of vehicle miles traveled.

Commuter Rail and LRT alternatives all can potentially reduce the number of vehicle miles traveled and assist in the improvement of air quality by offering increased transit services, carpool programs, or for rail, a high capacity transit alternative to the automobile.

#### Criteria Pollutants

Criteria pollutants include Carbon Monoxide (CO), particulate matter ($PM_{10}$), nitrogen oxides ($NO_x$), and volatile organic compounds (VOC), the latter two being precursors to ozone. The No Build and Highway Widening Alternatives have the potential to increase criteria pollutants that are precursors to ground-level ozone pollution. Furthermore, added capacity under the Highway Widening Alternatives discourages transit use. The TSM/TDM and HOV would help reduce vehicle miles traveled, reducing criteria pollutants.

Rail Alternatives can reduce vehicle miles traveled within the corridor and correspondingly reduce criteria pollutants.

#### Greenhouse Gas Emissions

Carbon Dioxide ($CO_2$) is the greenhouse gas evaluated for air quality studies. The No Build and Highway Widening Alternatives will increase carbon dioxide emissions as the total vehicle miles traveled within the corridor increase. Furthermore, added capacity discourages transit use.

HOV and Rail Alternatives can help to reduce vehicle miles traveled within the corridor and correspondingly reduce greenhouse gas emissions

### 5.4.5 Ecosystems

#### Wetlands

The No Build and TSM/TDM Alternatives are not anticipated to impact wetland areas. The HOV Alternative may impact wetland areas associated with creek and river crossings.

Potentially significant impacts may occur along UP RR from Frankford to Hebron Parkway for the Commuter and Light Rail Alternatives and underneath the Hebron Parkway/IH 35E intersection for the IH 35E Highway Widening Alternative. For all of the LRT Alternatives, the grade separation from the North Irving Transit Center to just north of Colwell Boulevard may impact wetlands associated with Hackberry Creek.

**Manana Spur vs. UD/ Texas Stadium Route**

A comparison of the Manana Spur and the UD/Texas Stadium routing options is provided in Table 5.20, as these are the two primary ways to access Irving and the Las Colinas area, and both routes would traverse the Elm Fork and associated wetland areas.

**TABLE 5.20**
**COMPARISON OF POTENTIAL JURISDICTIONAL WETLAND IMPACTS**

| Routing Option | City | Direct Impacts | Potential Wetlands Adjacent Areas | Potential Wetland Soils* |
|---|---|---|---|---|
| Manana Spur | Dallas | 1,200 linear feet | 3 within 200 feet of the corridor | 7,000 linear feet of Trinity clay, frequently flooded soils |
| UD/Texas Stadium | Irving | 2,300 linear feet | 6 within 200 feet of the corridor | 9,750 linear feet of Trinity clay, frequently flooded soils<br>3,750 linear feet of Trinity clay, occasionally fllooded soils |

SOURCE: Wendy Lopez & Associates; November 1999.

* Area of proposed acquisition based on 50 foot ROW requirement.

**Vegetation**

No significant vegetation impacts are anticipated for the No Build, TSM/TDM, or Highway Widening Alternatives. The areas proposed for the HOV Alternatives should not impact significant vegetation as the developed areas lack vegetation and the undeveloped areas have been graded for potential use. The no impact rating assumes that construction will occur within existing ROW.

For the LRT Alternatives, affected vegetation includes landscaped vegetation (trees) along Harry Hines Boulevard, natural vegetation in undeveloped areas along the Manana Spur, the Elm Fork floodplain for LRT Alternative 10, and the Hackberry Creek floodplain north of the North Irving Transit Center. Commuter Rail Alternatives may also affect vegetation in undeveloped areas along the Manana Spur and BN RR where the connection to the North Irving Transit Center would be made.

**Wildlife/ Threatened & Endangered Species (T&ES)**

No significant impacts are anticipated for the No Build, TSM/TDM, HOV or Highway Widening Alternatives. The no impact rating assumes that construction will occur within existing ROW and suitable habitat/vegetation would not be affected.

The potential to affect wildlife and Threatened and Endangered Species (T&ES) is possible for LRT and Commuter Rail Alternatives, particularly if suitable habitat (vegetation) is present in undeveloped areas. This will mostly occur where new alignment is proposed such as with the branch along the Manana Spur, UD/Texas Stadium route, and in the SH 114 corridor. Impacts around station areas along the Harry Hines/UP RR alignment is limited given the existing development in the area.

**Geology**

LRT Alternatives 9, 10 and 11 propose a tunnel to Love Field. LRT Alternative 11 also proposes a tunnel to DFW Airport from the SH 114 corridor. LRT Alternative 10 may require some tunneling for a north-south alignment through DFW and proposes a tunnel from Spur 482 to Tom Braniff Drive to avoid engineering conflicts in the vicinity of Texas Stadium. All of these alternatives have the potential to be affected by local geology. A detailed assessment of geologic conditions will be conducted during the PE/EIS phase for the preferred alternative to ensure that the geologic regime will support the proposed action.

### 5.4.6 Water Resources

**Floodplains**

The No Build and TSM/TDM Alternatives do not have the potential to affect floodplains. However, the potential to affect floodplains is assumed for all build alternatives, as they all have several river or stream crossings. Maps produced by the Federal Emergency Management Agency (FEMA) were examined to identify the current boundaries of the floodplains.

All major build alternatives will cross the Elm Fork of the Trinity River at some point. LRT Alternative 10 has the greatest potential to adversely impact floodplains because of a *new* Elm Fork Crossing near Texas Stadium and the Hackberry Creek crossing.

**Groundwater**

Groundwater impacts are likely to occur from increased runoff into creeks and recharge zones. The long-term impacts to groundwater for the No Build and TSM/TDM Alternatives are significant, relative to the other alternatives, because vehicle miles traveled within the corridor would continue to increase, and additional congestion would result. The HOV and Highway Widening Alternatives increase potential runoff due to increased surface area.

Rail alternative will have a minimal increase in surface area with station park-and-ride lots but significant impacts to groundwater are not expected. Commuter Rail Alternatives have potentially negative impacts because of diesel engine use. The LRT Alternatives would not

substantially increase run-off surface area and can potentially decrease the number of vehicle miles traveled within the corridor.

**Manana Spur vs. UD/ Texas Stadium Route**

A comparison of the Manana Spur and the UD/Texas Stadium routing options is provided in Table 5.21, as these are the two primary ways to access Irving and the Las Colinas area.

**TABLE 5.21**
**COMPARISON OF POTENTIAL JURISDICTIONAL WATERS OF THE US CROSSING**

| Routing Option | City | Elm Fork of the Trinity River | Tributaries of the Elm Fork | 100-Year Floodplain Crossings |
|---|---|---|---|---|
| Manana Spur | Dallas | 50-80 linear foot channel crossing | 3 perennial streams | 12,450 linear feet |
| UD/Texas Stadium | Irving | 180-200 linear foot channel crossing<br>100-120 linear foot channel crossing (old river) | 2 intermittent streams | 2,000 linear feet |

SOURCE: Wendy Lopez & Associates; November 1999.

### 5.4.7 Hazardous/ Regulated Materials

**Known Sites**

The No-Build and TSM/TDM Alternatives do not have the potential to affect known hazardous materials sites. No impacts were assumed for the HOV Alternatives because construction will occur in the existing medians of the highways. A detailed inventory and analysis of the known sites will be conducted during the PE/EIS phase for the preferred alternative. The environmental database search will identify known sites adjacent to the locally preferred alternative and allow for an assessment of their potential to affect construction activities. The Manana Spur option and associated ROW (Commuter Rail and LRT Alternatives 6,8,9,and 11) crosses approximately 2,000 linear feet of sanitary landfill (near Walnut Hill and IH-35). These alignments also have potential groundwater impacts from an adjacent gun club (Spur 348 and O'Connor Blvd), and pass south of a cemetery (Forest Lawn).

**Potential Sites**

A windshield survey was conducted for all build alternatives. Sites adjacent to the alignments or station areas that could potentially impact construction activities related to the alternatives were noted. No impacts due to potential sites are expected for the No Build, TSM/TDM, HOV and Highway Widening Alternatives. For the IH 35E Highway Widening Alternative, it is assumed that the widening of the access road would be within the existing ROW and that no subsurface digging would be required (i.e., change lane width).

The number of potential sites with potential negative impacts were identified during the windshield survey for the Commuter Rail and LRT Alternatives: Commuter Rail 6 (41 sites), and 7 (40 sites); LRT Alternatives 8 through 11 (40, 43,46, and 43 respectively). These sites include uses such as gas stations, auto repair shops, dry cleaners, manufacturing facilities, etc. adjacent to the proposed alignments. Potential hazardous materials impacts to the alignment, station areas, and park-and-rides will be evaluated as sites are refined.

**Manana Spur vs. UD/ Texas Stadium Route**

The Manana Spur option (Alternatives 6,8,9, and 11) is within the vicinity of three (3) unauthorized landfills. The UD/Texas Stadium option (Alternative 10) may have potential ground water impacts from adjacent trucking and industrial operations. This option is also near (2) unauthorized landfills, and is in the vicinity of a Picric acid CERCLIS site (1845 E, Northgate Drive, University of Dallas).

A comparison of the Manana Spur and the UD/Texas Stadium routing options is provided in Table 5.22, as these are the two primary ways to access Irving and the Las Colinas area.

**TABLE 5.22**
**COMPARISON OF POTENTIAL HAZARDOUS MATERIALS SITES**

| Routing Option | City | Known Sites | Industrial Sites | Other Potential Sites* |
|---|---|---|---|---|
| Manana Spur | Dallas | 2,000 linear feet of sanitary landfill crossing | 11,400 linear feet | • Possible heavy metals from an existing gun club<br>• Adjacent cemetery (potential groundwater contamination)<br>• Unauthorized landfill in 10500 block of Spangler Road<br>• Unauthorized landfill at 1800 West Northwest Highway frontage road at Spangler |
| UD/Texas Stadium | Irving | Uninvestigated /unknown | 10,700 linear feet | • Trucking and warehouse operations near Texas Stadium<br>• CERCLIS site, near University of Dallas, maybe a Superfund site.<br>• Unauthorized landfill east of Texas Stadium<br>• Unauthorized landfill at State Highway 183/ International Place Intersection. |

SOURCE: Wendy Lopez & Associates, Inc.; November 1999.

### 5.4.8 Energy Impacts

**Energy Consumption**

This is a FTA New Starts criteria measured in BTU's. The No Build Alternative and Highway Widening Alternatives may have a negative impact on energy consumption as vehicles miles of travel continue to increase. The TSM/TDM Alternative has a lower potential for positive impact, as improvements will reduce congestion and promote transit and carpooling.

The HOV, Commuter Rail and LRT Alternatives have the greatest potential to positively impact energy use by reducing fuel consumption through a reduction in vehicle miles of travel within the corridor. These alternatives provide carpooling incentives and increased express bus use (HOV) or a high capacity transit alternative (rail). Energy consumption will be required to operate the rail alternatives, but reductions in SOV travel and bus operations typically offset increases in energy use for a rail investment, resulting in an overall decrease in energy consumption.

## 5.5 PUBLIC AND AGENCY SUPPORT

In determining a locally preferred investment strategy, public and agency support is often critical to successful project implementation. As documented in Chapter 2, opportunities for public and agency involvement were provided throughout the Northwest Corridor MIS, in the form of regular work group meetings, public meetings, and smaller briefings to stakeholder groups.

**PUBLIC SUPPORT**

Three public meetings were held in November and December in the cities of Dallas (November 30, 1999), Irving (December 2, 1999), and Carrollton/Farmers Branch (December 6, 1999). At these meetings, attendees had the opportunity to provide input and comment toward the ultimate DART Board decision of the LPIS, in particular the rail element.

Table 5.23 summarizes the attendees, speakers, and overall comments from the audience. As shown, attendance was high at all three meetings. Overwhelming support was shown for LRT service to Carrollton along the Harry Hines/UP RR corridor, and specifically for using the UD/Texas Stadium alignment to access Irving and Las Colinas. This support reflects Alternative 10A. Limited or no support was shown for the Manana Spur option associated with Alternative 12A.

**TABLE 5.23**
**PUBLIC SUPPORT**

| MEETING | ATTENDEES | SPEAKERS | PUBLIC COMMENTS |
|---|---|---|---|
| DALLAS | 80 | 24 | Variety of questions; general support for UD/ Texas Stadium route and support for LRT along the UP RR to Carrollton. |
| IRVING | 110 | 31 | Unanimous support for LRT along the UD/Texas Stadium route. Support for LRT service on UP RR to Carrollton. |
| CARROLLTON/ FARMERS BRANCH | 70 | 18 | Variety of questions; general support of UD/Texas Stadium route and support for LRT along the UP RR to Frankford. |

SOURCE: BRW, Inc.; December 1999.

Additional comments from the public related to support for service to DFW Airport, and support for additional study on a potential tunnel connection to Love Field Airport.

## WORK GROUP SUPPORT

The Staff Work Group consists of technical representatives from all participating agencies and cities. The Executive Work Group consists of senior-level agency representatives, and elected officials for each City and Dallas County. The Community Work Group is made up of neighborhood, business, and environmental representatives from the Northwest Corridor.

DART met with the Community Work Group and Executive Work Group approximately 9 times each during the MIS. The Staff Work Group met over 20 times. At the last meeting of each of the Work Groups, they reached consensus. Table 5.24 is a summary of the consensus statements of each group.

**TABLE 5.24**
**WORK GROUP SUPPORT**

| WORK GROUP / DATE OF CONSENSUS | CONSENSUS STATEMENT |
|---|---|
| Community Work Group – November 9, 1999 | Reached consensus for LRT using UD/Texas Stadium route to DFW/Frankford. The Work Group also does not want to preclude using the BN south segment from South Irving Transit Center to Las Colinas as a potential Commuter Rail line. |
| Staff Work Group – December 2, 1999 | The consensus statement for the Staff Work Group (SWG) is as follows:<br><br>It is the consensus position of the SWG that the Harry Hines/UP RR alignment to Frankford Road in Carrollton, and the Manana Spur alignment to DFW Airport represents the most cost-effective alignments as |

| | |
|---|---|
| | of December 2, 1999. However, the UD/Texas Stadium route, the potential Love Field tunnel, and the downtown Griffin Street option represent alignments also to be evaluated in greater detail during the PE/EIS phase of the project. |
| Executive Work Group – December 6, 1999 | The Consensus Statement of the Executive Work Group is as follows:<br><br>After an exhaustive review of all data throughout the MIS, the fixed guideway improvements to be included in the Locally Preferred Investment Strategy (LPIS) should include the following alignments:<br>A) Light Rail on the Union Pacific (UP) from Downtown Dallas to Carrollton and Farmers Branch terminating at the Frankford area by 2006. This alignment should penetrate the Medical Market Center via Harry Hines, preserve the right-of-way through the arena site (Griffin Street option), and include service to Dallas Love Field. This is the dominant rail alignment in the corridor and should be completed first.<br>B) Light Rail on the Texas Stadium/University of Dallas alignment off the UP to DFW International Airport. SH-161 shall serve as the operating segment termini until such funding can be found to extend the line to DFW International Airport. |

SOURCE: BRW, Inc.; December 1999.

## CITY AND COUNTY RESOLUTIONS

In addition to Work Group Consensus statements, all of the Northwest Corridor cities have either stated their position or passed a resolution for the Northwest Corridor. Several other community organizations also passed resolutions. These resolutions are contained in Appendix C.

The cities of Dallas, Carrollton, and Farmers Branch all condition their willingness to accept a UD/Texas Stadium route. All three cities' resolutions recognize the additional cost for that alignment option (approximately $130 million) may reduce the overall project competitiveness for federal funding and DART's financial capacity to implement LRT service in the corridor by 2006-2007. Each of the city's position papers or resolutions are provided in Table 5.25.

**TABLE 5.25**
**CITY AND COUNTY POSITIONS**

| CITY | POSITION |
|---|---|
| Irving | The Irving City Council passed a Resolution (#536) on November 18, 1999 supporting LRT in the Harry Hines/UP RR corridor to Carrollton, and the UD/Texas Stadium alignment ( termed the "Olympic Express") to serve Irving, Las Colinas, and the DFW Airport. The Manana Spur option to Irving from the UP RR was found to be unacceptable. The City also stated support for the BN South Commuter Rail connection from South Irving to Las Colinas in addition to the LRT alignment. |
| Dallas | The City of Dallas submitted a position statement on December 7, 1999. The statement supports LRT in the Northwest Corridor, indicating that the Griffin Street alignment should be studied further in the PE/EIS as an alternative way to access the Dallas CBD. Dallas supports using Harry Hines Boulevard to access the Medical Center, and has a strong interest in studying direct access to the Love Field Terminal in the PE/EIS phase, including identification of alternative funding sources. The City of Dallas supports LRT to Frankford in Carrollton by 2006. Dallas does not object to the UD/Texas Stadium alignment provided that it does not impact DART's ability to compete for federal funding, or delay implementation of revenue service in the Dallas Northwest and Southeast Corridors. |
| Carrollton | The Carrollton City Council passed Resolution #2254 on December 7, 1999 supporting LRT in the Harry Hines/UP RR corridor to Carrollton near the Frankford area by 2006. Use of long term debt and federal grants are supported to meet this schedule. Implementation of rail service along the BN RR north of Belt Line Road was not recommended at this time. The City also supports the UD/Texas Stadium alignment, or "Olympic Express" over the Manana Spur option. A Love Field Tunnel, if found to be cost-effective, is also supported. |
| Farmers Branch | The Farmers Branch City Council passed resolution # 99-184 on November 15, 1999 to endorse the Harry Hines/UP RR alignment to Carrollton by 2006, given reasonable financing projections. The City also supports the extension of LRT to Irving from the UP RR along an alignment that will not adversely effect revenue service by 2006 along the UP RR alignment from downtown Dallas to Carrollton. No specific Irving alignment was identified in the resolution. |
| Dallas County | The Commissioners Court of Dallas County adopted a resolution (#99 2286) on December 7, 1999 supporting LRT in the Harry Hines/UP RR corridor to Carrollton by 2006, and service to Irving via the UD/Texas Stadium alignment by 2007. |

SOURCE: City and County Resolutions; DART; March, 2000.

## 5.6 SENSITIVITY TESTS

In addition to the examining the cost, mobility, socio-economic, land use, environmental, and public/agency support factors in the detailed evaluation, several sensitivity tests were conducted. The purpose of these sensitivity tests was to supplement the mobility analysis and assist in determining the effects of different operational scenarios and the relationship of parallel rail/HOV service in the Northwest Corridor.

In order to understand these issues and provide additional information to support the development of the LPIS packages, DART conducted the following sensitivity tests during the detailed evaluation phase:

- LRT 12/Interline – To determine the effects of interlining LRT service in the Northwest Corridor with the Southeast and North Central corridors.
- LRT 12/HOV – To understand the effects of parallel HOV facilities on LRT ridership in the corridor.
- CR 6/HOV – To understand the effects of parallel HOV facilities on Commuter Rail ridership in the corridor.

Table 5.26 summarizes the results of the interlining test. This test compared LRT Alternative 12 to LRT Alternative 12/Interlined with the North Central and Southeast Corridor LRT lines. The main UP RR line was interlined with the Southeast Corridor, and the Irving/DFW line was interlined up North Central to the LBJ Central station.

**TABLE 5.26**
**SENSITIVITY TEST - INTERLINING**

| | 12 | 12/ Interline (with SE/ NC) | Change |
|---|---|---|---|
| Riders (From North of the Arena Station) | | | |
| - UP line (interlined with Southeast Corridor LRT line) | 6,740 | 7,120 | +380 |
| - Irving line (interlined with North Central LRT line) | 6,440 | 6,620 | +180 |
| - Total | 13,180 | 13,740 | +560 |

SOURCE: NCTCOG, BRW, Inc.; November 1999.

As shown above, Alternative 12, when interlined with the Southeast and North Central LRT lines, is expected to result in a four percent overall increase in riders. This ridership increase is not as high as expected. The greatest change is observed for the UP/Southeast Corridor interlining pair. The stations that had the greatest increase in activity due to the interlining were the Arena, Medical Center and Mockingbird/Love Field station. This indicates that there is a demand for direct, seamless travel from the Southeast and North Central lines to these areas. Other interlining combinations will be considered as part of the operating plan refinements in the PE/EIS phase.

Table 5.27 summarizes the results of model runs testing rail and HOV together in the Northwest Corridor. LRT Alternative 12 was compared to Alternative 12 with HOV on SH 114 and IH 35E. For Commuter Rail, base Alternative 6 was compared to this alternative with HOV facilities on

SH 114 and IH 35E. No duplicative express bus was provided in the HOV lanes; thus, the HOV facilities would serve carpool trips only.

The travel demand forecast results indicate that the addition of HOV lanes in the corridor have no significant effect on rail ridership. Rail ridership remains consistent under both scenarios as shown above (21,500-21,600 riders for LRT and 10,800-10,850 riders for Commuter Rail). This indicates that the HOV lanes, which serve carpools, serve a different travel market than a rail line.

**TABLE 5.27**
**SENSITIVITY TEST – EFFECTS OF HOV ON RAIL RIDERSHIP**

| | LRT 12 | 12/ HOV |
|---|---|---|
| Peak Period HOV Volume | | |
| - Screenline #1 (Lower IH 35E) | 8,000 | 6,250 |
| - Screenline #2 (SH 114) | 6,000 | 2,000 |
| - Screenline #3 (Upper IH 35E) | 11,000 | 13,000 |
| Corridor Riders | 21,500 | 21,600 |
| | **CR 6** | **6/ HOV** |
| Peak Period HOV Volume | | |
| - Screenline #1 (Lower IH 35E) | 8,000 | 6,250 |
| - Screenline #2 (SH 114) | 6,000 | 2,000 |
| - Screenline #3 (Upper IH 35E) | 11,000 | 13,000 |
| Corridor Riders | 10,850 | 10,800 |

SOURCE: NCTCOG, BRW, Inc.; November, 1999.

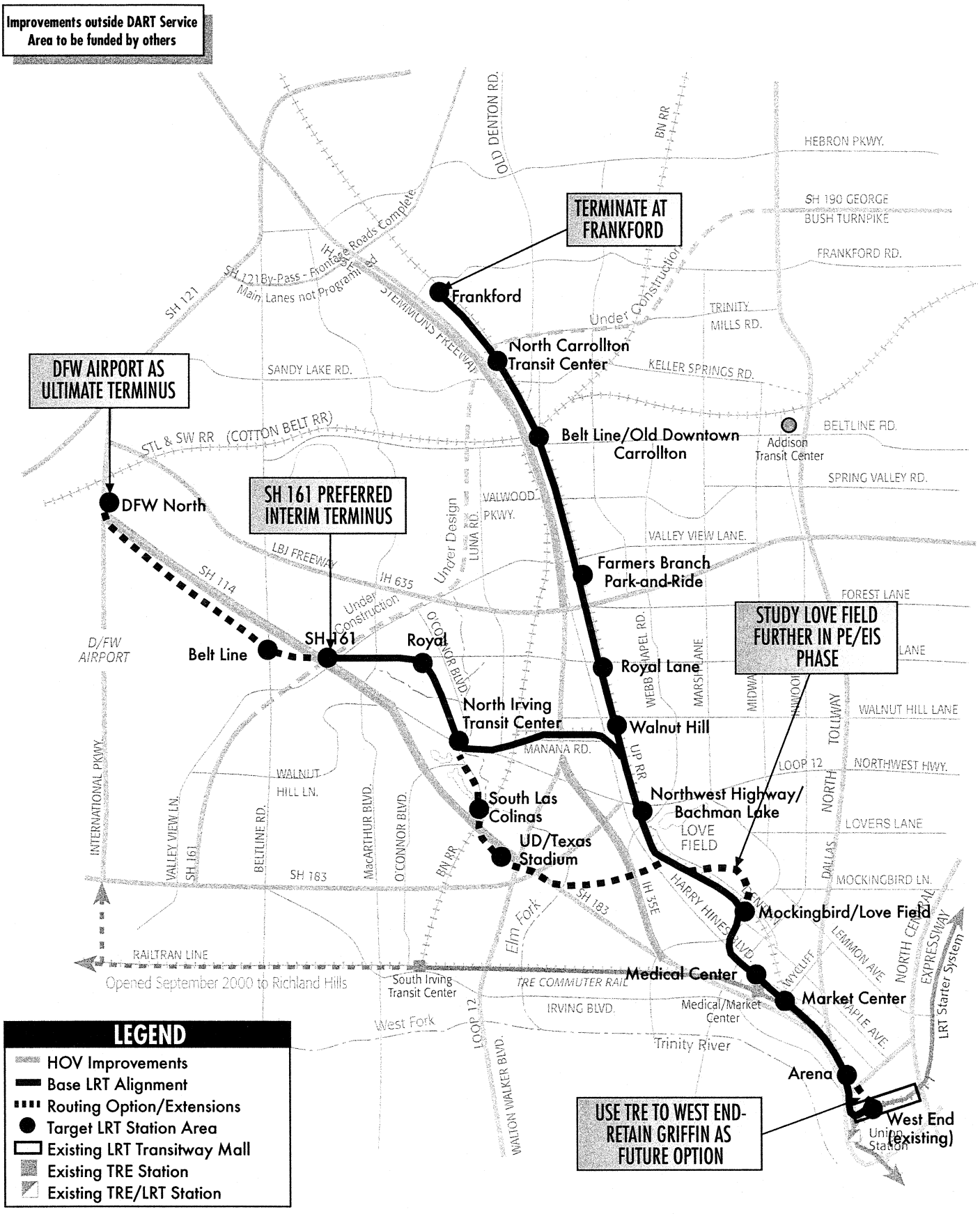
Note: LRT 12 and CR 6 peak period HOV volumes reflect HOV 4A1 and 4B model runs (SH 114 and IH 35E tested separately).

Another observation from Table 5.27 is that HOV volumes on SH 114 decrease significantly when tested with HOV on IH 35E. Peak period HOV volumes listed under LRT 12 and CR 6 in Table 5.27 are based on independent travel demand forecasts for SH 114 (Alternative 4B) and IH 35E (Alternative 4A1), which resulted in higher HOV volumes on each facility than when tested together. Without HOV on SH 114, peak period HOV volumes on lower and upper IH 35E were 8,000 an 11,000 vehicles, respectively. When HOV facilities on SH 114 are tested with IH 35E HOV facilities, some of the upper IH 35E HOV users switch to SH 114 HOV facilities. Lower IH 35E HOV volumes increase due to the combined effect of SH 114 and IH 35E users where the two facilities converge closer to downtown Dallas.

The results of this sensitivity test indicate that some HOV elements should be included in the investment strategy packages to accommodate future travel demands.

## 5.7 EMERGING CONSENSUS AND REMAINING ISSUES

Based on the public meetings, work group input, sensitivity tests, and the detailed evaluation, the following summarizes the emerging consensus as of December 1999. The emerging consensus is illustrated in Figure 5-1.




Note: Coordination with the IH-35 E/Loop 12 MIS ensures that the IH-35 E segment from LBJ Freeway to Loop 12 is addressed.

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EMERGING CONSENSUS

FIGURE 5-1
Source: BRW, Inc.
Date: July, 2000

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**Emerging Consensus**

As of the work group meetings held in December 1999, the following statements represent the emerging consensus for the Northwest Corridor:

- An HOV lane system is warranted as part of a Locally Preferred Investment Strategy
  - HOV lanes provide additional capacity without adversely impacting rail
  - 2 reversible HOV lanes warranted in upper and lower IH 35E (Stemmons)
  - 1 reversible HOV lane warranted on SH 114; possibly 2 reversible HOV to transition between SH 121 and SH 161
- LRT is the most cost-effective rail option
  - due to higher cost, long-term financing supported to meet scheduled commitments
- West End/Arena Subarea
  - Select alignment following the TRE corridor
  - Preserve Griffin as an option
  - Drop Woodall Rodgers
- Medical/Market Subarea
  - Penetrate Medical Center alignment along Harry Hines
  - Retain Market Center station
- Love Field Access
  - UP RR alignment is more cost-effective
  - Continue analysis in next phase / seek funding partners for terminal service
- Northern Terminus
  - Terminate alignment on UP RR at Frankford
- Western Terminus
  - DFW as ultimate terminus – preserve airport corridor
  - SH 161 – preferred interim end-of-line due to access, traffic operations
  - North Irving/Las Colinas – most cost-effective interim terminus, but has operational concerns

Additional improvements such as TSM/TDM projects (freeway bottleneck improvements, Signal/ITS Improvements, arterial improvements) are also supported. General purpose lane improvements are discussed in Chapters 6 and 7 in terms of their ability to help meet future travel demand in the corridor.

### Remaining Issues

The key remaining issue that was not fully resolved during the detailed evaluation is how to serve Irving – using the Manana Spur option or the UD/Texas Stadium alignment option. A summary comparison of the two alignments is provided in Table 5.28.

**TABLE 5.28**
**REMAINING ISSUE - NORTH IRVING/ LAS COLINAS ACCESS COMPARISON**

| | MANANA SPUR OPTION (12A) | UD/ TEXAS STADIUM OPTION (1OA) | Change from Manana |
|---|---|---|---|
| **To North Urban Center (NUC)** | | | |
| Capital Cost ($1999M) * | | | |
| - Segment | $151.5 | $274.5 | + $123.0 M |
| - Corridor | $1,265.6M | $1,394.6 M | + $129.1 M |
| Ridership: | Stations: NUC | Stations: UD/TX, SLC, NUC | |
| - Station Riders (for Segment) | 1 station: 1,990 | 3 stations: 2,875 | + 885 |
| - Corridor Riders | 24,200 | 24,100 | -100 |
| Annualized Capital Cost/Annual Rider | | | |
| - Segment (UP RR to NUC) | $20.67 | $25.92 | +$5.25/rider |
| - Corridor | $14.20 | $15.70 | + $1.50/rider |
| Travel Time (NUC to West End Station) | 28:17 minutes | 32:10 minutes | + 3:53 minutes |
| **Other Considerations** | | | |
| Environmental | ▪ Crosses 100-year floodplain<br>▪ Parkland issues<br>▪ Requires bridge over Elm Fork adjacent to existing NW Hwy bridge and levee | ▪ crosses 100-year floodplain<br>▪ parkland issues<br>▪ requires new bridge over Elm Fork between levees | Similar issues |
| Land Use/Development | Minimal opportunities for transit-oriented development | Greater potential for transit-oriented development around stations | More opportunity along UD/TX option |
| Access | Provides east-west access between Irving and Dallas, Farmers Branch, Carrollton | Provides access within areas of Irving south of Urban Center | Trade-offs for the Northwest Corridor |
| Right-of-Way | DART owns interest Manana Spur | Requires ROW acquisition | Less ROW cost with Manana |

SOURCE: BRW, Inc.; Urban Analytics; NCTCOG; DART; July 2000.

Notes:
* Cost for segment from the UP RR point of tangency to the NUC.
Station Key: UD/TX = University of Dallas/Texas Stadium Station, SLC = South Las Colinas

A summary of trade-offs among the two options is provided below:

- Manana Spur alignment option (LRT)
  - Lower capital cost
  - More cost-effective option
  - Less transit-supportive land use potential

- UD/Texas Stadium alignment option (LRT)
  - Higher transit-supportive land use potential
  - Higher ridership in Irving – Lower ridership on UP (net effect is basically no change in corridor ridership)

One of the key issues in selecting the UD/Texas Stadium route is the effect on affordability and timing of improvements in the Northwest Corridor.

A third option to serve Irving and the Las Colinas area is by using the BN RR south alignment as a Commuter Rail spur from the existing TRE line at the South Irving Transit Center. An analysis of this option indicates that it has very poor cost-effectiveness and is not the best service option for this location. A summary of this analysis is provided in Table 5.29.

As shown, Commuter Rail on the Manana Spur only is the most cost-effective option. The BN RR South, by itself, is significantly less cost-effective. When the BN RR South segment was tested *with* the Manana Spur, 200 riders were added. The added 200 riders was the result of 300 riders on the BN South segment and 100 fewer on the Manana Spur. Overall cost-effectiveness decreased by about 35 percent when the BN RR South was combined with the Manana Spur.

**TABLE 5.29**
**BN RR SOUTH – COMMUTER RAIL ANALYSIS**

| | Manana Spur UP RR to NITC | BN South SITC to NITC | BN South SITC to South Las Colinas | Manana to NITC plus BN South to South Las Colinas |
|---|---|---|---|---|
| Capital Cost | $79 M | $95 M | $45.7 M | $124.7 M |
| Riders | 1,330 | 830 | 340 | 1,530 |
| Annualized Capital Cost/ Annual Rider | $19.69 | $37.60 | $44.28 | $26.67 |

SOURCE: BRW, Inc.; From Fall 1999 Public Meeting Handout

# 6.0 Final Evaluation and Trade-Off Analysis

This chapter documents the development and evaluation of two multi-modal Locally Preferred Investment Strategy (LPIS) packages. The modes and alignments associated with the LPIS packages are based on the detailed technical evaluation, public and agency input, alignment refinements, as well as sensitivity tests conducted in the corridor. Two rail alternatives were forwarded into the final evaluation as part of the two LPIS packages. This chapter documents the final evaluation of these two packages and the refinements made to the Manana Spur and UD/Texas Stadium alignments made as part of the final analysis. These refinements, along with the sensitivity tests documented in the previous chapter, form the basis for the LPIS packages.

## 6.1 ALIGNMENT REFINEMENTS

In addition to sensitivity tests to help determine how different transportation elements should be combined, several alignment refinements were also made during the development of the LPIS packages in order to maximize ridership and cost-effectiveness. Because the primary remaining issue after the detailed evaluation phase was related to access to the Irving/Las Colinas area, DART explored refinements to both routing options in an effort to reduce cost and increase ridership. These refinements are illustrated in Figure 6-1.

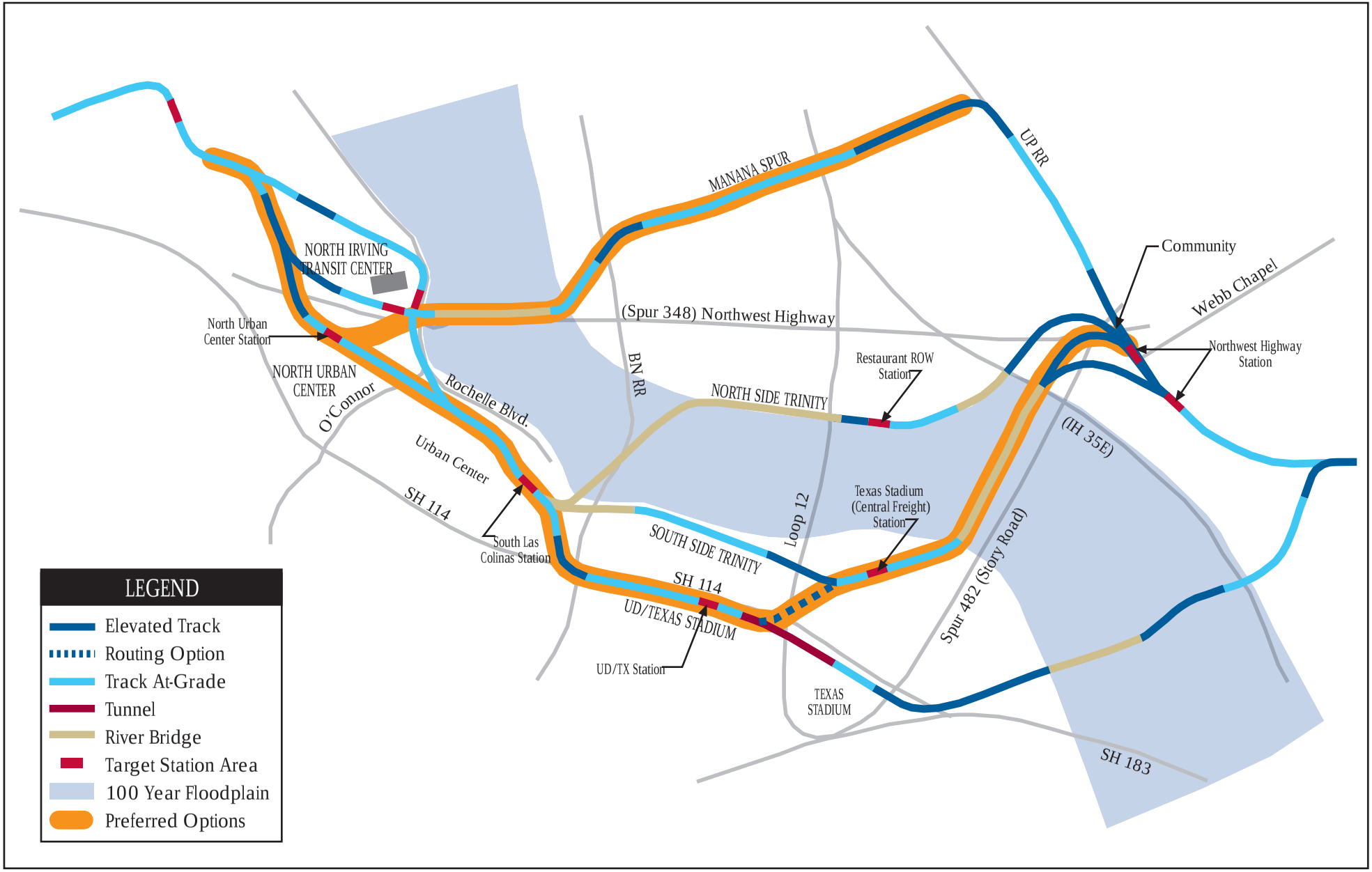
Refinements to the Manana Spur option included:

- Alignment refinement to stay on the Manana Spur longer before turning southwest towards North Urban Center. This allowed the alignment to maintain a more at-grade alignment and reduce elevated alignment by approximately 3,000 feet, resulting in a cost decrease.

Refinements to the UD/Texas Stadium option included:

- Development and evaluation of two refinements:

  - South Trinity Option – The south option comes off the UP RR then travels southwest to the central freight area adjacent to Texas Stadium.

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## MANANA SPUR AND UD/TX ALIGNMENT REFINEMENTS

FIGURE 6-1
Source: BRW, Inc.
Date: July 2000

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It then continues along the south side of the Trinity to the South Las Colinas and the North Urban Center stations. The dashed line on the map shows an alternate route to return to the south side of SH 114 to access the University of Dallas. Several additional options were also examined in this area and are shown in Appendix D.

- North Trinity Option – The north option leaves the UP RR and heads west toward a station in the Restaurant Row area near Northwest Highway and IH 35E. The alignment continues west toward the South Las Colinas and North Urban Center stations.

Diverging from the UP RR at the Northwest Highway/Bachman Lake Station allows the refined UD/TX alignments to maintain 5-minute peak headways at that station, which helps to maximize ridership. Alignments were also defined to try to decrease capital costs from the original UD/TX option.

The highlighted alignments in Figure 6-1 represent the two options selected for analysis as part of the LPIS packages. Final evaluation of the LPIS packages allows for a comparison of the Manana Spur vs. the UD/Texas Stadium alignment as part of a multi-modal investment strategy. It should be noted that the Texas Stadium (Central Freight station) was not included in the LPIS package as the design and cost for the station could vary significantly.

## 6.2 CONGESTION MANAGEMENT SYSTEM (CMS) ASSUMPTIONS

Another issue identified in the detailed evaluation phase and addressed during the final evaluation is the assumptions for Employee Trip Reduction (ETR) programs. ETR programs are a major element of the NCTCOG Congestion Management System (CMS) and account for a large increase in transit trips from the No Build to the No Build/CMS and TSM/TDM Alternatives.

As was shown in Table 5.1, the increase in systemwide linked transit trips as compared to the No Build Alternative was 9,900 for the No Build/CMS Alternative, and 13,300 for the TSM/TDM Alternative. This large increase is transit trips is largely attributed to the ETR program. Bus service enhancements in the TSM/TDM Alternative result in an additional increase in transit trips. NCTCOG applies the ETR factors consistently among alternatives. For the final evaluation, DART made suggestions to incrementally increase ETR factors in the build alternatives. Thus, a lower ETR factor would be associated with the TSM/TDM Alternative, and higher factors would be applied to build alternatives that offered a higher level of transit service. This would more realistically match what would actually happen if the alternatives were implemented.

The revisions to the ETR factors resulted in a revised TSM/TDM Alternative. The new TSM/TDM Alternative resulted in a decrease in systemwide linked transit trips from 188,800 to 187,000. This reduction results from a lower mode share of local bus, express bus, and a slight loss in LRT riders (300). The revised ETR factors were used in the LPIS model runs to ensure a consistent comparison.

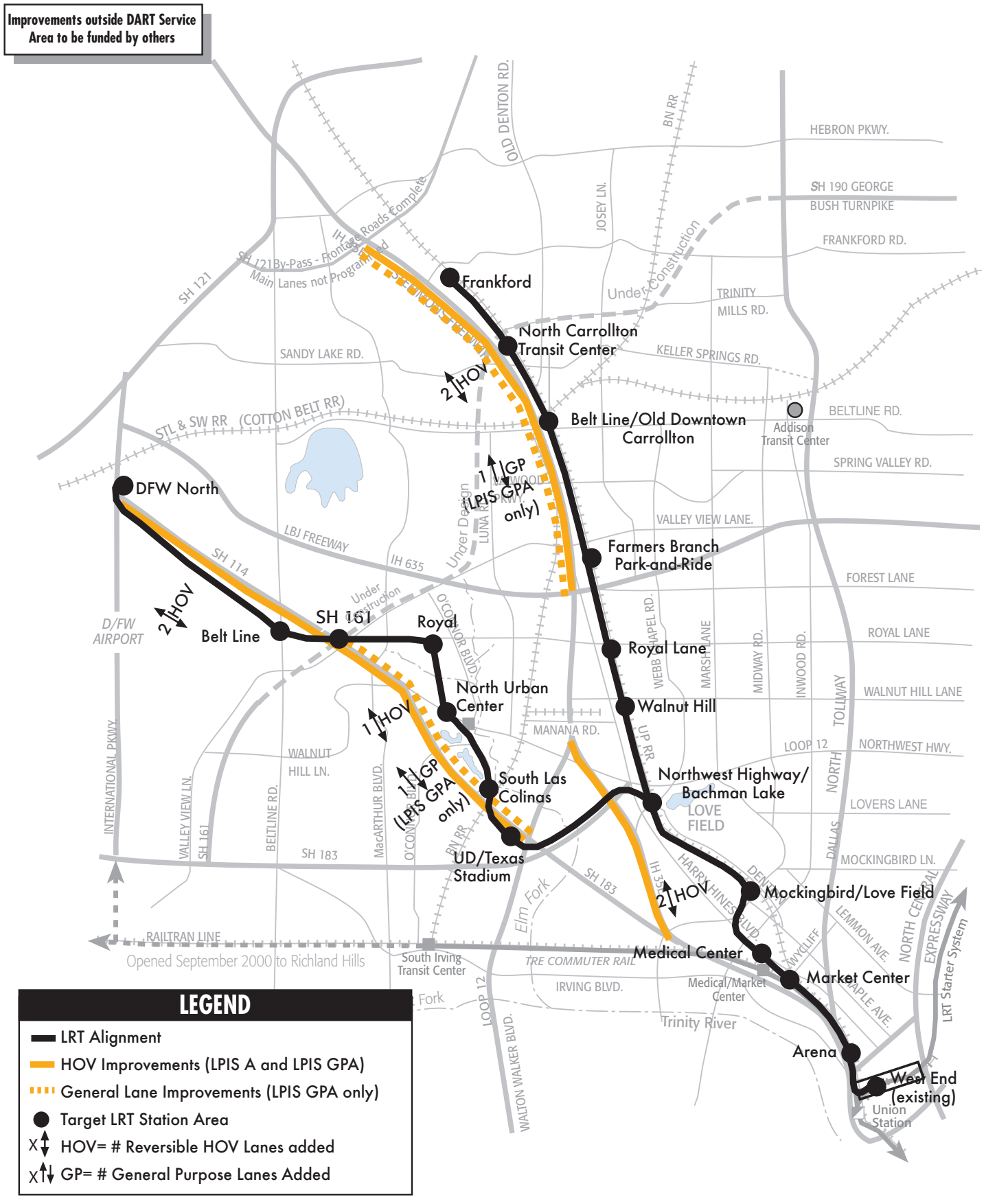
## 6.3 LOCALLY PREFERRED INVESTMENT STRATEGY (LPIS) PACKAGES

Table 6.1 summarizes the elements of the four LPIS packages tested in the final evaluation. Figures 6-2 and 6-3 illustrate the LPIS packages. The key difference between the "A" packages and the "B" packages is that the "A" packages contain the refined UD/TX alignment option and the "B" packages contain the Manana Spur option. The main north-south alignment is the same for both packages and represents the Harry Hines/UP RR alignment to Frankford. The highway network is the same for both packages, one having HOV lanes only and one having HOV plus general purpose lane improvements. The ***Definition of Highway and HOV Improvements for the Northwest Corridor Report*** contains detailed information supporting the proposed HOV and highway improvements.

**TABLE 6.1**
**SUMMARY OF LPIS PACKAGES**

| LPIS PACKAGE | Rail Element | HOV Element | Highway Element |
|---|---|---|---|
| LPIS A | LRT to Frankford via the Harry Hines/UP RR alignment, with the refined UD/TX alignment (no Texas Stadium Station) to Irving and DFW Airport. | - 2 Reversible lanes on upper IH 35E<br>- 2 Reversible lanes on lower IH 35E<br>- 2 Reversible HOV on SH 114 from SH 121 to SH 161<br>- 1 Reversible HOV on SH 114 from SH 161 to SH 183 | No change from No Build network |
| LPIS GPA | Same as above | Same as above | - Add 1 general purpose in each direction on upper IH 35E<br>- Add 1 general purpose lane in each direction on SH 114 |
| LPIS B | LRT to Frankford via the Harry Hines/UP RR alignment, with the Manana Spur alignment to Irving and DFW Airport. | Same as above | No change from No Build network |
| LPIS GPB | Same as above | Same as above | Same as LPIS GPA |

SOURCE: BRW, Inc.; March 2000.


Improvements outside DART Service Area to be funded by others
Frankford
North Carrollton Transit Center
Belt Line/Old Downtown Carrollton
Addison Transit Center
Farmers Branch Park-and-Ride
Royal Lane
Walnut Hill
Northwest Highway/ Bachman Lake
Mockingbird/Love Field
Medical Center
Market Center
Arena
West End (existing)
Union Station
DFW North
Belt Line
SH 161
Royal
North Urban Center
South Las Colinas
UD/Texas Stadium
South Irving Transit Center
2 HOV
1 GP (LPIS GPA only)
1 HOV
SH 121By-Pass - Frontage Roads Complete Main Lanes not Programmed
Under Construction
OLD DENTON RD.
BN RR
HEBRON PKWY.
SH 190 GEORGE BUSH TURNPIKE
FRANKFORD RD.
TRINITY MILLS RD.
KELLER SPRINGS RD.
BELTLINE RD.
SPRING VALLEY RD.
VALLEY VIEW LANE.
FOREST LANE
ROYAL LANE
WALNUT HILL LANE
NORTHWEST HWY.
LOVERS LANE
MOCKINGBIRD LN.
SANDY LAKE RD.
STL & SW RR (COTTON BELT RR)
LBJ FREEWAY
IH 635
SH 114
SH 121
D/FW AIRPORT
MANANA RD.
WALNUT HILL LN.
SH 183
IRVING BLVD.
TRE COMMUTER RAIL
RAILTRAN LINE
Opened September 2000 to Richland Hills
Trinity River
LOVE FIELD
LEGEND
LRT Alignment
HOV Improvements (LPIS A and LPIS GPA)
General Lane Improvements (LPIS GPA only)
Target LRT Station Area
X HOV= # Reversible HOV Lanes added
X GP= # General Purpose Lanes Added
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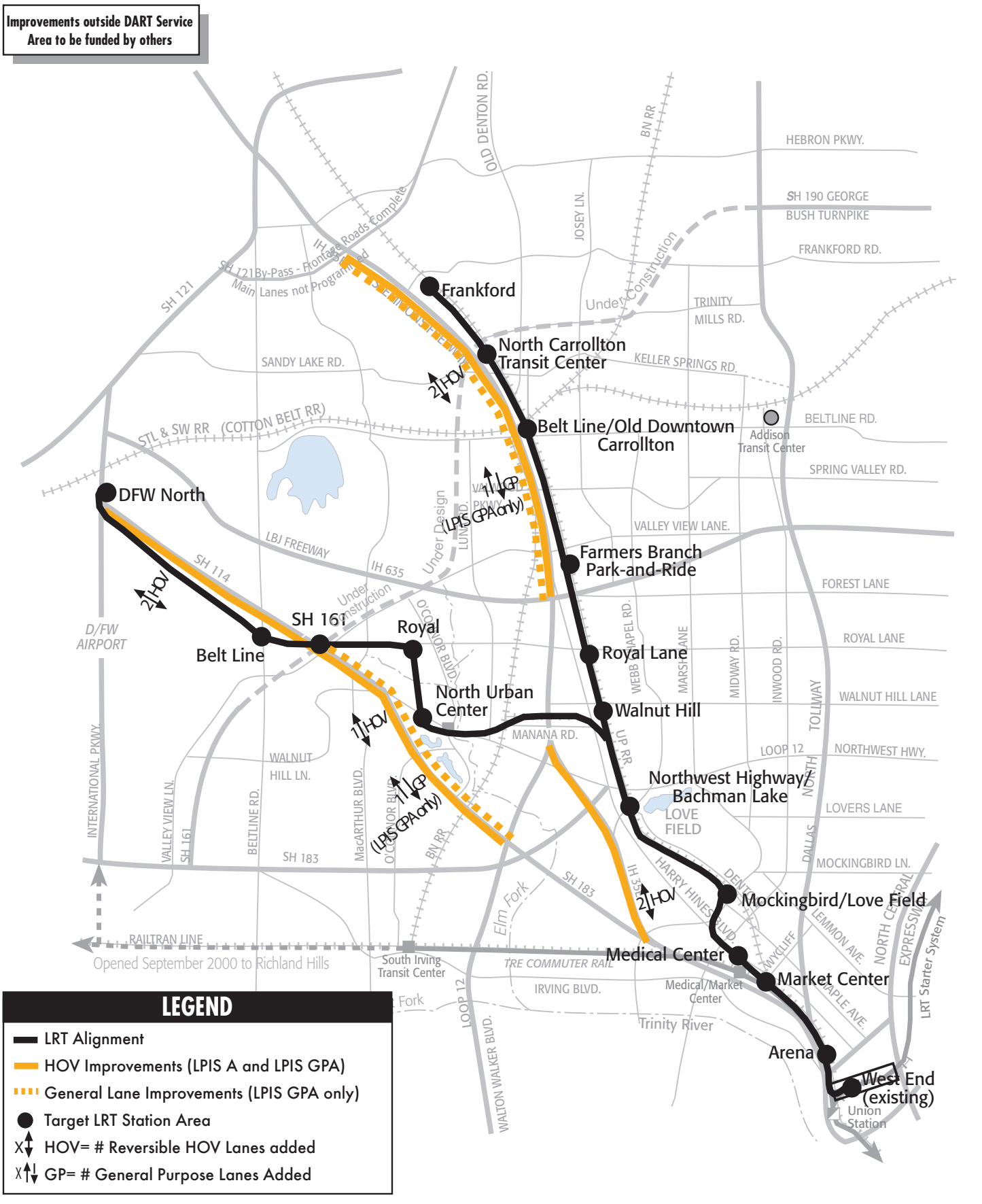
LPIS A PACKAGES
FIGURE 6-2
Source: BRW, Inc.
Date: July, 2000
DART BUS·RAIL·HOV

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LPIS B PACKAGES

FIGURE 6-3

Source: BRW, Inc.

Date: July, 2000

DART BUS·RAIL·HOV

## 6.4 FINAL EVALUATION

This section summarizes the final results of the LPIS analysis in comparison to the No Build and TSM/TDM Alternatives. The final evaluation focuses on mobility, costs, cost-effectiveness, and system-wide performance benefits that occur as a result of a multi-modal investment. The evaluation also takes into consideration the public and agency comments, and environmental issues noted in the previous chapter.

The following is a summary of systemwide performance for the LPIS packages. and highway network performance measures such as volumes, Vehicle Miles of Travel (VMT) and Percent Vehicle Hours of Congestion Delay. The LPIS packages test a multi-modal system consisting of rail, HOV and general purpose lane improvements. In addition to performance measures such as systemwide ridership, corridor ridership, travel time savings, other measures to examine how the transportation network performs as a system are considered, including:

- Changes in highway volumes
- Vehicle Miles of Travel (VMT)
- Vehicles Hours of Travel (VHT)
- Percent Vehicles Hours of Congestion Delay
- Lane Miles at LOS F
- Emissions per day of HC and $NO_x$

### 6.4.1 Systemwide Transit Riders (Linked Trips)

As shown in Table 6.2, LPIS A, which reflects the refined UD/TX alignment option, results in 300 additional linked trips daily as compared to the LPIS B option. This daily number translates into an annual increase of approximately 87,300 (using an average annualization factor of 291). Adding general purpose lanes to the LPIS options results in a decrease of only 100 daily linked trips for each LPIS option.

**TABLE 6.2**
**YEAR 2025 DAILY SYSTEMWIDE TRANSIT RIDERS (LINKED TRIPS)**

| Alternative | System Riders | Change vs. No Build | Change vs. TSM/ TDM (Added Riders) |
|---|---|---|---|
| No Build | 175,500 | -- | -- |
| No Build/CMS | 185,400 | 9,900 | -- |
| TSM/TDM | 187,000 | 11,500 | -- |
| LPIS A | 191,100 | 15,600 | 4,100 |
| LPIS GPA | 191,000 | 15,500 | 4,000 |
| LPIS B | 190,800 | 15,300 | 3,800 |
| LPIS GPB | 190,700 | 15,200 | 3,700 |

SOURCE: BRW, Inc.; NCTCOG; July 2000.

### 6.4.2 Daily Corridor Ridership

Table 6.3 summarizes daily corridor rail ridership for the LPIS Alternatives. As shown, corridor riders are higher under LPIS A by approximately 1,400 daily riders. Furthermore, the addition of general purpose lanes does not significantly change corridor ridership.

**TABLE 6.3**
**2025 DAILY CORRIDOR RAIL RIDERSHIP**

| LPIS Alternative | Daily Corridor Riders | Comments |
|---|---|---|
| **UD/ TX LRT Option** | | |
| LPIS A | 24,730 | Alternative 10A had 24,100 riders. This option was refined for the LPIS as the South Trinity option and resulted in an increase in ridership to 24,730. |
| LPIS GPA | 24,735 | Ridership is virtually unchanged with the addition of general purpose lanes. |
| **Manana Spur LRT Option** | | |
| LPIS B | 23,350 | Alternative 12A, which is the rail element of LPISB, originally had 24,200 corridor riders when not combined with an HOV system. Thus, ridership decreased slightly to 23,350. |
| LPIS GPB | 23,375 | Ridership is virtually unchanged with the addition of general purpose lanes. |

SOURCE: BRW, Inc.; NCTCOG; July 2000.

### 6.4.3 Travel Time Savings

Table 6.4 summarizes systemwide transit travel time savings for the LPIS alternatives. The travel time calculations reflect the existing and new riders to transit under each alternative. Each LPIS alternative is compared to the No Build and TSM to show the change in total daily and annual hours of travel. The greatest level of travel time savings vs. the No Build Alternative is associated with LPIS A and LPIS GPA packages. Both of these alternatives result in a total annual savings of nearly 780,000 hours. Compared to the TSM Alternative, LPIS B results in the highest level of travel time savings of over 400,000 annual hours. LPIS A and LPIS GPA both result in savings of between 336,000 to 337,000 annual hours vs. the TSM Alternative.

## TABLE 6.4
## SYSTEMWIDE TRAVEL TIME SAVINGS

| Daily Travel Time (Hours) | Total Daily Change (hours) | | Annual Factor | Total Annual Change (millions of hours) | |
|---|---|---|---|---|---|
| | Vs. No Build | Vs. TSM | | Vs. No Build | Vs. TSM |
| **LPIS A** | | | | | |
| Transit – Existing Riders | 1,814 | 663 | 291.3 | 0.528 | 0.193 |
| Transit – New Riders | 857 | 495 | 291.3 | 0.250 | 0.144 |
| Total Daily Travel Time | | | | **0.778** | **0.337** |
| **LPIS B** | | | | | |
| Transit – Existing Riders | 1,773 | 887 | 291.3 | 0.516 | 0.258 |
| Transit – New Riders | 814 | 498 | 291.3 | 0.237 | 0.145 |
| Total Daily Travel Time | | | | **0.754** | **0.403** |
| **LPIS GPA** | | | | | |
| Transit – Existing Riders | 1,812 | 662 | 291.3 | 0.528 | 0.193 |
| Transit – New Riders | 860 | 490 | 291.3 | 0.251 | 0.143 |
| Total Daily Travel Time | | | | **0.778** | **0.336** |
| **LPIS GPB** | | | | | |
| Transit – Existing Riders | 1,771 | 628 | 291.3 | 0.516 | 0.183 |
| Transit – New Riders | 817 | 437 | 291.3 | 0.238 | 0.127 |
| Total Daily Travel Time | | | | **0.754** | **0.310** |

SOURCE: Urban Analytics; July 2000.

Notes: Based on the FTA New Starts Criteria Travel Time Savings Worksheet.

### 6.4.4 Highway and HOV Volumes

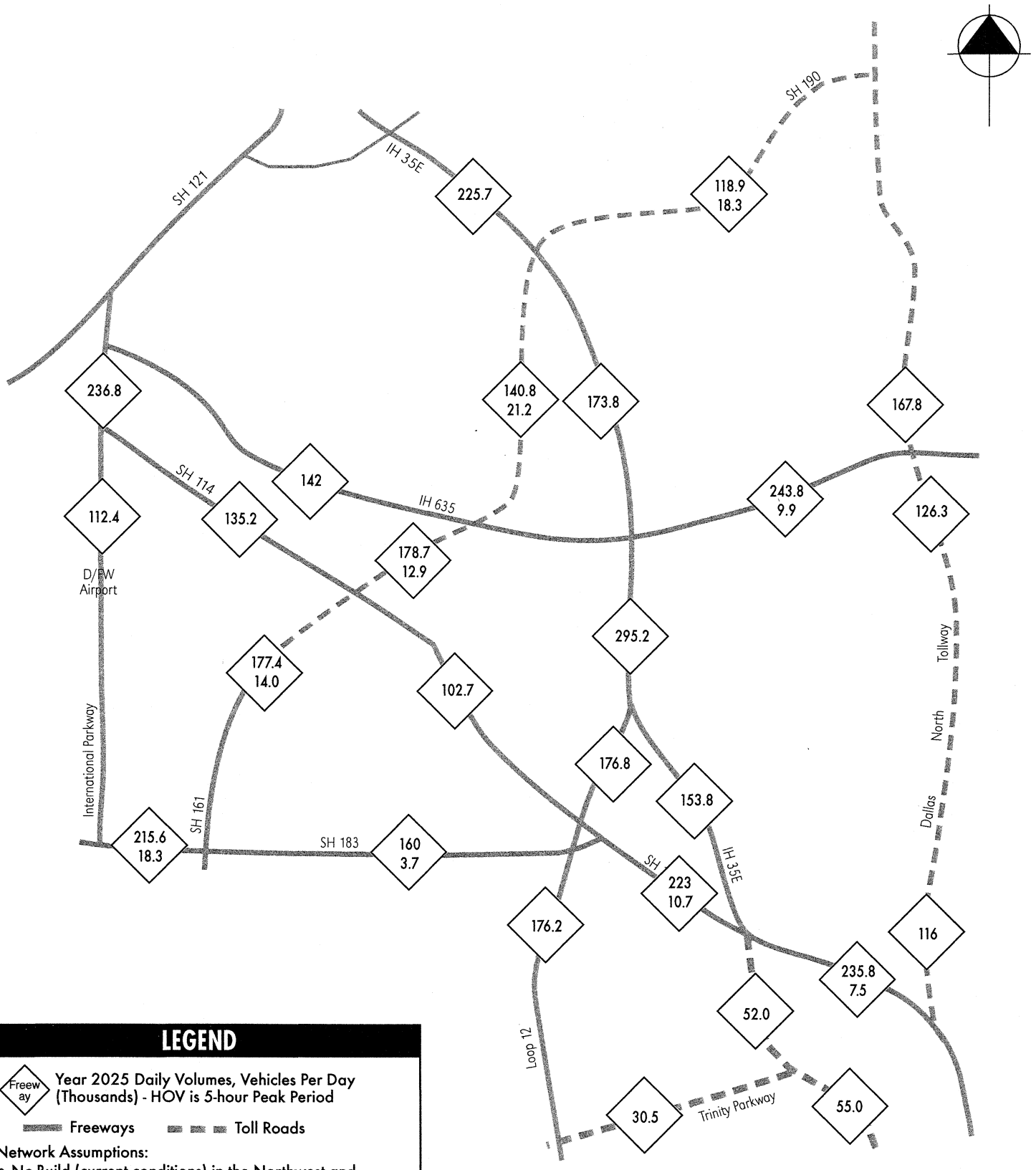
Figures 6-4 through 6-8 illustrate the forecast volumes on the study area freeways under the TSM/TDM Alternative and the LPIS packages.

The added peak hour/peak direction person trip capacity of the highway elements of the LPIS packages is:

| | HOV | General Lanes | Total |
|---|---|---|---|
| • IH 35E (IH 635 to SH 121) | 5,850 | 2,690 | 8,540 |
| • IH 35E (Loop 12 to SH 183) | 5,850 | 0 | 5,850 |
| • SH 114 | 3,000 | 2,690 | 5,690 |

Key observations of the volumes changes among alternatives with these capacity increases are:

- HOV utilization generally remains constant among the LPIS packages; volumes are the same regardless of LRT location or addition of general purpose lanes.
- Addition of general purpose lanes to SH 114 shifts traffic from IH 35E. On upper IH 35E (north of LBJ Freeway), daily per lane volume drops from 29,500 to 26,000. On IH 35E from Loop 12 to SH 183, daily per lane volume drops from 25,700 to 23,000. On SH 114, total volume increases by 22,500 per day, but daily per lane volume drops from 26,000 to 21,100 per lane.
- Addition of general purpose lanes to SH 114 and to upper IH 35E adds 10,000 vehicles per day to lower IH 35E (south of SH 183).
- HOV volumes on SH 114 barely meet and in some cases fall short of HOV lane volume warrants set by NCTCOG of 1,100 peak hour, peak direction vehicles or 4,400 peak period vehicles (5-hour peak period). However, other important reasons for inclusion of the HOV lanes on SH 114 include:
  - System continuity to provide HOV users with continuous travel paths between facilities; and,
  - Lane balance to match recommendations from other corridor and HOV studies. This should continue to be coordinated as projects advance into design.




## LEGEND

Freeway — Year 2025 Daily Volumes, Vehicles Per Day (Thousands) - HOV is 5-hour Peak Period

Freeways — Toll Roads

Network Assumptions:

- No-Build (current conditions) in the Northwest and Southeast Corridors, plus TSM improvements in Northwest Corridor
- Mobility 2025 recommendations outside study corridors.
- Regional CMS Baseline strategies

Note: Model Run TSM.REETR

NW CORRIDOR MIS

# MIS FINAL REPORT

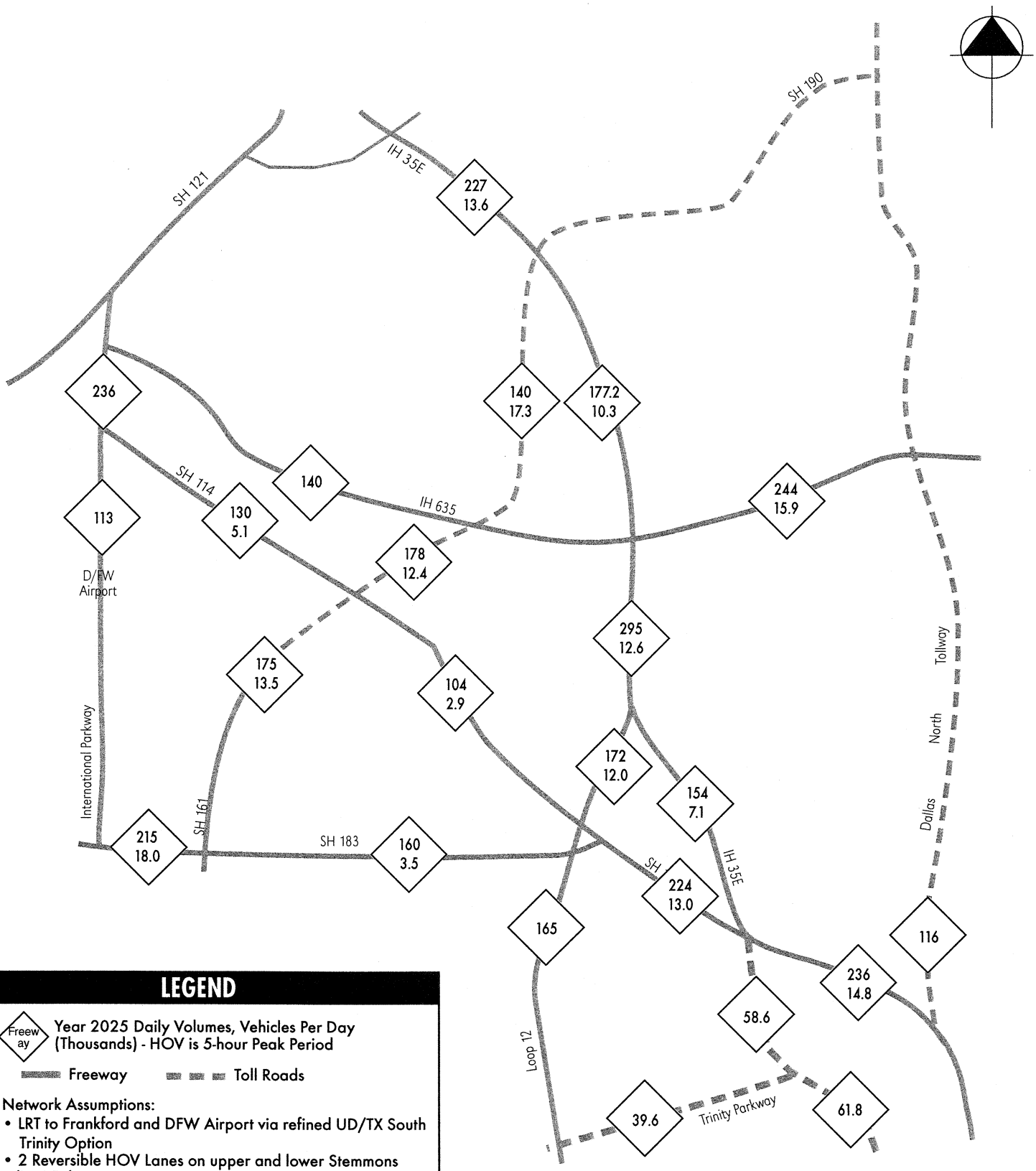
## 2025 DAILY VOLUMES FOR ALTERNATIVE 3 - TSM/TDM

FIGURE 6-4

Source: BRW, Inc, NCTCOG

Date: July 2000

DART BUS-RAIL-HOV




## LEGEND

Freeway — Year 2025 Daily Volumes, Vehicles Per Day (Thousands) - HOV is 5-hour Peak Period

Freeway — Toll Roads

Network Assumptions:

- LRT to Frankford and DFW Airport via refined UD/TX South Trinity Option
- 2 Reversible HOV Lanes on upper and lower Stemmons (IH 35E)
- 1 Reversible HOV Lane on SH 114 (Loop 12 to SH 161)
- 2 Reversible HOV Lanes on SH 114 (SH 161 to County Line)
- Mobility 2025 recommendations outside study corridors.
- Regional CMS Baseline strategies

Note: Model Run LPIS A2

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# MIS FINAL REPORT

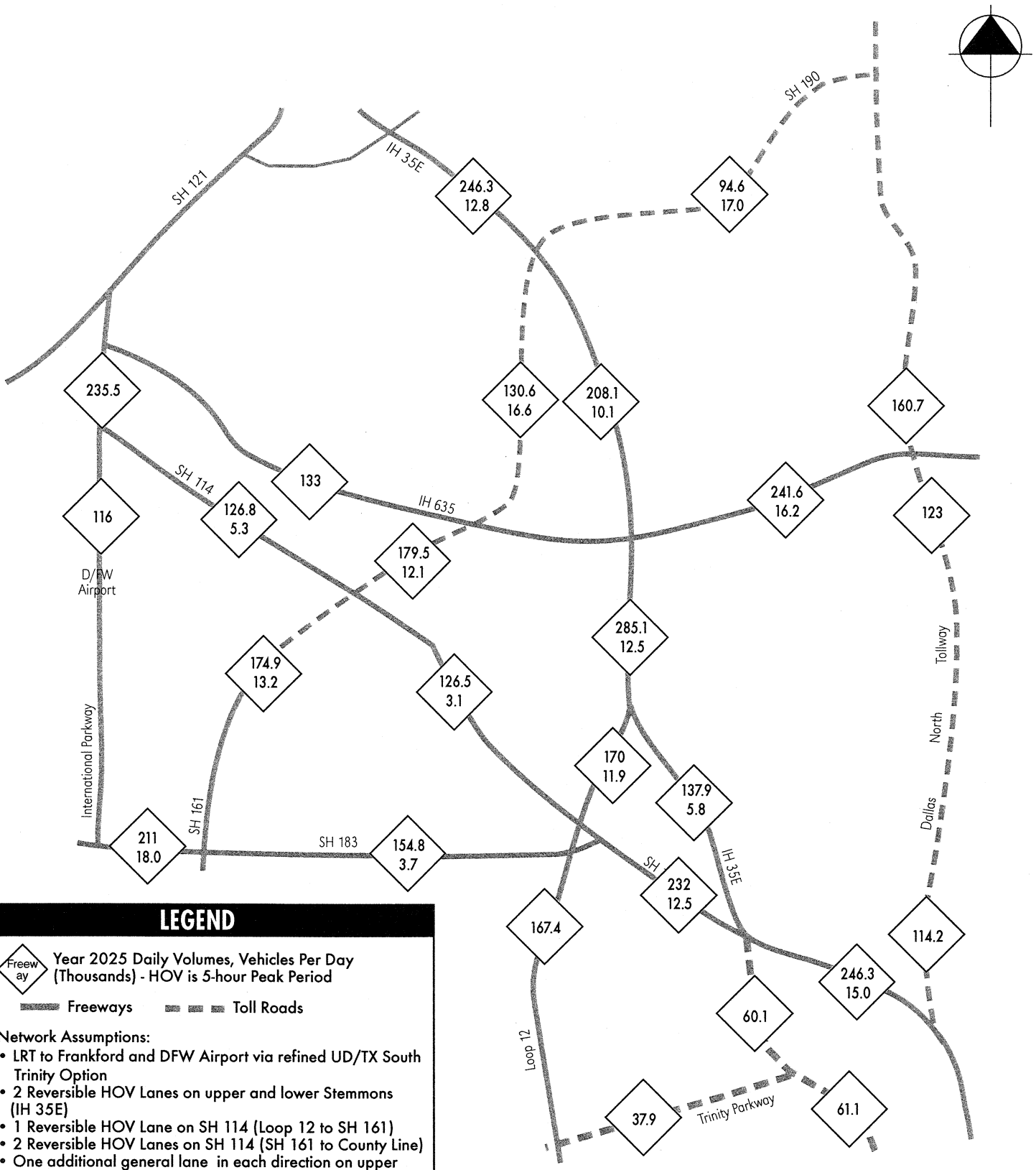
## 2025 DAILY VOLUMES FOR LPIS A

FIGURE 6-5

Source: BRW, Inc, NCTCOG

Date: July 2000

DART BUS·RAIL·HOV




## LEGEND

Freeway — Year 2025 Daily Volumes, Vehicles Per Day (Thousands) - HOV is 5-hour Peak Period

Freeways — Toll Roads

Network Assumptions:

- LRT to Frankford and DFW Airport via refined UD/TX South Trinity Option
- 2 Reversible HOV Lanes on upper and lower Stemmons (IH 35E)
- 1 Reversible HOV Lane on SH 114 (Loop 12 to SH 161)
- 2 Reversible HOV Lanes on SH 114 (SH 161 to County Line)
- One additional general lane in each direction on upper IH 35E (IH 635 to SH 121 bypass)
- One additional general lane in each direction on SH 114 (Loop 12 to SH 161)
- Mobility 2025 recommendations outside study corridors.
- Regional CMS Baseline strategies

Note: Model Run LPIS GPA3

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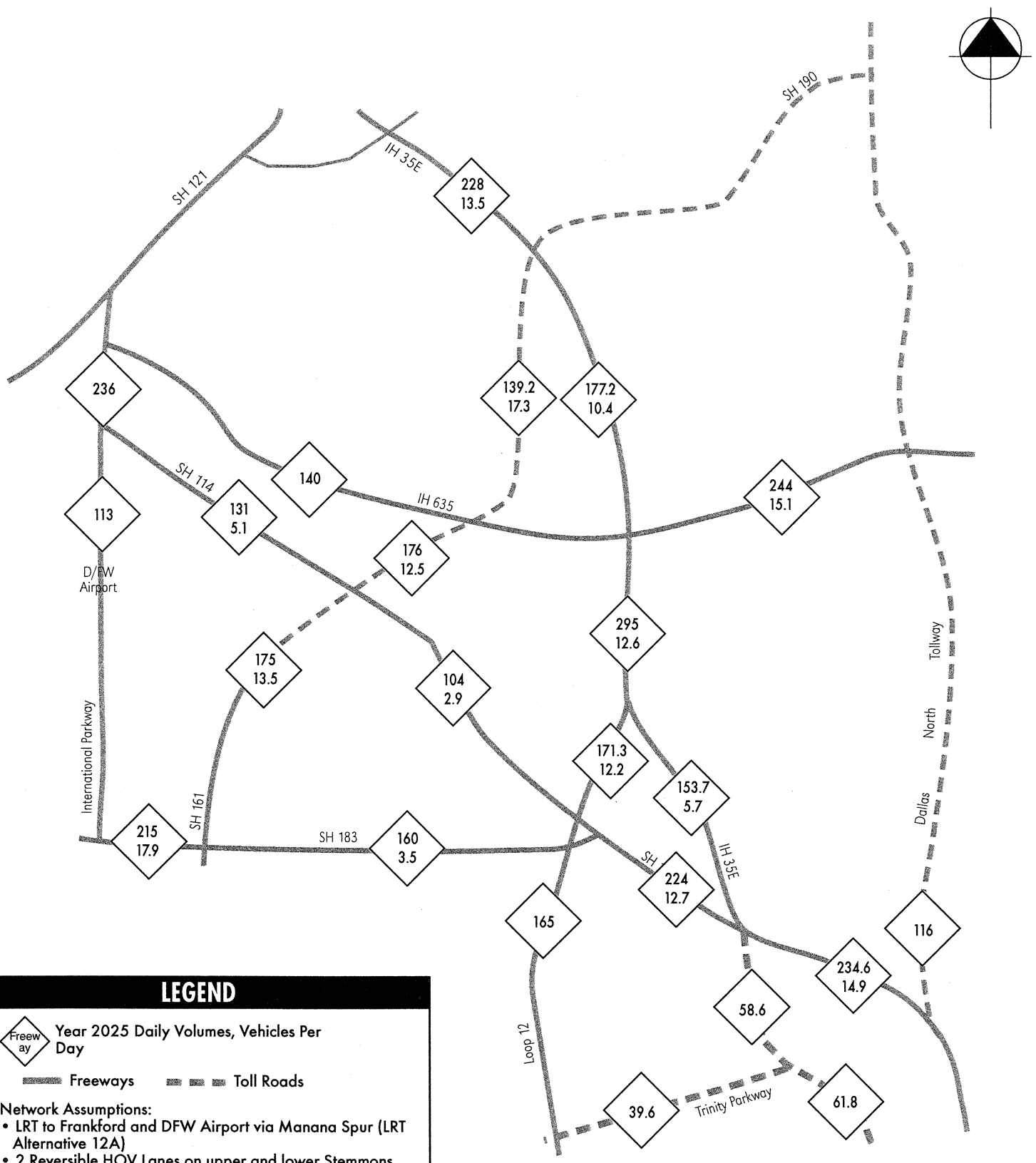
# MIS FINAL REPORT
## 2025 DAILY VOLUMES FOR LPIS GPA

FIGURE 6-6
Source: BRW, Inc, NCTCOG
Date: July 2000

DART BUS·RAIL·HOV




## LEGEND

Freeway — Year 2025 Daily Volumes, Vehicles Per Day

Freeways — Toll Roads

Network Assumptions:

- LRT to Frankford and DFW Airport via Manana Spur (LRT Alternative 12A)
- 2 Reversible HOV Lanes on upper and lower Stemmons (IH 35E)
- 1 Reversible HOV Lane on SH 114 (Loop 12 to SH 161)
- 2 Reversible HOV Lanes on SH 114 (SH 161 to County Line)
- Mobility 2025 recommendations outside study corridors.
- Regional CMS Baseline strategies

Note: Model Run LPIS 2B

NW CORRIDOR MIS

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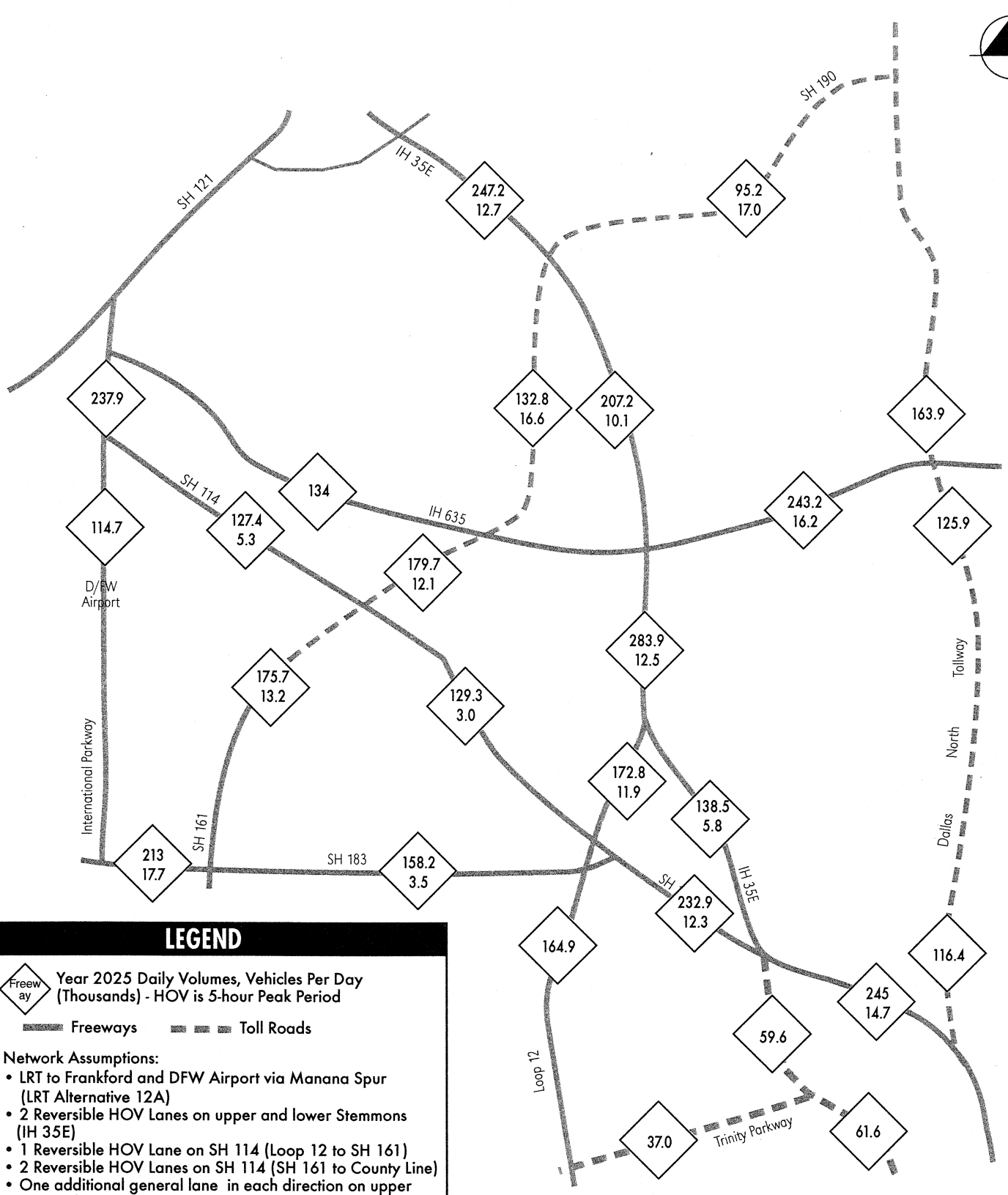
2025 DAILY VOLUMES FOR LPIS B

FIGURE 6-7
Source: BRW, Inc, NCTCOG
Date: July 2000

DART BUS·RAIL·HOV




## LEGEND

Freeway — Year 2025 Daily Volumes, Vehicles Per Day (Thousands) - HOV is 5-hour Peak Period

Freeways — Toll Roads

Network Assumptions:

- LRT to Frankford and DFW Airport via Manana Spur (LRT Alternative 12A)
- 2 Reversible HOV Lanes on upper and lower Stemmons (IH 35E)
- 1 Reversible HOV Lane on SH 114 (Loop 12 to SH 161)
- 2 Reversible HOV Lanes on SH 114 (SH 161 to County Line)
- One additional general lane in each direction on upper IH 35E (IH 635 to SH 121 bypass)
- One additional general lane in each direction on SH 114 (Loop 12 to SH 161)
- Mobility 2025 recommendations outside study corridors.
- Regional CMS Baseline strategies

Note: Model Run LPIS GPB3

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MIS FINAL REPORT
2025 DAILY VOLUMES FOR LPIS GPB

FIGURE 6-8
Source: BRW, Inc, NCTCOG
Date: July 2000

DART SUB-RAIL-HOV

### 6.4.5 Systemwide Performance

Additional measures that assist in understanding how the LPIS packages perform as a system are:

- Vehicle Miles of Travel (VMT)
- Vehicles Hours of Travel (VHT)
- Percent Vehicles Hours of Congestion Delay
- Lane Miles at LOS F
- Emissions per day of HC and $NO_x$

Table 6.5 summarizes performance measures for the four LPIS runs as compared to the No Build, No Build/CMS and TSM/TDM Alternatives.

Key observations associated with Table 6.5 are:

- The LPIS packages results in a slight increase in VMT (less than one to approximately 2%) as compared to the No Build/CMS Alternative. The greatest increase in VMT is associated with HOV lane usage, given that the baseline alternative does not have HOV facilities on SH 114 or IH 35E.
- The LPIS packages without general purpose lane improvements results in slightly decreased VMT on freeways and frontage roads, with slight increases on arterials. With general purpose lanes, VMT is reduced on arterials and shifts to the freeway and frontage road system.
- As with VMT, the LPIS packages without general purpose lane improvements result in slightly lower VHT on freeways and frontage road with slightly higher VHT on arterials. The greatest increase in VHT is associated with HOV lane usage.
- The addition of general purpose lanes increase VMT on all segments of the network except for principal arterials, which decreases slightly.
- All LPIS packages result in a lower percentage of congestion hours of delay. Greater savings in congestion delay are realized with the addition of general purpose lanes, particularly on the freeway network.
- All LPIS packages reduce the number of lane miles at LOS F. The addition of general purpose lanes improves LOS on the freeway network including frontage roads and arterials. No HOV lanes operate at LOS F under any LPIS packages.
- HC emissions increase slightly (less than 1%) for all LPIS packages.
- NOx emissions increase slightly also, with the greatest increase under the LPIS packages with general purpose lane improvements (increase of 2-3% tons per day).

### 6.4.6 Costs and Cost-Effectiveness

Table 6.6 summarizes the estimated capital costs for the various elements of the LPIS alternatives. Highway and freeway bottleneck improvements (which make up most of the TSM/TSM Element cost) would be funded separately by TxDOT. DART and TxDOT would likely jointly implement HOV improvements. DART would be fully responsible for the implementation of LRT. As shown, capital costs for the UD/TX South Trinity option are approximately $135 million higher than using the Manana Spur option. These capital cost estimates take into consideration the refinements made to the alignments.

**TABLE 6.6**
**CAPITAL COST - NORTHWEST CORRIDOR LPIS ELEMENTS**

| Alternative | Capital Cost ($1999M) |
|---|---|
| TSM/TDM Elements | $99.9 |
| **General Purpose Lanes/ Reconstruction** | |
| IH 35E | $348.7 |
| SH 114 | $170.8 |
| *Highway Reconstruction subtotal* | $519.5 |
| **HOV Element** | |
| HOV IH 35E | $212.4 |
| HOV SH 114 | $123.2 |
| *HOV subtotal* | *$335.6* |
| **HOV plus General Purpose Lanes** | |
| IH 35E | $561.1 |
| SH 114 | $294.4 |
| *HOV plus GP Lanes subtotal* | *$855.5* |
| **LRT Element** | |
| A – UD/TX South Trinity option | $1,400.7 |
| B – Manana Spur option | $1,265.5 |
| **LPIS Packages** | |
| LPIS A – includes:<br>- LRT Element A UD/TX South Trinity Option<br>- HOV on IH 35E and SH 114 | $2,161.9* |
| LPIS GPA – includes:<br>- LRT Element A UD/TX South Trinity Option<br>- HOV on IH 35E and SH 114<br>- General Purpose Lane improvements on IH 35E and SH 114 | $2,256.2 |
| LPIS B – includes:<br>- LRT Element B Manana Spur option<br>- HOV on IH 35E and SH 114 | $2,026.7* |
| LPIS GPB – includes:<br>- LRT Element B Manana Spur option<br>- HOV on IH 35E and SH 114<br>- General Purpose Lane improvements on IH 35E and SH 114 | $2,121.0 |

SOURCE: BRW, Inc; Wendy Lopez & Associates; August 2000.

* Without reconstruction of the highway to incorporate additional general purpose lanes, implementation of HOV lanes requires substantial additional costs to include reconstruction (IH 35E - $467.2 M; SH 114 – $294.0 M).

As shown, the total investment proposed to be made in the Northwest Corridor is more than $2 billion for all strategies. LRT represents approximately 60 percent of the total investment.

Table 6.7 presents cost-effectiveness in terms of annualized capital cost per annual transit rider for the LRT elements of the LPIS packages. The annualized ridership reflects that of the packages that includes both HOV and general purpose lane improvements. As shown in the table, the Manana Spur option continues to have a better cost-effectiveness due the lower capital cost of the option. Ridership is forecast to be greater for the UD/TX South Trinity Option.

**TABLE 6.7**
**ANNUALIZED CAPITAL COST PER ANNUAL TRANSIT RIDER**

| Alternative | Annualized Capital Cost ($1999) | Annual Corridor Transit Riders | Annualized Capital Cost per Annual Transit Rider |
|---|---|---|---|
| **LRT Element** | | | |
| LPIS A – with UD/TX South Trinity option | $114.8 | 7,469,970 | $15.39 |
| LPIS B – with Manana Spur option | $103.8 | 7,059,250 | $14.70 |

SOURCE: BRW, Inc; February 2000.

DART annualization factor: 302=LRT

## 6.5 TRADE-OFF ANALYSIS

The trade-off analysis examines the differences among the four LPIS packages based on the information presented in this chapter. Key observations from the LPIS packages are as follows:

**Transit Ridership**

- The addition of general purpose lanes reduces new transit trips by 100 (or less than 2%).
- The LRT element using the Manana alignment (LPISB, GPB) has 300-400 fewer new transit riders (7-10%) per day than that using the refined UD/TX South Trinity alignment as compared to the TSM/TDM Alternative.
- LRT ridership is highest for the LPIS GPA package, which uses the refined UD/TX South Trinity alignment and includes HOV and general purpose lane improvements. This package has 24,735 daily corridor riders.
- Systemwide LRT ridership vs. the TSM/TDM Alternative is highest under LPIS GPA (11,600 more LRT linked trips per day).

**Travel Time Savings**

- Systemwide transit travel time savings vs. the No Build Alternative are greatest under Alternatives LPIS A and LPIS GPA with the UD/Texas Stadium alignment option.

- LPIS B with HOV lanes and LRT using the Manana Spur option results in the greatest travel time savings (403,000 annual hours) vs. the TSM Alternative. This is about 20 percent better than the LPIS A and LPIS GPA packages, which result in nearly 340,000 annual hours of travel time savings.

**Roadway Network**

- The LPIS packages result in a slight increase in VMT (less than one to approximately 2%) as compared to the No Build/CMS Alternative.

- The LPIS packages without general purpose lane improvements result in slightly decreased VMT on freeways and frontage roads, with slight increases on arterials. With general purpose lanes, VMT is reduced on arterials and shifts to the freeway and frontage road system.

- The LPIS packages without general purpose lane improvements result in slightly lower VHT on freeways and frontage road with slightly higher VHT on arterials. The greatest increase in VHT is associated with HOV lane usage.

- All LPIS packages result in a lower percentage of congestion hours of delay. Greater savings in congestion delay are realized with the addition of general purpose lanes, particularly on the freeway network.

- All LPIS packages reduce the number of lane miles at LOS F. The addition of general purpose lanes improves LOS on the freeway network including frontage roads and arterials. No HOV lanes operate at LOS F under any LPIS packages.

- HC emissions increase slightly (less than 1%) for all LPIS packages.

- NOx emissions increase slightly also, with the greatest increase under the LPIS packages with general purpose lane improvements (increase of 2-3% tons per day).

**Screenline Capacity**

- Substantial increases in peak hour person trip capacity as compared to TSM are provided with each package. Without general purpose lanes, the increases in total person trip capacity are:

  - Lower IH 35E 10,650
  - Upper IH 35E 10,650
  - SH 114 7,725

  With additional general purpose lanes, the capacity increases are even greater:

  - Lower IH 35E 10,650 (no change)
  - Upper IH 35E 13,570
  - SH 114 10,425

- LRT adds a significant amount of peak hour person trip capacity. (4,800 peak hour person trips).

**Cost and Cost-Effectiveness**

- The LRT element that uses the UD/TX Stadium alignment option is estimated to cost approximately $135 million more than the Manana Spur.
- LPIS packages with general purpose lanes require reconstruction of the highway, particularly for IH 35E. Implementation of HOV lanes would not likely occur without the total reconstruction and added capacity of general purpose lanes also.

- With both HOV and general purpose lane improvements, the total LPIS packages are estimated to cost from $2.12 to $2.26 billion. The cost differential is solely due to the LRT element.

- The Manana Spur option, at $14.70 annualized capital cost per annual rider, is a more cost-effective option than the UD/TX Stadium alignment option at $15.39.

## 6.6 RECOMMENDED STRATEGY

Based on the information presented in the detailed evaluation, and final evaluation and trade-off analysis, the recommended Locally Preferred Investment Strategy is LPISGPA, which incorporates the refined South Trinity option of the UD/TX alignment. A more detailed description of the elements of the LPIS, including the DART Board resolution, is contained in the following Chapter.

In order to assess how the LPIS fits into the regional transportation plan, Mobility 2025, a reconciliation of the various elements is provided in Section 6.6.1.

### 6.6.1 Reconciliation with Mobility 2025 Plan

The following sections provide a review of how the LPIS relates to the final elements in the recently approved *Mobility 2025 Plan*.

**TDM/ TSM**

Sections X and XI of the ***Mobility 2025 Plan*** contain recommendations for Transportation Demand Management (TDM) and Transportation Systems Management (TSM), respectively. Section X contains a comprehensive list of recommended TSM and TDM projects in the Northwest Corridor. These projects were developed during the MIS process, and are based on interviews with local jurisdictions. Inclusion in the ***Mobility 2025 Plan*** can increase chances of implementing agencies to receive appropriate funding for the projects. A list of these TSM and TDM recommendations is included in Appendix B.

**HOV and Managed Facilities**

Section XV of the plan includes recommendations for HOV and Managed facilities. MIS recommendations and Mobility 2025 Plan recommendations are summarized in Table 6.8.

**TABLE 6.8**
**MIS AND MOBILITY 2025 HOV FACILITY RECOMMENDATIONS**

| Facility (Location) | MIS Recommendation | Mobility 2025 |
|---|---|---|
| Upper IH 35E (IH 635 to SH 121) | 2 Reversible HOV lanes | Same |
| Lower IH 35E (Loop 12 to SH 183) | 2 Reversible HOV lanes | Same |
| SH 114 (Loop 12 to SH 161) | 1 Reversible HOV lane | Same |
| SH 114 (SH 161 to County Line) | 2 Reversible HOV lanes | 1 Reversible HOV lane |

SOURCE: BRW, Inc.; NCTCOG; July 2000.

As shown above, all of the recommendations are consistent with Mobility 2025 with the exception of the upper portion of SH 114. The portion of SH 114 from International Parkway to SH 121 is proposed as 2 reversible plus two 2-way managed HOV lanes. The HOV volumes on SH 114 from SH 161 to County Line do not meet warrants for 2 reversible HOV lanes, but do exceed the warrant of 4,400 peak period vehicles (for one reversible lane) by approximately 1,000 vehicles. Two reversible lanes were viewed as more appropriate for the transition to and from SH 114 northwest of the County Line. As TxDOT initiates further studies in this corridor, the connections between the various freeway and HOV improvements north of the DFW Airport need to be revisited.

**Freeways**

MIS recommendations regarding freeway or general purpose lane improvements were also compared against what is in Mobility 2025. They are summarized in Table 6.9.

Mobility 2025 includes different recommendations related to general purpose lane improvements on the portion of SH 114 from SH 161 to County Line. As shown in Table 6.9, the MIS recommendations do not add this general purpose lane, but rather add an additional reversible HOV lane on that same segment. The SH 114/121 MIS recommended 4 managed/HOV lanes to meet SH 114 at the County Line. This lane balancing issue needs to be addressed as the SH 114/121 and future SH 114 improvements proceed in design

**TABLE 6.9**
**MIS AND MOBILITY 2025 FREEWAY RECOMMENDATIONS**

| Facility (Location) | MIS Recommendation | Mobility 2025 |
|---|---|---|
| Upper IH 35E (IH 635 to SH 121) | Add 1 general purpose lane in each direction for a total of 8 mainlanes | Same |
| Lower IH 35E (Loop 12 to SH 183) | Maintain a total of 6 mainlanes | Same |
| SH 114 (Loop 12 to SH 161) | Add 1 general purpose lane in each direction for a total of 6 mainlanes | Same |
| SH 114 (SH 161 to County Line) | Maintain a total of 6 mainlanes | Add 1 general purpose lane in each direction for a total of 8 mainlanes |

SOURCE: BRW, Inc.; NCTCOG; July 2000.

**Rail Transit**

The Mobility 2025 Plan is generally consistent with the MIS recommendations related to rail transit. The Mobility 2025 Plan shows LRT in the Northwest Corridor to Frankford Road in Carrollton with both options to Irving (Manana and UD/TX) shown pending the results of the MIS/PE/EIS. Cooperatively funded LRT is shown in the segment from the Las Colinas Urban Center to DFW Airport.

# 7.0 Locally Preferred Investment Strategy (LPIS)

This chapter presents a description of the elements of the Locally Preferred Investment Strategy. The LPIS combines the preferred rail element with highway/HOV and TSM components for a comprehensive investment strategy in the Northwest Corridor. The development of the elements of the LPIS was based upon a "building blocks" approach to combine capacity improvements that can meet future travel demands in the corridor. Section 7.1 describes the "building blocks" process and the ability of the LPIS to meet future travel demand.

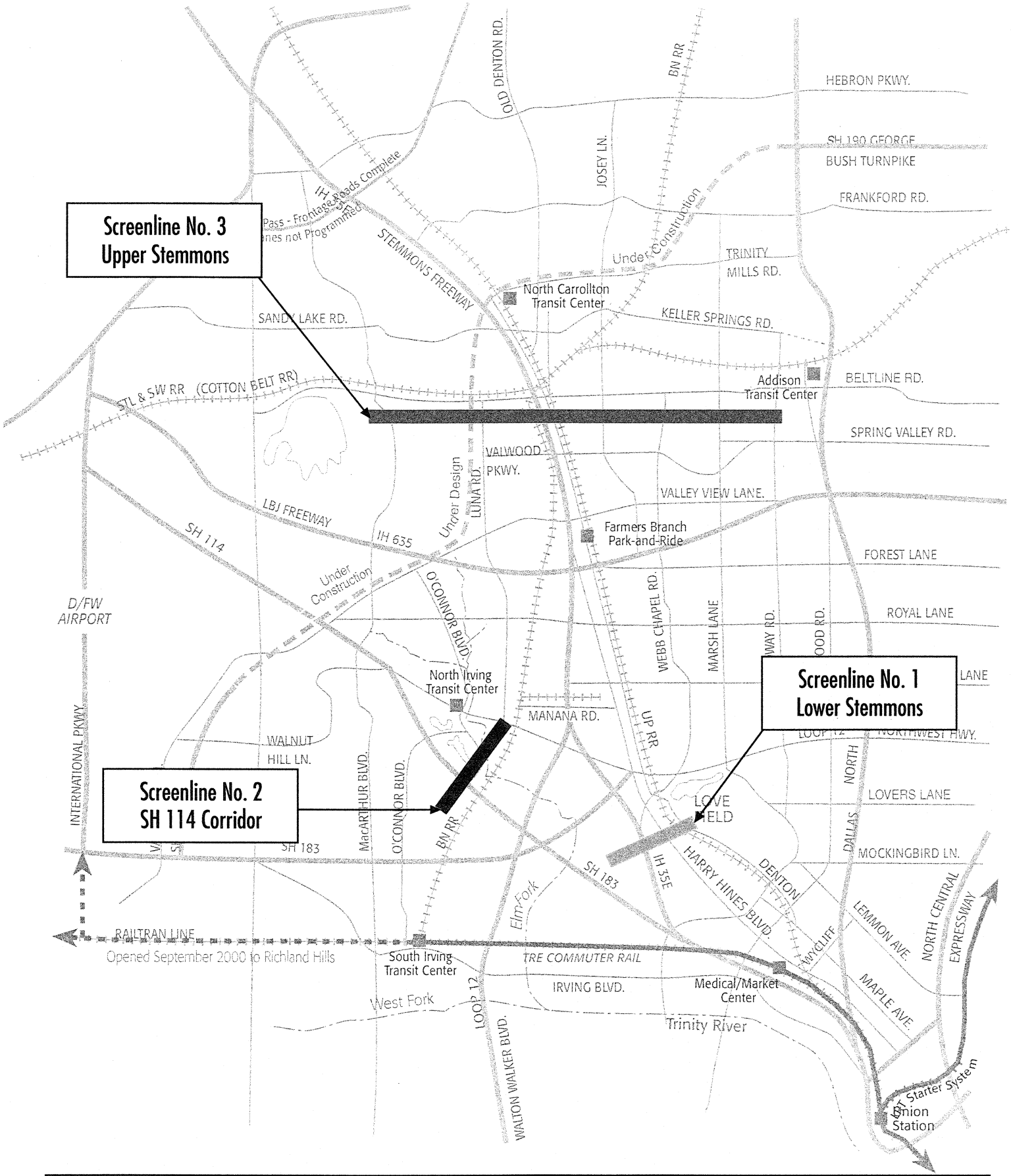
Section 7.2 describes the elements of the LPIS, and the resolution of the DART Board to adopt the LPIS. This resolution includes special conditions related to the financial support and land use in the City of Irving. Section 7.3 summarizes the next steps in the project development process, and highlights key issues that will be further addressed in the PE/EIS phase.

## 7.1 BUILDING BLOCKS ANALYSIS

During the development of alternatives for the Northwest Corridor, a building blocks analysis was initiated to assess travel demands compared to transportation facility supply in the Northwest Corridor. The purpose of this assessment was to provide an indication of the amount of travel demand in 2020 that would remain unserved or unmet in the No-Build network. 2025 data was not yet available at the time of this analysis. The future capacity deficit gives an idea of how much additional capacity is needed to meet future travel demands.

### 7.1.1 Screenline Analysis Locations

Three screenline corridor locations were defined within the corridor to conduct this analysis as shown in Figure 7-1. A screenline is a tool to sum person-trips forecast to cross that line during peak and/or daily periods. These screenlines were also used to define the amount of available transportation supply or capacity on facilities which cross the line. Both roadway and transit modes were summed for the screenlines.




NW CORRIDOR MIS

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SCREENLINE MAP

FIGURE 7-1
Source: BRW, Inc.
Date: July, 2000

DART BUS·RAIL·HOV

Prior to the availability of the 2025 demographics, an unrestricted travel demand forecast for Year 2020 was obtained from NCTCOG for the corridor. Key assumptions such as Peak-Hour factor and Peak Direction factor were obtained from the NCTCOG. Because 2025 travel forecasts were used for the LPIS model runs, the 2020 forecasts used in the building blocks analysis is conservative.

The 2020 No-Build network was used to calculate the available transportation supply or capacity at the three screenlines. Freeway and arterial lane capacities were obtained from NCTCOG. These values vary by area type with high capacities shown in suburban areas. Transit capacity was estimated from current schedules and a minor amount of trend growth. An average of 50 seats per bus was used to estimate capacity per vehicle. Automobile vehicle capacities were converted to person-trips through the use of an occupancy factor of 1.09 (Source: NCTCOG Mobility 2025 Plan).

### 7.1.2 Travel Demand vs. Transportation Capacity

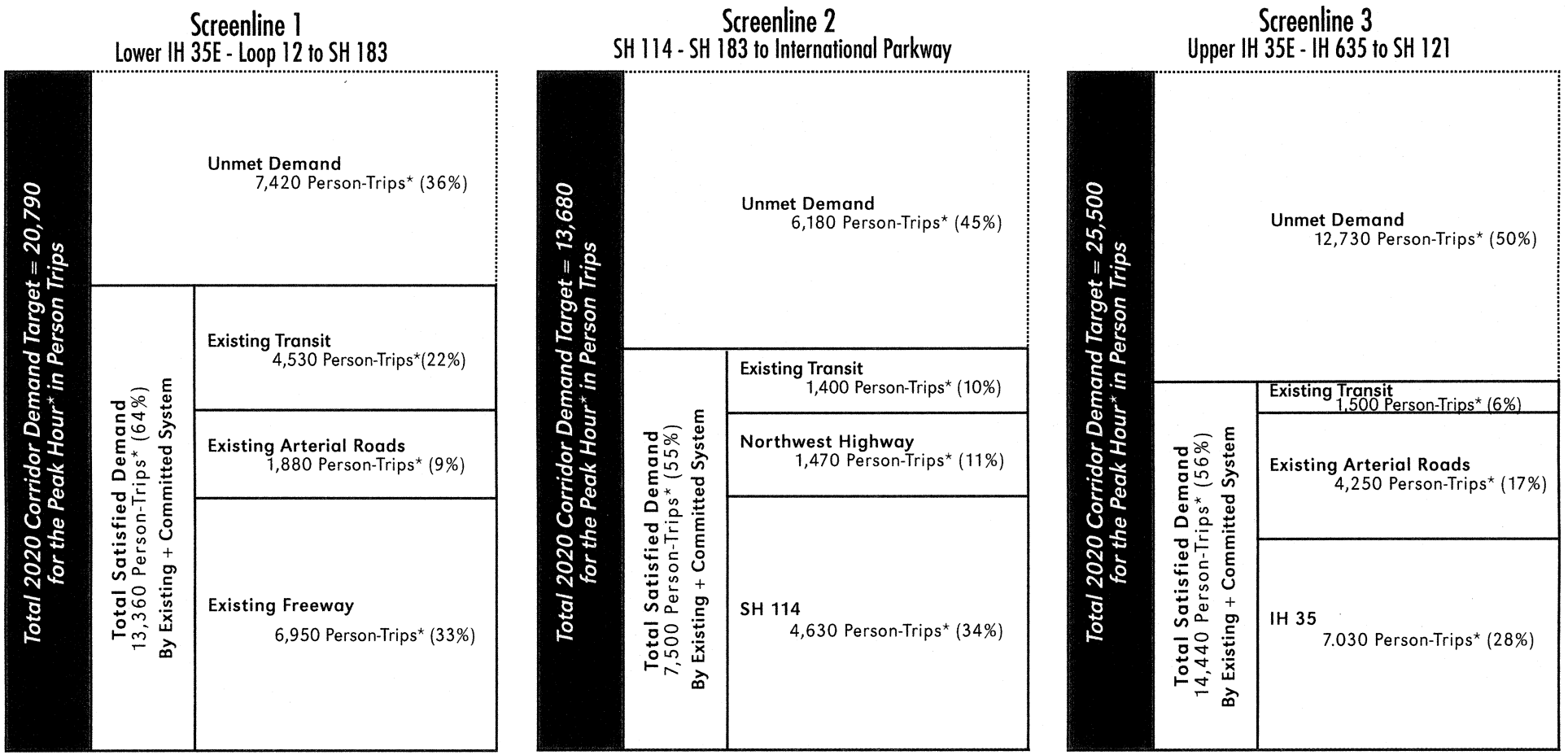
Based on the forecast travel demand and No-Build network capacity analysis, the excess or deficit capacity at each screenline can be calculated. Table 7.1 presents these results, which are also illustrated in Figure 7-2.

**TABLE 7.1**
**2020 NO BUILD TRAVEL DEMAND VS. TRANSPORTATION CAPACITY AT NORTHWEST CORRIDOR SCREENLINES (PERSON-TRIPS)**

| Screenline/ Facilities | Peak Hour Travel Demand | Peak Hour Transportation Capacity | Peak Hour Excess or (Deficit) Capacity | Peak-Period (1) Travel Demand | Peak-Period Transportation Capacity | Peak-Period Excess or (Deficit) Capacity |
|---|---|---|---|---|---|---|
| IH-35 at Regal Row | | | | | | |
| - IH-35 | 14,300 | 6,950 | (7,350) | 71,500 | 34,750 | (36,750) |
| - Harry Hines Blvd. | 1,960 | 1,880 | (80) | 9,800 | 9,400 | (400) |
| - TRE Com. Rail | 1,500 | 1,500 | 0 | 7,500 | 7,200 | (300) |
| - Express/Local Bus | 3,010 | 3,090 | 80 | 7,500 | 9,270 | 1,750 |
| **Total Screenline 1** | **20,780** | **13,360** | **(7,350)** | **96,300** | **60,620** | **(35,740)** |
| SH-114 at O'Connor | | | | | | |
| - SH-114 | 10,500 | 4,630 | (5,870) | 52,600 | 23,170 | (29,640) |
| - NW Hwy spur 348 | 2,020 | 1,470 | ( 550) | 10,000 | 7,400 | ( 2,740) |
| - Express/Local Bus | 1,140 | 1,400 | 260 | 2,900 | 5,600 | 2,750 |
| **Total Screenline 2** | **13,680** | **7,500** | **(6,180)** | **65,500** | **36,120** | **(29,450)** |
| IH-35 at Valwood | | | | | | |
| - IH-35 | 19,570 | 7,030 | (12,540) | 98,000 | 35,150 | (62,700) |
| - FM 2281/Luna Road | 2,370 | 2,130 | (240) | 11,800 | 10,630 | (1,220) |
| - Midway | 1,280 | 1,065 | ( 215) | 6,400 | 5,310 | ( 1,060) |
| - Marsh | 1,040 | 1,065 | 25 | 5,200 | 5,310 | 110 |
| - Express/Local Bus | 1,260 | 1,500 | 240 | 6,300 | 4,500 | (1,800) |
| **Total Screenline 3** | **25,550** | **12,790** | **(12,760)** | **127,500** | **61,000** | **(66,650)** |

Source: BRW, May 1999

(1) Peak period is 5 hours
(2) Excess (or Deficit) Capacity is calculated as Capacity minus Demand for the Peak-Hour and the Peak-Period




* *Peak Hour*

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BUILDING BLOCKS ANALYSIS - UNMET DEMAND (YEAR 2020 PEAK HOUR PERSON TRIPS)

FIGURE 7-2

Source: BRW, Inc.

Date: August 2000

DART

Observations from Table 7.1 and Figure 7-2 include the following:

- Each screenline shows a capacity deficit in the peak-hour and peak-period;
- Screenline 3, in upper IH 35E, has the highest total deficit;
- The peak hour deficit at screenline 3 (12,770 peak hour person trips) is about 100 percent of the available capacity (12,780);
- Screenline 2, at SH 114 near O'Connor Road, has the next highest deficit, at 82%, expressed as a percent of available capacity (6,180 peak hour person trip deficit as compared to capacity of 7,500); and,
- Screenline 1, in the lower IH 35E corridor, has the second highest absolute deficit at (7,350) peak-hour person-trips or (35,740) peak-period person-trips.

### 7.1.3 LPIS Building Blocks Analysis

Given the complex nature of travel in the Northwest Corridor, as well as the magnitude of the capacity deficit at the screenlines, the LPIS packages tested represent a multi-modal approach to meeting future travel demand. Based on the final evaluation and trade-off analysis, LPIS GPA was recommended to the DART Board as the Locally Preferred Multi-modal Investment Strategy for the Northwest Corridor. The elements of the LPIS (rail, bus, HOV, and general purpose lanes) add capacity to the three screenlines by building upon the No Build network.

**TABLE 7.2**
**COMPARISON OF DEMAND AND CAPACITY – NO BUILD VS. LPIS**
**YEAR 2025 PEAK HOUR PERSON TRIPS**

| Screenline | No Build | LPIS |
|---|---|---|
| 1 – IH 35E at Regal Row | (7,400) Deficit | +4,300 Excess |
| Resulting Condition: | Severe Congestion | Acceptable Operations |
| 2 – SH 114 at O'Connor | (6,200) Deficit | +2,500 Excess |
| Resulting Condition: | Severe Congestion | Acceptable Operations |
| 3 – IH 35E at Valwood | (12,700) Deficit | (500) Deficit |
| Resulting Condition: | Critical Failure | Some Congestion Remains |

SOURCE: BRW, Inc.; August 2000.

Note: Unmet demand is based on Year 2020 travel demand forecast

The ability of the LPIS to meet future travel demands in the corridor is illustrated in Figure 7-3. Observations from Table 7.2 and Figure 7-3 include the following:

- The No-Build Alternative results in severe congestion on IH 35E/Lower Stemmons and SH 114 (Screenlines 1 and 2). Critical failure will occur on IH 35E/Upper Stemmons (Screenline 3).

- The improvements recommended in the LPIS result in acceptable operations on IH 35E/Lower Stemmons and on SH 114. Some congestion may remain on IH 35E/Upper Stemmons.

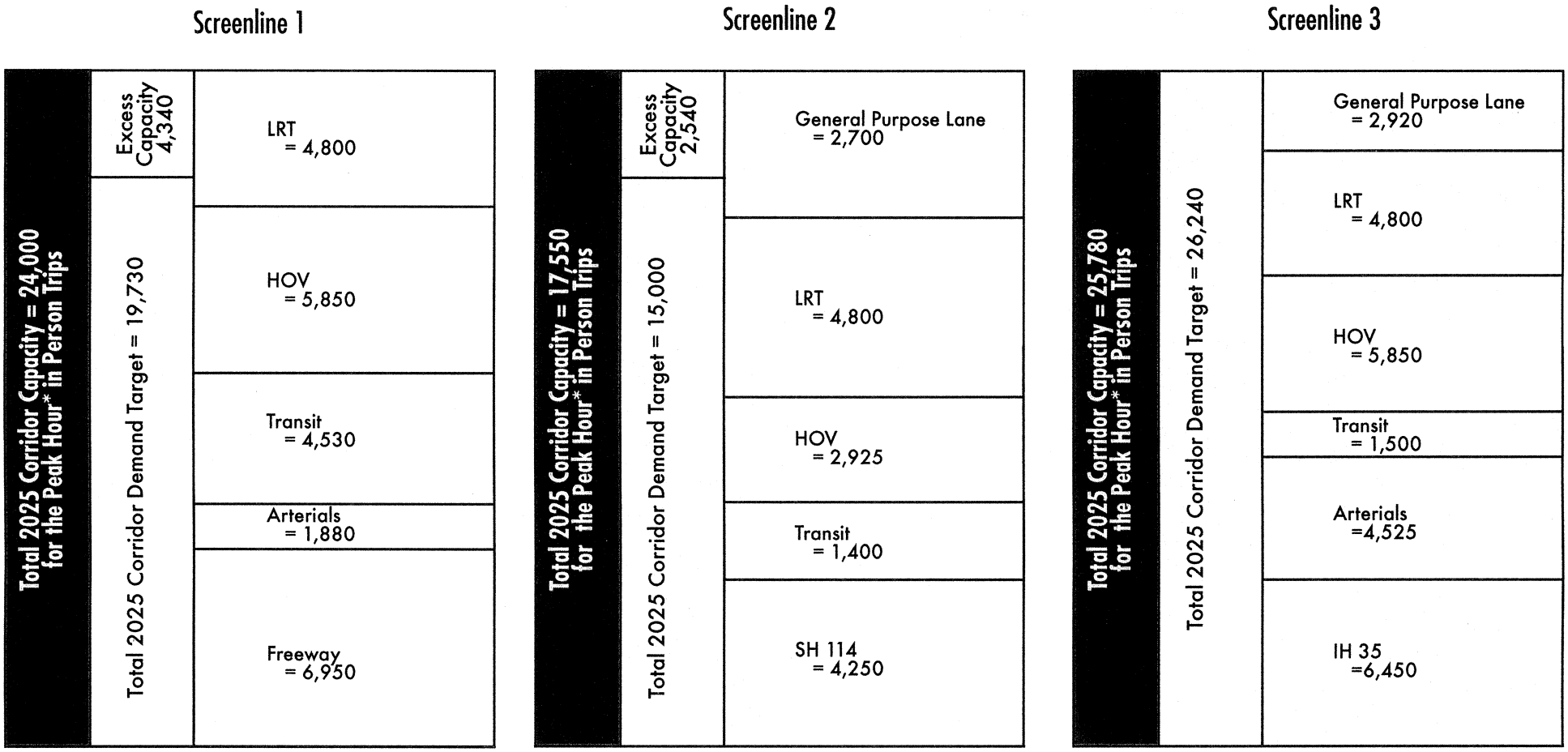
- LRT adds substantial capacity to the corridor. In fact, reserve capacity is likely to be available on LRT while the highway lanes all approach capacity. Of the excess capacity at the Screenlines 1 and 2, LRT accounts for the following:

  - Screenline 1 – 54% of the excess capacity is associated with LRT

  - Screenline 2 – 144% of the excess capacity is associated with LRT

  This indicates that the highway is still over capacity; additional mode shifts to transit is expected.

- At Screenline 3 a slight deficit of approximately 200 peak hour person trips is projected for Year 2025. The addition of LRT capacity (4,800 peak hour person trips) and a mode shift to LRT will be critical at this screenline to accommodate the future deficit.




NW CORRIDOR MIS

MIS FINAL REPORT

BUILDING BLOCKS ANALYSIS - UNMET DEMAND (YEAR 2025 PEAK HOUR PERSON TRIPS)

FIGURE 7-3
Source: BRW, Inc.
Date: August 2000

DART

## 7.2 ELEMENTS AND CONDITIONS OF THE LPIS

The DART Board approved the LPIS with a resolution on February 22, 2000. A copy of the resolution in included in Appendix E. The following sections describe the components of the Northwest Corridor LPIS.

### 7.2.1 TSM/ TDM Element

The TSM/TDM element is illustrated in Figure 7-4, and includes all those improvements described in Section 4.2. The largest component of the TSM/TDM element is freeway bottleneck improvements. More than 50 individual projects were developed to enhance safety and operations on IH 35E and SH 114. A list of these projects are contained in Appendix B. Several intersection and signal improvements are also included as described in Section 4.2.

This element also recommends formation of several Transportation Management Associations (TMA's) in the corridor to encourage and support travel demand management strategies in the corridor. Such actions have been shown to reduce peak hour travel demand by reducing peak hour commute trips through ridesharing, increased transit use and telecommuting. In addition to TDM strategies, bus service enhancements through new routes, route modification and headway improvements are included.

### 7.2.2 Highway/ HOV Element

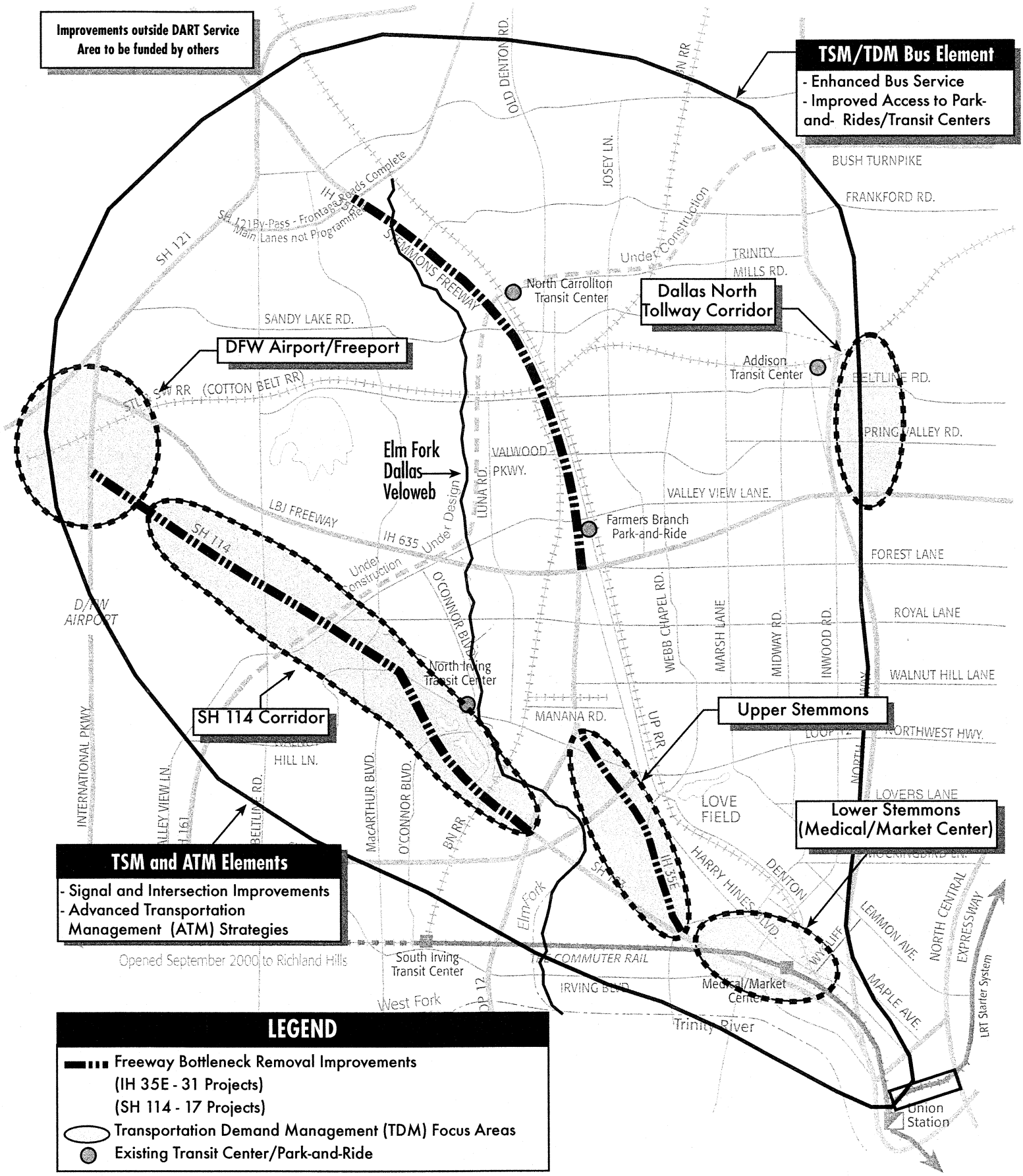
The Highway/HOV Element of the LPIS includes recommendations for both HOV facilities and general purpose lane improvements where additional capacity is needed. Figure 7-5 illustrates the HOV and Highway recommendations. Sensitivity tests indicate that these improvements do not adversely impact rail ridership but do help meet corridor travel demand.

Recommended HOV facility improvements are:

- 2 reversible HOV lanes on upper IH 35E (IH 635 to SH 121 bypass to meet with the IH 35E North recommendations)
- 2 reversible HOV lanes on lower IH 35E (Loop 12 to SH 183)
- 2 reversible HOV lanes on SH 114 (County Line to SH 161)
- 1 reversible HOV lane on SH 114 (SH 161 to Loop 12)

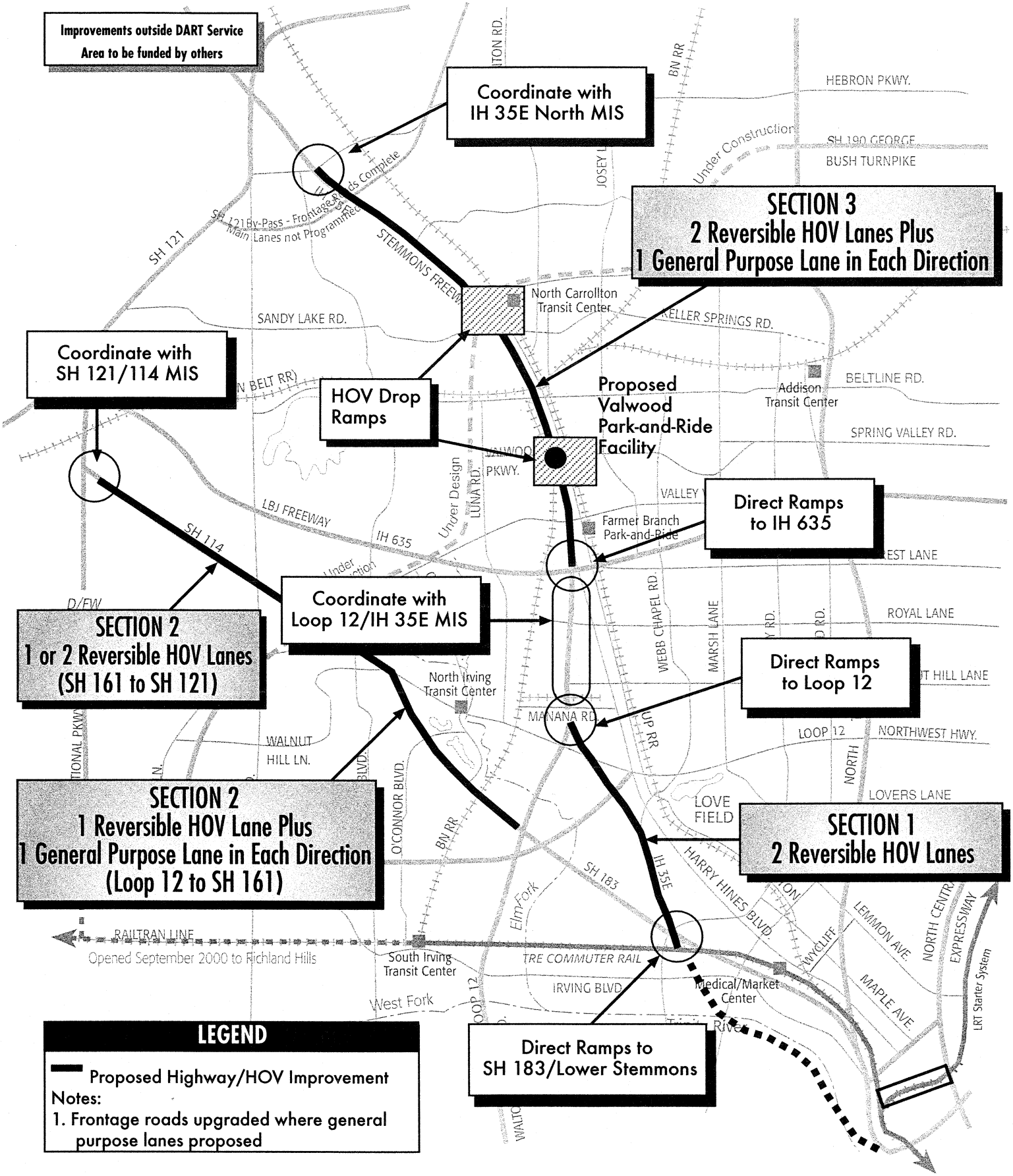
General purpose lane improvements are also recommended for portions of SH 114 and IH 35E as described below:

- Addition of 1 general purpose lane in each direction on upper IH 35E (IH 635 to SH 121 bypass)
- Addition of 1 general purpose lane in each direction on SH 114 (SH 161 to Loop 12) to bring the cross section of SH 114 to 3 lanes in each direction from County Line to Loop 12.




MIS FINAL REPORT
LPIS - TSM/CMS ELEMENT

FIGURE 7- 4
Source: BRW, Inc.
Date: July 2000




NW CORRIDOR MIS

MIS FINAL REPORT
LPIS - HIGHWAY/HOV ELEMENT

FIGURE 7-5
Source: BRW, Inc.
Date: July 2000

DART BUS·RAIL·HOV

### 7.2.3 Rail Transit Element

The approved rail element for the Northwest Corridor is illustrated in Figure 7-6. The key decision issue associated with the rail element of the LPIS was the Irving alignment. As discussed in previous sections, two alignments were analyzed in detail to access Las Colinas and continue to DFW Airport: the Manana Spur and UD/Texas Stadium. The Manana Spur was found to a technically appropriate option due to cost-effectiveness. However, public support and land use/economic development potential is greater for the refined UD/Texas Stadium option. Table 7.3 summarizes station area characteristics for the preferred alignment. A description of the alignment is provided below.

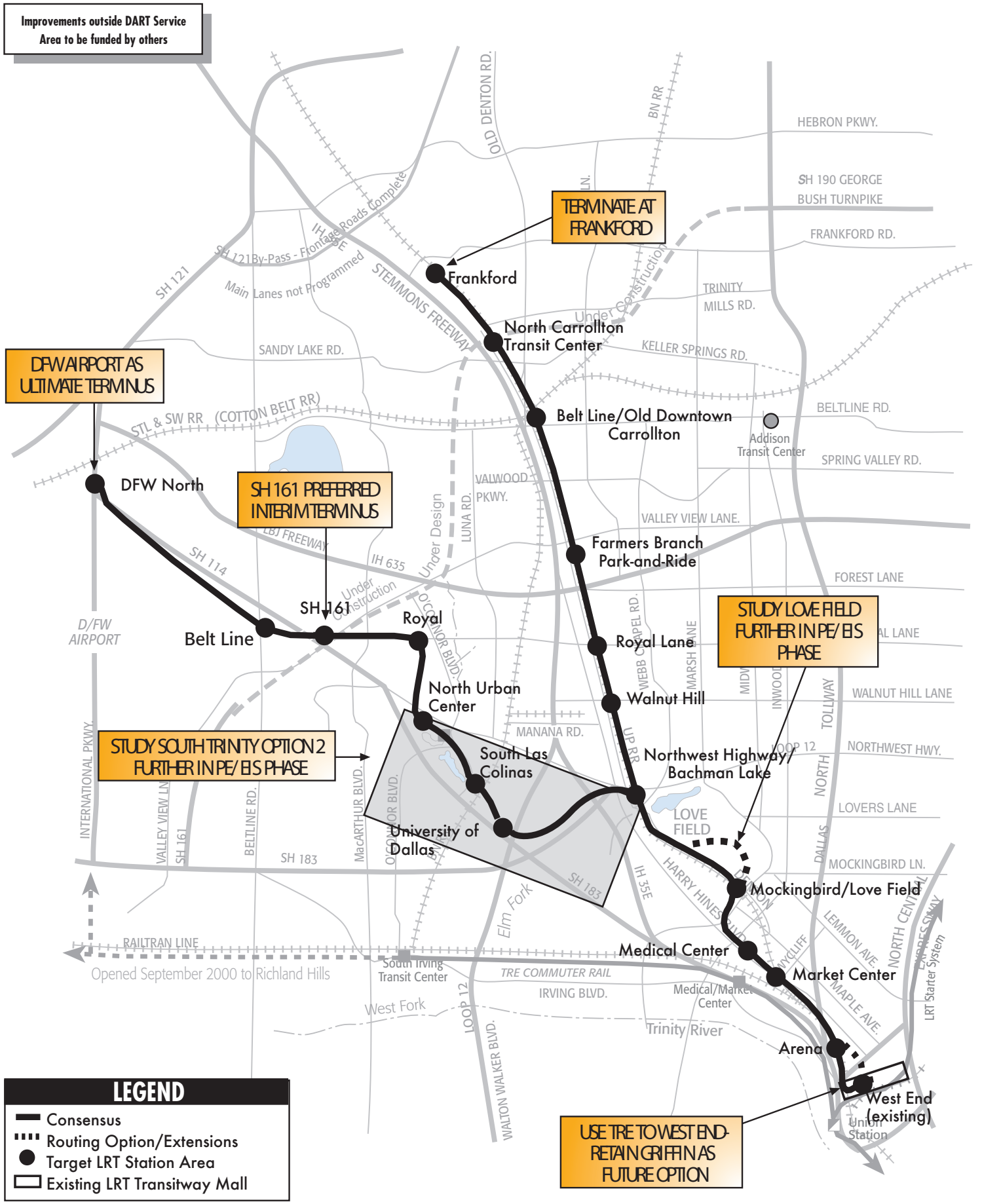
#### Alignment Description

As shown in Figure 7-6 and illustrated in Appendix F, the rail element consists of two LRT lines that branch off near Northwest Highway. A description of each is below. A summary of the proposed LRT stations is provided in Table 7.3.

#### UP RR Alignment to Frankford

The main LRT alignment begins in downtown Dallas and extends north from the existing LRT transitway mall. From downtown, the alignment joins the TRE corridor and continues north at-grade until approximately Wycliff Avenue. At-grade stations are provided at the Arena and at Market Center just south of Wycliff. The alignment stays elevated to cross over Market Center Boulevard then returns to at-grade, continuing in the median of Harry Hines Boulevard, and providing an at-grade Medical Center Station just south of Butler. Beyond this point, the alignment becomes aerial to cross over Inwood Road. The route then turns east and returns to an at-grade alignment following along Bomar Street. It then turns northwards at Denton Drive in a tunnel alignment to cross under Mockingbird Lane and avoid flight zone restrictions. A Mockingbird/Love Field Station is provided in this area, either along Bomar Street on the north side of the UTSW Medical Center complex, or closer to Mockingbird Lane, depending on how access to Love Field is resolved during the PE/EIS phase.

Continuing north, the alignment returns to at-grade near Empire Central and follows the UP RR corridor at-grade to a point south of Webb Chapel Extension. At this point, the alignment becomes elevated to cross over Webb Chapel and Northwest Highway (which is currently a depressed roadway under the UP RR). An at-grade station is provided between Northwest Highway and Webb Chapel Extension. Another branch of the LRT line diverges after the Northwest Highway Station and continues southwest toward the Texas Stadium/University of Dallas area. This alignment is described below. The main LRT line returns to at-grade approximately 1,000 feet north of Northwest Highway and continues at at-grade until just north of Valwood Parkway. Grade separations and aerial stations are provided at Walnut Hill and Royal Lane. An at-grade station is provided near Valley View (Farmers Branch Station) based on the desire of the City of Farmers Branch have this station better fit into the context of their planned transit-oriented development. A grade separation is recommended for Valley View Lane.




NW CORRIDOR MIS

MIS FINAL REPORT
LPIS - RAIL ELEMENT

FIGURE 7-6
Source: BRW, Inc.
Date: July 2000

DART BUS·RAIL·HOV

North of Valwood Parkway, the alignment becomes aerial to cross over several minor streets and the major Belt Line Road/BN RR crossing. An aerial station is provided at Belt Line. The alignment continues north using an at-grade alignment with at-grade stations near the North Carrollton Transit Center and Frankford Road.

**TABLE 7.3**
**LPIS – RAIL ELEMENT STATION AREA CHARACTERISTICS**

| Target Station Area | Mode Type | | | | |
|---|---|---|---|---|---|
| | Park-and-Ride | Bus Transfer | Kiss-and-Ride | Rail Transfer | Walk/ Bicycle |
| Arena[1] | | ■ | | ■ | ■ |
| Market Center | ■ | ■ | ■ | | ■ |
| Medical Center | | ■ | | | ■ |
| Mockingbird/Love Field[2] | | ■ | ■ | | ■ |
| Northwest Highway/Bachman Lake | ■ | ■ | ■ | ■ | ■ |
| Walnut Hill | ■ | ■ | ■ | | ■ |
| Royal Lane | ■ | ■ | ■ | | ■ |
| Farmers Branch Park-and-Ride[3] | ■ | ■ | ■ | | ■ |
| Beltline/Old Downtown Carrollton[4] | ■ | ■ | ■ | ■ | ■ |
| North Carrollton T.C.[3] | ■ | ■ | ■ | | ■ |
| Frankford | ■ | ■ | ■ | | ■ |
| University of Dallas[5] | ■ | ■ | ■ | | ■ |
| South Las Colinas[6] | ■ | ■ | ■ | ■ | ■ |
| North Urban Center (Las Colinas APT)[6] | ■ | ■ | ■ | ■ | ■ |
| Royal | ■ | ■ | ■ | | ■ |
| SH 161 | ■ | ■ | ■ | | ■ |
| Belt Line | ■ | ■ | ■ | | ■ |
| DFW North | ■ | ■ | ■ | ■ | ■ |

SOURCE: BRW, Inc.; June 2000.

Notes:
[1] Shared platform with the planned Trinity Railway Express commuter rail station. An additional arena or West End station will be examined as part of the Griffin alignment analysis in the PE/EIS phase.
[2] The Love Field tunnel option will be further examined in PE/EIS, which could result in differing station areas in the northern Medical Center and Love Field area.
[3] Existing bus transit center/park-and-ride to incorporate rail station. The North Carrollton T.C. may be relocated or additional property acquired for platform area adjacent to UP RR right-of-way.
[4] Opportunity for future rail transfer with potential rail lines along the Cotton Belt RR and/or the BN RR.
[5] This station would serve Texas Stadium unless a Texas Stadium station is incorporated into the alignment at a later date.
[6] Rail transfer with the Las Colinas APT system.

### Irving/ DFW Branch

After leaving the main LRT line at Northwest Highway, the Irving/DFW branch of the LRT line continues on elevated structure to cross over IH 35E and the Elm Fork. Near the Central Freight property and Texas Stadium parking lots, the alignment returns to at-grade and then goes on an aerial structure to cross over Loop 12, SH 114 and Tom Braniff Drive, landing on the south side of SH 114. At this point, the alignment returns to at-grade and provides a station at the University of Dallas. This station would also serve Texas Stadium unless a station at Texas Stadium is planned as part of the Irving Land Use Study. The alignment continues at-grade along the south side of SH 114, then crosses over both the BNRR and SH 114 to enter the Las

Colinas area. An at-grade station is provided in South Las Colinas, and provides a linkage to the Las Colinas Area Personal Transit (APT). The alignment continues north at-grade through the Las Colinas Urban Center on the west side of Rochelle Boulevard. The existing North Irving Transit Center would be relocated to the south side of Northwest Highway as a new North Urban Center station closer to the core development area. The alignment would then become aerial to cross over Northwest Highway and floodways around Lake Carolyn. South of Colwell Boulevard the alignment becomes at-grade and parallels Las Colinas Boulevard for a short distance until it turns northward to provide a station just south of Royal Lane. The alignment then turns westerly and is adjacent to Royal Lane, crossing over MacArthur with a grade separation. The route continues northwest at-grade, providing a station north of SH 161 to capture SH 114 and SH 161 commuters. The alignment then turns west to cross over SH 114 and Belt Line Road (grade separated) in order to access Airport property west of Belt Line Road. An at-grade station is provided at Belt Line Road. The at-grade route continues northwest to the DFW North station, with a grade separation over International Parkway.

**Conditions for Approval of Rail Element**

The Manana Spur was determined to be the technically preferred alignment. However, economic development potential and public support favored the UD/Texas Stadium alignment. Given DART financing limitations, the DART Board conditionally approved the UD/Texas Stadium alignment based on the following:

- That the City enter into an interlocal agreement with DART to set forth funding obligations by the City and by DART. The City will be responsible for $60 million (1999$) towards implementation, while DART will fund the remainder.

- That the City sponsor and conduct a Transit-Oriented Development (TOD) land use study for the Irving/Las Colinas LRT corridor to maximize transit supportive land use opportunities, thus enhancing ridership and cost-effectiveness. The study should be completed by December 1, 2000.

- That the UD/Texas Stadium alignment will continue into Preliminary Engineering after December 1, 2000 only if all of the outside funding commitments have been executed. If not, the Manana Spur will be reconsidered as the preferred alignment.

## 7.3 NEXT STEPS

### 7.3.1 Preliminary Engineering/ Environmental Impact Statement (PE/ EIS)

Following the MIS, the next step in the process is preliminary engineering and environmental documentation. Because DART will seek Federal funds for this corridor, an Environmental Impact Statement (EIS) will be developed. The PE/EIS phase will develop a 10% level of engineering detail, and fully the document the environmental baseline conditions. From the baseline condition, potential impacts will be identified, and mitigation measures for issues such as noise, visual quality, wetlands, etc. will be recommended. Public and agency involvement

will continue into the next phase to ensure that the preliminary engineering is consistent with local guidelines, and that impacts are identified and appropriate mitigation measures are developed.

The project would then be advanced to final design, which will develop detailed engineering plans and finalize mitigation treatments. Depending on financial constraints, DART anticipates the UP rail line to Frankford to be in operation by the year 2007. Preliminary engineering and environmental documentation for the Irving LRT line will be initiated upon completion of funding agreements and the transit oriented land use study. Revenue operations will be dependent on funding availability.

### 7.3.2 Modeling and Ridership Issues

During the MIS, several modeling issues were discussed as related to patronage forecasting. It should be noted that NCTCOG is currently in the process of updating its travel demand forecasting model as well as converting from the mainframe operation to a microcomputer-based model using TRNSCAD, a transportation modeling and planning software platform. The calibration and validation of the Trip Generation, Trip Distribution, and Highway Assignment components of the TRNSCAD model is to be completed by January of 2001. This will allow for the application of the newly developed model in non-transit thoroughfare studies starting in 2001.

Work on the development of a new Mode Choice model is anticipated to start in 2001. By early 2002, NCTCOG expects to have the ability to apply the full model for some projects within the context of the Mobility Plan. However, the application of the new model in a full multimodal fashion is expected in early 2003, in conjunction with the next round of the Mobility Plan update. This schedule suggests that ridership forecasting during the PE/EIS phase will be performed within the framework of the existing model. The modeling issues discussed below are, therefore, those with respect to the existing travel demand model, which will be used in the PE/EIS phase.

1) **Model Validation** – One of the first modeling tasks undertaken as part of the Northwest Corridor MIS was the validation of the ridership estimation process. The validation task ensures the accuracy of the model by applying it to a base year condition and comparing its 'estimated' results to the 'observed' ridership figures. Validation of estimated rail ridership in South Oak Cliff and West Oak Cliff rail corridors for the 1998 base year was an issue of concern in this phase of the project. When compared to DART's observed ridership, model results were underestimated by 29% and 23% for these two corridors, respectively. A series of sensitivity runs and tests were undertaken by NCTCOG in an effort to identify and resolve the problem. Changes were made in the specification of the model to more closely mimic rail's advantage over other modes in the formation of the best path. Transit mode shares were not affected by these modifications, however, post- assignment ridership figures were affected by the modified paths to better reflect rail. The resulting increase in rail ridership closed the gap between the observed and estimated figures in the West and South Oak Cliff corridors. However, this increase in ridership was not limited to these two corridors only. Ridership estimates were

overestimated in other corridors as a result of this exercise. It was, therefore, concluded that larger size of zones in these two corridors could be the contributing factor to this trend.

2) **Timed Transfer Centers (Pulse Nodes)** – Accurate representation of 'Timed Transfer Centers' is a desirable feature of a robust travel demand model. These are designated transfer centers, where a large number of line-to-line transfers take place within a very short period of time. The 'pulsing' operation at transfer centers provides an intensive for transit riders by substantially reducing the onerous transfer wait time. Rail-to-rail pulsing at a number of stations was a feature of several of the rail alternatives in the recent MIS. Mode-to-mode pulsing ability is embedded in the model's transit path building module, by imposing a cap on the transfer wait time. However, in post Mode choice analyses, increases in walk and drive first boardings at pulse stations were also observed (pulsing should only affect transfer boardings). A software bug in the model's path builder program is most likely the cause of this problem. This anomaly resulted in the elimination of the pulse points at the desired rail stations in the MIS phase, pending software review.

3) **Employer Trip Reduction (ETR) Factors** – Various employer-based trip reduction initiatives in the Dallas- Forth Worth area are currently in place and will continue in the future. Such initiatives are designed to reduce single-occupancy vehicle trips (SOV) by providing incentives for carpooling and transit. The effects of these efforts on the region's travel pattern are captured in the travel demand modeling process through the application of a set of ETR factors to trip tables generated by the Mode Choice component of the model. The result is reduction of a percentage of single-occupancy vehicle trips and their subsequent reallocation to carpool and transit trips. Three sets of ETR factors were developed and applied to various alternatives in the Northwest Corridor, namely, the No-Build factors, TSM factors, and Rail alternative factors.

   Several issues arise in conjunction with this subject. The first one is with respect to the assumptions used in the reallocation of the reduced Single Occupancy Vehicle (SOV) trips. Currently, the reduced SOV trips are distributed based on the distribution of 2-person carpool, 3+person carpool, and transit as suggested by the 1990 Census data. Approximately, 15% of the reduced SOV trips are added back as transit trips. The rest are reallocated as 2-person or 3+ person carpoolers. The major concern regarding this approach is the use of 1990 data in deriving transit-related assumptions for application to a transit-rich future year network.

   The second issue is with respect to the pattern of change of the post-ETR vehicle trips under the rail scenario. Analysis of post-Mode Choice vehicle trips has shown a reduction in total vehicle trips and vehicle miles of travel (VMT) under the rail scenario as compared to the No-Build alternative. Application of two different sets of ETR factors (one for the No-Build and the other specific to the Rail alternative) yields a faster rate of reduction in No-Build's vehicle trips compared to the Rail scenario. Therefore, original travel patterns under the rail scenario (i.e. less VMT) are now reversed. The end

result is a rail scenario with more vehicle trips and VMT compared to the No-Build alternative.

Thirdly, in the application software implementing the ETR factors, approximately 12% of auto-accessed transit trips in the DART service area are not allocated to any of the trip tables, and are, therefore, omitted in the transit assignment step. The application software for this procedure is currently under review and revision to address some possible shortcomings.

4) **Special Generators** – Two classes of trips are attracted to a given Special Generator with which we should be concerned for corridor planning purposes. The first category consists of average daily trips made by employees and visitors on a typical weekday. Traditional travel demand forecasting models are generally capable of predicting the magnitude of these trips by means of special handling of Special Generators in the Trip Generation model.

The second category consists of attractions to special events occasionally held at the site of a Special Generator. Similar to many other traditional four-step travel models, the NCTCOG model does not address trips associated with such events. Estimation of this class of attractions requires the implementation of a post processing technique either within the context of the travel demand forecasting model itself, or outside of the model. For the Northwest Corridor MIS, DART followed FTA guidance in determining trips associated with special events. The proposed rail lines in the DART service area serve a number of Special Generators, e.g., Fair Park, Love Field and DFW Airports. Ridership estimation methods used in projecting transit demand at these facilities are unique to each site and are determined by the nature of the events, and most importantly the type and quality of available data and relevant statistics.

One last issue regarding the modeling of Light Rail trips is the special treatment of the Rail mode in the Mode Choice model. There has been a realization in various cities across the country that people react to rail differently compared to buses. They tend to exhibit higher tolerance for wait time and in-vehicle time for rail as opposed to the bus. They are also willing to walk longer to access rail stations. More and more, travel demand forecasting models are shying away from Mode Choice models with transit as a generic mode distinguished only by mode of access, and toward a structure with rail and bus identified as distinct alternatives where riders' travel behavior regarding these two modes can be modeled more distinctly. However, it is understood that incorporating such a change in the existing Mode Choice model is a major and perhaps redundant effort since the issue will be addressed in the upcoming Mode Choice model update efforts and conversion to a new TRNSCAD model.

A relatively easy and quick update of the overall performance of the existing Mode Choice model may be undertaken by adjusting the model's mode specific constants using the results of the most recent DART Transit On-Board survey. The existing mode specific constants for the choice riders and the transit captives were calibrated based on the results of the 1984 on-board transit survey when DART did not have a rail component.

### 7.3.3 Funding Issues

As discussed in Section 5.2.3, the DART *FY 2000 Financial Plan* assumed that the Northwest Corridor would be Commuter Rail – consistent with previous plans. Based on the results of the MIS, the DART Board approved a double-track LRT alignment in the corridor. The Southeast Corridor MIS, also recently completed, was assumed to be intermediate-capacity LRT. The DART Board recently approved the Southeast Corridor as double-track LRT.

The Financial Plan states DART has sufficient financing capacity in FY 2004 through FY 2008 to build the Northwest and Southeast Corridors as originally assumed. However, because the DART Board approved the double track light rail option in both corridors, there is insufficient capacity (assuming short-term debt) to build these lines within the established timeframes of 2006-7. The DART Board recently discussed budget and financing issues in detail to support amendments to the FY 2000 Budget and Financial Plan. In order to avoid delays to the planned revenue service dates to Northwest Corridor communities for LRT Alternatives, DART held a referendum on August 12, 2000 to approve long-term financing options. The referendum passed by a significant margin and will enable the Northwest Corridor rail improvements to be built on schedule.

### 7.3.4 Northwest Corridor/ Las Colinas Transit Oriented Land Use Study

Based on the conditions set forth in the LPIS decision, the City of Irving initiated the Northwest Corridor/Las Colinas Transit Oriented Land Use Study in April, 2000. The land use study will focus on developing a master land use plan for the LRT corridor, focusing on the areas around the four potential station locations:

- **Area 1 – Texas Stadium/ Central Freight** – The approved rail element does not reflect a station in this area. However, this station area has the ability to enhance ridership through special events and promote a more transit-friendly environment. Currently, this area is dominated by parking lots for Texas Stadium and the Central Freight trucking and distribution center. The focus of this planning area will be to identify a station area and land uses that can benefit from proximity to a major sports venue, access from a future rail line, and access from four major roadways (SH 183, SH 114, Loop12, and Spur 482).

- **Area 2 – University of Dallas/ Cistercian Academy** – The University of Dallas was an active participant in the Northwest Corridor MIS. An LRT station adjacent their campus can promote their name, improve access for students, and encourage development on vacant land to the east and north. The amount of vacant land in this area presents a prime opportunity to develop a more transit-oriented land use plan.

- **Area 3 – South Las Colinas Urban Center** – This area represents the portion of the Urban Center south of O'Connor Boulevard. The proposed South Las Colinas LRT station would serve this area and provide a link to the APT system. The land use plan will consider the effects of the future LRT line potentially replacing the planned APT expansion on the east side of Las Colinas, as well as on optimizing the integration of

LRT into future development and roadway networks to maximize the economic potential of future land uses.

- **Area 4 – North Las Colinas Urban Center –** From South Las Colinas, the LRT alignment is planned to continue to a new North Urban Center station. This station would replace the North Irving Transit Center, and represents a significant opportunity to integrate a transit-oriented development into the station area design, creating a "gateway" into the Las Colinas Urban Center. Linkages to the future APT expansion to the north can carry the transit-oriented concept to areas north of Northwest Highway.

NORTHWEST CORRIDOR
MAJOR INVESTMENT STUDY

# Appendix A

# Summary of Public Involvement and Work Group Participants

NORTHWEST CORRIDOR
MAJOR INVESTMENT STUDY

# SUMMARY OF PUBLIC AND AGENCY PARTICIPATION

| MEETING | DATE | LOCATION |
|---|---|---|
| **Public Meetings** | | |
| May 1998 Joint Public Meetings (with SH 183 and Loop 12/IH 35E MIS Teams) | May 18, 1998<br>May 21, 1998<br>May 26, 1998 | Gilbert Elementary School, Irving<br>Wilson World Hotel, Irving<br>Farmers Branch City Hall |
| August 1998 Public Meetings | August 20, 1998<br>August 25, 1998<br>August 26, 1998<br>August 27, 1998 | University of Dallas, Irving<br>Farmers Branch Manske Library<br>DeWitt Perry Middle School, Carrollton<br>Bachman Recreation Center, Dallas |
| May 1999 Public Meetings | May 18, 1999<br>May 19, 1999<br>May 20, 1999 | DeWitt Perry Middle School, Carrollton<br>Irving Public Library<br>Northway Baptist Church, Dallas |
| Fall 1999 Public Meetings | November 30, 1999<br>December 2, 1999<br>December 6, 1999 | Bachman Recreation Center, Dallas<br>Irving Public Library<br>Dan Long Middle School, Carrollton |
| **Community Work Group (CWG) Meetings** | | |
| CWG Member Recruitment<br>Neighborhood Representative Meetings | April 27, 1998<br>April 28, 1998<br>April 30, 1998<br>May 6, 1998 | Frankford Village Branch Library, Carrollton<br>Grauwyler Recreation Center, Dallas<br>MacArthur High School, Irving<br>Farmers Branch Manske Library |
| CWG Meeting #1 | June 23, 1998 | Herbert Marcus Elementary, Dallas |
| CWG Meeting #2 | July 29, 1998 | MacArthur High School, Irving |
| CWG Meeting #3 | September 2, 1998 | Knights of Columbus, Farmers Branch |
| CWG Meeting #4 | November 17, 1998 | RL Turner High School |
| CWG Meeting #5 | May 11, 1999 | Northway Baptist Church |
| CWG Meeting #6 | June 8, 1999 | Farmers Branch Manske Library |
| CWG Meeting #7 | July 13, 1999 | Irving Public Library |
| CWG Meeting #8 | August 10, 1999 | Crosby Recreation Center, Carrollton |
| CWG Meeting #9 | November 9, 1999 | Bachman Recreation Center, Dallas |
| **Staff Work Group (SWG) Meetings** | | |
| SWG Meeting #1 | May 13, 1998 | DART |
| SWG Meeting #2 | June 10, 1998 | DART |
| SWG Meeting #3 | June 29, 1998 | Farmers Branch City Hall |
| SWG Meeting #4 | August 5, 1998 | DART |
| SWG Meeting #5 | September 9, 1998 | DART |
| SWG Meeting #6 | October 7, 1998 | DART |
| SWG Meeting #7 | October 28, 1998 | DART |
| SWG Meeting #8 | December 9, 1998 | DART |
| SWG Meeting #9 | December 16, 1998 | DART |
| SWG Meeting #10 | March 10, 1999 | DART |
| SWG Meeting #11 | March 16, 1999 | Dallas County Building, Stemmons Fwy. |
| SWG Meeting #12 | March 29, 1999 | Irving City Hall |
| SWG Meeting #13 | May 12, 1999 | DART |
| SWG Meeting #14 | June 9, 1999 | DART |
| SWG Meeting #15 | July 14, 1999 | DART |

| MEETING | DATE | LOCATION |
|---|---|---|
| SWG Meeting #16 | August 11, 1999 | DART |
| SWG Meeting #17 | October 13, 1999 | DART |
| SWG Meeting #18 | November 3, 1999 | DART |
| SWG Meeting #19 | November 22, 1999 | DART |
| SWG Meeting #20 | December 2, 1999 | DART |
| | | |
| **Executive Work Group (EWG) Meetings** | | |
| EWG Meeting #1 | April 27, 1998 | DART Room 1C |
| EWG Meeting #2 | June 29, 1998 | Farmers Branch City Hall |
| EWG Special Work Session | August 19, 1998 | Dallas City Hall |
| EWG Meeting #3 | September 21, 1998 | Carrollton City Hall |
| EWG Meeting #4 | November 17, 1998 | Irving City Hall |
| EWG Meeting #5 | June 17, 1999 | Dallas City Hall |
| EWG Meeting #6 | July 15, 1999 | Farmers Branch City Hall |
| EWG Meeting #7 | August 26, 1999 | Carrollton City Hall |
| EWG Meeting #8 | October 28, 1999 | Coppell City Hall |
| EWG Meeting #9 | December 6, 1999 | |
| | | |
| **DART Board** | | |
| DART Planning Committee | March 31, 1998 | DART |
| DART Planning Committee | May 26, 1998 | DART |
| DART Planning Committee | July 21, 1998 | DART |
| DART Board | October 13, 1998 | DART |
| DART Planning Committee | November 24, 1998 | DART |
| DART Planning Committee | February 23, 1999 | DART |
| DART Planning Committee | April 27, 1999 | DART |
| DART Planning Committee | July 20, 1999 | DART |
| DART Planning Committee | August 24, 1999 | DART |
| DART Planning Committee | October 5, 1999 | DART |
| DART Planning Committee | October 26, 1999 | DART |
| DART Planning Committee | November 9, 1999 | DART |
| DART Planning Committee | November 23, 1999 | DART |
| DART Planning Committee – City Presentations | December 7, 1999 | DART |
| DART Board | February 22, 2000 | DART – Approval of LPIS |
| | | |
| **Miscellaneous Meetings / Briefings** | | |
| Stemmons Corridor Business Association | April 29, 1998 | Dallas |
| President's Luncheon Briefing to DART Management and Board Members | May 5, 1998 | DART |
| Arena Project Briefing | May 21, 1998 | DART |
| Dallas Planning and Zoning Commission Briefing | June 11, 1998 | Dallas City Hall |
| Carrollton City Council Briefing | June 16, 1998 | Carrollton City Hall |
| DART Citizens Advisory Committee (CAC) | June 18, 1998 | DART |
| Medical Center Meeting | June 24, 1998 | UT Southwestern Medical Center |
| North Crosstown Corridor Task Force Briefing | June 25, 1998 | Carrollton City Hall |

| MEETING | DATE | LOCATION |
|---|---|---|
| City of Dallas Comm./Transportation Comm. | August 11, 1998 | City of Dallas |
| Irving Citizens Advisory Commission (ICAC) | October 12, 1998 | Irving |
| Irving City Management/Las Colinas Meeting | October 19, 1998 | Irving |
| Carrollton City Management Meeting | October 22, 1998 | Carrollton |
| ICAC Bus Tour (by Dean International) | December 8, 1998 | Northwest Corridor |
| Bus/Rail Tour of UP and BN for Work Groups | December 10, 1998 | Northwest Corridor |
| Dallas Delegation Briefing | January 6, 1999 | Dallas |
| Irving Tax Increment Financing Board Meeting | February 12, 1999 | Irving |
| Irving Tax Increment Financing Board Meeting | February 16, 1999 | Irving |
| Irving Tax Increment Financing Board Meeting | February 24, 1999 | Irving |
| Irving Chamber of Commerce Briefing | March 8, 1999 | Irving |
| Love Field Coordination Meeting | March 15, 1999 | Dallas |
| Irving Subarea Stakeholders Meeting | March 29, 1999 | Irving |
| Irving CAC to the NW MIS Meeting | March 30, 1999 | Irving |
| DFW Airport Coordination Meeting | March 31, 1999 | DFW Airport |
| Farmers Branch City Council Work Session | April 5, 1999 | Farmers Branch |
| President's Luncheon Briefing to DART Management and Board Members | April 6, 1999 | DART |
| DFW Airport Coordination Meeting | April 6, 1999 | DFW Airport |
| Arena/West End Subarea Group Meeting | April 13, 1999 | DART |
| Medical Center Subarea Group Meeting | May 14, 1999 | Medical Center |
| Cistercian Academy Meeting | May 17, 1999 | Irving, Cistercian Academy |
| Irving City Council Work Session | May 19, 1999 | Irving |
| City Manager's Meeting (all 4 cities) | May 20, 1999 | |
| Irving Property Owners Impacts Meeting | June 9, 1999 | |
| Las Colinas Subarea Group Meeting | June 11, 1999 | Irving |
| Medical Center Subarea Group Meeting | June 15, 1999 | Medical Center |
| Texas Stadium/TxDOT Meeting | June 25, 1999 | |
| TSM/TDM Alternative Development | July 6, 1999 | City of Farmers Branch |
| TSM/TDM Alternative Development | July 7, 1999 | City of Addison |
| TSM/TDM Alternative Development | July 8, 1999 | City of Dallas |
| TSM/TDM Alternative Development | July 9, 1999 | City of Carrollton |
| Irving City Council Work Session | July 13, 1999 | Irving |
| Texas Stadium/TxDOT Meeting | July 19, 1999 | |
| Station Planning Meeting – Dallas | August 3, 1999 | City of Dallas Planning Department |
| Station Planning Meeting – Farmers Branch | August 5, 1999 | City of Farmers Branch |
| Station Planning Meeting – Irving | August 6, 1999 | City of Irving |
| Station Planning Meeting – Carrollton | August 6, 1999 | City of Carrollton |
| Irving CAC to the NW MIS Meeting | August 10, 1999 | Irving |
| Arena/West End Subarea Group Meeting | August 16, 1999 | DART |
| Irving Video Presentation to DART Board | August 24, 1999 | DART Board Room |
| Arena/West End Subarea Group Meeting | August 25, 1999 | DART |
| Irving Transportation Day Display Table | August 27, 1999 | Irving Mall |

| MEETING | DATE | LOCATION |
|---|---|---|
| Arena/West End Subarea Group Meeting | September 1, 1999 | DART |
| Hackberry Creek HOA Briefing | September 16, 1999 | Irving |
| Farmers Branch City Council Work Session | September 20, 1999 | Farmers Branch |
| DART Railvolution Mobile Workshop | September 27, 1999 | Northwest Corridor |
| City of Irving Staff Meeting – Las Colinas route | October 15, 1999 | DART |
| City of Irving Staff Meeting – Las Colinas route | October 19, 1999 | |
| City of Irving Staff Meeting – Las Colinas route | October 27, 1999 | |
| Irving City Council Work Session | November 2, 1999 | Irving |
| North Dallas Chamber of Commerce | November 9, 1999 | North Dallas |
| Irving Citizens Advisory Commission | November 16, 1999 | Irving |
| Dallas Urban Design Committee | November 16, 1999 | Dallas City Hall |
| | | |
| | | |
| **Agency Coordination Meetings** | | |
| Joint Interagency Coordination Meeting | March 6, 1998 | Irving Public Library |
| MIS Coordination Meeting | April 30, 1998 | TxDOT Dallas District |
| MIS Coordination Meeting | May 8, 1998 | Consultant Offices, Dallas |
| FTA Briefing on DART MIS projects | May 20, 1998 | DART |
| TxDOT, TTI Coordination Meeting | May 28, 1998 | DART |
| North Texas Commission Briefing on DFW International Airport | May 29, 1998 | NCTCOG |
| MIS Coordination Meeting | June 2, 1998 | TxDOT, Dallas District |
| TxDOT Coordination Meeting | June 25, 1998 | TxDOT |
| Dallas Aviation – Love Field Meeting | July 2, 1998 | Love Field |
| TxDOT Coordination Meeting | August 24, 1998 | TxDOT |
| MIS Coordination Meeting | February 4, 1999 | TxDOT |
| SH 114/121 MIS Coordination Meeting | February 8, 1999 | TxDOT |
| MIS Coordination Meeting | March 4, 1999 | TxDOT |
| MIS Coordination Meeting | April 1, 1999 | TxDOT |
| MIS Coordination Meeting | May 6, 1999 | TxDOT |
| SH 183 Public Meeting | May 19, 1999 | TxDOT |
| MIS Coordination Meeting | June 3, 1999 | TxDOT |
| SH 114/121 MIS Coordination Meeting | June 7, 1999 | TxDOT |
| MIS Coordination Meeting | July 1, 1999 | TxDOT |
| SH 114/121 MIS Coordination Meeting | July 23, 1999 | TxDOT |
| MIS Coordination Meeting | August 5, 1999 | TxDOT |
| MIS Coordination Meeting | August 26, 1999 | TxDOT |
| | | |
| | | |
| | | |

SOURCE: DART; BRW, Inc.; July 2000.

NORTHWEST CORRIDOR
MAJOR INVESTMENT STUDY

# EXECUTIVE WORK GROUP

Mr. David Blair
North Texas Tollway Authority Board

Councilwoman Fran Brown
City of Carrollton

Mr. Bill Criswell
DART Board

Councilwoman Veletta Forsythe-Lill
Dallas City Council
District 14

Councilman Berry Grubbs
City of Farmers Branch

Councilwoman Linda Harper-Brown
City of Irving

Commissioner Jim Jackson
Dallas County Commissioners Court

Honorable Candy Shehan
Mayor of Coppell

Mr. Charles Tucker, PE
Texas Department of Transportation

NORTHWEST CORRIDOR
MAJOR INVESTMENT STUDY

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NORTHWEST CORRIDOR
MAJOR INVESTMENT STUDY

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NORTHWEST CORRIDOR
MAJOR INVESTMENT STUDY

# COMMUNITY WORK GROUP

## COMMUNITY REPRESENTATIVES

### Northwest Dallas

Vic Muse
Northwest Development League and
District 6 Advisory Committee

Barbara Brummit
Northwest Development League and
District 6 Advisory Committee

Bob Strasavich
Glen Cove Homeowners Association

Julia Soto Cabrera

Randy Staff
Bachman Coalition for Growth

Tim Dickey
Bachman/Northwest Highway

William Lux

Tommy Hines

Mary Curran

W.E. Dance

Councilwoman Barbara Mallory Caraway

Cay Kolb

Jack Irwin

Dedo Kidd

### Irving

Jennings Smith
Cotton Valley HOA

George Edwin
Hospital District Neighborhood

Patrick Dougherty

Kim Limberg

### Farmers Branch

Al Solis

Jim Andrews

Chuck Cargill

### Carrollton

Jim Abadie

Tim Hayden

Jodi Jenkins
Palisades Homeowners Association

Charlie Gongre

## BUSINESS INTERESTS

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Stemmons Corridor Business Association
Dallas Market Center

Gregg Hamill
SCBA Chairperson
Industrial Properties Corporation

Don Jensen
Greater Irving-Las Colinas Chamber of
Commerce

Les Tanaka
Greater Dallas Asian American Chamber of
Commerce

Kurt Horn
Addison Airport/Metrocrest Chamber

John Land
Farmers Branch Chamber of Commerce

Al Whitehouse
President
Irving Hotel Association

Larry Font
Central Dallas Association

George Marks
North Dallas Chamber of Commerce

John H. Martinez - D
Hispanic Chamber of Commerce

John Martinez
The Cleaning Store

Reginald Gates
Dallas Black Chamber of Commerce

Richard Douglas
Dallas Chamber of Commerce

Rex Hecht
Greater Dallas Planning Council

Gerald Jones
Irving Downtown Association

Debbie Neel
Southwest Airlines

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Vice President of Facilities
Children's Medical Center

Mr. Robert Youde
Director of Planning
UT Southwestern Medical Center

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Patrick Daly
Director of Business Services
University of Dallas

Carla Smith
League of Women Voters

Bill Wood
DART Citizen Advisory Committee (CAC)

Michael Brounoff
Chairman, Irving Citizens Advisory Committee

Glenna Taite
Dallas Independent School District
Evaluation and Planning Division

Mr. Mark Hyatt
Asst Supt. Of Support Services
Carrollton/Farmers Branch ISD

**ENVIRONMENTAL**

Betty Svoboda
Dallas Parks & Recreation Board

Earl Hammond
Texas Trails Network

Rita Beving
Sierra Club Dallas

Joanne Hill
Friends of the Trinity River

NORTHWEST CORRIDOR
MAJOR INVESTMENT STUDY

# Appendix B

# TSM/ TDM Alternative

- TSM/TDM Projects (Mobility 2025)
- Freeway Bottleneck Removal Projects

# CONGESTION MANAGEMENT SYSTEM (CMS)
# INVENTORY OF TDM and TSM RECOMMENDATIONS from MAJOR INVESTMENT STUDIES (MIS)

## NORTHWEST CORRIDOR MIS

(Preliminary Recommendations—Study in Progress)

| CMS Strategy Recommendations | Additional Comments |
|---|---|
| **Transportation Management Associations** | |
| 1. Beltline Road TMA<br>2. LBJ/Valwood Parkway TMA<br>3. LBJ/Stemmons TMA<br>4. Stemmons/Walnut Hill TMA<br>5. SH 114/161 TMA<br>6. SH 114/North Irving Transit Center TMA<br>7. SH 183 TMA | • Programs offered to smaller eligible work locations would be administered through the TMA<br>• For larger employers, an additional site specific organization would be stressed<br>• Potential programs offered for all TMA participants include subsidized transit passes, information on other modes (e.g. transit, bicycles), and support for employer/employee sponsored van/carpooling<br>• For larger employers, potential programs include coordinated parking services for van/carpools, and coordinated transit scheduling with worker scheduling |
| **Pedestrian/Bicycle Improvements** | |
| Elm Fork Dallas Veloweb | |
| Lewisville-Denton Veloweb | |
| Carrollton<br>1. Furneaux Creek/Greenbelt Park Bike Path<br>2. Hutton Branch/Cottonbelt Bike Path<br>3. Josey/Dennis Shared Bike Lane (on-street) | Carrollton<br>1. From Hebron Pkwy to Elm Fork Veloweb<br>2. From Trinity Mills to Elm Fork Veloweb<br>3. From Frankford to Valwood |
| Dallas<br>1. Loop 12/Northwest Highway Bike/Ped Bridge<br>2. Denton Drive Shared Bike Lane (on-street)<br>3. Luna Road Shared Bike Lane (on-street)<br>4. California Crossing/Manana/Lombardy Shared Bike Lane (on-street)<br>5. Rebuild Proctor Street Bridge<br>6. Regal Row/Burbank Shared Bike Lane (on-street)<br>7. Houston/Irving Blvd Shared Bike Lane (on-street) | Dallas<br>1. Over NW Hwy<br>2. From Rossford (FB) to Maple/Fairmont<br>3. From Hutton Branch (FB) to California Crossing<br>4. From Luna to Brockbank<br>5. Over Elm Fork from Proctor to Regal Row<br>6. From Denton to Proctor Bridge<br>7. From Houston St. Ext to Irving Blvd |
| Farmers Branch<br>1. Rawhide Creek Bike/Ped Off-Street Path<br>2. Farmers Branch Creek Bike/Ped Off-Street Path<br>3. Valley View Shared Bike Lane (on-street)<br>4. Josey Lane Shared Bike Lane (on-street) | Farmers Branch<br>1. From Brookhaven Club to Denton Dr<br>2. From Marsh Lane to Denton Dr<br>3. From Denton/Valley View to Elm Fork Veloweb<br>4. From Valwood to LBJ |
| Irving<br>1. Royal Lane Shared Bike Lane (on-street)<br>2. MacArthur/Las Colinas Blvd Shared Bike Lane (on-street) | Irving<br>1. From Belt Line Road to O'Connor<br>2. From Valley Ranch Pkwy to Campion Trail |
| **Signal Improvements** | |
| Addison<br>1. Addison Road @ Excel<br>2. Addison Road @ Keller Springs<br>3. Keller Springs @ Quorum<br>4. Belt Line Rd from Tollway to Marsh<br>5. Midway from Spring Valley to Sojourn<br>6. Arapaho @ Surveyor<br>7. Spectrum @ Arapaho<br>8. Spectrum @ Airport Pkwy | Addison<br>1. New signal<br>2. Upgrade signal<br>3. Upgrade signal<br>4. Signal timing and Hardware Upgrade<br>5. Signal timing and Hardware Upgrade<br>6. New signal<br>7. New signal<br>8. New signal |

EXHIBIT X-4 (CONT.)

# CONGESTION MANAGEMENT SYSTEM (CMS)

# INVENTORY OF TDM and TSM RECOMMENDATIONS from MAJOR INVESTMENT STUDIES (MIS)

| | |
|---|---|
| Carrollton<br>1. Old Denton @ Broadway<br>2. Old Denton @ Clinton<br>3. Josey @ Southern Oaks<br>4. Marsh Lane @ Running Duke<br>5. Marsh Lane @ Glen Morris<br>6. Marsh Lane @ Marsh Ridge<br>7. Hebron @ Eisenhower<br>8. Hebron @ Standridge<br>9. Hebron @ Cemetery Hill<br>10. Hebron @ Furneaux<br>11. Hebron @ International Pkwy<br>12. Beltline from Marsh Lane to Hebron<br>13. Old Denton from Broadway to Hebron<br>14. Josey from Valwood to Hebron<br>15. Marsh from Trinity Mills to Beltline | Carrollton<br>1. New Signal<br>2. New Signal<br>3. New Signal<br>4. New Signal<br>5. New Signal<br>6. New Signal<br>7. New Signal<br>8. New Signal<br>9. New Signal<br>10. New Signal<br>11. New Signal<br>12. Signal upgrade/timing improvements - 19 signals<br>13. Signal upgrade/timing improvements - 12 signals<br>14. Signal upgrade/timing improvements - 21 signals<br>15. Signal upgrade/timing improvements - 14 signals |
| Dallas<br>Forest @ Harry Hines<br>Harry Hines @ LBJ; @ Lombardy; @ Manana; @ Northwest; @ Royal; @ Southwell; @ Walnut Hill; @ Willowbrook<br>LBJ @ Midway; @ Webb Chapel<br>Luna @ Royal<br>Midway @ Northwest<br>Northwest @ Sams Club; @ Shady Trail; @ Shady Brook; @ Stemmons NBSR; @ Stemmons SBSR; @ Stemmons NB Off Ramp; @ Technology; @ Thackery; @ Walton Walker; @ Webb Chapel Rd.; @ Webb Chapel Ext<br>Royal @ Stemmons<br>Stemmons @ Walnut Hill<br>Ables @ Walnut Hill<br>Denton @ Forest; @ Lombardy; @ Merrell; @ Royal; @ Walnut Hill<br>Forest @ Greenville; @ Hillcrest; @ Inwood; @ Josey; @ Lake Forest; @ Marsh; @ MeadowKnoll; @ Midway; @ Webb Chapel<br>Lombardy @ Webb Chapel<br>Marsh @ Merrell; @ Northhaven; @ Royal; @ Walnut Hill<br>Midway @ Northhaven; @ Royal; @ Walnut Hill<br>Northhaven @ Webb Chapel<br>Royal @ Webb Chapel<br>Shady Trail @ Walnut Hill | Dallas<br>Timing (NE / NW Dallas) |
| Dallas<br>Denton @ Mockingbird<br>Empire Central @ Stemmons<br>Forest Park @ Mockingbird<br>Harry Hines @ Mockingbird; @ Raceway; @ Webb Chapel<br>Manor @ Mockingbird<br>Maple @ Mockingbird<br>Market Center @ Stemmons<br>Mockingbird @ Oakbrook; @ Stemmons<br>Motor @ Stemmons<br>Oak Lawn @ Stemmons<br>Regal Row @ Stemmons<br>Stemmons @ Wycliff | Dallas<br>Timing (Ctr City) |

# CONGESTION MANAGEMENT SYSTEM (CMS)
# INVENTORY OF TDM and TSM RECOMMENDATIONS
# from MAJOR INVESTMENT STUDIES (MIS)

| | |
|---|---|
| Denton @ Inwood; @ Seelco; @ Shorecrest; @ Webb Chapel<br>Denton Cut Off @ Maple<br>Empire Central @ Harry Hines<br>Exchange Park @ Harry Hines<br>Harry Hines @ Lofland; @ Market Center; @ Motor; @ Oak Lawn; @ Parkland Hospital; @ Record Crossing; @ Regal; @ Research; @ Shorecrest; @ Wycliff<br>Maple @ Oak Lawn; @ Turtle Creek; @ Welborn; @ Wycliff<br>Market Center @ Market Hall | |
| Dallas<br>Frankford @ Kelly; @ Marsh<br>Kelly @ Timberglen<br>Marsh @ Timberglen<br>Midway @ Rosemeade | Dallas<br>Timing (Far N. Dallas) |
| Dallas<br>Stemmons @ Walnut Hill<br>Denton @ Inwood | Dallas<br>Signal Hardware |
| Farmers Branch<br>1. Josey Lane @ Fyke<br>2. Josey Lane @ Rollingdale<br>3. Midway Road from Spring Valley to LBJ<br>4. Westside Parkway @ Luna<br>5. Westside Parkway @ Harry Hines<br>6. Valley View from IH 35E to Superconnector | Farmers Branch<br>1. Signal upgrade and interconnect<br>2. Signal upgrade and interconnect<br>3. Signal upgrades<br>4. New signal<br>5. New signal<br>6. Signal upgrades |
| Irving<br>1. Beltline from LBJ to Valley View<br>2. MacArthur Blvd. from LBJ to Hidden Ridge<br>3. O' Connor Blvd. from Royal to Leland | Irving<br>1. Signal upgrade/timing improvements - 6 signals<br>2. Signal upgrade/timing improvements - 13 signals<br>3. Signal upgrade/timing improvements - 7 signals |
| **Intersection Improvements** | |
| Addison<br>1. Addison Road @ Excel<br>2. Addison Road @ Keller Springs<br>3. Keller Springs @ Quorum<br>4. NB Surveyor @ Beltline | Addison<br>1. Intersection imp (turn lanes)<br>2. Intersection imp (turn lanes)<br>3. Intersection imp (turn lanes)<br>4. Intersection imp (add rt. turn lane) |
| Carrollton<br>1. Old Denton @ PGBT<br>2. McCoy @ PGBT<br>3. Josey @ PGBT<br>4. Scott Mill @ PGBT<br>5. Kelly Blvd @ PGBT<br>6. Old Denton @ Hebron Pkwy<br>7. Frankford @ Josey<br>8. Belt Line @ Webb Chapel<br>9. Sandy Lake @ IH 35E<br>10. Belt Line @ Metrocrest<br>11. Josey @ Hebron Pkwy<br>12. Josey @ Rosemeade<br>13. Old Denton @ Frankford<br>14. Rosemeade @ Marsh | Carrollton<br>1. Add turn lanes<br>2. Add turn lanes<br>3. Add turn lanes<br>4. Add turn lanes<br>5. Add turn lanes<br>6. Grade separation<br>7. Add turn lanes<br>8. Add turn lanes<br>9. Add thru lanes<br>10. Add turn lanes<br>11. Add turn lanes<br>12. Add turn lanes<br>13. Add turn lanes<br>14. Add turn lanes |
| Dallas<br>1. Ables @ Walnut Hill<br>2. Butler @ Harry Hines | Dallas<br>1. NB / SB left turn pockets<br>2. EB / WB left turn pockets / median / modifications |

# CONGESTION MANAGEMENT SYSTEM (CMS)
# INVENTORY OF TDM and TSM RECOMMENDATIONS from MAJOR INVESTMENT STUDIES (MIS)

| | |
|---|---|
| 3. Continental @ IH 35E<br>4. Empire Central @ IH 35 E<br>5. Forest @ Marsh<br>6. Forest @ Midway<br>7. Harry Hines @ Oak Lawn<br>8. Oak Lawn @ IH 35E<br>9. Shady Trail @ Walnut Hill<br>10. IH 35E @ Walnut Hill<br>11. Harry Hines @ Oak Lawn<br>12. Harry Hines @ Motor<br>13. Harry Hines @ Market Center<br>14. Spur 482 / Storey from Loop 12/NW Hwy to IH 35E<br>15. Luna from Royal to Spur 482/NW Hwy<br>16. IH 35E from Spur 348 to N/of Storey<br>17. Manana from IH 35E to Newkirk<br>18. Manana from Harry Hines to IH 35E<br>19. Luna from Spur 348 to Wildwood<br>20. Walnut Hill from IH 35 E to Malibu<br>21. IH 35E from Walnut Hill to Manana<br>22. Midway @ Trinity Mills<br>23. Shorcrest @ Webb Chapel | 3. U-Turns for service road, SB / NB / WB treatments<br>4. Free right turn lanes on all approaches<br>5. Dual left turn and free right turn on all app.<br>6. EB / WB dual left turn lanes<br>7. Widen bridge, add signal, left turn bay for SB and WB<br>8. Intersection improvements<br>9. NB / SB left turn pockets,increase radii for SW and NE corners<br>10. EB/WB left turn pockets,NB dual L.T. Lanes, BN to SB u-turn, NB free right turn lane<br>11. Left turn pockets at cross streets<br>12. Left turn pockets at cross streets<br>13. Left turn pockets at cross streets<br>14. Widen 4 lane divided roadway to 6 lane<br>15. Remove existing 2 lane asphalt and replace with 6 ln div. concrete roadway<br>16. Construct new 2 lane southbound frontage road intersection and ramp imp's at NW Hwy<br>17. Widen existing 36 ft wide concrete pavement to 44 ft wide pavement<br>18. Widen existing 36 ft wide concrete pavement to 44 ft wide pavement<br>19. Addition of a lane<br>20. Addition of a lane<br>21. New Roadway - construct new 2 lane NB service road<br>22. SB Free right turn lane<br>23. SB / EB left turn pockets |
| Farmers Branch | Farmers Branch |
| Irving<br>1. Esters Blvd. @ Freeway Pkwy<br>2. Belt Line Rd. @ Valley View<br>3. Belt Line Rd. @ SH 114 WBSR<br>4. Macarthur Blvd. @ Walnut Hill<br>5. Macarthur Blvd. @ SH 114 EBSR<br>6. Macarthur Blvd. @ SH 114 WBSR<br>7. O'connor Blvd. @ SH 114 WBSR<br>8. Wingren Dr. @ SH 114 EBSR<br>9. Rochelle Blvd. @ SH 114 WBSR | Irving<br>Intersection improvements |
| **Arterial Improvements** | |
| Addison<br>1. Addison Road from Belt Line to Keller Springs<br>2. Arapaho from Addison to Marsh/Realty Lane-bridge over Midway (no access)<br>3. Spectrum from New Arapaho to Airport Parkway | Addison<br>1. Street widening (add center turn lane)<br>2. Arapaho Phase II/III (New 4 lane)<br>3. Roadway Extension (2 lanes each dir) |
| Carrollton<br>1. Valwood from Luna to PGBT<br>2. Sandy Lake from IH 35 E to West CL<br>3. Dickerson Pkwy from Frankford to PGBT<br>4. Midway from Hebron to International Pkwy<br>5. Josey Lane from Keller Springs to Walnut St.<br>6. Keller Springs from Marsh Lane to Midway<br>7. Belt Line Rd from Metrocrest to Webb Chapel<br>8. Capital Pkwy From Sandy Lake to Luna<br>9. Old Denton Rd from Whitlock to Trinity Mills<br>10. Kelly Blvd from Belt Line to Country Club Dr<br>11. Kelly Blvd from Rosemeade Pkwy to Michaelangelo Dr | Carrollton<br>1. Roadway extension (6 lanes)<br>2. Widen from 4 to 6 lanes<br>3. Widen from 4 to 6 lanes<br>4. Widen from 4 to 6 lanes<br>5. Recontruct from 3-11ft lanes to 3-12 ft lanes<br>6. Widen from 4 to 6 lanes<br>7. Recontruct from 3-11ft lanes to 3-12 ft lanes<br>8. New 4 lane roadway<br>9. Rebuild 6 lane road<br>10. Widen from 4 to 5 lanes<br>11. Widen from 2 to 4 lanes |

# CONGESTION MANAGEMENT SYSTEM (CMS)
# INVENTORY OF TDM and TSM RECOMMENDATIONS from MAJOR INVESTMENT STUDIES (MIS)

| | |
|---|---|
| Dallas<br>1. Community from Harry Hines to NW Hwy<br>2. Community from NW Hwy to Webb Chapel<br>3. Denton from Mockingbird Lane to Inwood<br>4. Denton Drive from Inwood to Maple<br>5. Harry Hines from Inwood to Mockingbird<br>6. Harry Hines from Oak Lawn to Market Center<br>7. Harry Hines from Webb Chapel to NW Hwy<br>8. Harry Hines from DNT to Oak Lawn<br>9. Harry Hines from Mkt Center to Inwood<br>10. Harry Hines from Mockingbird Lane to Webb Chapel<br>11. Harry Hines from Royal Lane to NW Hwy<br>12. Shorecrest from Harry Hines to Lemmon<br>13. Shorecrest from Denton to Regal Row<br>14. California Crossing from Luna to NW Hwy<br>15. California Crossing from Dallas City Limits to Luna<br>16. Lombardy from Goodnight to Harry Hines<br>17. Lombardy from NW Hwy to Goodnight<br>18. Shady Trail from Loop 12 to Harry Hines<br>19. Wildwood from Luna to S. City Limit<br>20. Wildwood from California Crossing to City Limit | Dallas<br>1. Build new 4 lane roadway to replace existing street<br>2. Build new 4 lane roadway to replace existing street<br>3. Build new 4 lane roadway to replace existing street<br>4. Build new 4 lane roadway to replace existing pavement<br>5. Widen exisitng 6 lane divided to 8 lane divided<br>6. same<br>7. same<br>8. same<br>9. same<br>10. same<br>11. same<br>12. Build new 4 lane roadway to replace existing street<br>13. Widen to 44 ft roadway, exist 40 ft.<br>14. Build new 4 lane roadway to replace existing substandard street<br>15. Build new 4 lane roadway to replace existing substandard street<br>16. Widen existing 36 ft street to 44 ft<br>17. Not designated<br>18. Striped for 2.40' pavement 21<br>19. Build 6 lane roadway to replace existing asphalt roadway<br>20. Build 6 lane roadway to replace existing asphalt roadway |
| Farmers Branch<br>1. Josey from Valwood to Fyke<br>2. Midway Road from Spring Valley to LBJ<br>3. Luna Road from Royal to LBJ<br>4. Westside Parkway from Superconnector to Harry Hines<br>5. Valley View from IH 35E to Superconnector | Farmers Branch<br>1. Street reconstruction<br>2. Street widening 6 to 8 lanes<br>3. Street widening to 6 lanes<br>4. New street – 6 lane divided<br>5. Street widening 6 to 8 lanes |
| Irving<br>1. Las Colinas Blvd. From Colorado to California Crossing<br>2. Parkridge Blvd. From Royal to Over Hackberry Creek<br>3. Lake Carolyn Pkwy. From Las Colinan Bld to O'Connor Blvd<br>4. Calif. Crossing from Las Colinas Blvd to Rochelle<br>5. Campus Cir. Dr. from Premier Blvd to Cabell Dr<br>6. Campus Cir. Dr. from Cabell Dr to SH 114EBFR<br>7. Carl Rd. from Northgate Dr. to SH 114 EBFR<br>8. Commerce Dr. from Premier Dr to Cabell Dr<br>9. Commerce Dr. from Cabell Dr. to SH 114EBFR<br>10. Las Colinas Blvd. From Buffalo to Royal<br>11. Las Colinas Blvd. From Customer Way to Spur 348<br>12. Las Colinas Blvd. From Spur 348 to O'Connor Blvd<br>13. Las Colinas Blvd. From Leone Dr. to Colorado<br>14. Las Colinas Blvd. From California Crossing to O'Connor Blvd<br>15. Las Colinas Blvd. From O'Connor Blvd to Walnut Hill Ext<br>16. Las Colinas Blvd. From Walnut Hill Ext to Las Colinas Blvd<br>17. Longhorn Dr. from Campus Cir Dr. E. to SH 114 EBFR<br>18. Love Dr. from Royal to Patton Dr | Irving<br>1. New 6 lane divided<br>2. New 4 lane divided<br>3. New 6 lane divided<br>4. New 6 lane divided<br>5. New 3 lane undivided<br>6. New 3 lane undivided<br>7. New 5 lane undivided<br>8. New 3 lane undivided<br>9. New 3 lane undivided<br>10. New 6 lane divided<br>11. New 6 lane divided<br>12. New 6 lane divided<br>13. New 6 lane divided<br>14. New 6 lane divided<br>15. New 6 lane divided<br>16. New 6 lane divided<br>17. New 3 lane undivided<br>18. New 3 lane undivided<br>19. New 4 lane undivided<br>20. New 3 lane undivided<br>21. New 3 lane undivided<br>22. New 3 lane undivided<br>23. New 6 lane divided<br>24. New 6 lane divided |

# CONGESTION MANAGEMENT SYSTEM (CMS)
# INVENTORY OF TDM and TSM RECOMMENDATIONS from MAJOR INVESTMENT STUDIES (MIS)

| | |
|---|---|
| 19. O'Connor Blvd. Ext. from Rochelle to Spur 348<br>20. Reese from Esters Blvd. To Street O<br>21. Ridgepoint Dr. from SH 114 WBFR to Royal<br>22. SH 114 WBFR from Parkridge to Belt Line<br>23. Walnut Hill Ln. Ext. from Las Colinas Blvd. To Spur 348<br>24. Walnut Hill Ln. Ext. from Spur 348 to O'Connor Blvd<br>25. Walnut Hill Ln. Ext. from O'Connor Blvd to E. City Limits<br>26. Street A from Spur 482 to Loop 12 NBFR<br>27. Street D from Las Colinas Blvd. To Walnut Hill Ext.<br>28. Street O from Cabell Dr. to SH 114 EBFR<br>29. Street Q from Walnut Hill Ext to MacArthur<br>30. Bent Branch Dr. from Royal to Regent Blvd<br>31. Bent Branch Dr. from Regent Blvd. To IH 635 EBFR<br>32. Campus Cir. Dr. E from Shorthorn Dr. to Longhorn Dr.<br>33. Campus Cir. Dr. E to Longhorn Dr. to Longhorn Dr.<br>34. Campus Cir. Dr. E from Longhorn Dr to Gateway<br>35. Colwell Blvd. From SH 114/Spur 348 to Las Colinas Blvd.<br>36. Corporate Dr. from Gateway Dr. to High Point Dr<br>37. Corporate Dr. from High Point Dr. to MacArthur<br>38. Jetstar Dr. from SH 114 WBFR to Tristar<br>39. Jetstar Dr. from Tristar to Royal<br>40. Las Colinas Blvd. From Colwell Blvd to Customer Way<br>41. Leone Dr. from Rochelle to Las Colinas Bld<br>42. Longhorn Dr. from Campus Cir Dr. E. to Campus Cir Dr. E.<br>43. Longhorn Dr. from SH 114 WBFR to Royal<br>44. Rochelle from Leone Dr. to California Crossing<br>45. Royal from N. City Limits to Freeport Parkway<br>46. Royal from Freeport Pkwy to Esters Blvd<br>47. Royal From Esters Blvd to Royal Crossing<br>48. Royal from MacArthur to O'Connor Blvd<br>49. Royal from O'Connor Blvd to E. City Limits<br>50. O'Connor Blvd. From SH 161 to Spur 348<br>51. Spur 348 from O'Connor Blvd. To E. City Limits<br>52. Tom Braniff Dr. from Northgate Dr. to SH 114 | 25. New 6 lane divided<br>26. New 4 lane undivided<br>27. New 4 lane divided<br>28. New 3 lane undivided<br>29. New 4 lane divided<br>30. Widen 2U to 3U<br>31. Widen to 3U<br>32. Widen 2U to 3U<br>33. Widen 2U to 3U<br>34. Widen 2U to 3U<br>35. Widen 4D/6D to 6D<br>36. Widen 2U to 3U<br>37. Widen 2U to 3U<br>38. Widen 2U to 3U<br>39. Widen 2U to 3U<br>40. Widen 2U to 6D<br>41. Widen 4U to 4D<br>42. Widen 2U to 3U<br>43. Widen 2U to 3U<br>44. Widen 2U to 6D<br>45. Widen 2U/6D to 6D<br>46. Widen 2U/6D to 6D<br>47. Widen 2U/6D to 6D<br>48. Widen 4D to 6D<br>49. Widen 4D to 6D<br>50. Widen to 6D<br>51. Widen 4D to 8 lane freeway<br>52. Widen 4D to 6D |
| **Advanced Transportation Management/Intelligent Transportation System** | |
| Addison<br>1. Arapaho @ Addison<br>2. Arapaho @ Edwin-Lewis<br>3. Arapaho @ Quorum<br>4. Quorum @ Keller Springs | Addison<br>ITS - Video Detection (timing override) |
| Carrollton<br>1. Frankford @ IH 35E<br>2. Trinity Mills @ IH 35E<br>3. Whitlock/Keller Springs @ IH 35E<br>4. Belt Line Road @ IH 35E<br>5. Crosby Road @ IH 35E | Carrollton<br>ITS-Cameras/System Det./DMS |
| Dallas<br>Harry Hines @ NW Hwy; @ Raceway; @ Walnut Hill<br>Regal Row @ Stemmons<br>Royal @ Stemmons<br>Stemmons @ Walnut Hill<br>Denton @ Inwood | Dallas<br>ITS - Cameras |
| Dallas<br>Commonwealth @ Stemmons | Dallas<br>ITS - System Detection |

# CONGESTION MANAGEMENT SYSTEM (CMS)
# INVENTORY OF TDM and TSM RECOMMENDATIONS from MAJOR INVESTMENT STUDIES (MIS)

| | |
|---|---|
| Continental @ Stemmons<br>Denton @ LBJ<br>Royal @ Stemmons<br>Empire Central @ Stemmons<br>Forest @ Harry Hines; @ LBJ<br>Harry Hines @ LBJ; @ Northwest; @ Raceway<br>Josey @ LBJ<br>Market Center @ Stemmons<br>Midway @ Northwest<br>Mockingbird @ Stemmons<br>Motor @ Stemmons<br>Northwest @ Technology; @ Stemmons NB Off Ramp; @ Stemmons NBSR; @ Stemmons SBSR; @ Walton Walker<br>Regal Row @ Stemmons<br>Stemmons @ Walnut Hill; @ Wycliff<br>Forest @ Josey; @ Marsh; @ Midway<br>Harry Hines @ Market Center; @ Motor<br>Marsh @ Rosemeade; @ Royal; @ Walnut Hill | |
| Dallas<br>Northwest EB (3000 Block) between Midway & Marsh<br>Northwest WB (3000 Block) between Midway & Marsh<br>Harry Hines SB between Walnut Hill & NW Hwy<br>Harry HinesNB between Walnut Hill & NW Hwy<br>Northwest WB between Luna & Walton Walker<br>Midway approaching LBJ | Dallas<br>DMS |
| Farmers Branch<br>1. Valley View @ IH 35<br>2. Midway @ LBJ | Farmers Branch<br>1. IDR (Incident Detection) - message signs regarding freeway speed<br>2. IDR (Incident Detection) |
| Irving<br>1. Belt line @ SH 114<br>2. SH 161@ SH 114<br>3. Macarthur Blvd. @ SH 114<br>4. SPUR 348 @ SH 114<br>5. O'Connor Blvd. @ SH 114<br>6. Rochelle Blvd @ SH 114 | Irving<br>ITS-Cameras/System Det./DMS |
| TxDot-Dallas District ITS Plan Proposed Tea-21 Projects<br>1. 0196-03-179 (This project listed under completed projects)<br>2. 0047-07-149 (This project listed under completed projects)<br>3. 0196-03-209 (Funded project in design)<br>4. Imlementation of Dallas Co. Speed Map<br>5. Control center<br>6. High accident location treatment<br>7. Couttesy Patrol<br>8. control center operations<br>9. 196-03-209<br>10. various projects<br>11. 0196-03-915<br>12. Various projects(High Accedent Locations)<br>13. Courtesy Patrols<br>14. Control center operations<br>15. 0353-04-902 | TxDot-Dallas District ITS Plan Proposed Tea-21 Projects<br>1. IH 35 E @ IH 635<br>2. US 75 @ Coit<br>3. IH 35 E from IH 30 to SH 183<br>4.<br>5.<br>6.<br>7.<br>8.<br>9. IH 35 E from Loop12 12 to SH 183<br>10.<br>11. IH 35 E from IH 635 to SH 121<br>12.<br>13.<br>14.<br>15. SH 114 from Tarrant CL to SH 183 |
| **Freeway Bottleneck Removal** | |
| (several sites identified– Under Separate Cover) | |

**TABLE 3.1 Bottleneck Improvement Matrix – IH 35E Northbound**

| NO. | HIGHWAY / DIRECTION | LOCATION | BOTTLENECK ANALYSIS RECOMMENDATION | OPPORTUNITIES / CONSTRAINTS |
|---|---|---|---|---|
| 1 | IH 35E-NB | Commonwealth entrance ramp | Improve entrance ramp taper /acceleration lane | Close proximity to the existing Bridge Structure at Mockingbird Lane; Existing steep side slopes. |
| 2 | IH 35E-NB | Between Mockingbird entrance and Empire Central exit | Add auxiliary lane | Reduces the existing median between the main lanes and the NB frontage road. May need to extend/relocate existing drainage structures. |
| 3 | IH 35E-NB | Between Empire Central entrance and Regal Row exit | Add auxiliary lane | Reduces the existing median between the main lanes and the NB frontage road. May need to extend/relocate existing drainage structures. |
| 4 | IH 35E-NB | Between Regal Row entrance and Raceway exit | Add auxiliary lane | Will require new bridge over the Rail Road track. Steep embankment. Retaining wall may be necessary. |
| 5 | IH 35E-NB | Between Loop 12 entrance and Manana exit | Add auxiliary lane | Will require a new bridge structure; Steep embankment |
| 6 | IH 35E-NB | Between Harry Hines entrance and Valley View entrance | Add auxiliary lane | Will require a new bridge structure; new retaining wall. |
| 7 | IH 35E-NB | Between Crosby exit and Beltline exit | Add auxiliary lane | Will require a new bridge structure. May have R.O.W. issues here. |
| 8 | IH 35E-NB | Between Northside entrance and Whitlock exit | Add auxiliary lane | Extremely close to the existing NB frontage road. |
| 9 | IH 35E-NB | Between Whitlock entrance and Trinity Mills exit | Add auxiliary lane | If a shoulder is needed with the auxiliary lane, it might impact the existing frontage road. R.O.W. issues. PGB Turnpike/IH 35E Interchange, currently under construction, may clear this bottleneck. |
| 10 | IH 35E-NB | Between Frankford entrance and Vista Ridge exit | Add auxiliary lane | Will require two new bridge structures. |
| 11 | IH 35E-NB | Between Hebron Pkwy entrance and Corporate Drive exit | Add auxiliary lane | Will require a new bridge structure. |
| 12 | IH 35E-NB | Between Corporate Drive entrance and SH 121 exit | Add auxiliary lane | Auxiliary lane with shoulder may be difficult. |
| 13 | IH 35E-NB | SH 121 exit | Construct 2-lane exit ramp | 2-lane ramp can be constructed; However, the existing buffer (striped but unused) area on the frontage road may need to be used. It may be difficult to construct an auxiliary lane as well as a two-lane exit ramp at this location. |

**TABLE 3.2 Bottleneck Improvement Matrix – IH 35E Southbound**

| NO. | HIGHWAY / DIRECTION | LOCATION | BOTTLENECK ANALYSIS RECOMMENDATION | OPPORTUNITIES / CONSTRAINTS |
|---|---|---|---|---|
| 14 | IH 35E-SB | Between SH 121 entrance and Corporate Drive exit | Add auxiliary lane | Narrow median at the SH 121 entrance. Existing trees may need to be cut down to accommodate the auxiliary lane. |
| 15 | IH 35E-SB | Between Corporate Drive entrance and Hebron Pkwy exit | Add auxiliary lane | Will require two new bridge structures. By eliminating the outside shoulder, it may be possible to accommodate an auxiliary lane on existing bridges. |
| 16 | IH 35E-SB | Hebron Pkwy exit | Construct 2-lane exit ramp | No apparent constraints. |
| 17 | IH 35E-SB | Between Vista Ridge entrance and Frankford exit | Add auxiliary lane | Will require three new bridge structures. Steep side slopes. |
| 18 | IH 35E-SB | Frankford exit | Construct 2-lane exit ramp | No apparent constraints. Will require some MBGF treatment. |
| 19 | IH 35E-SB | Between Trinity Mills entrance and Whitlock Lane exit | Add auxiliary lane | This area falls under the proposed PGB Turnpike and IH 35E interchange, which is currently under construction. This new interchange may clear this bottleneck. |
| 20 | IH 35E-SB | Between Whitlock Lane entrance and Beltline exit | Add auxiliary lane | Aux. lane with an outside shoulder will almost eliminate the existing median between the main lanes and the SB frontage road. Can be done without an outside shoulder. |
| 21 | IH 35E-SB | Between Beltline entrance and Crosby entrance | Add auxiliary lane | Will require a new bridge structure and a new retaining wall. Existing shoulder is not sufficient for converting into an auxiliary lane. |
| 22 | IH 35E-SB | Between Valley View exit and Harry Hines exit | Continue auxiliary lane | Will require a new bridge structure and a new retaining wall. Steep embankment and other misc. drainage structures. |
| 23 | IH 35E-SB | Harry Hines exit | Construct 2-lane exit ramp | The existing bridge piers of Valley View entrance ramp will cause an obstruction to adding an extra lane on this exit ramp. |
| 24 | IH 35E-SB | Valley View entrance | Improve entrance ramp taper/acceleration lane | Bridge over Harry Hines is in close proximity to this entrance ramp. |
| 25 | IH 35E-SB | Loop 12 entrance | Improve entrance ramp taper/acceleration lane | No apparent constraints. Will require some MBGF treatment. |
| 26 | IH 35E-SB | Between Raceway entrance and Regal Row exit | Add auxiliary lane | Will require a new bridge structure. Existing steep embankment and levee may be the other issues here. |
| 27 | IH 35E-SB | Between Regal Row entrance and Empire Central exit | Add auxiliary lane | Adding an auxiliary lane will require narrowing the existing grass median. Otherwise, it can be done. |
| 28 | IH 35E-SB | Between Empire Central entrance and Mockingbird exit | Add auxiliary lane | No apparent constraints. |
| 29 | IH 35E-SB | Mockingbird exit | Construct 2-lane exit ramp | Retaining Wall may be necessary. May have some R.O.W. constraints also. |
| 30 | IH 35E-SB | Frontage Road between Mockingbird exit and Mockingbird Lane signal | Add one lane | R.O.W. constraints. Addition of a new lane will definitely require some R.O.W. acquisition. |
| 31 | IH 35E-SB | Mockingbird Lane entrance | Improve entrance ramp taper/acceleration lane | This falls on an existing bridge structure. The acceleration lane can be improved by |

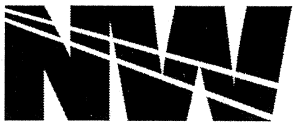
| | | | | |
|---|---|---|---|---|
| | | | | eliminating the existing outside shoulder. |

**TABLE 3.3 Bottleneck Improvement Matrix – SH 114 Eastbound**

| NO. | HIGHWAY / DIRECTION | LOCATION | BOTTLENECK ANALYSIS RECOMMENDATION | OPPORTUNITIES / CONSTRAINTS |
|---|---|---|---|---|
| 1 | SH 114-EB | Between Freeport entrance and Esters exit | Add auxiliary lane | No apparent constraints. |
| 2 | SH 114-EB | Between Esters entrance and Belt Line exit | Add auxiliary lane | Will require re-grading of the existing ditch. |
| 3 | SH 114-EB | Between Belt Line entrance and Valley View exit | Add auxiliary lane | Will require a minor bridge structure. Grading and steep slopes are other design issues here. |
| 4 | SH 114-EB | Between Valley View exit and MacArthur exit | Continue auxiliary lane | Bridge piers at Valley View Lane (SH 161) will cause an obstruction to the proposed auxiliary lane. Also, steep slopes and grading are other issues here. |
| 5 | SH 114-EB | MacArthur exit ramp | Construct 2-lane exit ramp | **May not be feasible.** The existing exit ramp is a bridge structure in its entirety. |
| 6 | SH 114-EB | Between Valley View entrance and Walnut Hill exit | Add auxiliary lane | MacArthur bridge piers will cause an obstruction. |
| 7 | SH 114-EB | Between Walnut Hill entrance and Hidden Ridge entrance | Add auxiliary lane | Steep embankment. Hidden Ridge bridge abutment will cause an obstruction. Will also require a new bridge structure at an other location. |
| 8 | SH 114-EB | Hidden Ridge entrance ramp | Improve entrance ramp taper/acceleration lane | Steep embankment; Will require grading and may require a retaining wall. |
| 9 | SH 114-EB | Between Hidden Ridge entrance and O'Connor exit | Continue auxiliary lane | Steep embankment; Will require grading and may require a retaining wall. |
| 10 | SH 114-EB | Between O'Connor entrance and Rochelle exit | Add auxiliary lane | Bridge piers at Wingren Road will cause an obstruction to the proposed auxiliary lane. Will require grading and median reduction. |

**TABLE 3.4 Bottleneck Improvement Matrix – SH 114 Westbound**

| NO. | HIGHWAY / DIRECTION | LOCATION | BOTTLENECK ANALYSIS RECOMMENDATION | OPPORTUNITIES / CONSTRAINTS |
|---|---|---|---|---|
| 11 | SH 114-WB | Between Rochelle entrance and O'Connor exit | Add auxiliary lane | No apparent constraints. |
| 12 | SH 114-WB | Between O'Connor entrance and Hidden Ridge exit | Add auxiliary lane | Will require median reduction. (between main lanes and WB frontage road) |
| 13 | SH 114-WB | Between Hidden Ridge exit and Walnut Hill exit | Continue auxiliary lane | Hidden Ridge overpass will be an obstruction; Walnut Hill exit is a bridge structure. May be difficult to add an auxiliary lane here. |
| 14 | SH 114-WB | MacArthur entrance Ramp | Improve entrance ramp taper/acceleration lane | Bridge piers at Valley View Lane (SH 161); May be difficult to improve acceleration lane here. |
| 15 | SH 114-WB | Between Valley View entrance and Belt Line exit | Add auxiliary lane | Will require a small bridge structure; grading on account of existing steep embankment. |
| 16 | SH 114-WB | Between Belt Line entrance and Esters exit | Add auxiliary lane | Will require median reduction. |
| 17 | SH 114-WB | Between Esters entrance and Freeport exit | Add auxiliary lane | No apparent constraints. |




# Appendix C

# City and Community Organization Resolutions

# Resolutions

City of Irving

City of Carrollton

City of Farmers Branch

City of Dallas

Greater Irving - Las Colinas Chamber of Commerce

DCURD Board of Directors

CITY OF IRVING

COUNCIL RESOLUTION NO. 11-18-99- 536

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WHEREAS, Dallas Area Rapid Transit (DART) is the lead agency for the Northwest Corridor Major Investment Study (MIS) which is examining transportation needs for northwest Dallas County; and

WHEREAS, the DART Board is scheduled to make a decision by January 13, 2000, on the final results of the study to include rail, high occupancy vehicle (HOV)/highway (particularly State Highway 114), travel demand management, and transportation systems management alternatives; and

WHEREAS, Las Colinas has been identified by the North Central Texas Council of Governments (NCTCOG) to be one of the fastest growing activity centers in the region; and

WHEREAS, the City of Irving has pursued with great interest the completion of this study and recognizes the immense value to the community of a properly designed and located rail transit and highway/HOV (particularly State Highway 114) system; and

WHEREAS, the City of Irving recognizes the decisions being made in the Northwest Corridor to have significant impacts on Irving for the next 50-100 years; and

WHEREAS, the Northwest Corridor MIS has identified both commuter rail and light rail as possible rail transit modes in this corridor; and

WHEREAS, further analysis has revealed that the light rail mode provides shorter headways, greater ridership, and is roughly as cost efficient as commuter rail for new alignments; and

WHEREAS, the Northwest Corridor MIS has identified the Olympic Express (serving the Elm Fork Regional Activity District on a route that connects the Union Pacific (UP) with Texas Stadium, the University of Dallas, and the Urban Center) and the Manana Spur as two alternative rail alignments to provide service from the north-south UP line to North Irving; and

WHEREAS, further analysis has revealed that the Olympic Express has far superior segment ridership at a reasonable efficiency level, provides significantly superior "Access to Jobs" and "Access to Education," and the ability to serve a far greater area of Irving in the Elm Fork Regional Activity District (to include a large portion of the Urban Center, the University of Dallas, the area near the University of Dallas now being developed, Texas Stadium and the area near Texas Stadium) than the Manana Spur without compromising transit access to other DART member cities; and

WHEREAS, the City of Irving Comprehensive Plan as well as master planning by the University of Dallas and Texas Stadium fully support increased transit oriented development and job growth in the area served by the Olympic Express; and

WHEREAS, there is a broad, deep, and growing base of formal support throughout the City of Irving for the implementation of the Olympic Express to include the University of Dallas, Las Colinas Association, Irving DART Citizens Advisory Committee, Irving Citizens Advisory Commission, and the Greater Irving Las Colinas Chamber of Commerce; and

WHEREAS, the Northwest Corridor MIS's Community Work Group unanimously endorsed the Olympic Express alignment, the UP alignment, and the implementation of light rail technology in the corridor at their meeting on November 9, 1999; and

WHEREAS, further analysis has revealed that the Manana Spur would actually constitute a bypass of significant job growth areas and educational facilities in and near the Urban Center, the University of Dallas, and Texas Stadium; and

WHEREAS, the Northwest Corridor has developed alternatives to extend rail service to DFW International Airport generally along the State Highway 114 Corridor; and

WHEREAS, further analysis has revealed the significant regional potential for a connection to DFW International Airport for airport employees, passengers, and the potential to intercept commuter traffic as it enters Irving; and

WHEREAS, the Northwest Corridor MIS has identified the Burlington Northern (BN) and Union Pacific (UP) as two alternative alignments to serve Carrollton north of Belt Line Road; and

WHEREAS, the Carrollton City Council has adopted a position that the UP alignment best meets the present and future needs of the City of Carrollton at this time; and

WHEREAS, the Northwest Corridor MIS has identified an option for accessing Love Field, and further analysis has revealed significant regional potential for this improvement; and

WHEREAS, the Northwest Corridor MIS has identified the Burlington Northern from South Irving to Las Colinas (BN South) as a connection from the Trinity Railway Express into the Las Colinas Urban Center; and

WHEREAS, further analysis has revealed the BN South to be a relatively low cost means of providing access to the Las Colinas Urban Center but only in addition to the light rail extension from the UP or as a part of a phased implementation; and

WHEREAS, there is a clear need for consensus reflecting the importance of local self-determination among the four affected member cities and for a cooperative effort to secure the required funding;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF IRVING, TEXAS:

SECTION I. THAT the City Council supports the implementation of light rail technology in this corridor on the UP and Olympic Express alignments.

SECTION II. THAT the City Council supports the implementation of highway and HOV improvements on State Highway 114 as expeditiously as possible.

SECTION III THAT the City Council finds the implementation of the Olympic Express alignment (on a route which leaves the UP near Love Field and connects Texas Stadium, the University of Dallas, and the Urban Center) to be vital to the future transportation needs of Irving.

SECTION IV THAT the City Council finds the implementation of the Manana alignment to be unacceptable.

SECTION V. THAT the City Council supports the extension of rail service to DFW International Airport in a manner that maximizes access for airport employees, air passengers, and highway commuters.

SECTION VI THAT the City Council supports the position of the City of Carrollton regarding the selection of the UP over the BN for light rail service north of Belt Line Road.

SECTION VII. THAT the City Council supports the potential of directly accessing Love Field.

SECTION VIII. THAT the City Council supports the implementation of the BN South alignment in addition to the Olympic Express alignment and the extension to DFW International Airport.

SECTION IX. THAT the City Council supports the development of a consensus position among the four affected member cities that recognizes the importance of local self-determination in project development and reaffirms the need to cooperatively pursue additional project funding.

SECTION X. THAT the City Council requests that the DART Board implement the above items in its final recommendation regarding the Northwest Corridor MIS.

SECTION XI. THAT this resolution shall take effect from and after its final date of passage, and it is accordingly so ordered.

PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF IRVING, TEXAS, this 18th day of November, A.D., 1999.

JOE PUTNAM
MAYOR

ATTEST:

Janice Carroll, CMC
City Secretary

CITY OF IRVING SEAL STATE OF TEXAS

APPROVED AS TO FORM:

David Caylor
City Attorney

RESOLUTION NO. 2254

A RESOLUTION OF THE CITY OF CARROLLTON, TEXAS SUPPORTING THE SELECTION OF LIGHT RAIL TRANSIT ON THE UNION PACIFIC ALIGNMENT AS THE LOCALLY PREFERRED INVESTMENT STRATEGY FOR THE NORTHWEST CORRIDOR MAJOR INVESTMENT STUDY AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the DART Northwest Corridor Major Investment Study is nearing conclusion; and

WHEREAS, the Carrollton City Council was briefed on the status of the study at the November 9, 1999 meeting; and

WHEREAS, the cost and ridership projections resulting from the study clearly indicate that light rail transit along the Union Pacific Railroad alignment from downtown Dallas to Carrollton is the most cost effective transit alternative for the Northwest Corridor; and

WHEREAS, the City of Carrollton has adopted a position paper on the Northwest Corridor MIS.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF CARROLLTON, TEXAS THAT:

Section 1.

The City of Carrollton recommends implementation of Light Rail Transit along the Union Pacific Railroad alignment from downtown Dallas to northwest Carrollton near the Frankford area.

Section 2.

The City of Carrollton does NOT recommend the implementation of rail service along the Burlington Northern line from Old Downtown Carrollton to the Legacy Park area at this time and without further study.

Section 3.

The City of Carrollton recommends that DART obtain whatever finances are necessary in order to provide rail service that terminates at the Frankford area by 2006, including the use of long term debt and application for federal rail grants.

Section 4.

The City of Carrollton supports the City of Irving's preference for the "Olympic Express" over the Mañana Spur to provide service to the University of Dallas and the North Irving Transit Center.

Section 5.

The City of Carrollton supports the City of Dallas' position on a Love Field Tunnel if and when it is cost effective.

Section 6.

The City of Carrollton recognizes the need to preserve the region's air quality and desires that the outcome of this MIS selects technologies that accomplish this end. Specifically, the City supports Transportation System Management/Travel Demand Management improvements, HOV improvements, and LRT service in this corridor.

Section 7.

The City of Carrollton recommends that the four member cities in the corridor and DART should develop a consensus position and move forward cooperatively to secure appropriate local and federal funding.

Section 8.

That this resolution shall take effect immediately from and after this passage.

PASSED AND APPROVED ON THIS 7th DAY OF December 1999

CITY OF CARROLLTON, TEXAS

By: Milburn R. Gravley
Milburn R. Gravley, Mayor

ATTEST:
Pamela Schmidt
Pamela Schmidt, City Secretary

CITY OF CARROLLTON CARROLLTON, TEXAS

Approved as to form:
R. Clayton Hutchins
R. Clayton Hutchins
Assistant City Attorney

Approved as to Content:
Cesar J. Molina, Jr.
Cesar J. Molina, Jr.
Director of Transportation

FARMERS BRANCH

RESOLUTION NO. 99-184

A RESOLUTION SUPPORTING THE SELECTION OF LIGHT RAIL TRANSIT ON THE UNION PACIFIC ALIGNMENT AS THE LOCALLY PREFERRED INVESTMENT STRATEGY FOR THE NORTHWEST CORRIDOR MAJOR INVESTMENT STUDY.

WHEREAS, The DART Northwest Corridor Major Investment Study is nearing conclusion; and

WHEREAS, The Farmers Branch City Council was briefed on the status of the study at their November 1, 1999 meeting; and

WHEREAS, Cost and ridership projections resulting from the study clearly indicate that light rail transit along the Union Pacific Railroad alignment from downtown Dallas to Carrollton is the most cost-effective transit alternative for the Northwest Corridor; and

WHEREAS, Light Rail Transit along the Union Pacific Railroad alignment has projected ridership which is double the projected ridership of the commuter rail alternative, and

WHEREAS, Implementation of Light Rail Transit along the Union Pacific Railroad alignment from downtown Dallas to Carrollton can be accomplished by 2006, given reasonable projections of DART and Federal financing capabilities.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY OF FARMERS BRANCH, TEXAS, that:

SECTION 1. The City of Farmers Branch recommends the implementation of Light Rail Transit along the Union Pacific Railroad alignment from downtown Dallas to Carrollton with revenue service to begin by 2006.

SECTION 2. The City of Farmers Branch supports the extension of Light Rail Transit service to north Irving via a connection to the Union Pacific Railroad alignment that will not adversely effect revenue service by 2006 along the Union Pacific Railroad alignment from downtown Dallas to Carrollton.

SECTION 3. Required environmental studies and preliminary engineering for the Northwest Corridor should be commenced by DART as soon as possible.

SECTION 4. The City of Farmers Branch will continue to work closely with DART to ensure that necessary DART and Federal financing is made available to

support the timely implementation of Light Rail Transit service in the Northwest Corridor.

PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF FARMERS BRANCH, TEXAS, this 15th day of November 1999.

ATTEST:

City Secretary

Bob Phelps, Mayor

APPROVED AS TO FORM:

City Attorney

Northwest Corridor Major Investment Study
DART Planning Committee Meeting Presentation
December 7, 1999

City of Dallas Statement
Presented by Councilmember Veletta Forsythe Lill

We have appreciated the opportunity to work with DART, Dallas County, and our neighboring cities — Farmers Branch, Carrollton, Irving, and Coppell — in examining the transportation alternatives in the Northwest Corridor. The location of this high growth corridor between our Central Business District and DFW Airport, with its variety of diverse activity centers (such as the Market Center, Medical Center, Love Field, Texas Stadium, Las Colinas), provides a unique challenge in designing an effective multimodal transportation system.

The Dallas City Council is scheduled to be briefed on the Northwest Corridor MIS this Wednesday afternoon, December 8th, and to consider a resolution next Wednesday, December 15th. Since the Council has not taken a position on any elements of the project, I am here to represent

the City based on my participation in the study as the Dallas Council representative on the Executive Work Group, my interaction with the Community Work Group and other Dallas' citizens with an interest in the project, and my understanding of my colleagues priorities on the Council.

Dallas supports light rail transit as the best transit mode choice for the Northwest Corridor because its performance characteristics enable it to attract more than double the ridership that we can expect from commuter rail. This increased ridership means that light rail is not only the most cost effective alternative, it also provides the best opportunity to help reshape the pattern of development in our region so that we drive less and walk more.

Dallas supports use of the Trinity Railway Express line as a cost effective way to penetrate the Central Business District and tie into the existing transit mall. However, we believe that the Griffin alignment

provides an opportunity to spur new development where we have parking lots today, and may be a more appropriate way to enter the CBD depending on the outcome of DART's ongoing study of rail service through the downtown. The Griffin alignment alternative should be preserved and studied further during preliminary engineering for the project.

Dallas supports light rail transit service to the Medical Center area via Harry Hines Boulevard and encourages DART to work closely with the City and community during the preliminary engineering for the project to be certain that its design will maximize transit access for the area, ensure the safety of pedestrians, and not adversely affect the flow of vehicular traffic on Harry Hines.

Dallas supports a Locally Preferred Investment Stategy that identifies LRT service on the Union Pacific along the southwest side of Love Field. However, the City has a strong interest in providing direct LRT

service to the terminal building at Love Field. We want DART to commit to a continuing dialogue during the preliminary engineering for this project to define the most cost effective alternative to the Love Field terminal. The City will work with DART to identify other revenue sources to help offset the higher costs of providing direct terminal access.

Dallas supports the station locations identified in the Major Investment Study at the new Arena, Market Center, Medical Center, Mockingbird Lane, Northwest Highway, Walnut Hill Lane, and Royal Lane. The City wants to work closely with DART to finalize the station locations and develop land use plans and policies that maximize the potential for transit oriented development.

We respect the desire of our neighboring cities to maximize the potential of rail service for their community and to have rail service delivered in a reasonable time frame. The provision of light rail transit on the Union

Pacific Railroad through Farmers Branch to Frankford Road in Carrollton by 2006 is consistent with DART's original commitments to these suburban cities and should be supported by the MIS. Irving has urged that adoption of light rail service to their City that serves the area near the University of Dallas and provides an additional station at the south end of Las Colinas. From a technical perspective, this alternative increases the cost of the project, slightly reduces the frequency of service to the Northwest Highway station in Dallas, and may delay our ability to provide light rail service to DFW Airport. However, Dallas does not object to the alternative proposed by Irving provided that it does not significantly impact the ability to compete for federal funding for the project and does not delay implementation of revenue service in Dallas in the Northwest Corridor or the Southeast Corridor.

GREATER
IRVING-LAS COLINAS
CHAMBER OF COMMERCE

# GREATER IRVING-LAS COLINAS CHAMBER OF COMMERCE
# RESOLUTION 1999/00-13

## RECOMMENDATION TO THE CITY OF IRVING CITY COUNCIL SUPPORTING THE "DFW OLYMPIC EXPRESS"

**WHEREAS**, the City of Irving is participating in the Northwest Corridor Major Investment Study (MIS); and

**WHEREAS**, the Northwest Corridor MIS has identified several rail alignments for further study including rail routes along the Union Pacific (UP) railroad from downtown Dallas to Carrollton and Farmers Branch; the Burlington Northern (BN) railroad from South Irving Transit Center to North Irving; the DFW Olympic Express route from the UP route by Texas Stadium, the University of Dallas, the Las Colinas Urban Center to DFW International Airport and the Manana route from the UP route to the North Irving Transit Center; and

**WHEREAS**, the City of Irving is best served by the DFW Olympic Express and the Burlington Northern routes; and

**WHEREAS**, the Manana alignment currently being contemplated by the DART staff does not adequately serve the corridor from the UP route to Texas Stadium, the University of Dallas and the Las Colinas Urban Center; and

**WHEREAS**, due to continued growth within the City of Irving, implementation of the DFW Olympic Express and the Burlington Northern alignments will improve access to jobs, relieve traffic congestion, improve air quality and increase economic development; and

**WHEREAS**, it is important that the City of Irving and its business community present a unified effort to take swift and appropriate action to preserve and advocate the interest of the Citizens of Irving regarding the DFW Olympic Express and Burlington Northern rail alignments.

**THEREFORE**, be it resolved by the Greater Irving-Las Colinas Board of Directors that it supports the City Council intent to take the necessary action to implement rail service along the DFW Olympic Express and Burlington Northern alignments to serve the business interests and the Citizens of Irving.

Adopted this 26th day of October, 1999 by the Board of Directors of the Greater Irving-Las Colinas Chamber of Commerce.

Dr. Frank Cannon
Chairman of the Board

James A. Spriggs
President

RESOLUTION NO. 99-27

A RESOLUTION OF THE BOARD OF DIRECTORS OF DALLAS COUNTY UTILITY AND RECLAMATION DISTRICT SUPPORTING THE "DFW OLYMPIC EXPRESS" AND BURLINGTON NORTHERN RAIL ALIGNMENTS

Preamble

WHEREAS, on August 19, 1973 the Las Colinas Development was introduced as a uniquely master planned community located in Irving, Texas which envisioned an internal grade separated transit system which was to interconnect to a regional transit system; and

WHEREAS, on June 18, 1989 the Dallas County Utility and Reclamation District (District) opened the Las Colinas Area Personal Transit System (APT) to public service in anticipation of interfacing with the Dallas Area Rapid Transit (DART) regional transit system; and

WHEREAS, on January 29, 1998 an agreement was approved among the Dallas Area Rapid Transit, the Fort Worth Transportation Authority, the City of Irving and the District concerning authorization and appropriation of funding for regional transportation projects; and

WHEREAS, the District and the City of Irving have been actively participating in the Northwest Corridor Major Investment Study (NWMIS) being conducted by DART to guide future transit improvements in the northwest quadrant of Dallas County; and

WHEREAS, the NWMIS has identified several rail alignments for further study including rail routes along the Union Pacific (UP) railroad from downtown Dallas to Carrollton and Farmers Branch; the Burlington Northern (BN) railroad from South Irving Transit Center to North Irving; the DFW Olympic Express Route from the UP route by Texas Stadium, the University of Dallas, the Las Colinas Urban Center to DFW International Airport and the Manana route from the UP route to the North Irving Transit Center; and

WHEREAS, the Las Colinas Urban Center is the 1,000 acre area of highest density, high rise office buildings within the 12,000 acre Las Colinas Development which currently has 30,000 employees with an expected employment of over 100,000 employees upon build out; and

WHEREAS, in order for the DART rail transit system to adequately and completely serve the Las Colinas Urban Center, the implementation of the DFW Olympic Express and Burlington Northern rail alignments will complete the master planned regional connection to regional transit; and

WHEREAS, the District and the City of Irving are best served by the DFW Olympic Express and the Burlington Northern routes; and

WHEREAS, the Manana alignment currently being contemplated by the DART staff does not adequately serve the corridor from the UP route to Texas Stadium, the University of Dallas and the Las Colinas Urban Center; and

WHEREAS, due to continued growth within the City of Irving, implementation of the DFW Olympic Express and the Burlington Northern alignments will improve access to jobs, relieve traffic congestion, improve air quality and increase economic development; and

WHEREAS, it is important that the District and the City of Irving and its business community present a unified effort to take swift and appropriate action to preserve and advocate the interest of the Citizens of Irving regarding the DFW Olympic Express and Burlington Northern rail alignments.

NOW, THEREFORE, BE IT RESOLVED BY THE DISTRICT'S BOARD OF DIRECTORS:

1. That the District supports the efforts of the City of Irving in taking whatever steps are necessary to implement rail service along the DFW Olympic Express and Burlington Northern alignments.

2. That the District expects the DFW Olympic Express LRT alignment to pass through the entire eastern side of the Urban Center to provide adequate and efficient service and that it be interfaced with the APT System.

3. That the District expects the Burlington Northern commuter rail alignment to interface with the APT System on the south end of the Urban Center to provide rail service from Fort Worth and the mid-cities to help relieve congestion and improve air quality.

4. That the District supports the concept of phasing of projects in order to build a truly comprehensive and efficient rail transit system to serve the City of Irving, DFW International Airport and the Northwest Corridor of Dallas County.

PASSED AND APPROVED THIS 16th day of November, 1999.

Dary Stone
President

ATTEST:

By: _____
Michael S. Lewis
Secretary

# Resolution

ORDER NO. 99 2286

DATE: December 7, 1999

STATE OF TEXAS

COUNTY OF DALLAS

**BE IT REMEMBERED** at a regular meeting of Commissioners Court of Dallas County, Texas on the 7th day of December, 1999, on motion made by Kenneth A. Mayfield, Comm. of Dist. 4, and seconded by Jim Jackson, Comm. of Dist. 1, the following resolution was adopted:

**WHEREAS,** Dallas Area Rapid Transit (DART) is the lead agency for the Northwest Corridor Major Investment Study (MIS) which is examining transportation needs for northwest Dallas County; and

**WHEREAS,** the formally adopted DART Financial Plan outlines rail service to Carrollton and Farmers Branch by 2006 and Irving by 2007; and

**WHEREAS,** federal law mandates that public involvement be an integral element of the technical review for an MIS so that the needs of the communities involved are properly considered in the development of a locally preferred investment strategy (LPIS); and

**EREAS,** the MIS has identified a light rail alignment known as the "Union Pacific" (UP) to serve the cities of Carrollton and Farmers Branch generally along the UP rail line from downtown Dallas and terminating at Frankford; and

**WHEREAS,** the MIS has identified a light rail alignment from the UP serving Dallas Love Field, Texas Stadium, the University of Dallas, the Las Colinas Urban Center, the SH-114 Corridor and DFW International Airport which is known as the "Texas Stadium/University of Dallas" Alignment; and

**WHEREAS,** the MIS has identified a light rail alternative from the UP known as the "Manana" Alignment to DFW International Airport that would bypass Texas Stadium, the University of Dallas and the center of the Las Colinas Urban Center; and

**WHEREAS,** the United States Department of Transportation and Federal Transit Administration have identified access to jobs, education, major activity centers and stadiums as elements of criteria for federal funding; and

**WHEREAS,** after lengthy discussion and consideration, and after dozens of meetings in preparation, the Carrollton City Council, the Irving City Council, the Greater Irving-Las Colinas Chamber of Commerce, the Las Colinas Association, the Dallas County Utility and Reclamation District, the Irving Citizen Advisory Commission, the Irving DART Advisory Committee and scores of Irving civic organizations, corporations, employers and individuals have all unanimously passed resolutions or position statements supporting the "Texas Stadium" and "Union Pacific" Alignments and opposing the "Manana" Alignment; and

# Resolution

ORDER NO. 99 2286

DATE: December 7, 1999

STATE OF TEXAS

COUNTY OF DALLAS

**BE IT REMEMBERED** at a regular meeting of Commissioners Court of Dallas County, Texas on the 7th day of December 1999, on motion made by Kenneth A. Mayfield, Comm. of Dist. 4, and seconded by Jim Jackson, Comm. of Dist. 1, the following resolution was adopted:

**WHEREAS,** Dallas Area Rapid Transit (DART) is the lead agency for the Northwest Corridor Major Investment Study (MIS) which is examining transportation needs for northwest Dallas County; and

**WHEREAS,** the formally adopted DART Financial Plan outlines rail service to Carrollton and Farmers Branch by 2006 and Irving by 2007; and

**WHEREAS,** federal law mandates that public involvement be an integral element of the technical review for an MIS so that the needs of the communities involved are properly considered in the development of a locally preferred investment strategy (LPIS); and

**EREAS,** the MIS has identified a light rail alignment known as the "Union Pacific" (UP) to serve the cities of Carrollton and Farmers Branch generally along the UP rail line from downtown Dallas and terminating at Frankford; and

**WHEREAS,** the MIS has identified a light rail alignment from the UP serving Dallas Love Field, Texas Stadium, the University of Dallas, the Las Colinas Urban Center, the SH-114 Corridor and DFW International Airport which is known as the "Texas Stadium/University of Dallas" Alignment; and

**WHEREAS,** the MIS has identified a light rail alternative from the UP known as the "Manana" Alignment to DFW International Airport that would bypass Texas Stadium, the University of Dallas and the center of the Las Colinas Urban Center; and

**WHEREAS,** the United States Department of Transportation and Federal Transit Administration have identified access to jobs, education, major activity centers and stadiums as elements of criteria for federal funding; and

**WHEREAS,** after lengthy discussion and consideration, and after dozens of meetings in preparation, the Carrollton City Council, the Irving City Council, the Greater Irving-Las Colinas Chamber of Commerce, the Las Colinas Association, the Dallas County Utility and Reclamation District, the Irving Citizen Advisory Commission, the Irving DART Advisory Committee and scores of Irving civic organizations, corporations, employers and individuals have all unanimously passed resolutions or position statements supporting the "Texas Stadium" and "Union Pacific" Alignments and opposing the "Manana" Alignment; and

**WHEREAS,** DART's Community Work Group, which consists of business and citizen representatives from all cities involved and was officially created by DART to assist in the MIS, has unanimously passed a resolution and expressed a strong opinion publicly supporting the "Texas Stadium" and "Union Pacific" Alignments and opposing the "Manana" Alignment; and

**WHEREAS,** there is unanimous support, consensus and no disagreement among all entities and individuals involved in the MIS for the UP to serve Dallas, Carrollton and Farmers Branch; and

**WHEREAS,** the above mentioned entities and individuals, by their actions described above, have identified the LPIS; and

**EREAS,** the direct light rail connection between DFW International Airport and Dallas Love Field along a route that will connect athletic venues at Texas Stadium, the Dallas American Airlines Arena and the Cotton Bowl provided by the "Texas Stadium/University of Dallas" Alignment will be extremely helpful in providing adequate regional mobility at all times and especially during the 2012 Olympic Games; and

**WHEREAS,** Dallas County has participated in the MIS through active representation on DART's Staff Work Group and Executive Work Group, reviewing all the technical and public involvement data, since the beginning of the study.

**NOW, THEREFORE, BE IT RESOLVED** that the Dallas County Commissioners Court does declare that it finds the **"Union Pacific"** and **"Texas Stadium/University of Dallas"** Alignments to be locally preferred by the above mentioned entities and individuals, and encourages DART to carry these alignments forward.

**FURTHERMORE,** we encourage DART to recognize the broad support for the position above stated and to eliminate the "Manana" Alignment from further study.

**FURTHERMORE,** this action is to be read and interpreted to be concurring with the above referenced entities and individuals to define the LPIS for Dallas County in regard to the above mentioned light rail alignments.

**DONE IN OPEN COURT** this the 7th day of December, 1999.

Lee F. Jackson, County Judge

Jim Jackson, District 1

Mike Cantrell, District 2

John Wiley Price, District 3

Kenneth A. Mayfield, District 4

# Appendix D

# Las Colinas Access Options

N

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GRAPHIC SCALE IN FEET

LEGEND

- ALIGNMENT NODE
- ELEVATED TRACK
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- RIVER BRIDGE
- TRACK AT-GRADE
- TARGET STATION AREA
- POTENTIAL FUTURE TEXAS STADIUM STATIONS

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(214) 741-7777

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A DAMES & MOORE GROUP COMPANY
1840 WOODALL RODGERS FWY.-SUITE 1220
DALLAS, TEXAS 75201

DART PROJECT

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| DRAWN | BRW/WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CONTRACT SHEET No. 1 OF 1

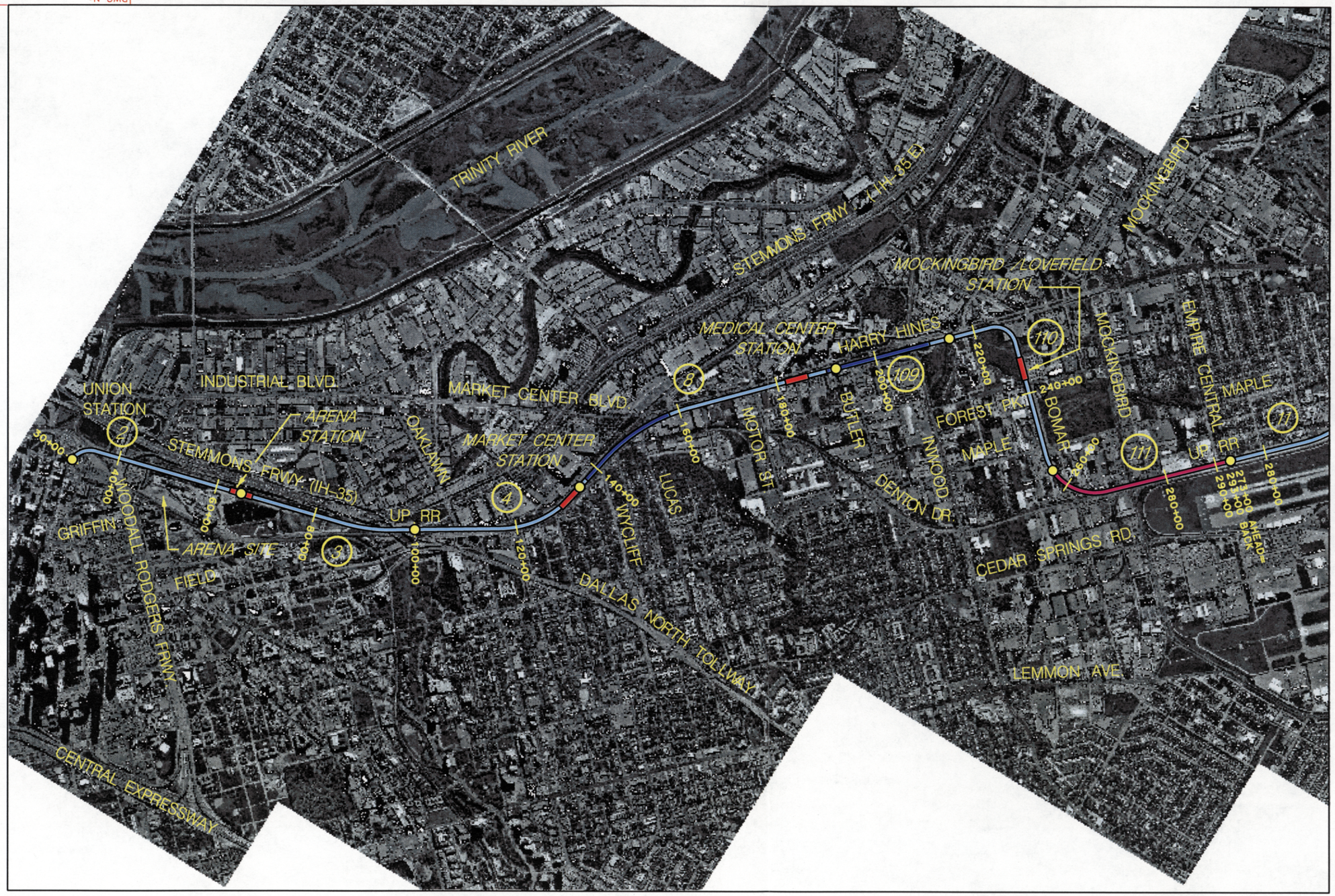
# NORTHWEST CORRIDOR MIS

## LRT SCHEMATIC ALIGNMENT DFW / TEXAS STADIUM CORRIDOR

## LAS COLINAS ACCESS OPTIONS

CONTRACT | DWG No. DFW-VRT-COM7 | REV

DWG No. UPRR-VRT-FR-001

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GRAPHIC SCALE IN FEET

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DART PROJECT

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| SCALE | AS NOTED |
| DRAWN | BRW/WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 1 OF 7

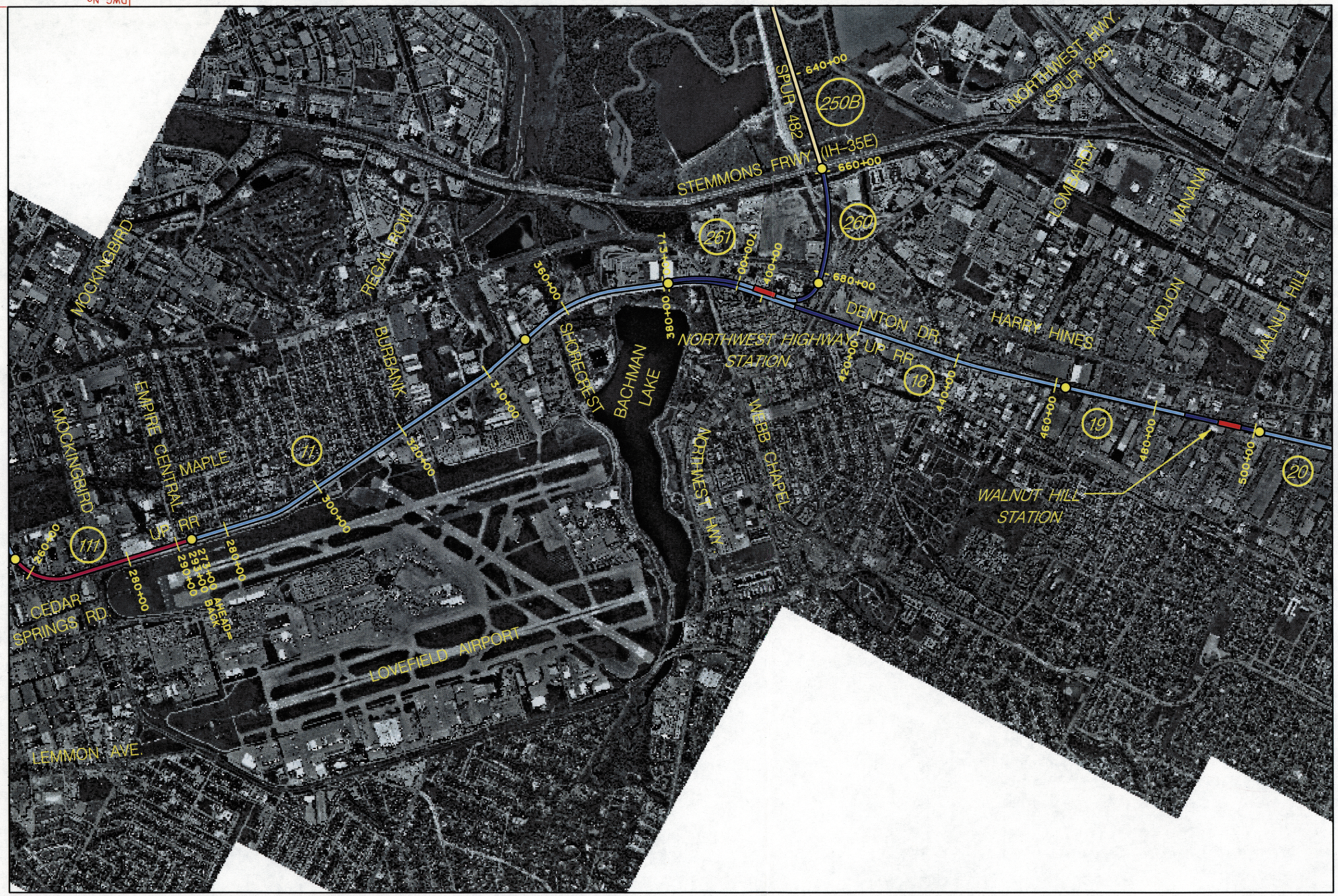
# NORTHWEST CORRIDOR MIS

## LRT SCHEMATIC ALIGNMENT
## UP RAIL CORRIDOR

LINK NOS. 2, 3, 4, 8, 109, 110, 111, 11

CONTRACT | DWG No. UPRR-VRT-FR-001 | REV

DWG No. UPRR-VRT-FR-005

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| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

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CONTRACT SHEET No. 2 OF 7

# NORTHWEST CORRIDOR MIS

## LRT SCHEMATIC ALIGNMENT UP RAIL CORRIDOR

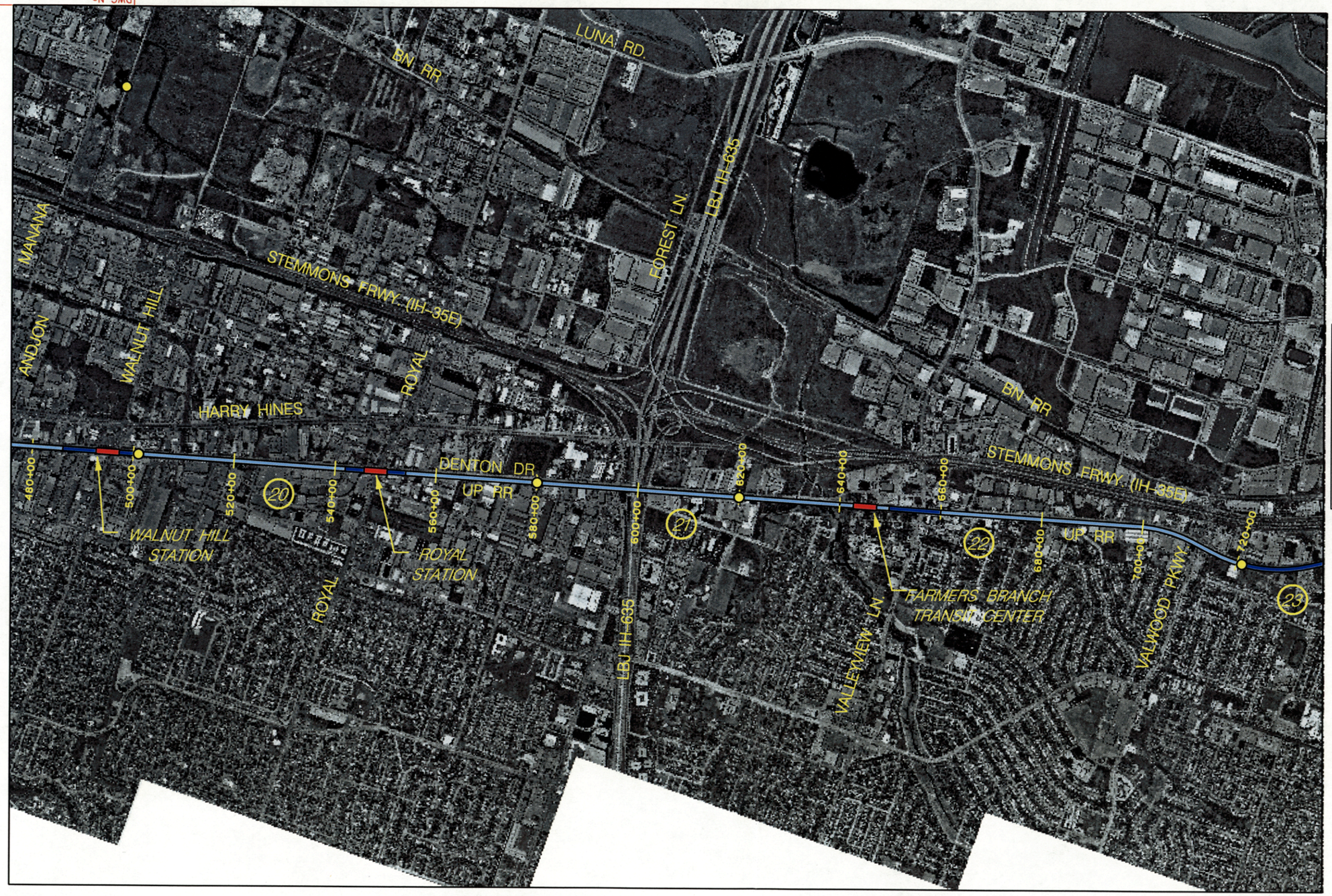
LINK NOS. 111, 11, 18, 19, 20

CONTRACT

DWG No. UPRR-VRT-FR-005

REV

DWG No. UPRR-VRT-FR-003

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- ELEVATED TRACK
- TUNNEL
- RIVER BRIDGE
- TRACK AT-GRADE
- TARGET STATION AREA

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DART PROJECT

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| SCALE | AS NOTED |
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| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 3 OF 7

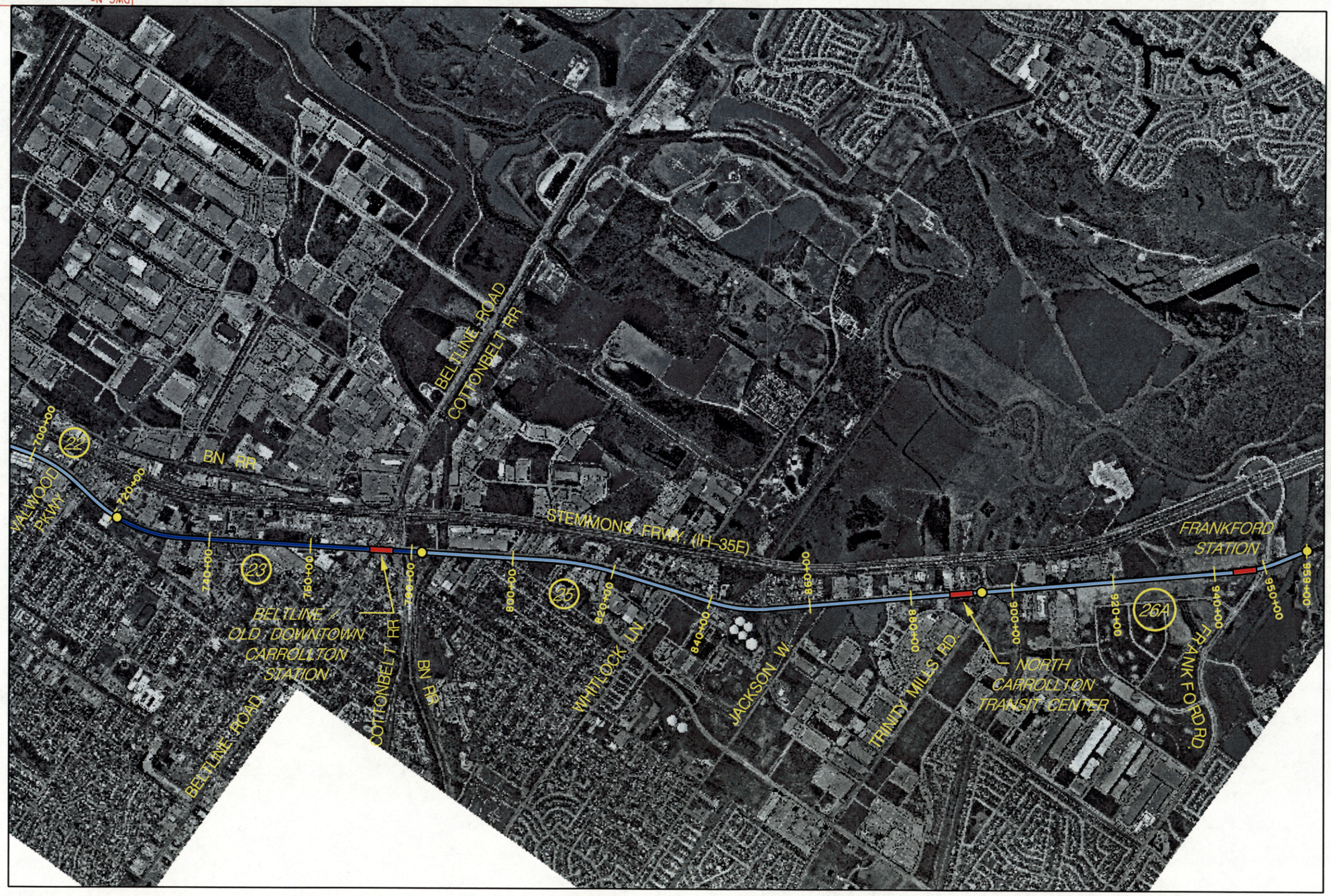
# NORTHWEST CORRIDOR MIS

## LRT SCHEMATIC ALIGNMENT UP RAIL CORRIDOR

LINK NOS. 20, 21, 22, 23

CONTRACT | DWG No. UPRR-VRT-FR-003 | REV

DWG No. UPRR-VRT-FR-004

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DART PROJECT

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| SCALE | AS NOTED |
| DRAWN | BRW/WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 4 OF 7

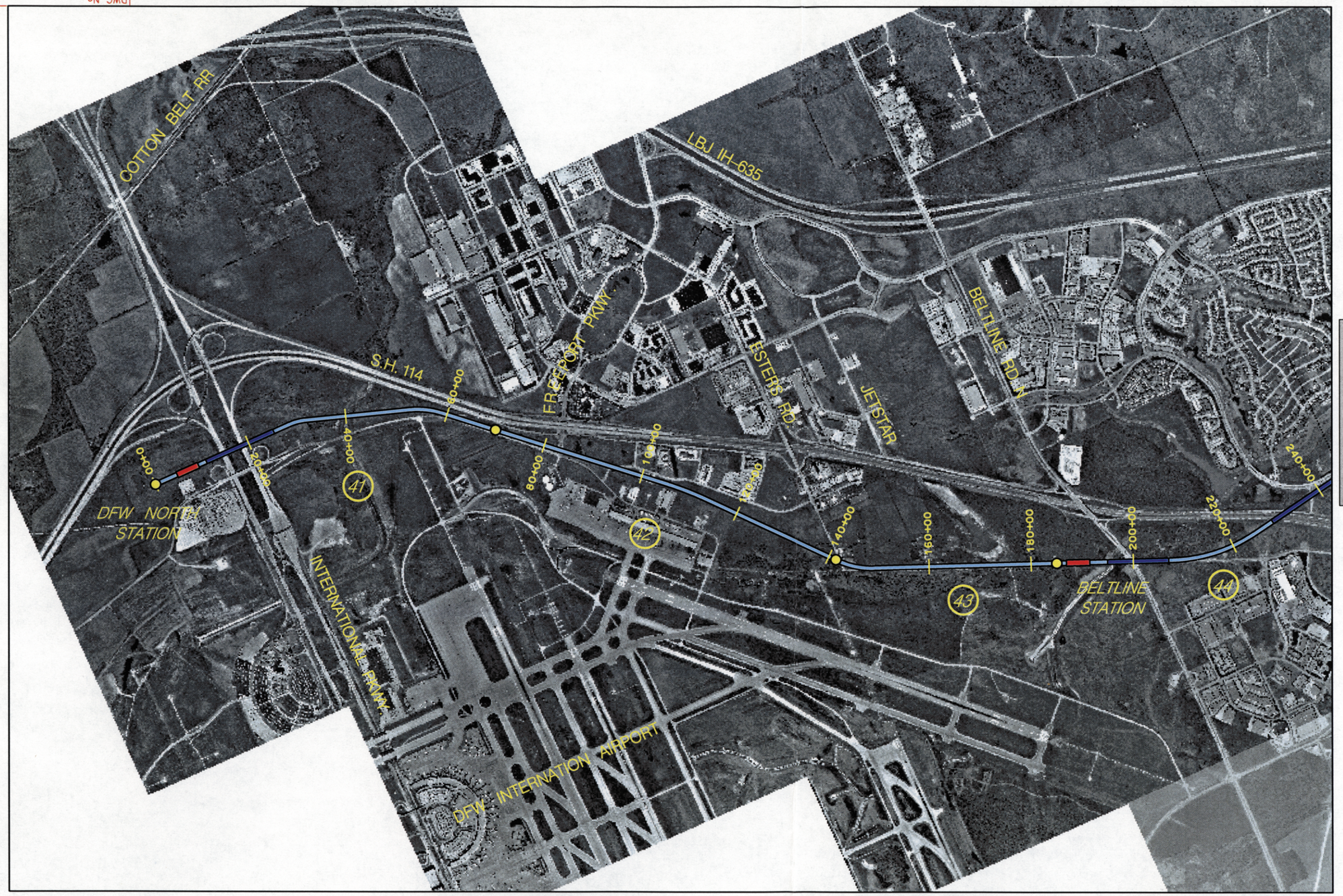
# NORTHWEST CORRIDOR MIS

## LRT SCHEMATIC ALIGNMENT UP RAIL CORRIDOR

## LINK NOS. 22, 23, 25, 26A

CONTRACT | DWG No. UPRR-VRT-FR-004 | REV

DWG No. DFW-VRT-FR-007

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DALLAS, TEXAS 75201


DART PROJECT

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| SCALE | AS NOTED |
| DRAWN | BRW/WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 5 OF 7

# NORTHWEST CORRIDOR MIS

## LRT SCHEMATIC ALIGNMENT
## DFW / TEXAS STADIUM CORRIDOR

LINK NOS. 41, 42, 43, 44

| CONTRACT | DWG No. | REV |
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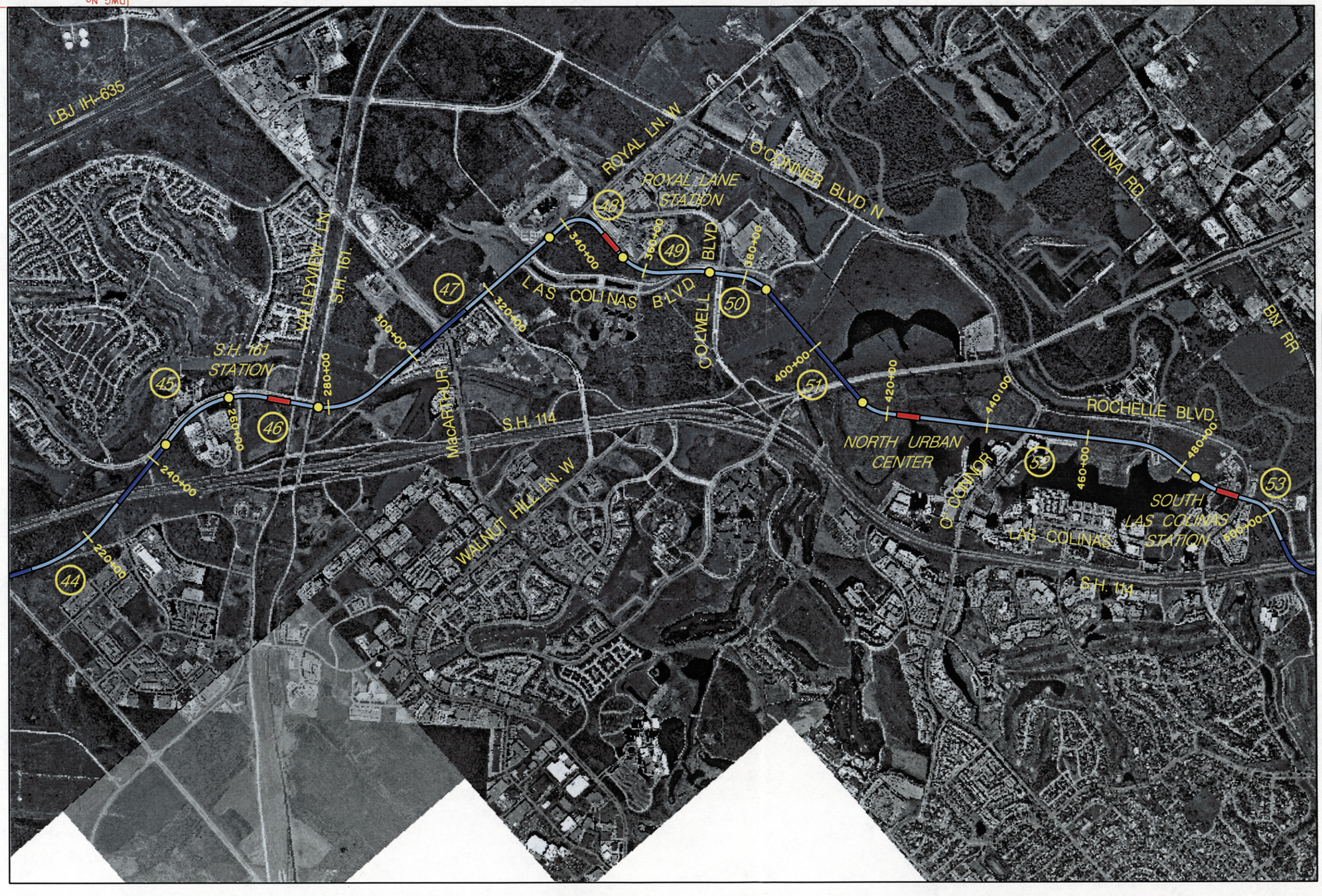
| | DFW-VRT-FR-007 | |

DWG No. DFW-VRT-FR-008

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| | TRACK AT-GRADE |
| | TARGET STATION AREA |

CONTRACT SHEET No. 6 OF 7

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WENDY LOPEZ & ASSOCIATES, INC.
engineering/environmental/surveying/
construction services
1825 MARKET CENTER BLVD. - SUITE 510
DALLAS, TEXAS
(214) 741-7777

D&M GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1020
DALLAS, TEXAS 75201

DART PROJECT

DART

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| SCALE | AS NOTED |
| DRAWN | BRW/WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

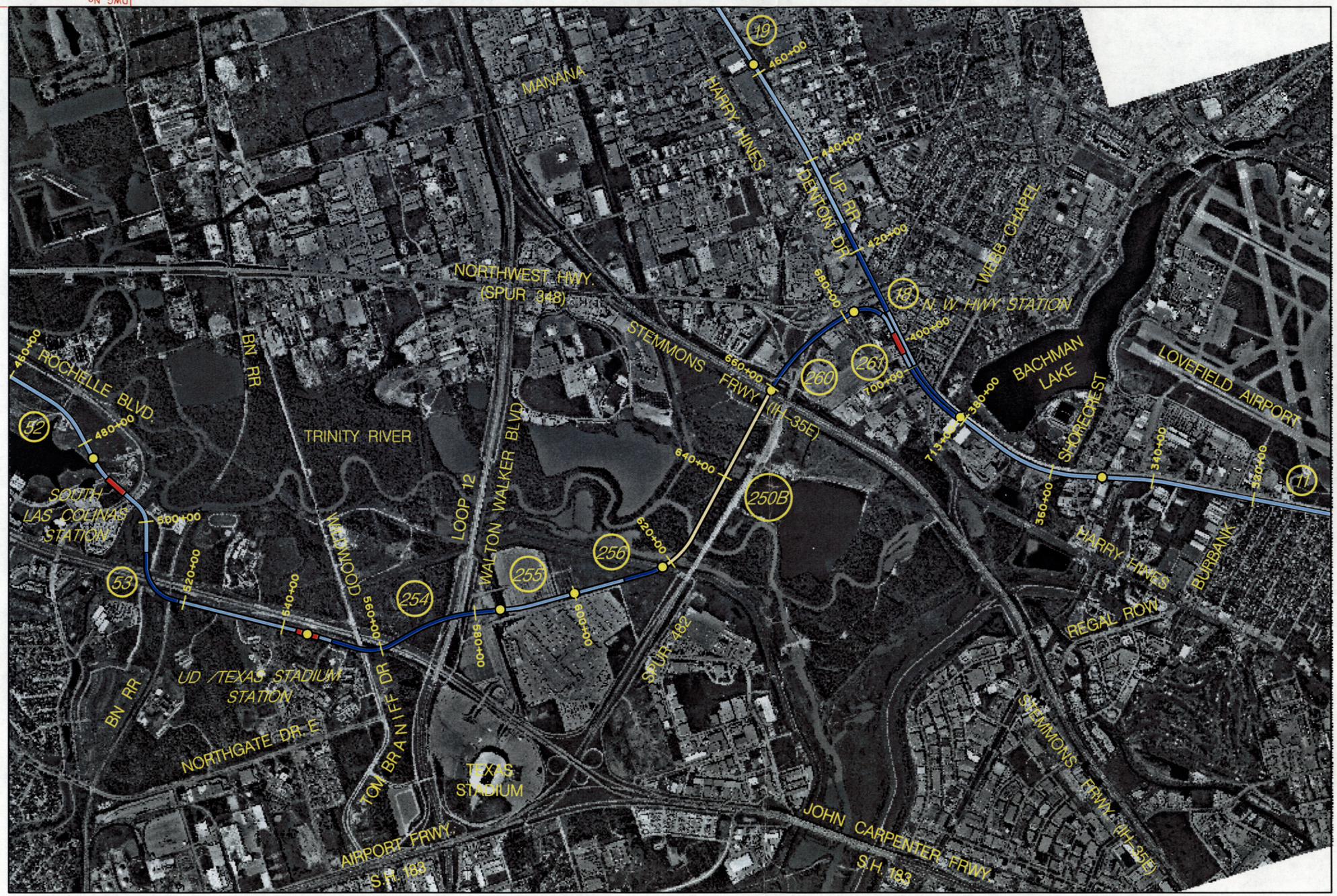
# NORTHWEST CORRIDOR MIS

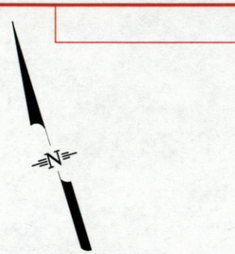
## LRT SCHEMATIC ALIGNMENT
## DFW / TEXAS STADIUM CORRIDOR

LINK NOS. 44, 45, 46, 47, 48, 49
50, 51, 52, 53

CONTRACT | DWG No. DFW-VRT-FR-008 | REV

DWG No. DFW-VRT-FR-009




LEGEND

- 44 — LINK NUMBER
- 0+00 — STATIONING IN FEET
- ALIGNMENT NODE
- ELEVATED TRACK
- TUNNEL
- RIVER BRIDGE
- TRACK AT-GRADE
- TARGET STATION AREA

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WENDY LOPEZ & ASSOCIATES, INC.
engineering/environmental/surveying/
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1825 MARKET CENTER BLVD. - SUITE 510
DALLAS, TEXAS
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D&M GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1020
DALLAS, TEXAS 75201


DART PROJECT

DART

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| SCALE | AS NOTED |
| DRAWN | BRW/WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 7 OF 7

# NORTHWEST CORRIDOR MIS

## LRT SCHEMATIC ALIGNMENT
## DFW / TEXAS STADIUM CORRIDOR

LINK NOS. 52, 53, 254, 255, 256, 250B 260, 261

CONTRACT | DWG No. DFW-VRT-FR-009 | REV

# Appendix E

# DART Board Resolution for the LPIS

Dallas Area Rapid Transit

000034

**RESOLUTION**

**RESOLUTION**

**of the**

**DALLAS AREA RAPID TRANSIT**
**(Executive Committee)**

**Approval of a Locally Preferred Investment Strategy (LPIS)**
**for the Northwest Corridor**

WHEREAS, the Northwest Corridor Major Investment Study has evaluated technologies such as light rail transit (LRT), commuter rail, High Occupancy Vehicle (HOV) lanes, general purpose highway lanes, and various Transportation System Management/Congestion Management System (TSM/CMS) projects or programs; and

WHEREAS, LRT has been chosen by all participants as the appropriate rail technology for the corridor; and

WHEREAS, the evaluation of alternatives has identified the need for two-lane reversible HOV lanes on portions of IH35 and a one-lane reversible HOV lane on SH114; and

WHEREAS, general purpose highway lanes may be required to meet additional mobility demand after LRT and HOV have been implemented; and

WHEREAS, additional TSM/CMS projects have been identified to enhance mobility in the Northwest Corridor; and

WHEREAS, the Northwest Corridor Major Investment Study (MIS) has included an extensive agency coordination and public participation program; and

WHEREAS, the Planning Committee was briefed on September 28, October 5, October 26, November 9, November 23, December 7, and December 14, 1999, on the detailed evaluation results, areas of agreement, remaining issues, member city views, and resolution of issues; and

WHEREAS, the recommended LPIS for the Northwest Corridor is consistent with Mobility 2025, the regional transportation plan as adopted by the Regional Transportation Council on January 13, 2000; and

WHEREAS, the evaluation of alternatives has identified the Harry Hines/UP alignment to Frankford and the Manana Spur alignment to DFW Airport as the technically preferred LRT alignment; and

WHEREAS, the City of Irving because of its development potential and supported by public input through the Work Groups within the MIS process prefers a UD/Texas Stadium alignment over the technically preferred Manana alignment; and

WHEREAS, the Planning Committee recommended deferring the determination of rail into Irving on January 25, 2000, pending identification of non-DART funding sources and/or other routing alternatives to reduce the cost difference to DART between the technically preferred Manana route and the City of Irving preferred UD/Texas Stadium route as much as possible; and

WHEREAS, the City of Irving has passed a resolution expressing their intent to enter into an interlocal agreement with DART to make $60 million available through direct contributions or cost savings toward the construction of the UD/Texas Stadium alignment; and

WHEREAS, DART wishes to continue to work cooperatively with the City of Irving to resolve the issues creating barriers to a decision by DART to select the UD/Texas Stadium route over the technically preferred option; and

WHEREAS, a Financial Plan Amendment for the Northwest Corridor LPIS elements has to be evaluated and will be considered by the Board at a later time, based on time phasing, Federal funding, and financing alternatives.

NOW, THEREFORE BE IT RESOLVED, by the Dallas Area Rapid Transit Board of Directors that:

Section 1: The Northwest Corridor Locally Preferred Investment Strategy (LPIS) rail element is approved to reflect light rail transit (LRT) on the UP/Harry Hines alignment to Frankford. (Exhibit 1)

Section 2: Light rail transit on the UD/Texas Stadium alignment is approved for inclusion in the rail element of the Locally Preferred Investment Strategy contingent on the conditions included in Exhibit 2. In the event the conditions are not met, the Manana alignment would be reconsidered as part of the rail element of the LPIS for this section of the corridor (Exhibit 1).

Section 3: The Highway/HOV element of the Locally Preferred Investment Strategy includes a two-lane reversible HOV on portions of IH35E and a one-lane reversible HOV on SH114, and one additional general purpose highway lane in each direction on portions of IH35E and SH114 and is adopted (Exhibit 3).

Section 4: The Transportation System Management/Congetion Management System (TSM/CMS) element of the Locally Preferred Investment Strategy includes a freeway bottleneck removal component, intersection improvement projects, and formation of Transportation Management Associations (TMAs) and is adopted (Exhibit 4).

Section 5: The President/Executive Director is authorized to advance the LPIS elements referenced in Sections 1, 2, 3, and 4 into the preliminary engineering and preparation of an environmental impact statement (PE/EIS) phase of project development in accordance with US Department of Transportation (USDOT) rules and regulations and conditions referenced in Exhibit 2.

Section 6: The PE/EIS phase will examine further the Griffin/Griffin routing option in the downtown Dallas area (Exhibit 1).

Section 7: The PE/EIS phase will examine further the Love Field terminal connection including seeking non-DART funding partners (Exhibit 1).

Section 8: The Transit System Plan is modified to reflect the LPIS.

John De La Garza, Jr.
Secretary

Jesse Oliver
Chairman

APPROVED AS TO FORM:

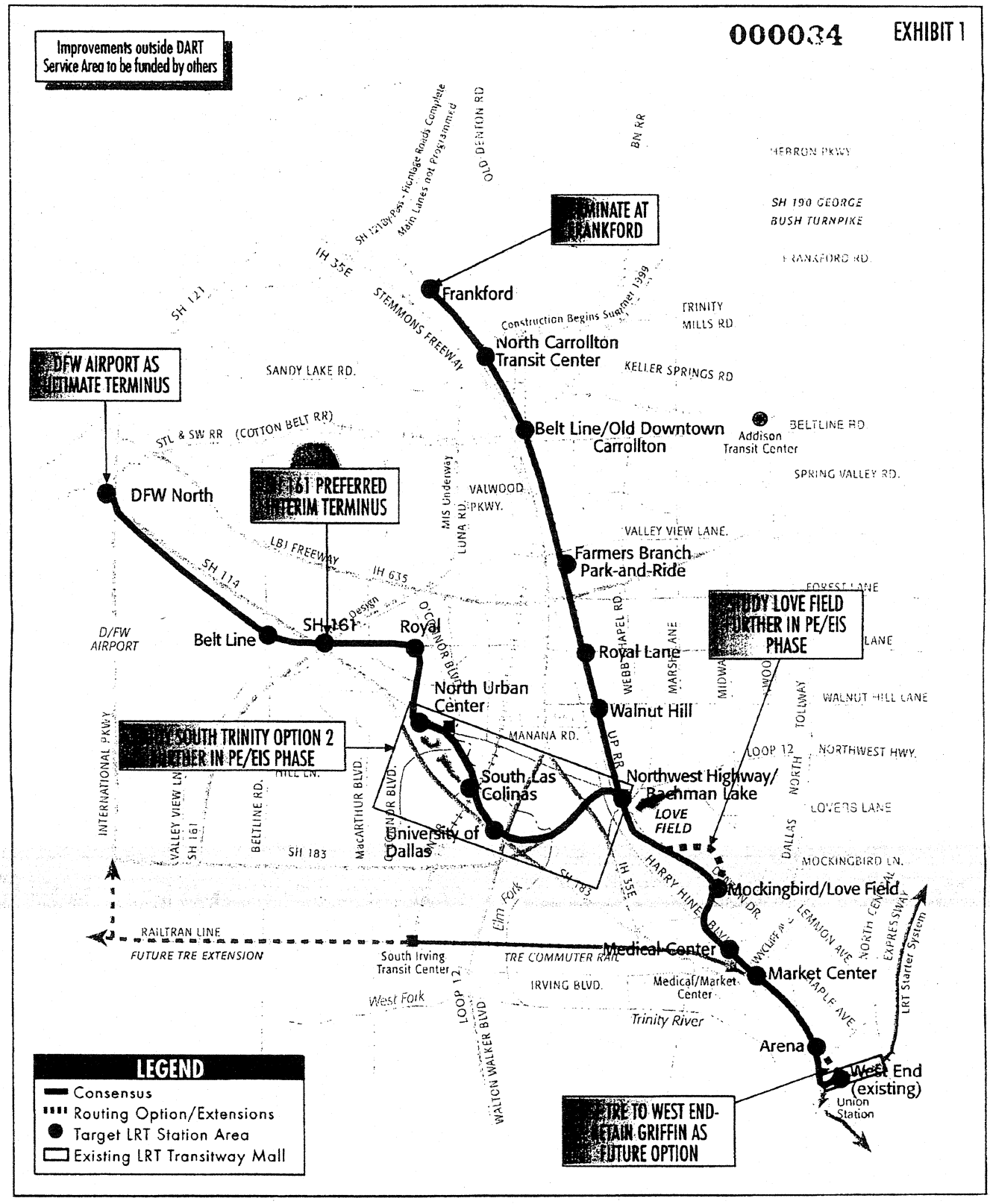
DART Counsel

ATTEST:

Roger Snoble
President/Executive Director

February 22, 2000
Date

000034 EXHIBIT 1




NW CORRIDOR MIS

LOCALLY PREFERRED INVESTMENT STRATEGY

RAIL ELEMENT

Source: BRW, Inc.

Date: February 2000

DART BUS·RAIL·HOV

Exhibit 2

**Conditions for Final Approval of the UD/Texas Stadium Alignment**

1. The UD/Texas Stadium route will be advanced into preliminary engineering upon receipt of a Irving City Council resolution indicating the City's concurrence with the conditional approval approach and its intent to enter into an interlocal agreement described below. The alignment will also be the subject of a city-sponsored comprehensive land use planning study that will focus on the opportunities for transit oriented development associated with the alignment. DART anticipates that this study and the early stages of the preliminary engineering effort will be completed before December 1, 2000.

2. DART and the City of Irving shall negotiate and execute an interlocal agreement before December 1, 2000 that sets out DART's obligations and Irving's obligations for funding the UD/Texas Stadium alignment. This agreement will also reflect the standard practices and procedures to be followed throughout the project development process. Such agreement will also specify the nature and extent of the financial participation of any other person or entity.

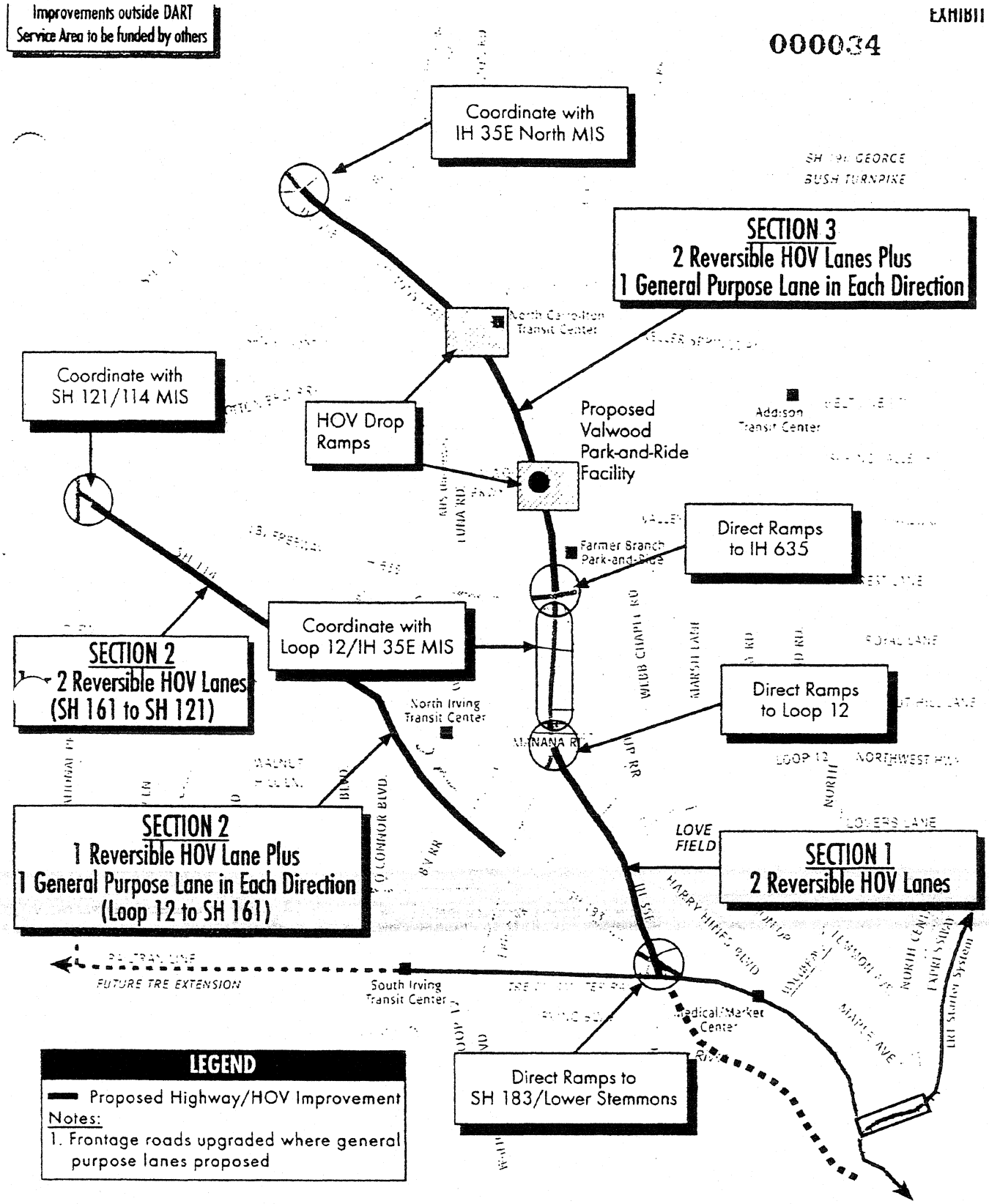
3. The City of Irving will be responsible for $60 million (in 1999 dollars) toward the implementation of the UD/Texas Stadium alignment. DART shall be responsible for the remainder of the costs. The City of Irving 's share may come from a variety of funding sources.

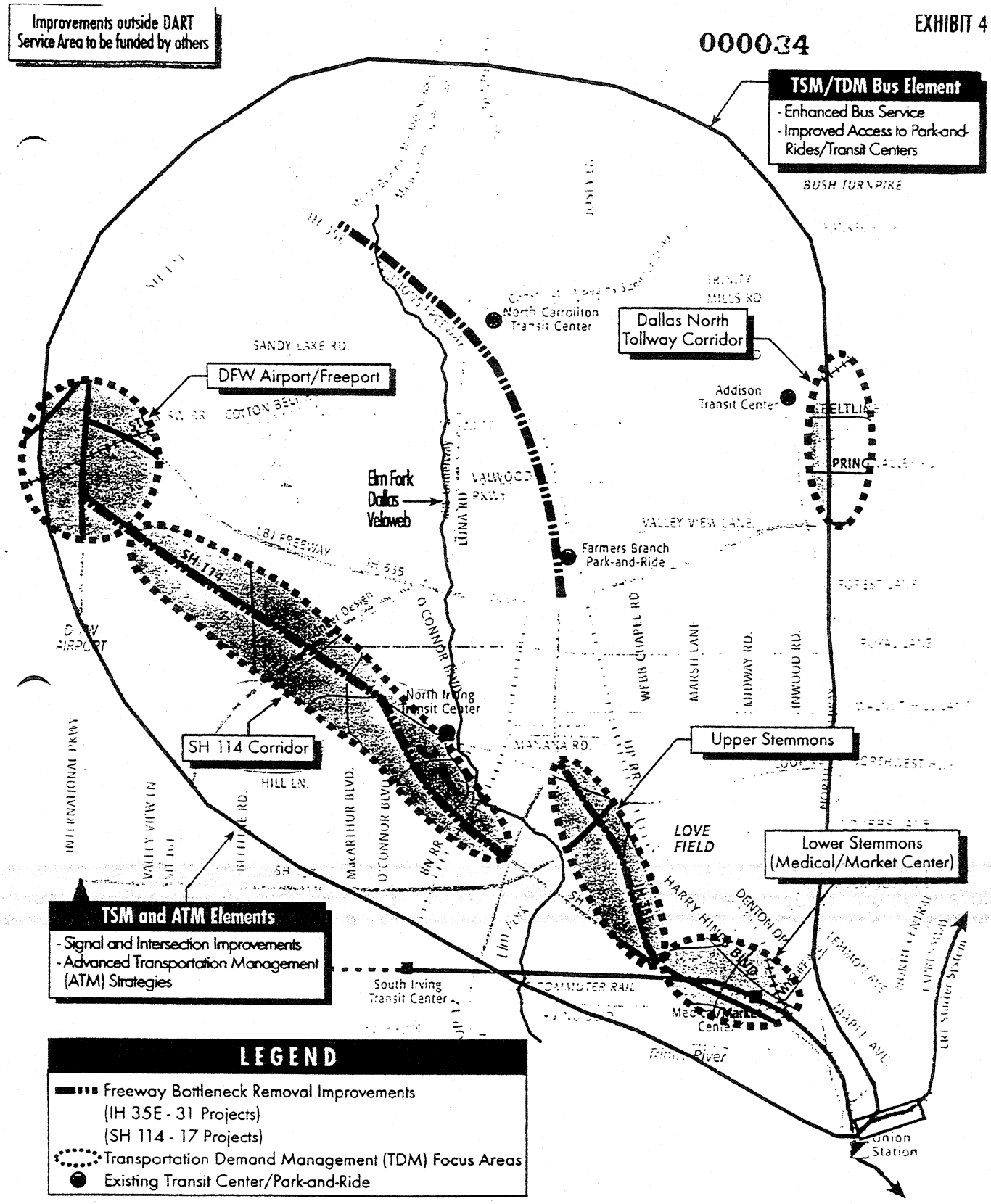
4. Irving's responsibilities can be met through cost reductions, as well as direct contributions. Several sources of potential funding are within Irving's direct control. These include right-of-way and its acquisition and Local Assistance Program funds. Cost reductions would be counted only for elements of the project that would otherwise be a direct cost to DART. Existing interlocal agreements currently being used to develop the light rail system in other cities will be followed in defining some of these cost elements. Other sources of potential funding include Dallas County, the Regional Transportation Council, the Las Colinas Tax Increment Financing District, and land owners or developers who will benefit from the UD/Texas Stadium alignment. DART's member cities will coordinate their efforts with DART prior to taking any action regarding federal funding.

5. The cost difference between the Manana and UD/Texas Stadium alignments is estimated to be between $90 - $110 million calculated in 1999 dollars. For the purposes of this agreement the difference is set at $90 million.

6. The UD/Texas Stadium alignment will continue in preliminary engineering after December 1, 2000 only if all of the outside funding commitments have been executed. If an agreement is not reached by December 1, 2000, work on the UD/Texas Stadium alignment will stop and the Manana alignment will be reconsidered as the preferred alignment for this section of the corridor.

7. The UD/Texas Stadium alignment will be advanced into the final design phase of project development only after the additional funding has been secured. The ILA will define what will be considered secured.


Improvements outside DART Service Area to be funded by others
Coordinate with IH 35E North MIS
SECTION 3
2 Reversible HOV Lanes Plus
1 General Purpose Lane in Each Direction
Coordinate with SH 121/114 MIS
HOV Drop Ramps
Proposed Valwood Park-and-Ride Facility
Direct Ramps to IH 635
Coordinate with Loop 12/IH 35E MIS
SECTION 2
2 Reversible HOV Lanes
(SH 161 to SH 121)
Direct Ramps to Loop 12
SECTION 2
1 Reversible HOV Lane Plus
1 General Purpose Lane in Each Direction
(Loop 12 to SH 161)
SECTION 1
2 Reversible HOV Lanes
Direct Ramps to SH 183/Lower Stemmons
FUTURE TRE EXTENSION
LEGEND
Proposed Highway/HOV Improvement
Notes:
1. Frontage roads upgraded where general purpose lanes proposed
LOCALLY PREFERRED INVESTMENT STRATEGY
HIGHWAY/HOV ELEMENT
Source: BRW, Inc.
Date: January 2000




NW CORRIDOR MIS

LOCALLY PREFERRED INVESTMENT STRATEGY

TSM/CMS ELEMENT

Source: BRW, Inc.

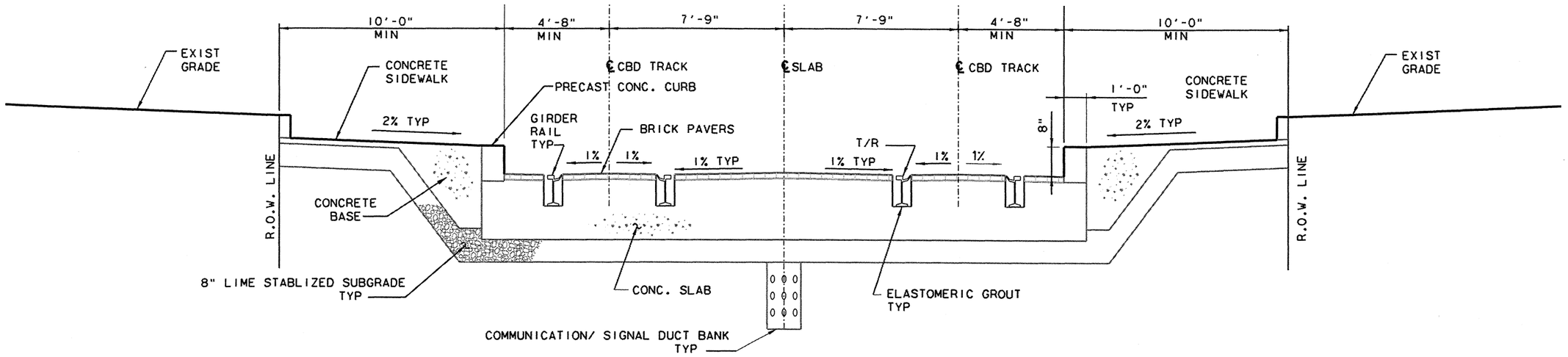
Date: January 2000

DART

# Appendix F

# LPIS Rail Element
# LRT Plan and Profile

DART Northwest Corridor
MIS Final Report




## TYPICAL LRT SECTION IN ROAD R.O.W. NEAR STARTER SYSTEM

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D&M GROUP BRW
A DAMES & MOORE GROUP COMPANY
1545 WOODALL RODGERS FWY-SUITE 1020 DALLAS, TEXAS 75201

DART PROJECT

DART

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| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

DAES

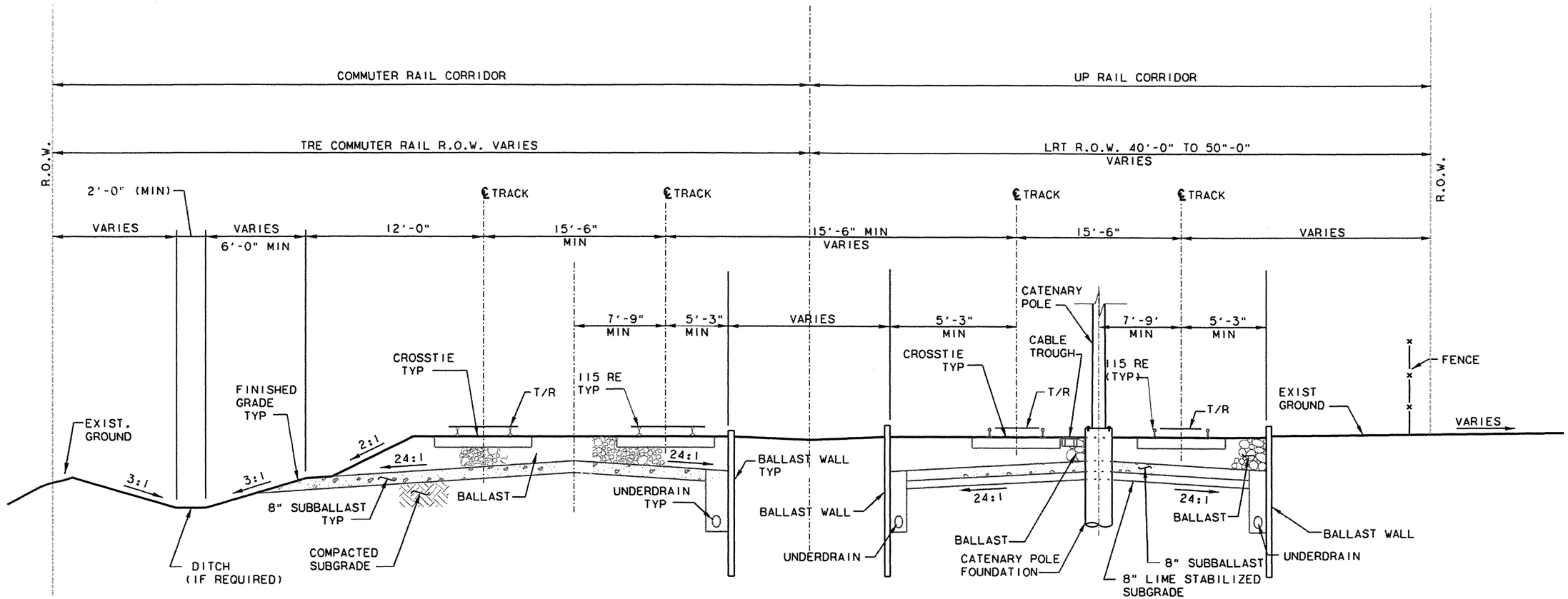
CONTRACT SHEET No. *1 OF 14*

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION AT STARTER SYSTEM AREA*

CONTRACT | DWG No. *UPRR-CS-FR-01* | REV

DWG No.

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STA. 35+00 — 135+00

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DCM GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1000 DALLAS, TEXAS 75201

DART PROJECT

DART

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| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

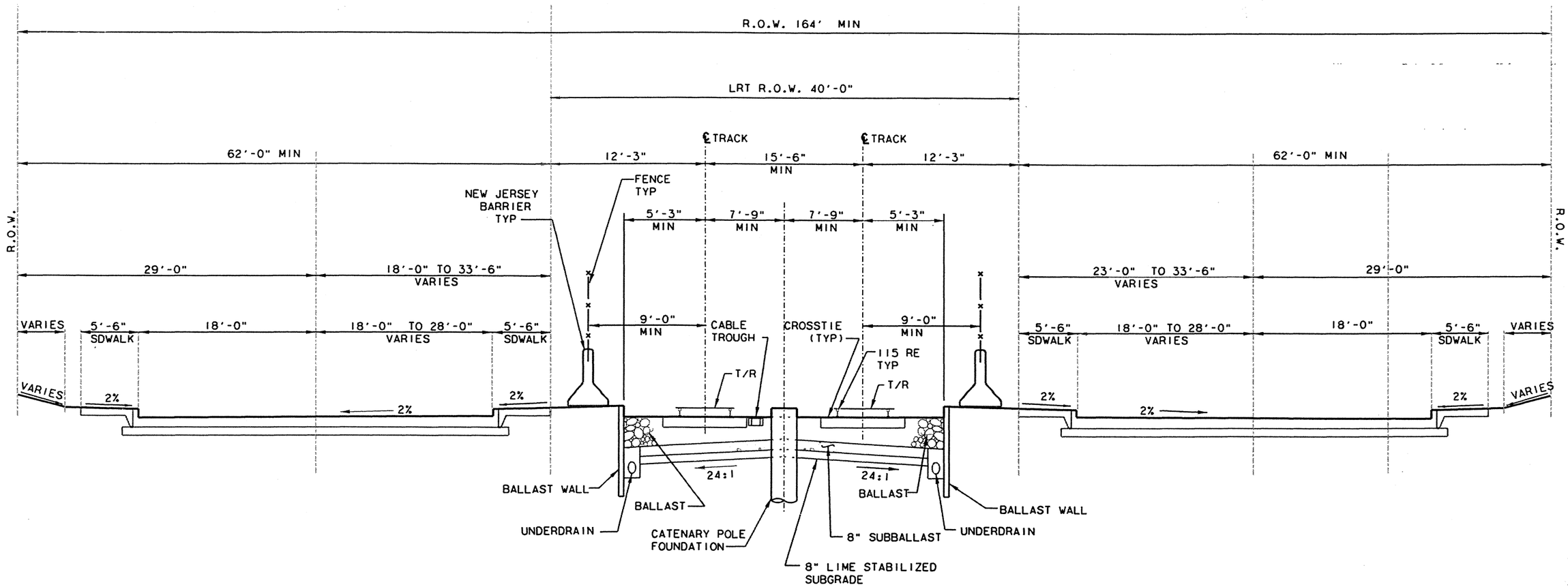
CONTRACT SHEET No. 2 OF 14

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION*

*ADJACENT TO TRE LINE*

CONTRACT | DWG No. *UPRR-CS-FR-02* | REV




## TYPICAL LRT SECTION IN ROAD ROW

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STA. 290+00 — 340+00 ON ROYAL LN BLVD, W.

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DCM GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1000 DALLAS, TEXAS 75201

DART PROJECT

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| SCALE | NO SCALE |
| DRAWN | E ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

CAES

CONTRACT SHEET No. 3 OF 14

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION*

*HARRY HINES & ROYAL LANE*

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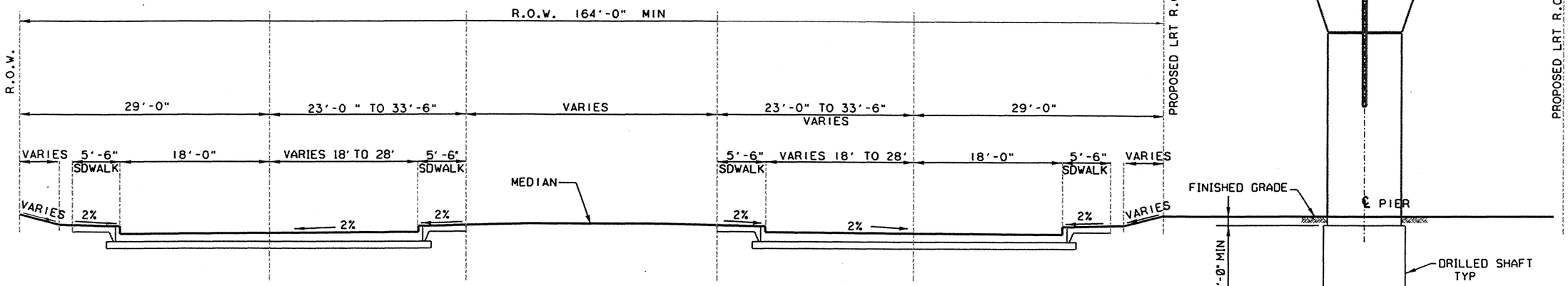


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DM GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1200 DALLAS, TEXAS 75201

DART PROJECT

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| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

CAES

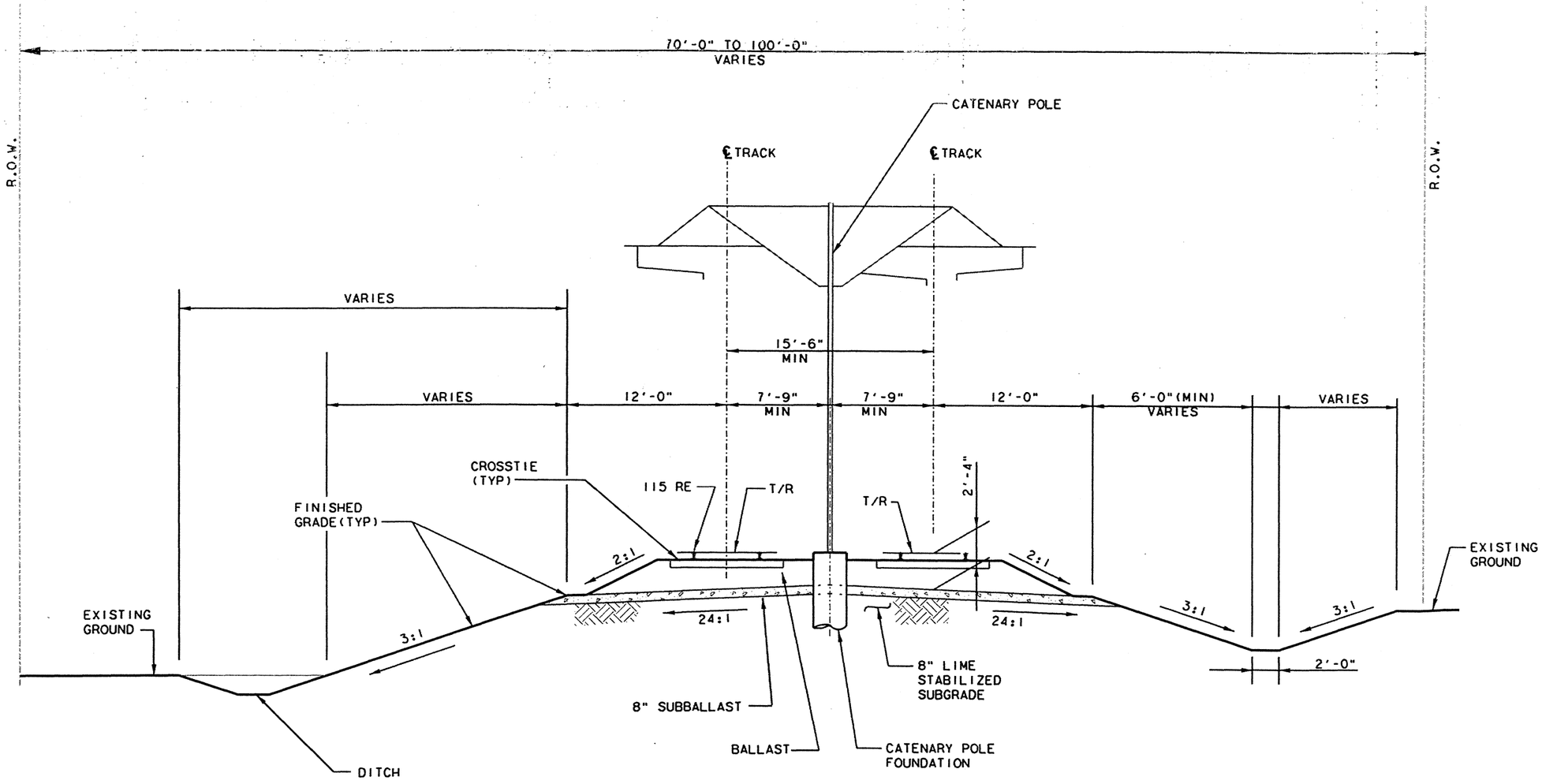
CONTRACT SHEET No. 4 OF 14

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION*

*HARRY HINES CORRIDOR*

CONTRACT | DWG No. *UPRR-CS-FR-04* | REV

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STA. 0+00 — 290+00 DFW/TEXAS STADIUM CORRIDOR
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DCM GROUP BRW
A DAMES & MOORE GROUP COMPANY
1645 WOODALL RODGERS FWY-SUITE 1020 DALLAS, TEXAS 75201

DART PROJECT

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| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

CONTRACT SHEET No. *5 OF 14*

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION*

*LRT MAINLINE TRACK SECTION*

CONTRACT | DWG No. *UPRR-CS-FR-05* | REV

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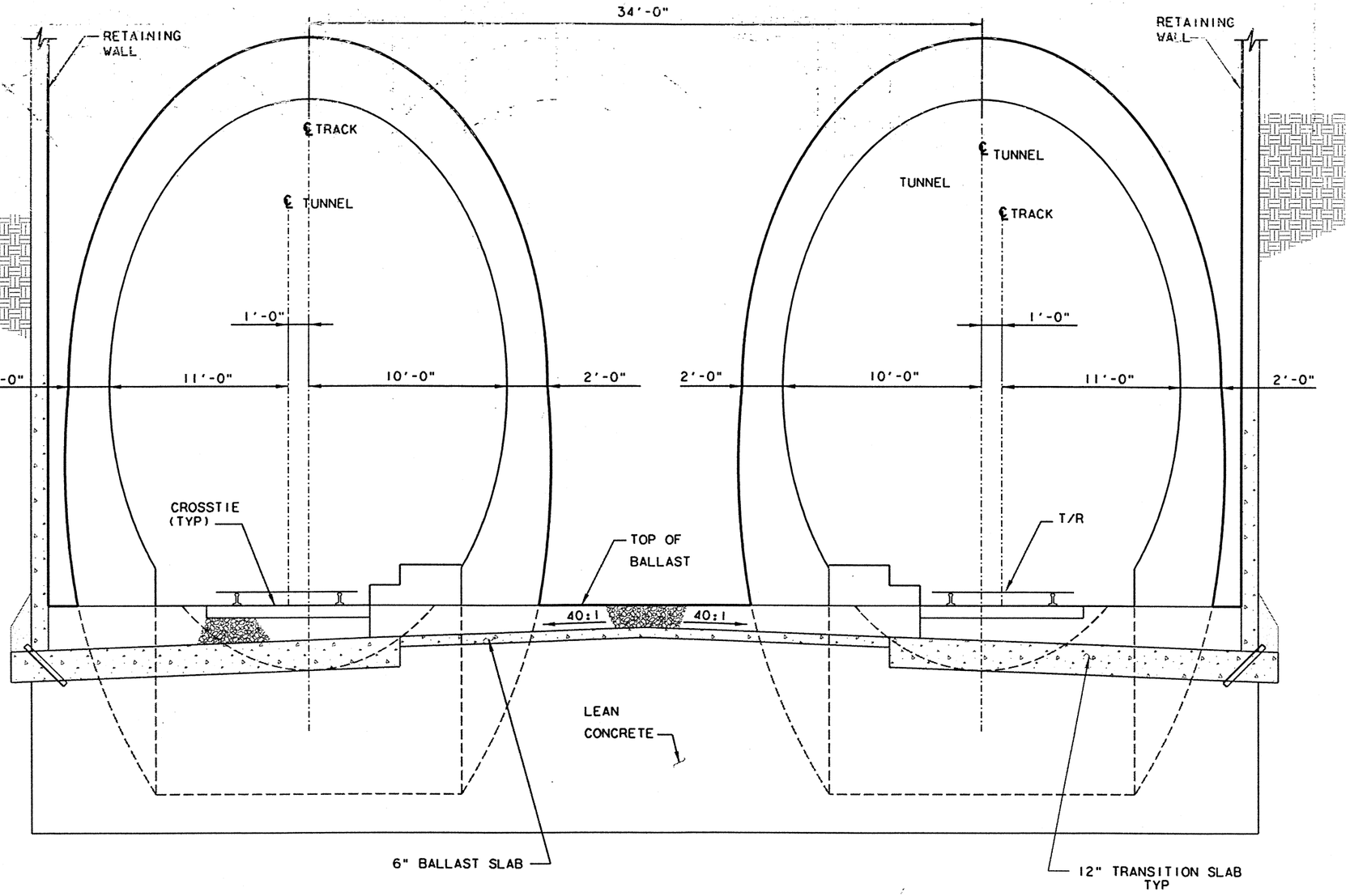


## TYPICAL LRT TUNNEL SECTION NEAR DENTON DRIVE/MOCKINGBIRD LANE

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D&M GROUP BRW A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1020 DALLAS, TEXAS 75201

DART PROJECT

DART

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| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

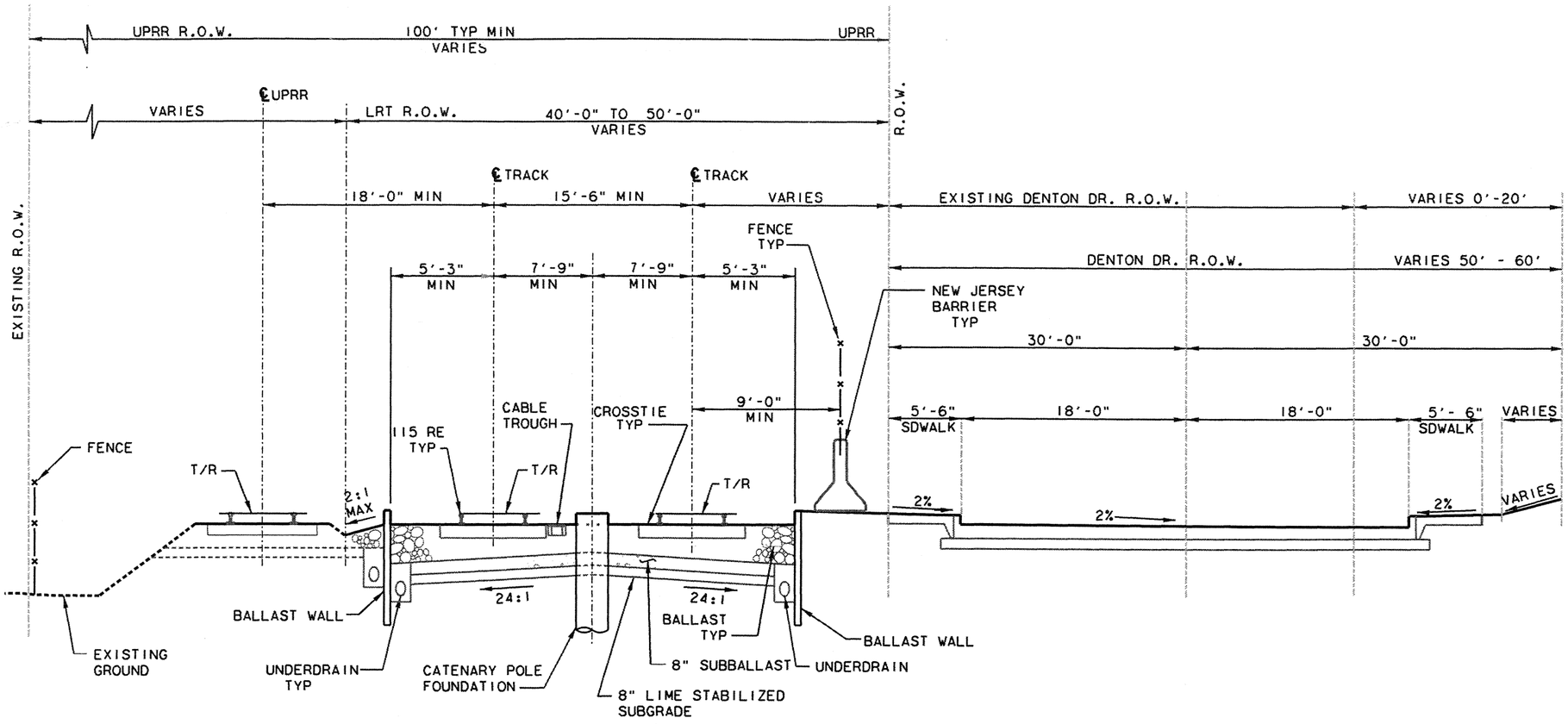
CONTRACT SHEET No. 6 OF 14

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT TUNNEL-SECTION*

*DENTON / MOCKINGBIRD AREA*

CONTRACT | DWG No. *UPRR-CS-FR-14* | REV




## TYPICAL LRT SECTION ADJACENT TO DENTON DRIVE

STA. 273+00 — 381+00

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D&M GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1000 DALLAS, TEXAS 75201

DART PROJECT

DART

| | |
|---|---|
| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

CAES

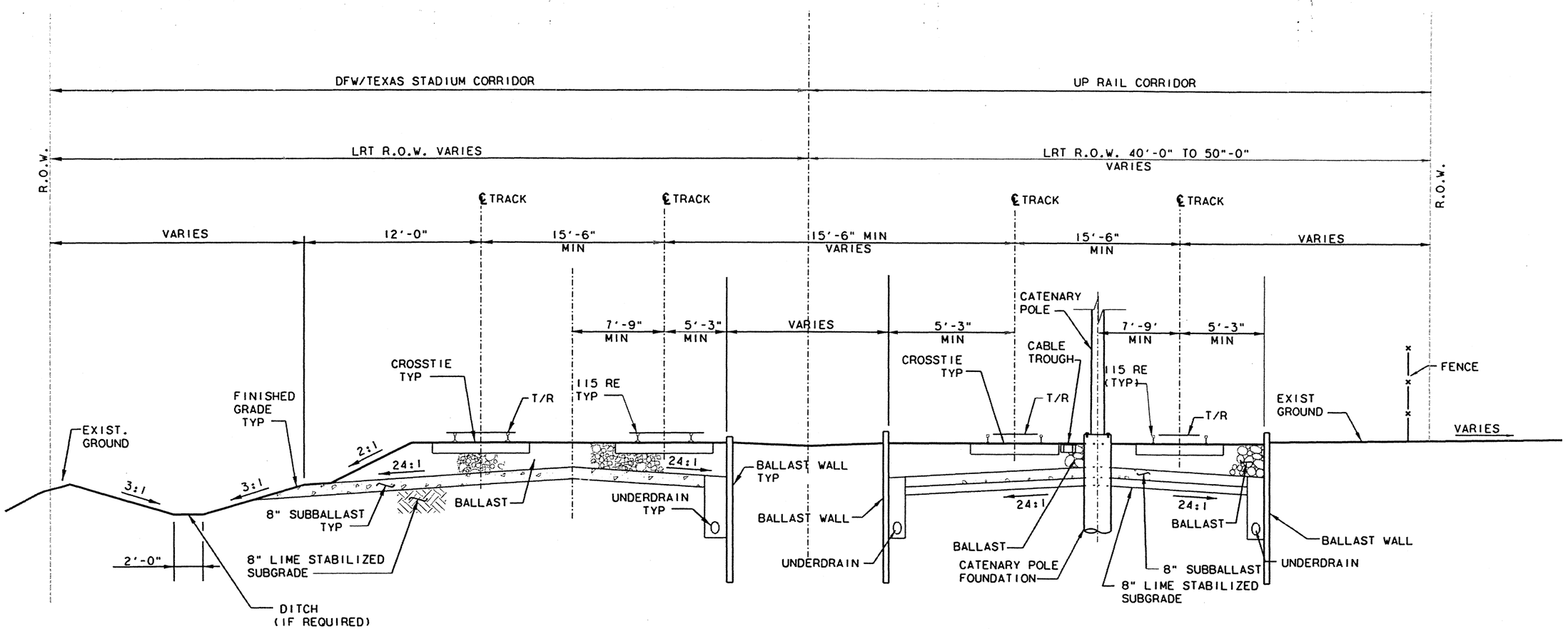
CONTRACT SHEET No. 7 OF 14

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION*

*UPRR CORRIDOR*
*EMPIRE CENTRAL TO WEBB CHAPEL*

CONTRACT | DWG No. *UPRR-CS-FR-07* | REV




## TYPICAL LRT SECTION AT NORTHWEST HIGHWAY STATION AREA

STA. 395+00 — 406+00

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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DCM GROUP BRW A DAMES & MOORE GROUP COMPANY
1945 WOODALL RODGERS FWY-SUITE 1020 DALLAS TEXAS 75201

DART PROJECT

DART

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|---|---|
| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

DAES

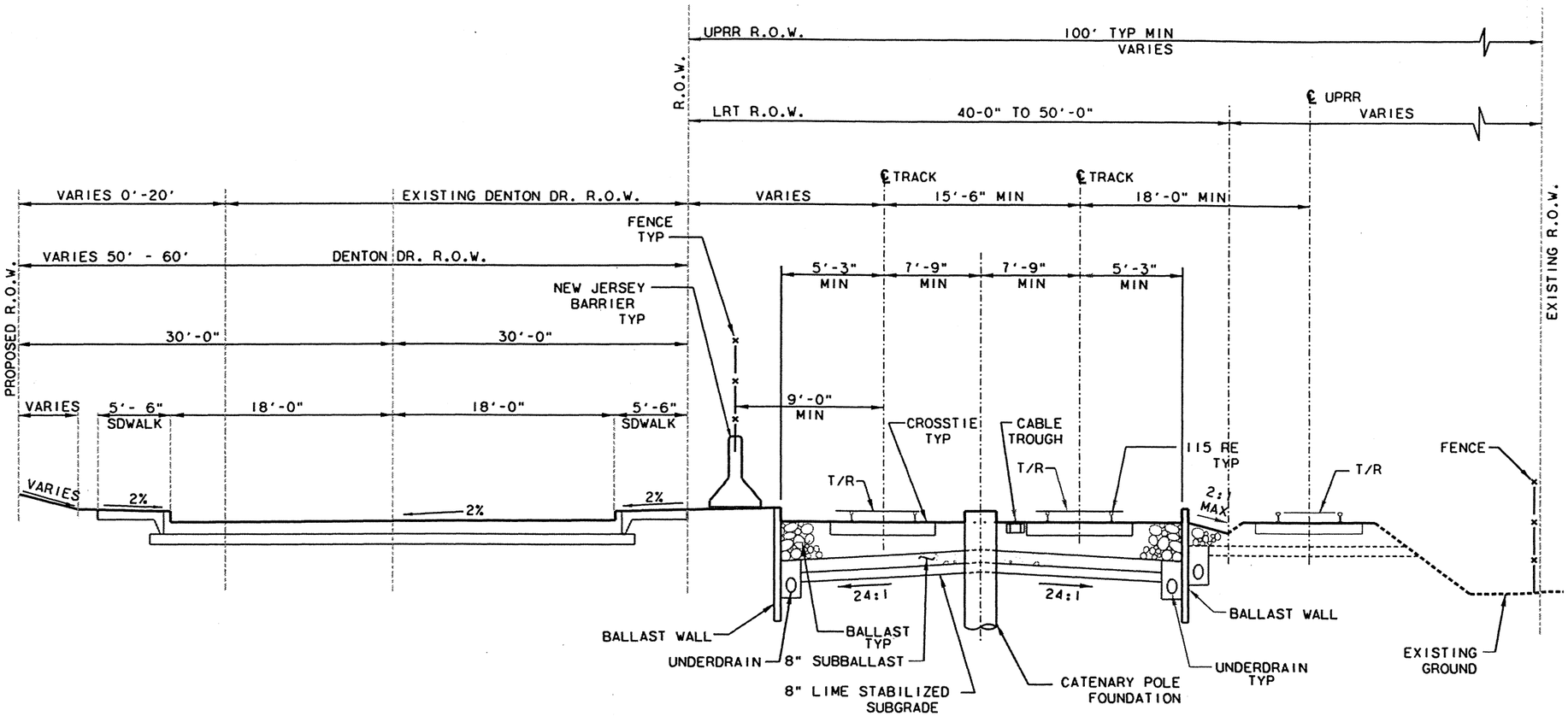
CONTRACT SHEET No. 8 OF 14

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION*

*NORTHWEST HIGHWAY STATION AREA*

CONTRACT | DWG No. *UPRR-CS-FR-08* | REV




## TYPICAL LRT SECTION ADJACENT TO DENTON DRIVE

STA. 420+00 — 950+00

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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D&M GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1020 DALLAS, TEXAS 75201

DART PROJECT

DART

CAES

| | |
|---|---|
| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

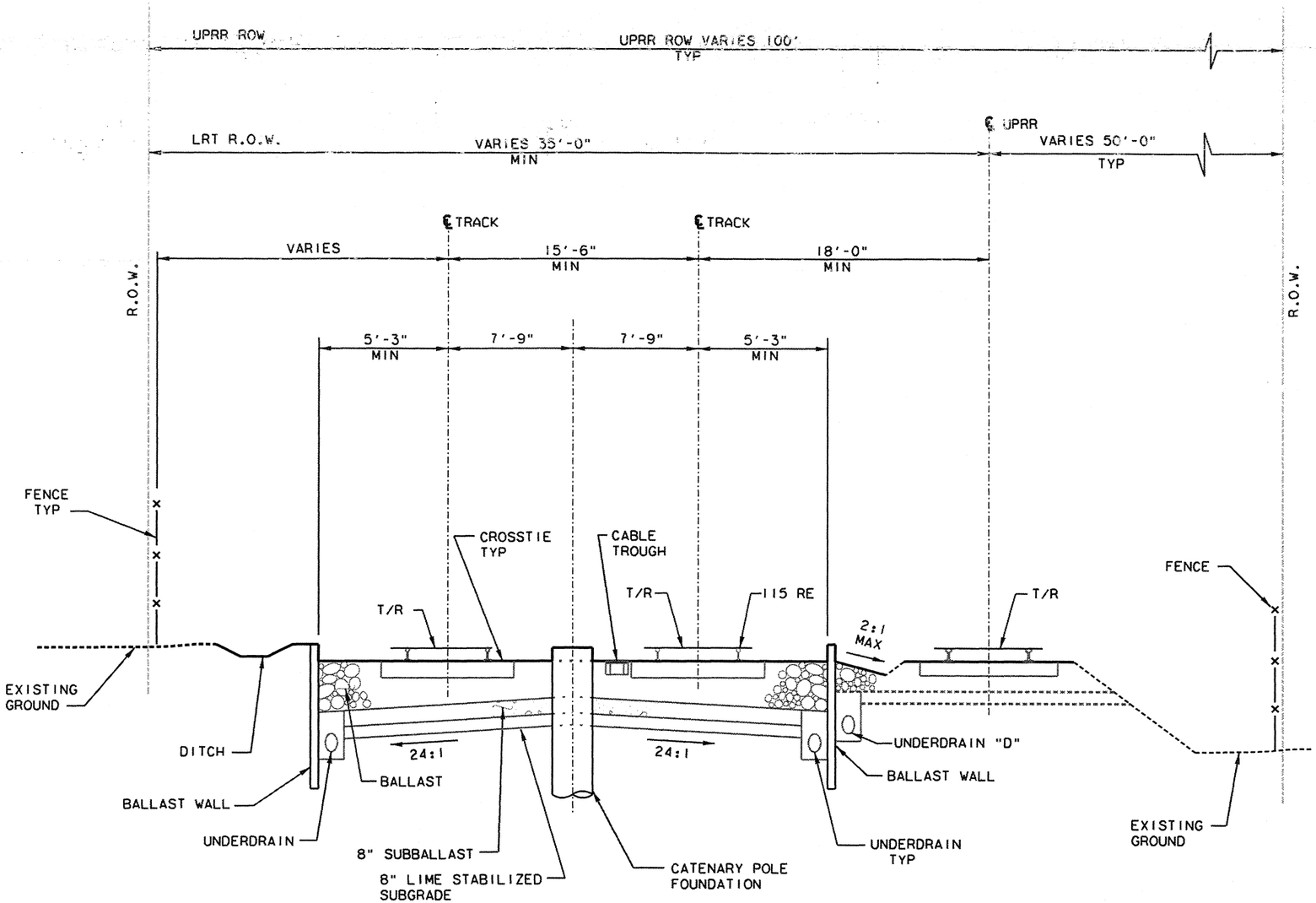
CONTRACT SHEET No. *9 of 14*

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION*

*UPRR CORRIDOR*
*STORY ROAD TO GEORGE BUSH TURNPIKE*

CONTRACT | DWG No. *UPRR-CS-FR-09* | REV




# TYPICAL LRT SECTION GEORGE BUSH TO FRANKFORD TURNPIKE

STA. 950+00 — 959+00

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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D&M BRW
GROUP
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1020
DALLAS, TEXAS 75201

DART PROJECT

DART

| | |
|---|---|
| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

CAES

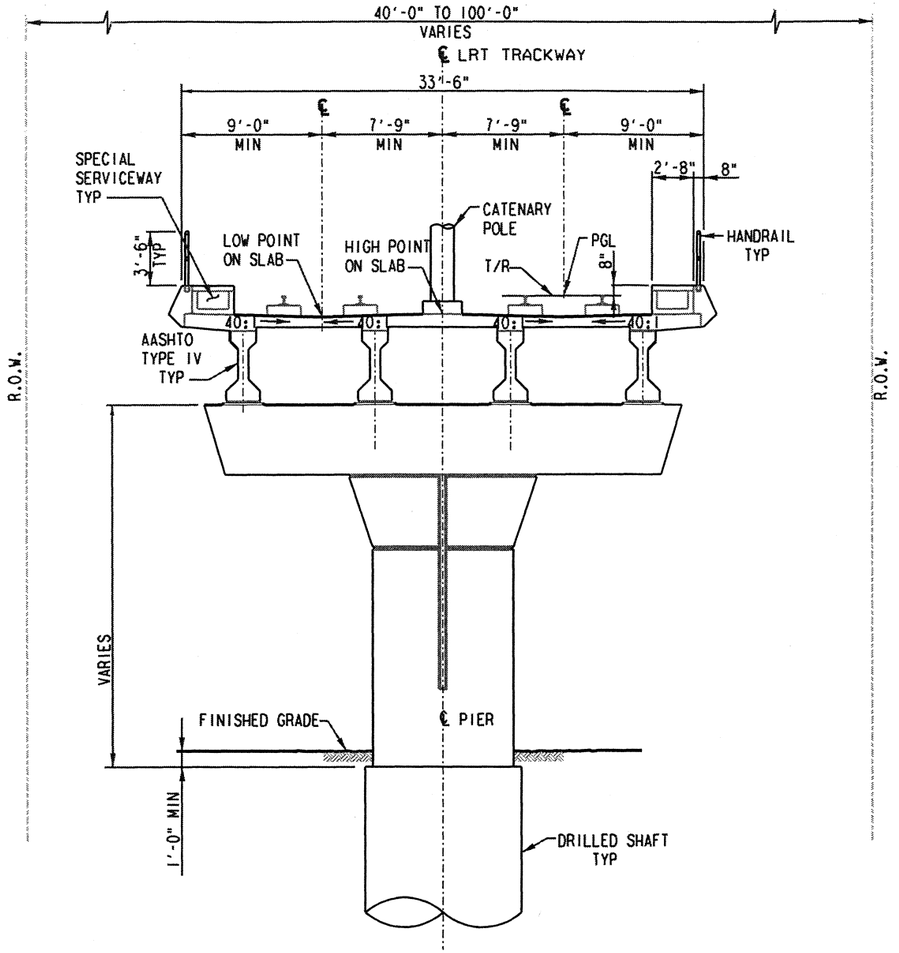
CONTRACT SHEET No. *10 OF 14*

*NORTHWEST CORRIDOR MIS*

*FRANKFORD TO GEORGE BUSH TURNPIKE*

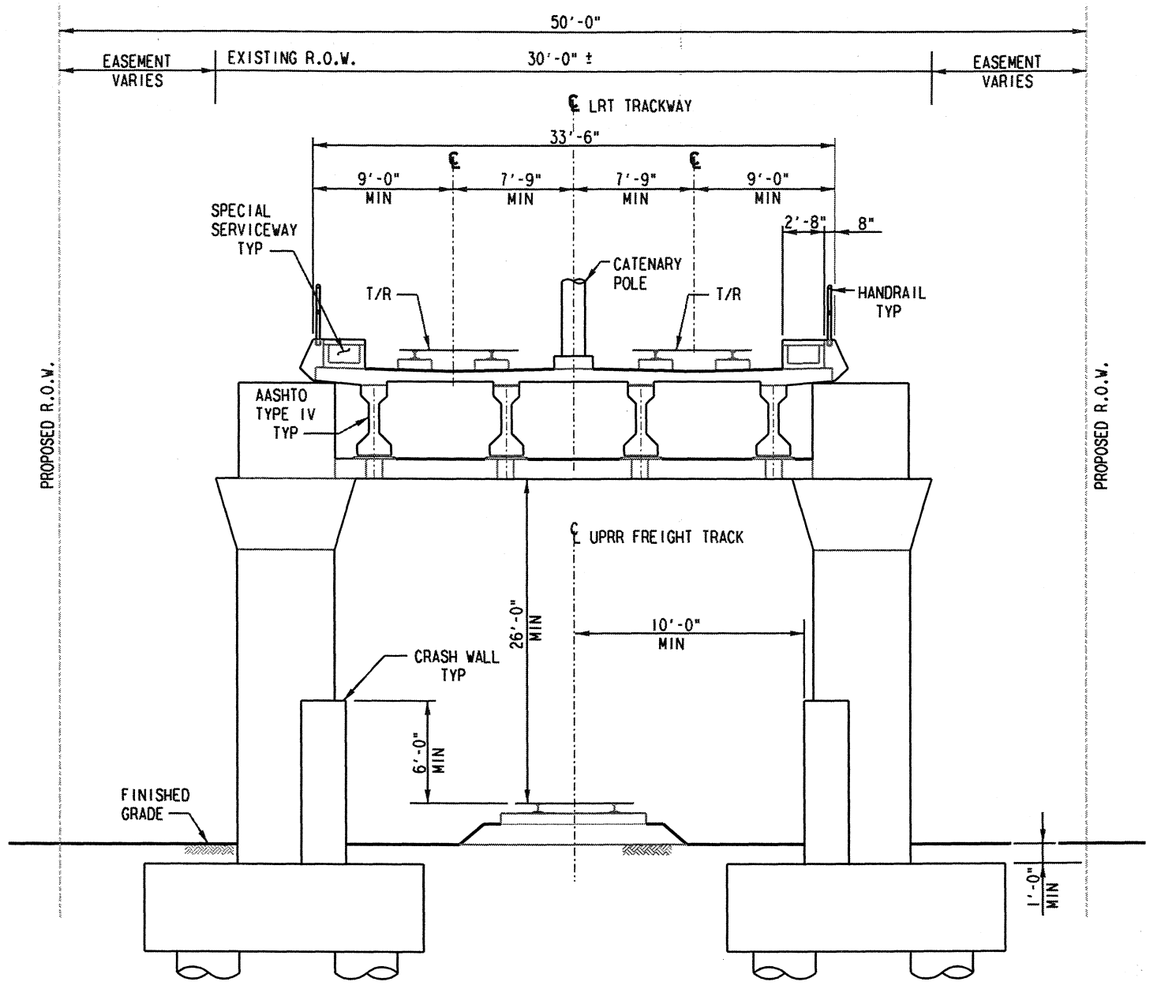
*TYPICAL LRT CROSS-SECTION UPRR CORRIDOR*

CONTRACT | DWG No. *UPRR-CS-FR-10* | REV




## TYPICAL LRT ELEVATED TRACK SECTION OVER ROADWAY

UPRR AND DFW / TEXAS CORRIDOR




## TYPICAL LRT ELEVATED TRACK SECTION OVER UPRR

STA. 406+00 — 426+00

UPRR CORRIDOR

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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D&M GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1020 DALLAS, TEXAS 75201

DART PROJECT

DART

| | |
|---|---|
| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

CAES

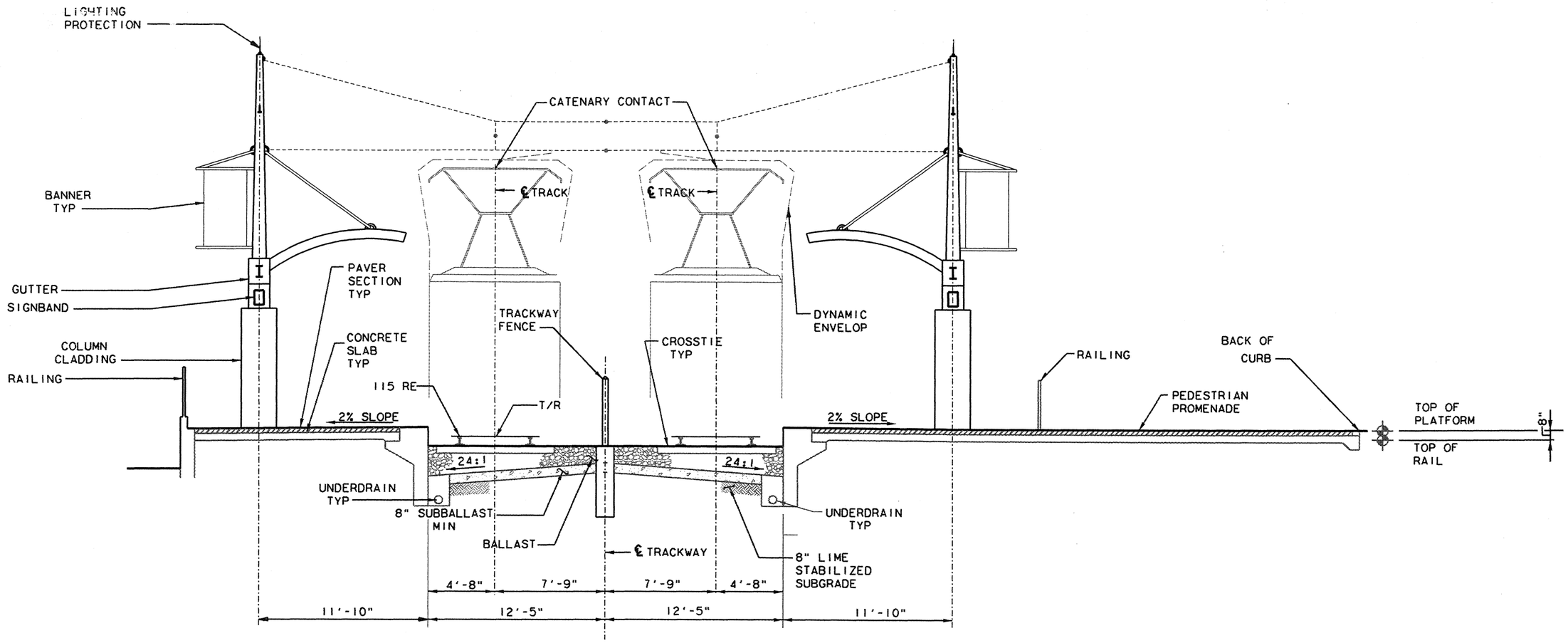
CONTRACT SHEET No. *11 OF 14*

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION*

*ELEVATED TRACK SECTIONS*

CONTRACT | DWG No. *UPRR-CS-FR-11* | REV




## TYPICAL AT GRADE STATION SECTION IN CBD AND DEVELOPED AREAS

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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DCM GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1020 DALLAS, TEXAS 75201

DART PROJECT

DART

| | |
|---|---|
| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

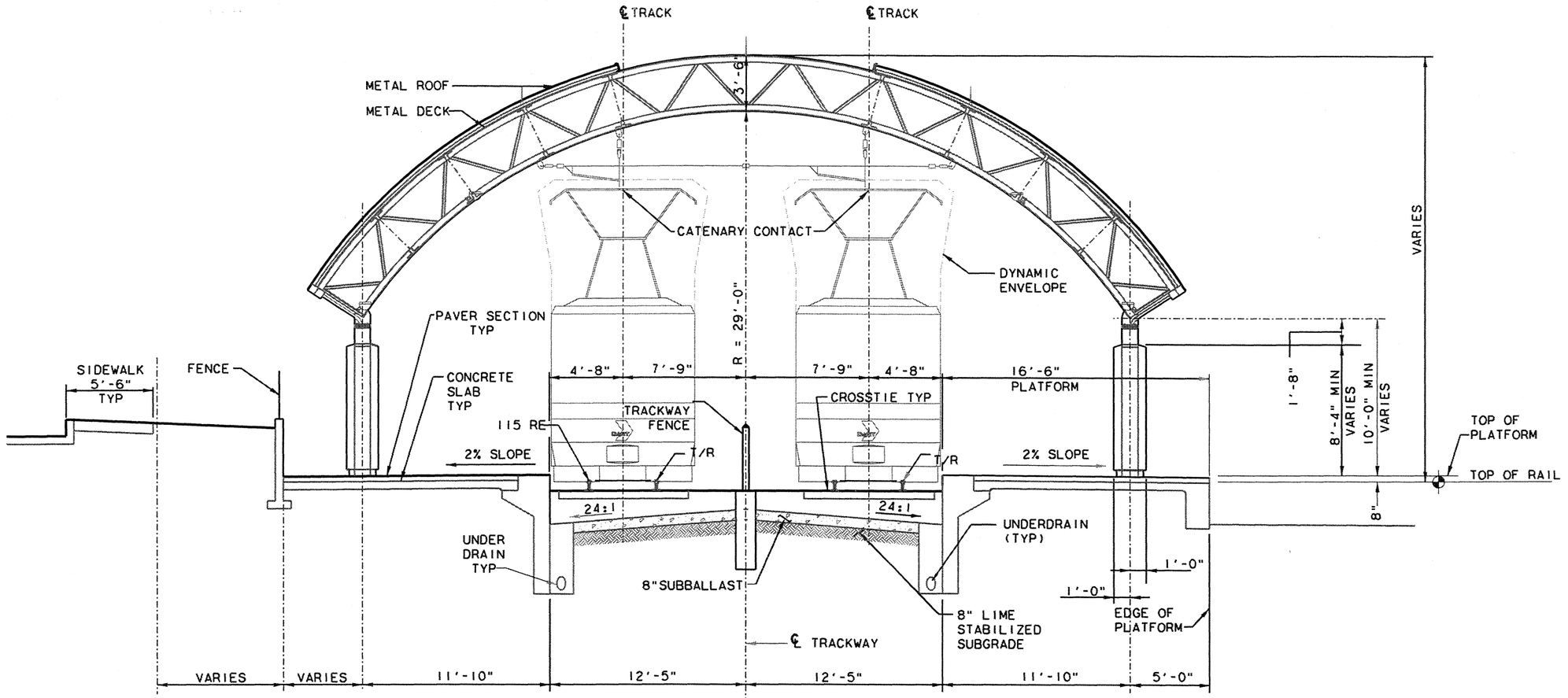
CAES

CONTRACT SHEET No. *12 OF 14*

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION AND GRADE STATION CBD DEVELOPED AREAS*

CONTRACT | DWG No. *UPRR-CS-FR-12* | REV




## TYPICAL AT-GRADE STATION SECTION ON MAINLINE TRACK

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BRW
A DAMES & MOORE GROUP COMPANY
1645 WOODALL RODGERS FWY-SUITE 1020
DALLAS, TEXAS 75201

DART PROJECT

DART

| | |
|---|---|
| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

CAES

CONTRACT SHEET No. *13 OF 14*

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION*

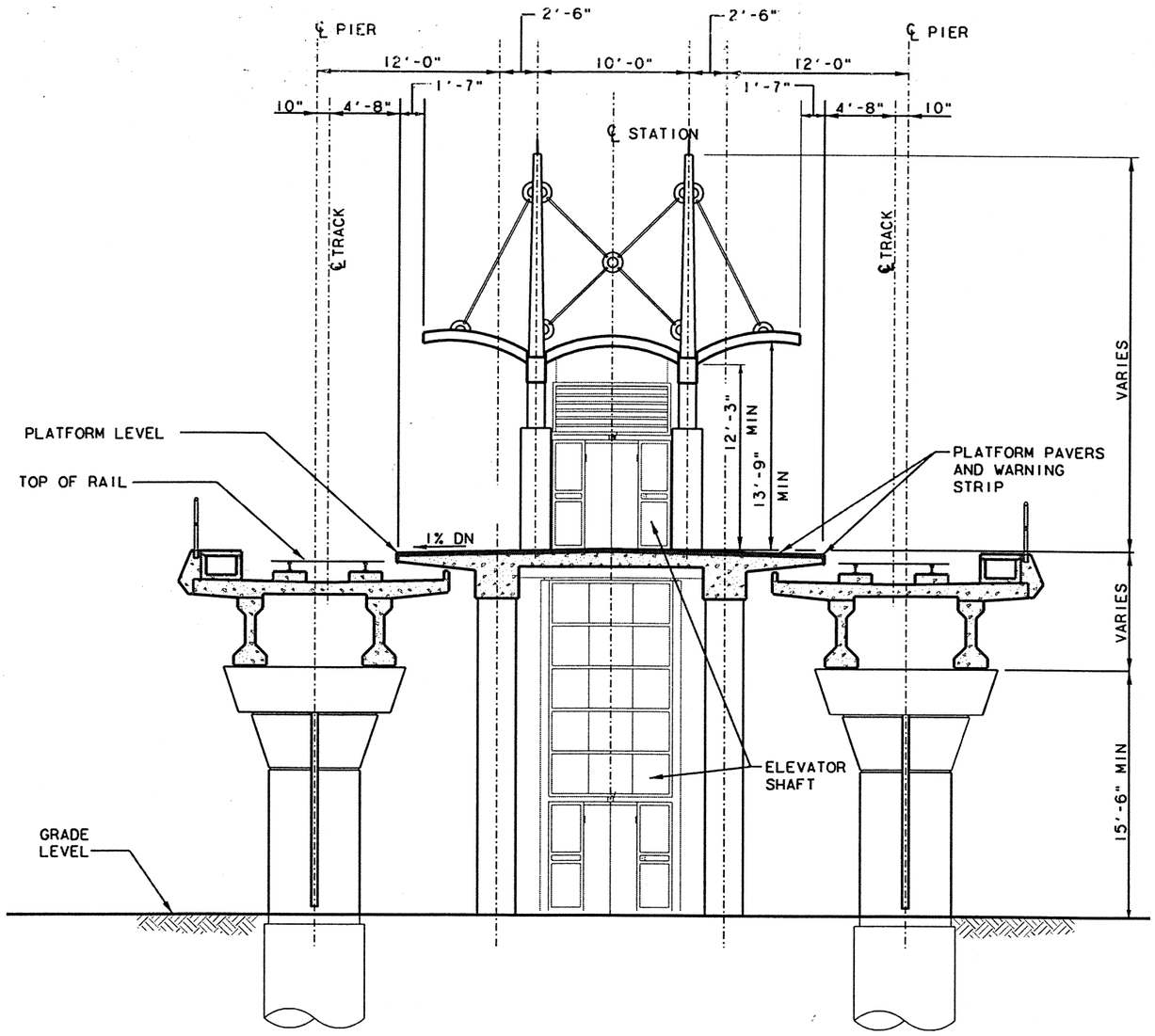
*AT-GRADE STATION ON MAINLINE TRACK*

CONTRACT

DWG No. *UPRR-CS-FR-13*

REV

DWG No. UPRR-CS-FR-14




## TYPICAL LRT ELEVATED STATION SECTION

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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D&M GROUP BRW
A DAMES & MOORE GROUP COMPANY
1545 WOODALL RODGERS FWY-SUITE 1000 DALLAS, TEXAS 75201

DART PROJECT

DART

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|---|---|
| SCALE | NO SCALE |
| DRAWN | E. ALFARO |
| DESIGNED | I.J. THOMAS |
| CHECKED | BRW |
| IN CHARGE | R. PILGRIM |
| DATE | AUGUST 2000 |

DAES

CONTRACT SHEET No. *14 OF 14*

*NORTHWEST CORRIDOR MIS*

*TYPICAL LRT CROSS-SECTION*

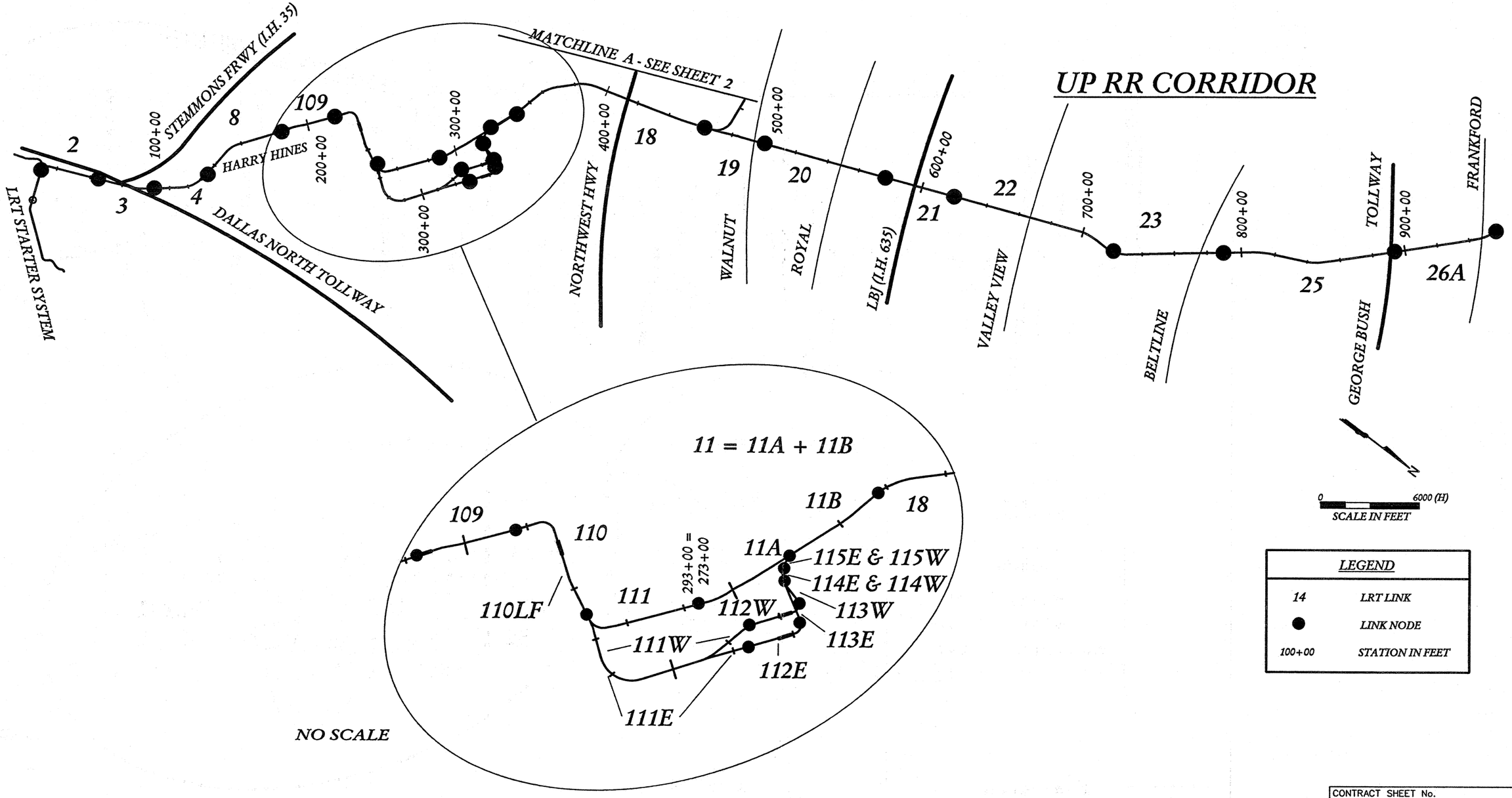
*UPRR CORRIDOR ELEVATED STATION SECTION*

CONTRACT | DWG No. *UPRR-CS-FR-14* | REV

DWG No. LINKS - 1

# LRT LINK DIAGRAM

## UP RAIL/ HARRY HINES CORRIDOR




| LEGEND | |
|---|---|
| 14 | LRT LINK |
| ● | LINK NODE |
| 100+00 | STATION IN FEET |

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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WENDY LOPEZ & ASSOCIATES, INC.
engineering/environmental/surveying/
construction services
1825 MARKET CENTER BLVD. - SUITE 530
DALLAS, TEXAS
(214) 741-7777

BRW
A DAMES & MOORE GROUP COMPANY
1645 WOODALL RODGERS FWY.-SUITE 1020
DALLAS, TEXAS 75201

DART PROJECT

| | |
|---|---|
| SCALE | AS NOTED |
| DRAWN | WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | WLA |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. LINKS - 1 OF 2

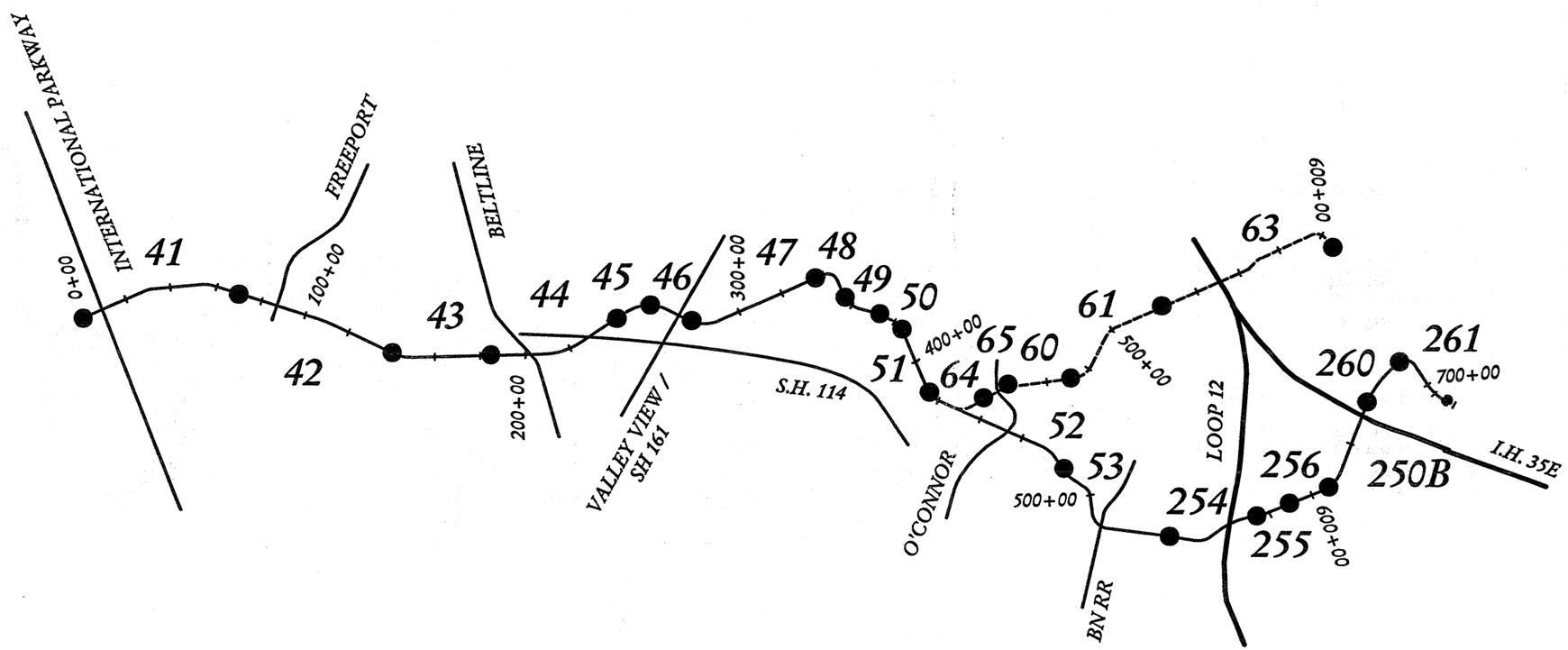
NORTHWEST CORRIDOR MIS

LRT SCHEMATIC ALIGNMENT-
LINK DIAGRAM
UP RAIL/HARRY HINES CORRIDOR

CONTRACT | DWG No. LINKS - 1 | REV

DWG No. LINKS-2

# LRT LINK DIAGRAM
# DFW / TEXAS STADIUM CORRIDOR



**LEGEND**

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|---|---|
| 14 | LRT LINK |
| ● | LINK NODE |
| 100+00 | STATION IN FEET |
| ——— | DFW/ TX STADIUM CORRIDOR |
| - - - - | MANANA CORRIDOR |

## DFW / TEXAS STADIUM CORRIDOR

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WENDY LOPEZ & ASSOCIATES, INC.
engineering/environmental/surveying/
construction services
3825 MARKET CENTER BLVD. - SUITE 510
DALLAS, TEXAS
(214) 741-7777

DEM GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1000
DALLAS, TEXAS 75201


DART PROJECT

DART

CAES

| | |
|---|---|
| SCALE | AS NOTED |
| DRAWN | WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | WLA |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CONTRACT SHEET No. LINKS - 2 OF 2

NORTHWEST CORRIDOR MIS

LRT SCHEMATIC ALIGNMENT-
LINK DIAGRAM
DFW / TEXAS STADIUM

| CONTRACT | DWG No. | REV |
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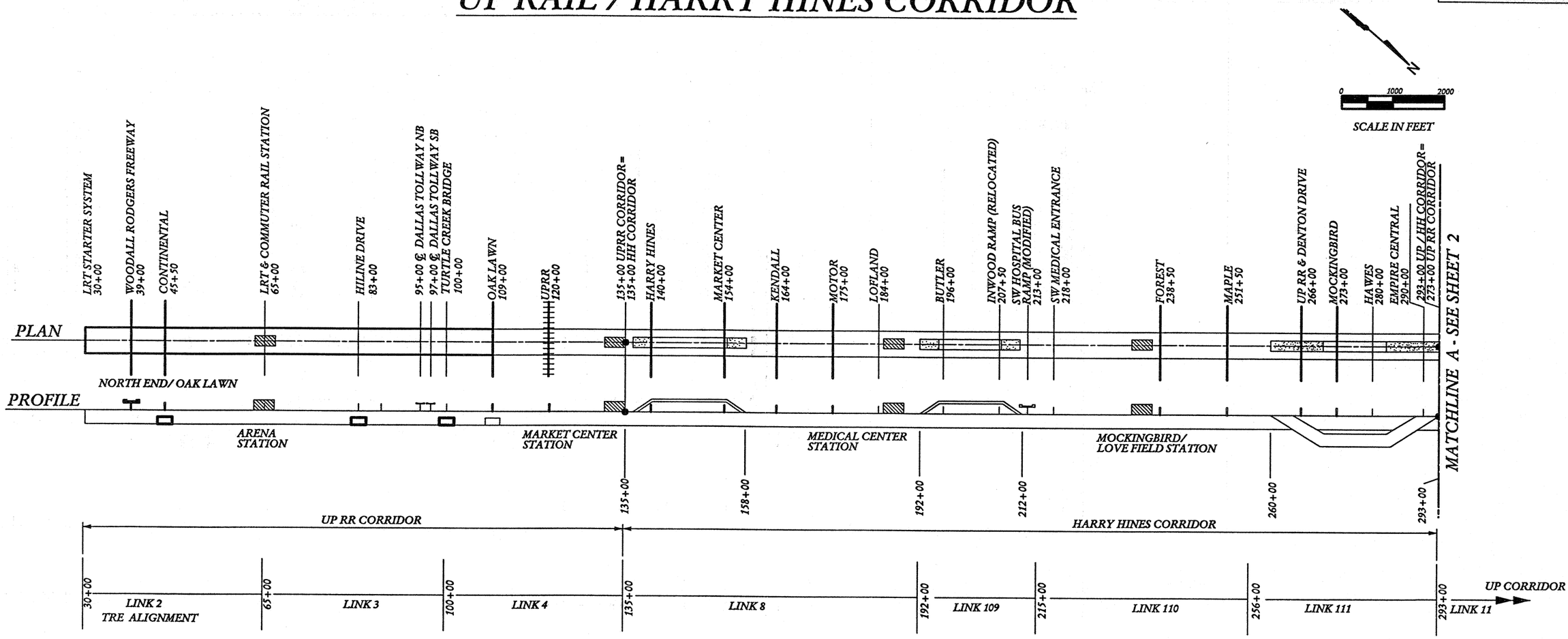
| | LINKS - 2 | |

DWG No. UPRR-HH-01

# UP RAIL / HARRY HINES CORRIDOR




## LEGEND

- TRACKWAY AT GRADE
- TRACKWAY ELEVATED WITH (WITHOUT) RETAINED FILL APPROACHES
- TRACKWAY IN TUNNEL
- TARGETED STATION AREA
- CROSSING (MINOR STREET/PRIVATE RD.)
- CROSSING (MAJOR ARTERIAL)
- RAILROAD CROSSING
- ROAD GRADE SEPARATION
- NEW GRADE SEPARATION
- EXISTING BRIDGE
- NEW BRIDGE
- COMMON POINT OF TANGENCY (P.O.T.) FOR 2 OR MORE ROUTE OPTIONS
- 100+00 STATION IN FEET

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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WENDY LOPEZ & ASSOCIATES, INC.
engineering/environmental/surveying/ construction services
1825 MARKET CENTER BLVD. - SUITE 530
DALLAS, TEXAS
(214) 741-7777

D&M GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1220
DALLAS, TEXAS 75201


DART PROJECT

DART

| | |
|---|---|
| SCALE | AS NOTED |
| DRAWN | WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | WLA |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 1 of 7

## NORTHWEST CORRIDOR MIS

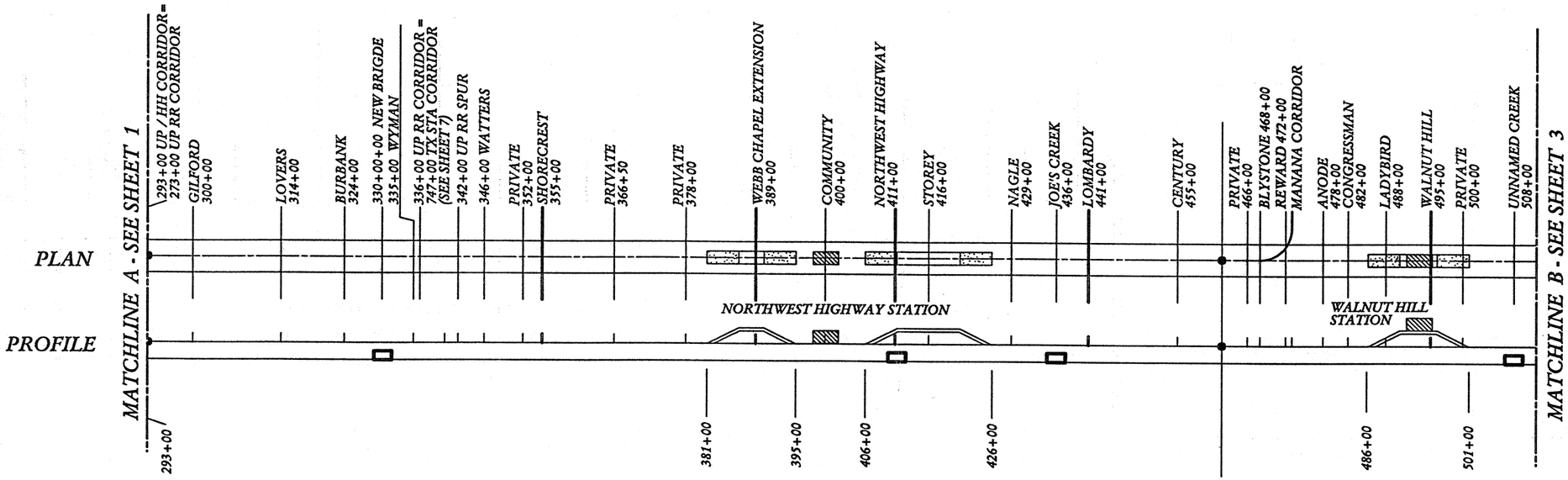
### LRT SCHEMATIC ALIGNMENT- UP RAIL/HARRY HINES CORRIDOR

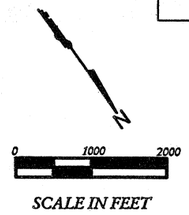
LINK NOS. 2, 3, 4, 8, 109, 110, 111, 11

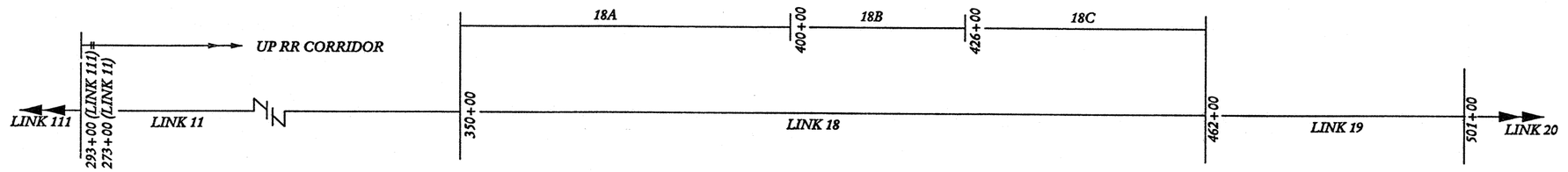
| CONTRACT | DWG No. UPRR-HH-01 | REV |
|---|---|---|

DWG No. UPRR-HH-02

# UP RAIL / HARRY HINES CORRIDOR




## LEGEND

- TRACKWAY AT GRADE
- TRACKWAY ELEVATED WITH (WITHOUT) RETAINED FILL APPROACHES
- TRACKWAY IN TUNNEL
- TARGETED STATION AREA
- CROSSING (MINOR STREET/PRIVATE RD.)
- CROSSING (MAJOR ARTERIAL)
- RAILROAD CROSSING
- ROAD GRADE SEPARATION
- NEW GRADE SEPARATION
- EXISTING BRIDGE
- NEW BRIDGE
- COMMON POINT OF TANGENCY (P.O.T.) FOR 2 OR MORE ROUTE OPTIONS
- 100+00 STATION IN FEET

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
|---|---|---|---|---|---|---|
| | | | | | | |

WENDY LOPEZ & ASSOCIATES, INC.
engineering/environmental/surveying/
construction services
1825 MARKET CENTER BLVD. - SUITE 510
DALLAS, TEXAS
(214) 741-7777

D&M GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY.-SUITE 1020
DALLAS, TEXAS 75201

DART PROJECT

DART

| | |
|---|---|
| SCALE | AS NOTED |
| DRAWN | WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | WLA |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 2 of 7

**NORTHWEST CORRIDOR MIS**

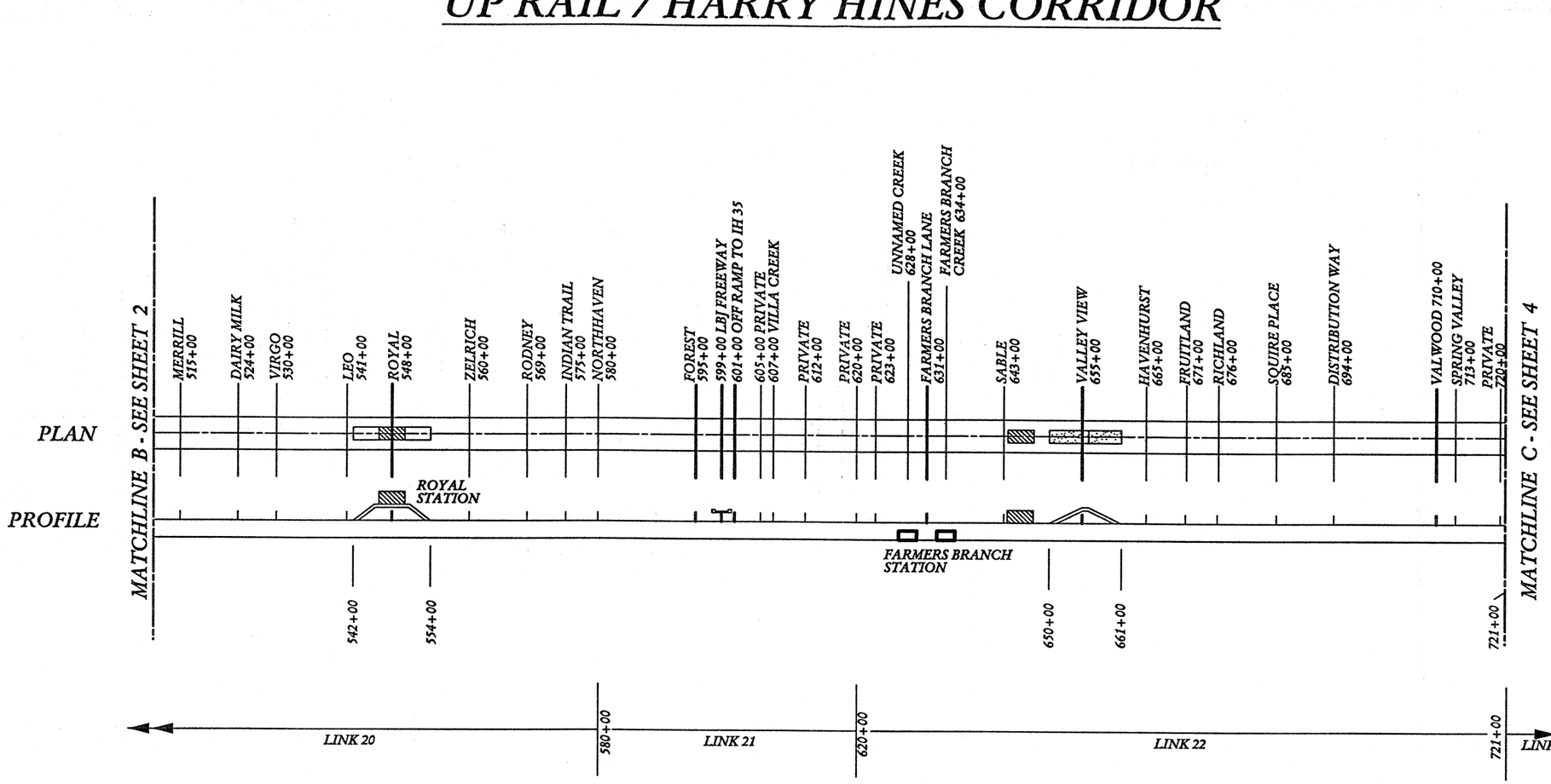
*LRT SCHEMATIC ALIGNMENT-*
*UP RAIL / HARRY HINES CORRIDOR*

*LINK NOS. 111, 11,18,19,20*

CONTRACT | DWG No. UPRR-HH-02 | REV

DWG No UPRR-HH-03

# UP RAIL / HARRY HINES CORRIDOR




## LEGEND

- TRACKWAY AT GRADE
- TRACKWAY ELEVATED WITH (WITHOUT) RETAINED FILL APPROACHES
- TRACKWAY IN TUNNEL
- TARGETED STATION AREA
- CROSSING (MINOR STREET/PRIVATE RD.)
- CROSSING (MAJOR ARTERIAL)
- RAILROAD CROSSING
- ROAD GRADE SEPARATION
- NEW GRADE SEPARATION
- EXISTING BRIDGE
- NEW BRIDGE
- COMMON POINT OF TANGENCY (P.O.T.) FOR 2 OR MORE ROUTE OPTIONS
- 100+00 STATION IN FEET

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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DALLAS, TEXAS
(214) 741-7777

D&M GROUP BRW
A DAMES & MOORE GROUP COMPANY
1845 WOODALL RODGERS FWY-SUITE 1000
DALLAS, TEXAS 75201


DART PROJECT

DART

| | |
|---|---|
| SCALE | AS NOTED |
| DRAWN | WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | WLA |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 3 of 7

**NORTHWEST CORRIDOR MIS**

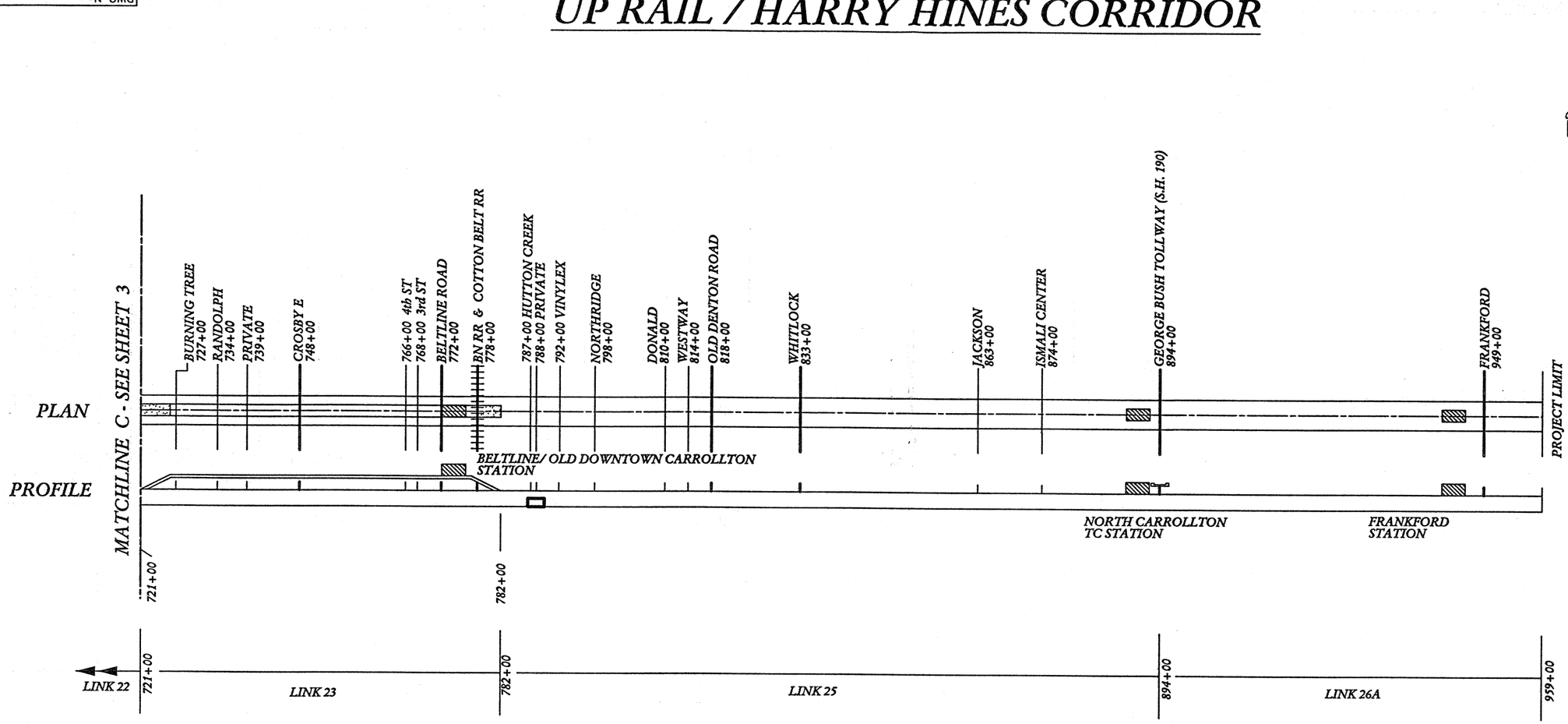
*LRT SCHEMATIC ALIGNMENT- UP RAIL / HARRY HINES CORRIDOR*

*LINK NOS. 20,21,22, 23*

| CONTRACT | DWG No. | REV |
|---|---|---|
| | UPRR-HH-03 | |

DWG No. UPRR-HH-04

# UP RAIL / HARRY HINES CORRIDOR




## LEGEND

- TRACKWAY AT GRADE
- TRACKWAY ELEVATED WITH (WITHOUT) RETAINED FILL APPROACHES
- TRACKWAY IN TUNNEL
- TARGETED STATION AREA
- CROSSING (MINOR STREET/PRIVATE RD.)
- CROSSING (MAJOR ARTERIAL)
- RAILROAD CROSSING
- ROAD GRADE SEPARATION
- NEW GRADE SEPARATION
- EXISTING BRIDGE
- NEW BRIDGE
- COMMON POINT OF TANGENCY (P.O.T.) FOR 2 OR MORE ROUTE OPTIONS
- 100+00 STATION IN FEET

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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DALLAS, TEXAS 75201


DART PROJECT

DART

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|---|---|
| SCALE | AS NOTED |
| DRAWN | WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | WLA |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 4 of 7

**NORTHWEST CORRIDOR MIS**

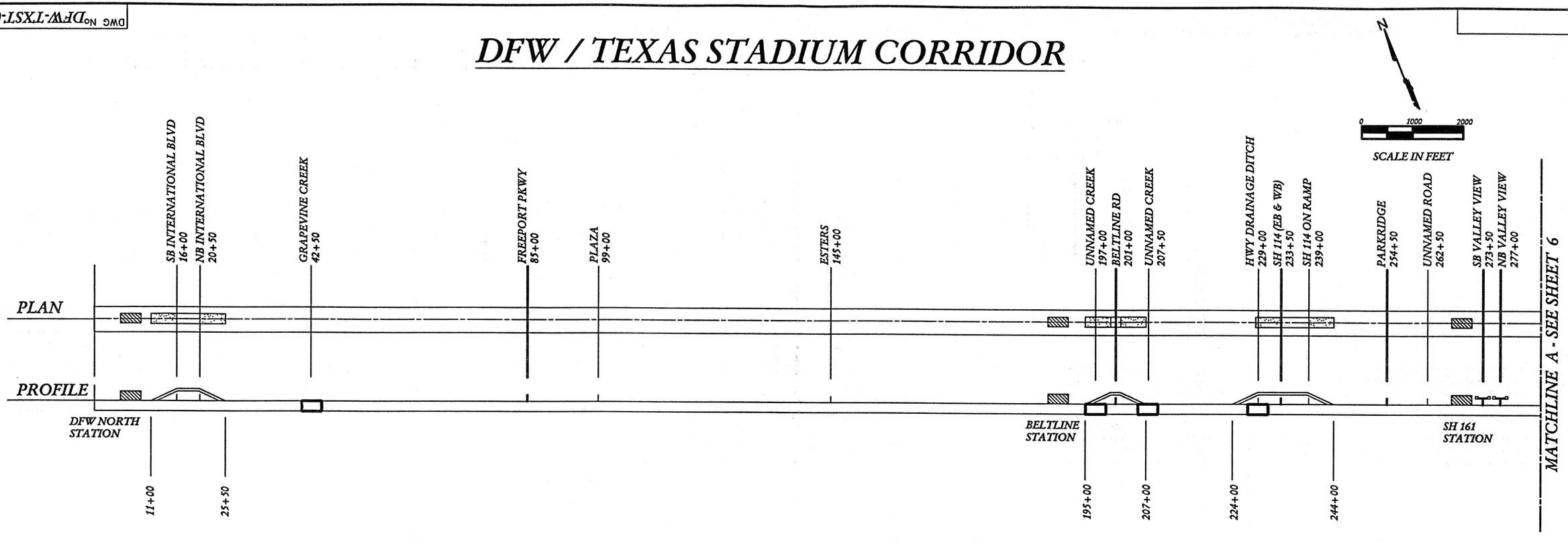
*LRT SCHEMATIC ALIGNMENT- UP RAIL / HARRY HINES CORRIDOR*

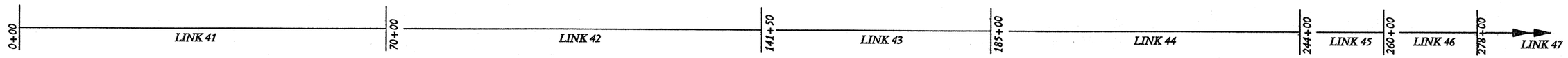
*LINK NOS. 22,23,25,26A*

| CONTRACT | DWG No. | REV |
|---|---|---|
| | UPRR-HH-04 | |

DWG No DFW-TXST-01

# DFW / TEXAS STADIUM CORRIDOR




## LEGEND

- TRACKWAY AT GRADE
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- NEW GRADE SEPARATION
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- 100+00 STATION IN FEET

| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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1845 WOODALL RODGERS FWY.-SUITE 1020
DALLAS, TEXAS 75201

DART PROJECT

DART

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| SCALE | AS NOTED |
| DRAWN | WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | WLA |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 5 of 7

# NORTHWEST CORRIDOR MIS

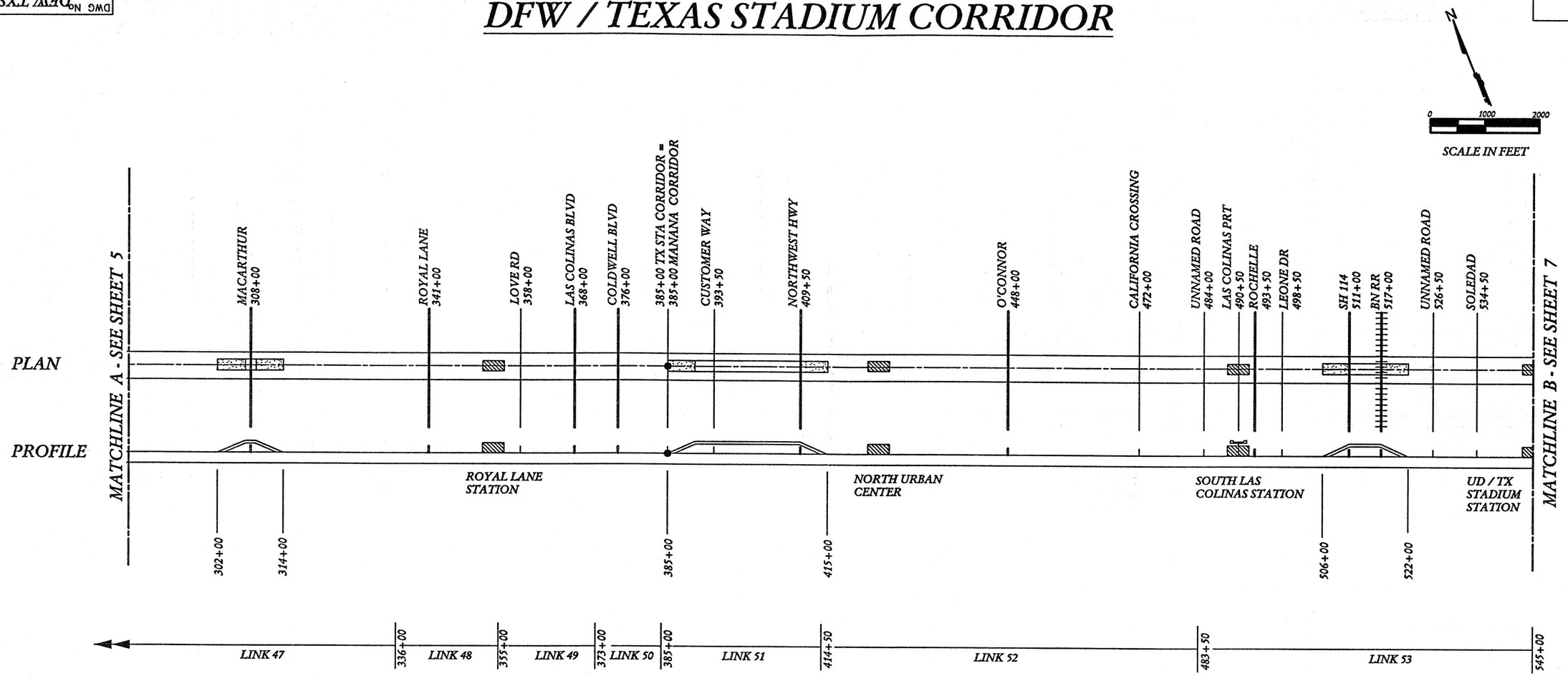
## LRT SCHEMATIC ALIGNMENT- DFW/ TEXAS STADIUM CORRIDOR

LINK NOS. 41, 42, 43, 44, 45, 46, 47

CONTRACT | DWG No. DFW-TXST-01 | REV

DWG No DFW-TXST-02

# DFW / TEXAS STADIUM CORRIDOR




## LEGEND

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1845 WOODALL RODGERS FWY-SUITE 1000
DALLAS, TEXAS 75201


DART PROJECT

DART

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|---|---|
| SCALE | AS NOTED |
| DRAWN | WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | WLA |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 6 of 7

**NORTHWEST CORRIDOR MIS**

*LRT SCHEMATIC ALIGNMENT- DFW/ TEXAS STADIUM CORRIDOR*

*LINK NOS. 47, 48, 49, 50, 51, 52, 53*

| CONTRACT | DWG No. | REV |
|---|---|---|
| | DFW-TXST-02 | |

DWG No DFW-TXST-03

# DFW / TEXAS STADIUM CORRIDOR

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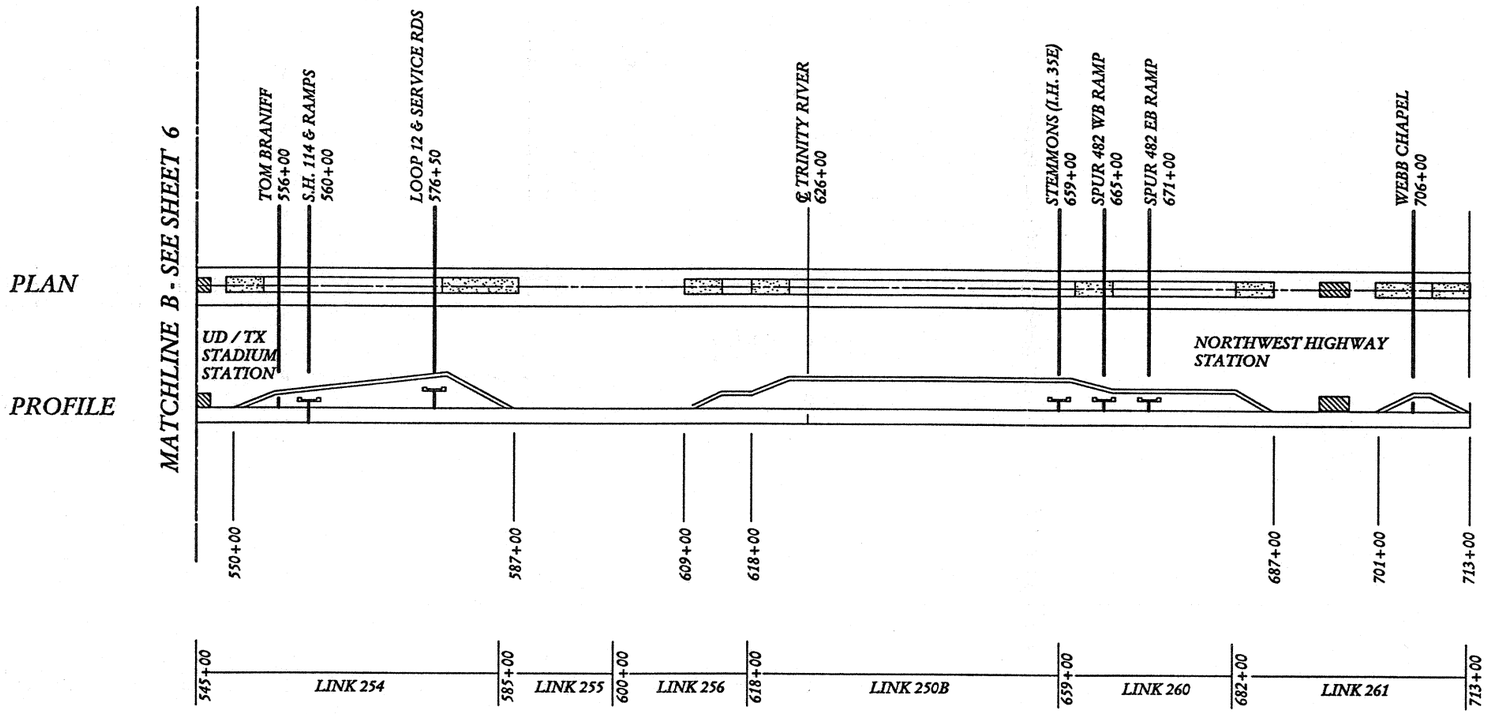
0 1000 2000

SCALE IN FEET




## LEGEND

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| REV | DATE | DESCRIPTION | BY | ENG | CHK | APP |
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construction services
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(214) 741-7777

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DALLAS, TEXAS 75201

DART PROJECT

DART

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|---|---|
| SCALE | AS NOTED |
| DRAWN | WLA |
| DESIGNED | I.J. THOMAS |
| CHECKED | WLA |
| IN CHARGE | R. PILGRIM |
| DATE | JULY 2000 |

CAES

CONTRACT SHEET No. 7 of 7

**NORTHWEST CORRIDOR MIS**

*LRT SCHEMATIC ALIGNMENT- DFW/ TEXAS STADIUM CORRIDOR*

*LINK NOS. 254, 255, 256, 250B, 260, 261*

| CONTRACT | DWG No. | REV |
|---|---|---|
| | DFW-TXST-03 | |

## TABLE 6.5
## SUMMARY OF TRANSPORTATION NETWORK PERFORMANCE MEASURES

| *2025 Projected Values* | | | | | | | | *Percentage Change Relative to CMS (No-Build) Alternative* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Performance Measure** | **No Build** | **No-Build (CMS)** | **TSM** | **LPIS A** | **LPISGPA** | **LPISB** | **LPISGPB** | **No Build** | **No-Build (CMS)** | **LPIS A** | **LPISGPA** | **LPISB** | **LPISGPB** |
| | | | | | | | | | | | | | |
| **VMT** | | | | | | | | | | | | | |
| Freeways | 14,206,115 | 14,002,154 | 14,034,947 | 13,891,792 | 14,026,199 | 13,896,858 | 14,092,344 | 1.46% | - | -0.79% | 0.17% | -0.75% | 0.64% |
| Principal Arterials | 3,472,576 | 3,483,877 | 3,477,457 | 3,548,827 | 3,293,215 | 3,549,378 | 3,436,815 | -0.32% | - | 1.86% | -5.47% | 1.88% | -1.35% |
| Minor Arterials | 2,141,822 | 2,110,904 | 2,132,823 | 2,133,215 | 2,207,208 | 2,135,011 | 2,084,619 | 1.46% | - | 1.06% | 4.56% | 1.14% | -1.25% |
| Collectors | 1,524,557 | 1,495,413 | 1,500,100 | 1,494,745 | 1,524,214 | 1,490,393 | 1,454,725 | 1.95% | - | -0.04% | 1.93% | -0.34% | -2.72% |
| HOV Lanes | 348,764 | 343,142 | 324,602 | 574,372 | 561,756 | 574,518 | 560,314 | 1.64% | - | 67.39% | 63.71% | 67.43% | 63.29% |
| Freeway Ramps | 1,012,028 | 989,385 | 996,667 | 998,413 | 1,014,262 | 994,792 | 985,250 | 2.29% | - | 0.91% | 2.51% | 0.55% | -0.42% |
| Frontage Roads | 1,432,074 | 1,432,389 | 1,433,004 | 1,426,487 | 1,693,263 | 1,417,534 | 1,762,300 | -0.02% | - | -0.41% | 18.21% | -1.04% | 23.03% |
| Total Roadway Network | 24,137,936 | 23,857,264 | 23,899,600 | 24,067,851 | 24,320,117 | 24,058,484 | 24,376,367 | 1.18% | - | 0.88% | 1.94% | 0.84% | 2.18% |
| | | | | | | | | | | | | | |
| **VHT** | | | | | | | | | | | | | |
| Freeways | 313,065 | 300,205 | 301,454 | 296,112 | 304,503 | 296,467 | 287,943 | 4.28% | - | -1.36% | 1.43% | -1.25% | -4.08% |
| Principal Arterials | 135,973 | 134,203 | 133,866 | 137,112 | 131,975 | 137,207 | 131,208 | 1.32% | - | 2.17% | -1.66% | 2.24% | -2.23% |
| Minor Arterials | 104,441 | 101,685 | 102,808 | 102,821 | 106,250 | 102,785 | 99,932 | 2.71% | - | 1.12% | 4.49% | 1.08% | -1.72% |
| Collectors | 78,735 | 76,704 | 77,012 | 76,168 | 78,316 | 75,994 | 74,591 | 2.65% | - | -0.70% | 2.10% | -0.93% | -2.75% |
| HOV Lanes | 6,208 | 6,020 | 5,653 | 9,728 | 9,501 | 9,735 | 9,470 | 3.12% | - | 61.59% | 57.82% | 61.71% | 57.31% |
| Freeway Ramps | 39,733 | 38,206 | 38,955 | 38,564 | 39,630 | 38,288 | 37,691 | 4.00% | - | 0.94% | 3.73% | 0.21% | -1.35% |
| Frontage Roads | 55,347 | 54,814 | 55,065 | 54,591 | 64,377 | 54,072 | 63,165 | 0.97% | - | -0.41% | 17.45% | -1.35% | 15.24% |
| Total Roadway Network | 733,502 | 711,837 | 714,813 | 715,096 | 734,552 | 714,548 | 704,000 | 3.04% | - | 0.46% | 3.19% | 0.38% | -1.10% |
| | | | | | 704,528 | | | | | | | | |
| **Percent Vehicle Hours of Delay** | | | | | | | | | | | | | |
| Freeways | 34.52% | 32.69% | 32.81% | 32.27% | 27.15% | 32.33% | 29.33% | 1.83% | - | -0.42% | -5.65% | -0.36% | -3.36% |
| Principal Arterials | 30.75% | 30.80% | 30.89% | 31.36% | 27.50% | 31.41% | 30.44% | -0.05% | - | 0.56% | -3.39% | 0.62% | -0.36% |
| Minor Arterials | 29.51% | 29.49% | 29.91% | 30.09% | 30.04% | 30.04% | 29.60% | 0.02% | - | 0.60% | 0.14% | 0.56% | 0.11% |
| Collectors | 24.53% | 24.51% | 24.58% | 24.33% | 24.85% | 24.35% | 24.31% | 0.02% | - | -0.18% | 0.27% | -0.15% | -0.19% |
| HOV Lanes | 9.75% | 8.50% | 7.98% | 4.79% | 4.56% | 4.84% | 4.52% | 1.24% | - | -3.71% | -3.42% | -3.67% | -3.99% |
| Freeway Ramps | 35.18% | 34.39% | 35.11% | 34.51% | 34.93% | 34.33% | 33.37% | 0.79% | - | 0.12% | -0.18% | -0.06% | -1.01% |
| Frontage Roads | 33.17% | 32.77% | 33.21% | 32.82% | 28.31% | 32.63% | 30.69% | 0.40% | - | 0.06% | -4.90% | -0.14% | -2.08% |
| Total Roadway Network | 31.76% | 30.89% | 31.10% | 30.73% | 27.62% | 30.73% | 29.05% | 0.87% | - | -0.16% | -3.49% | -0.15% | -1.84% |
| | | | | | | | | | | | | | |
| **Lane Miles at LOS F** | | | | | | | | | | | | | |
| Freeways | 348.5 | 343.3 | 350 | 323.6 | 309.8 | 329.6 | 318.1 | 1.51% | - | -5.74% | -9.76% | -3.99% | -7.34% |
| Principal Arterials | 314.5 | 319.7 | 321 | 330.2 | 279.1 | 330.6 | 301.5 | -1.63% | - | 3.28% | -12.70% | 3.41% | -5.69% |
| Minor Arterials | 145.5 | 143.4 | 148 | 144.1 | 170.1 | 139.8 | 147.6 | 1.46% | - | 0.49% | 18.62% | -2.51% | 2.93% |
| Collectors | 100.9 | 90.4 | 95 | 91.1 | 101.3 | 91.0 | 89.6 | 11.62% | - | 0.77% | 12.06% | 0.66% | -0.88% |
| HOV Lanes | 4.1 | 2.4 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 70.83% | - | -100.00% | -100.00% | -100.00% | -100.00% |
| Freeway Ramps | 39.1 | 36.2 | 35 | 35.8 | 37.9 | 35.9 | 34.2 | 8.01% | - | -1.10% | 4.70% | -0.83% | -5.52% |
| Frontage Roads | 130.0 | 142.8 | 140 | 127.4 | 142.9 | 117.5 | 162.4 | -8.96% | - | -10.78% | 0.07% | -17.72% | 13.73% |
| Total Roadway Network | 1,082.6 | 1,078.2 | 1,089 | 1,052.2 | 1,041.1 | 1,044.4 | 1,053.4 | 0.41% | - | -2.41% | -3.44% | -3.13% | -2.30% |
| | | | | | | | | | | | | | |
| **HC Emissions/ Day (Total Tons)** | 18.554 | 18.172 | 18.226 | 18.300 | 18.340 | 18.290 | 18.285 | 2.10% | - | 0.70% | 0.92% | 0.65% | 0.62% |
| | | | | | | | | | | | | | |
| **NOx Emissions/ Day (Total Tons)** | 26.638 | 26.267 | 26.320 | 26.510 | 26.880 | 26.490 | 26.762 | 1.41% | - | 0.93% | 2.33% | 0.85% | 1.88% |
| | | | | | | | | | | | | | |
| *Model Run* | | | *TSM.REETR* | *LPISA2* | *LPISGPA3* | *LPIS2B* | *LPISGP3B* | | | | | | |

Source: BRW, Inc. NCTCOG Performance Reports, Report #1, District #1

NORTHWEST CORRIDOR
MAJOR INVESTMENT STUDY

# Appendix G

# List of Preparers

# LIST OF PREPARERS

**Dallas Area Rapid Transit (DART)**

Mike Morgan – Project Manager
Doug Allen – Vice President of Planning
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Rosa Cavazos Rosteet – Community Affairs
Phil Johnson – Project Planner, Travel Demand Modeling
Angie Gamez – Project Planner
Koorosh Olyai – Assistant Vice President of Mobility Programs

**Prime Consultant**

**BRW, Inc.**

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Steve Salin, AICP – Deputy Project Manager*
Kay Shelton, AICP – Task Manager,Community Planning and Public and Agency Involvement*
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Mohammad Al-Hweil, EIT – Project Planner*
Reena Mathews – Project Planner
Lynn Schwartz, PE – Project Engineer, Cost Estimates

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Billy Gross, AICP – Project Planner*
Greg Tickle – Biologist

**Carter-Burgess, Inc.**

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**Urban Analytics**

Firouzeh Nourzad – Travel Demand Forecasting

**Manuel Padron & Associates**

Manuel Padron - O&M Costs
Tim Crobons – Operations Planning

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Mike Rose - Planner

**Myra L. Frank & Associates**

Myra L. Frank - President
Gail Miller – Architectural Historian
Natalia Valderrama – Planner

* No longer with firm