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PROJECT DESCRIPTION

Location and Setting

The Greater Dallas Metropolitan Area spans sixteen counties and encompasses over five million people. Over the past decade this area has seen continual growth. According to the North Central Texas Council of Governments (NCTCOG), population projections are expected to rise to over nine million by 2030, resulting in additional stress to an already strained transportation network.

The Dallas metropolitan area is most easily recognized as a massive inland market center. The "crossroads" gave way to railroads, interstate highways, and international airports. Dallas civic and business leaders took advantage of these developments which, even today, continue to benefit the city economically. Currently, the central city is growing at a faster rate than in many decades. Thousands of new homes, condominiums and apartment units are being constructed within five miles of the Dallas Central Business District (CBD) and are rapidly being absorbed by buyers and renters. Outside the CBD, suburban areas flourish adding new retail and office development at a steady pace.

The combination of population growth and sprawl led to the development of a major rail system for commuting within the North Texas Region. Dallas Area Rapid Transit (DART) now operates a 45-mile Rail System serving 12 surrounding cities and providing fast, convenient service to work, shopping and entertainment destinations in Dallas, Garland, Plano and Richardson (see Figure 1-1). In addition to rail service, DART operates bus service in all 13 cities within the DART Service Area and has plans to more than double the rail system by 2018.

As part of the Rail System's network, the North Central Corridor extended the initial DART 20-mile Starter System 13.8 miles from Park Lane Station in Dallas to Parker Road Station in Plano.

Corridor Description

As shown in figure 1-2, the North Central (NC) Corridor is one of four current and seven ultimate radial rail transit corridors providing direct access to the Dallas Central Business District (CBD). The first phase of DART's Light Rail Transit (LRT) system began revenue service in June 1996 and consists of the Red Line from southwest Dallas and the Blue Line from south Dallas, both of which terminated at Mockingbird Station. The Red Line service was extended from Mockingbird Station into the NC Corridor to Park Lane in January 1997, Galatyn Park in July 2002, and finally, in December 2002, the complete NC line opened for service to Parker Road in Plano, completing the Red Line into Plano.

The NC Corridor LRT Extension planning and engineering studies were focused on the portion of the corridor north of Park Lane. The Study Corridor begins at the Park Lane LRT station and extends northward to Spring Creek Parkway in Plano, a distance of approximately 13.8 miles. The Study Corridor encompasses portions of the Cities of Dallas, Richardson, and Plano in Dallas and Collin Counties (see Figure 1-2).

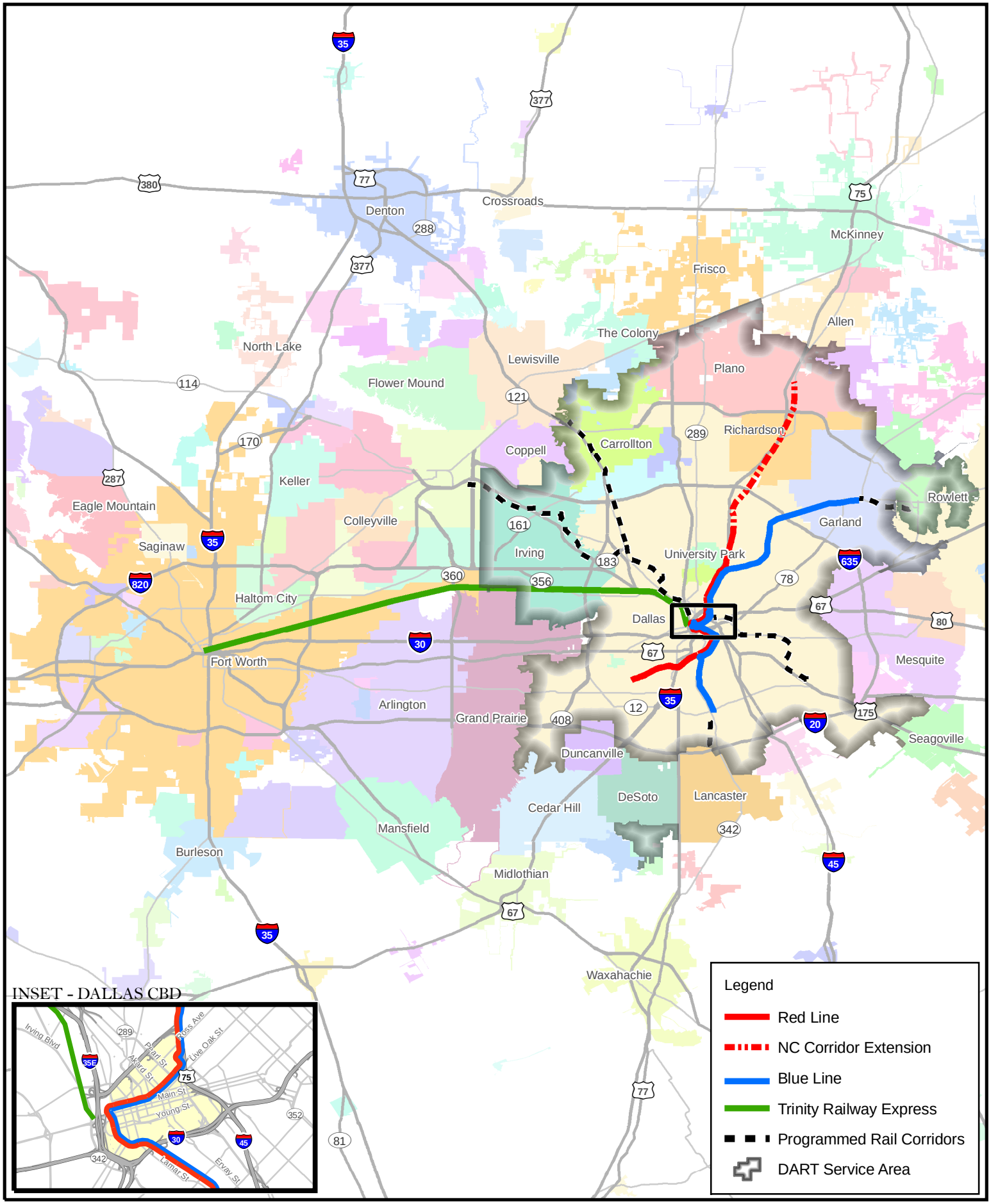


Fig 1-1. The Dallas/Fort Worth Metropolitan Area

North Central Corridor Extension

Before and After Study - November 2006

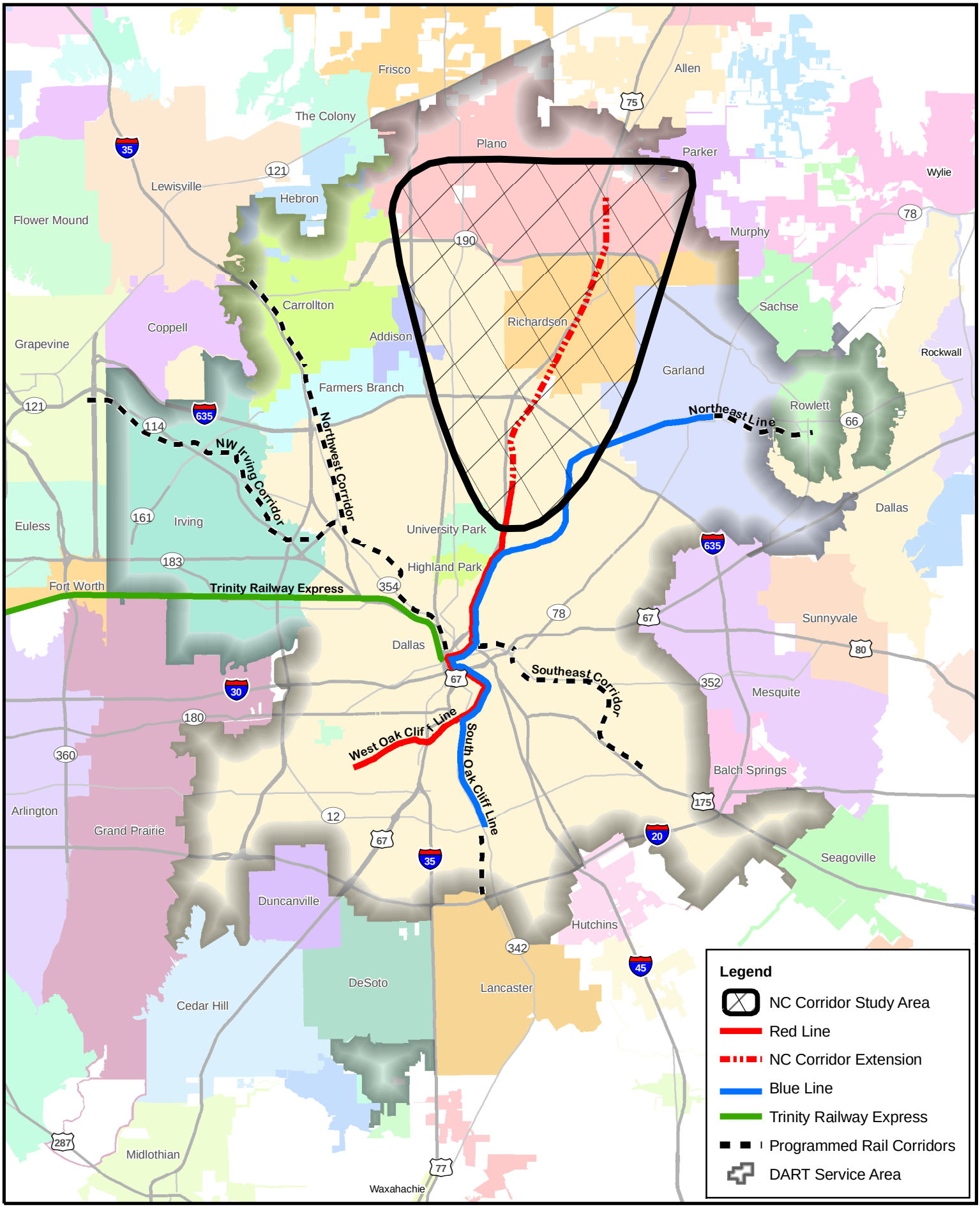


Fig 1-2. Planned and Programmed Rail System Map and NC Corridor Study Area

North Central Corridor Extension

Before and After Study - November 2006

Purpose and Need

North Central Corridor LRT Extension

Prior to the initiation of LRT into the North Central Corridor, the transportation system within the Study Corridor was composed of highways, an extensive grid system of local streets and arterial roadways, and a bus system that operated daily on city streets. Significant traffic increases were projected within the Study Corridor, particularly along North Central Expressway (US-75), reflecting projected growth in residential, commercial and industrial development throughout the entire Study Corridor and in the suburban communities north of the study area.

During the mid 1990s, the North Central Corridor had the highest percentage of employed population among the DART light rail corridors (see table 1-1). Projections from 1990 to 2010 estimated that the North Central Corridor would exceed the region's percentage increase for population and employment. Roadway improvement plans within the Study Corridor and implementation of Congestion Management Systems strategies will provided some, but not all, of the additional traffic carrying capacity necessary to respond to the projected population and employment growth. Additional studies and recommendations were needed in order to resolve this problem. Demographics and growth within the North Central Corridor are discussed further on page 26, Transit Markets.

Table 1-1: DART Corridor Demographic Comparisons

Corridor	Population	Employment (16 years and over; in labor force; civilian; employed)	% of Population Employed
North Central Corridor Ext. – north of Park Lane	58,645	31,722	54%
North Central Corridor – south of Park Lane	49,592	29,642	60%
West Oak Cliff	39,630	14,080	36%
South Oak Cliff	81,155	30,972	38%

source: U.S. Census Bureau, 2000 Census

The initial assessment revealed that the first step would be to improve mobility. In order for this objective to be achieved, four issues needed to be addressed. The first issue was to reduce congestion and increase the people-carrying capacity. Second, reduce peak-hour congestion on corridor freeways and arterial roads, which ultimately decreases travel times and delays. Third, increase the effectiveness of public transit in meeting the travel demands of existing and prospective transit users, including efficient access for reverse commute trips to employment centers within the study area. Finally, provide additional capacity within the right-of-way (ROW) constraints imposed by the existing land use and development patterns. In addition to improving mobility, all of these objectives would help reduce the growing problem of unacceptable air quality in DART Service Area.

The Before and After Study

The Federal Transit Administration (FTA) included in its *Final Rule on Major Capital Investment Projects (2000)* a requirement that sponsors seeking Full Funding Grant Agreements (FFGA) for New Starts projects submit a plan for the collection and analysis of information leading to the identification of the impacts of the project and the accuracy of the forecasts which were prepared during project planning. This Before and After Study is the product of that plan and attempts to expand the insights into the costs and impacts of major transit investments. By completing the Before and After Study process, improvements to the technical methods and procedures used in the planning and development of those investments can be identified and implemented.

Conditions analyzed include a snapshot of before conditions (2000) that is considered two years prior to rail service implementation in the corridor and after conditions (2004) two years after implementation.

Physical Description

LRT Alignment

The fully functioning NC Corridor LRT Extension project consists of approximately 12.3 miles of a double track rail with 10 stations. The federally funded NC Corridor LRT Extension project extends from Park Lane Station in Dallas through the city of Richardson into Plano following the route detailed in **Figure 1-3.**

DART enlisted the help of the FTA in order to meet their objectives. The federally funded elements of the NC Corridor LRT Extension consisted of preliminary engineering; all civil/structural construction; trackwork; utility relocation; station construction; environmental mitigation; Service & Inspection (S&I) expansion; Vehicle Acceptance Facility (VAF) construction; development; procurement and installation contracts for traction, electrification, power distribution, signals, communications, and fare collection; acquisition of 21 LRT vehicles; insurance; real estate; owner controlled insurance costs; costs associated with a Grant Anticipation Note (GAN) financing program; and railroad ROW.

DART local funds were utilized for planning, employee wages and benefits, final engineering and design, hazardous material clean-up, construction management, contract change orders (with the exception of those necessary for quantity changes), start-up activities, systems integration, and project management.

LRT Stations

Station platforms are designed as at-grade or aerial, depending on the profile of the guideway. Aerial stations feature 400-foot long platforms; at grade stations have 300-foot, low level platforms expandable to 400 feet. Weather protection for patrons includes canopies over the platforms for at least one-third of their length. All platforms and LRT vehicles are fully accessibility to elderly and physically challenged patrons during all hours of operation. Typical patron amenities at each station include: bench seating, windscreens, trash receptacles, newspaper racks, and artwork.

Park Lane -This interim terminal station for the LRT Starter System previously located south of Park Lane was upgraded to a permanent aerial station immediately north of Park Lane. The station was planned primarily for commuters from residential areas to east and west of US-75 along in addition to nearby commercial areas and activity centers. Existing land uses include commercial, retail and office. Passenger access to the station is located westbound at Park Lane and the new Twin Hills Connector that runs through the station site from Greenville Avenue.

The Park Lane Station has three bus bays, 17 short-term parking spaces for passenger drop-off, 12 parking spaces reserved for mobility-impaired patrons, along with wheelchair ramps and elevators, and 368 long-term parking spaces. In addition, this facility has customer shelters, windscreens, seating and bicycle storage facilities.

Walnut Hill - The Walnut Hill Station is an aerial station with the passenger platform and aerial guideway located directly over Walnut Hill Lane. Utilized primarily a destination station, the Walnut Hill Station serves the Presbyterian Hospital, nearby offices, and activity centers. Multifamily residential areas also have access to the facility as a walk-up station. Pedestrians can access the station from both the north and south sides of Walnut Hill Lane. Bus and automobile access is located at Manderville Lane and Glen Lakes Drive. The

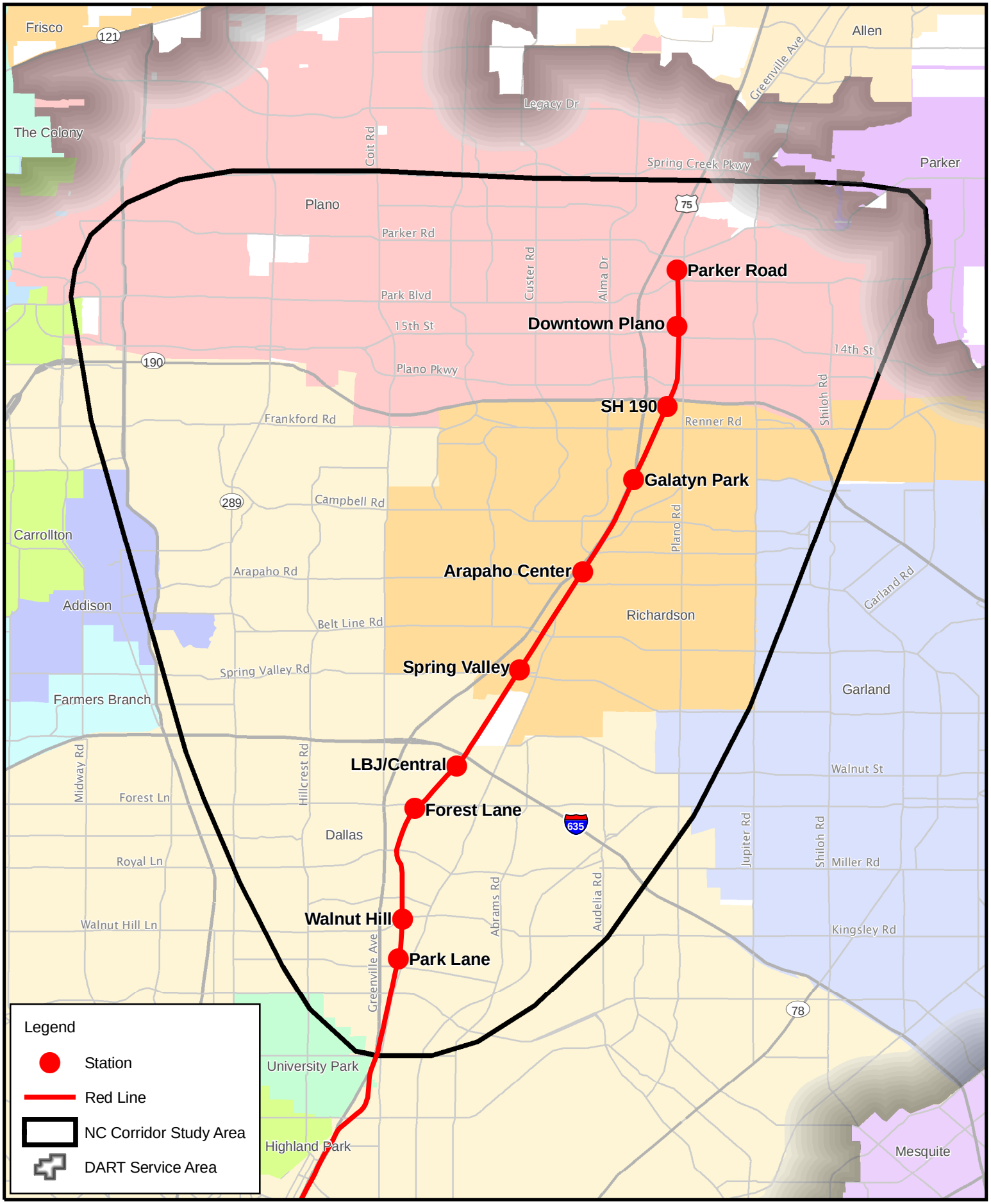


Fig 1-3. Study Area
North Central Corridor Extension
Before and After Study - November 2006

Walnut Hill Station features three bus bays and five short-term parking spaces for passenger drop-off. No long-term parking was originally provided at this station; however, a parking expansion is currently underway due to high utilization of the short-term parking area.

Forest Lane Station – The Forest Lane Station is an aerial station with passenger loading platforms located immediately south of Forest Lane as part of an aerial guideway cross-over. This station serves residential areas to the east and west of the US-75 as well as nearby employment and activity centers. Existing land uses are primarily residential and commercial. Passengers can access the station from Forest Lane and Schroeder Road.

The Forest Lane Station features three bus bays, seven short-term parking spaces for passenger drop-off, and six parking spaces reserved for mobility-impaired patrons. The station's 240 long-term parking spaces are located adjacent to Forest Lane between the DART rail ROW and Cottonwood Creek.

LBJ Station -- The LBJ Station platforms are located immediately south of the LBJ Freeway. This station serves the surrounding residential neighborhoods and provides access to area employment centers, such as Texas Instruments. Existing land uses are primarily residential and industrial. Passenger access to the station is located at Floyd Road and an extension from Markville to Floyd Road.

The LBJ Station has three bus bays, seven short-term parking spaces for passenger drop-off, and six parking spaces reserved for mobility-impaired patrons. The station's 603 long-term parking spaces are located immediately south of the LBJ Freeway and adjacent to the rail alignment between Floyd Road and Floyd Branch of Cottonwood Creek.

Spring Valley Station - The Spring Valley Station is an aerial station with the passenger platform located immediately north of Spring Valley Road as part of an aerial guideway crossing over the roadway. The station serves commuters from nearby residential areas and provides access to Blue Cross/Blue Shield and other employment and commercial centers in the area. Passenger access to the station is from Spring Valley Road and Lingco Road.

The station provides four bus bays, nine short-term (drop-off) parking spaces, 12 spaces exclusively for mobility-impaired patrons, and approximately 400 long-term parking spaces. Approximately 170 of the long-term parking spaces are located on the west side of Lingco Road.

Arapaho Center Station - The Arapaho Station platforms are located north of Arapaho Road across from the Richardson Transit Center, on Greenville Avenue. The Arapaho Station serves commuters from area neighborhoods and provides access to the Municipal Center and other destinations through transfers to bus services at the Richardson Transit Center. Land use is primarily commercial. Passenger can access the station from Greenville Avenue.

Patrons driving to the Arapaho station can utilize any of the 1,105 existing parking spaces at the adjacent Richardson Transit Center. In addition to these long-term parking spaces, the Richardson Transit Center provides 12 bus bays, 12 short-term parking spaces for passenger drop off, and 14 parking spaces for the use of mobility-impaired patrons.

Galatyn Park Station- The Galatyn Park Station, located in the City of Richardson between Campbell and Renner Road, is adjacent to the 500 acre Galatyn Park development, which contains a transit plaza, major hotel, and access to numerous technological businesses.

Station amenities include bus passenger drop off/pick up area, one bike locker, and one bike rack.

Bush Turnpike Station - The Bush Turnpike Station is located immediately south of the eastbound SH 190 turnpike facility and has pedestrian connections to the platform. Approximately 778 parking spaces are provided in this area along with 2 bike racks. Bus activity takes place along the eastbound frontage road, east and west of the rail alignment. Access to the station park-and-ride is provided from the eastbound and westbound SH 190 service roads.

Downtown Plano Station - The Downtown Plano Station is located immediately north of 15th street and provides access to the city's municipal center, courthouse and business district, reflecting its downtown historic neighborhood. Station amenities include bus/passenger drop-off, one bike locker, and one bike rack. The station was originally planned to be constructed south of 15th street, but the location was reconsidered due to right-of-way availability and pedestrian circulation.

Parker Road Station - The Parker Road Station is located between Park Boulevard and Parker Road adjacent to the East Plano Transit Center. This station serves a variety of retail and commercial destinations and is the last station on the North Central corridor. In addition to 1,555 long-term parking spaces, this station offers bus bays, short-term parking for passenger drop-off, and reserved parking for mobility-impaired patrons, bus/passenger drop off/pickup area, two bike lockers, and seven bike racks.

LRT Vehicles

The LRT system employed by DART is a proven and mature technology, consisting of a driver-operated, articulated vehicle using an overhead catenary for traction power. The LRT technology, as defined, has the capacity to carry up to 20,000 passengers per hour in the peak direction. Each articulated LRT vehicle is 92 feet, 8 inches in length and is capable of bi-directional operation. Each car has four entrances per side, with the front door designed for use by physically challenged patrons via a special platform. LRT technology also employs a mixture of wayside signals and modified traffic signals.

Each vehicle accommodates approximately 152 passengers —72 seated and 80 standing. If ridership warranted additional capacity in the future, station platforms could be lengthened to accommodate additional LRT trains with up to four vehicles linked together.

Fig 1-4. Typical LRT Vehicle
North Central Corridor Extension
Before and After Study - November 2006

Planning History

Prior to construction and operation of the LRT extension of the Red Line referred to as the North Central Extension, a multi-step planning process was conducted involving local, regional, state and federal decision makers. Because the project would utilize federal funding, the National Environmental Policy Act (NEPA) guided the planning process. Table 1-2 provides a rough outline of the various decisions, documents and actions required for LRT operation in the North Central Extension. The table also references where an expanded discussion of each step is located within this chapter.

Table 1-2: Timeline of Key Planning Milestones

Date	Event	Page #
Aug. 1983	Service Plan accepted and DART created by voters	11
Jun. 1989	System Plan Completion	11
Sept. 1994	Alternatives Analysis (AA) Approval, Locally Preferred Alternative (LPA) selected	11
Apr. 1997	Record of Decision (ROD) for Final Environmental Impact Statement	19
Oct. 1999	Full Funding Grant Agreement (FFGA)	20
Jul. 2002	NC-3/NC-4 Opening	20
Dec. 2002	NC-5 Opening	20
Sept. 2003	FFGA Amendment	21

Source:
Full Funding Grant Agreement between Dallas Area Rapid Transit and U.S. Department of Transportation Federal Transit Administration, 1999.
North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.
Full Funding Grant Agreement Amendment between Dallas Area Rapid Transit and U.S. Department of Transportation Federal Transit Administration, 2003.

System Plan

DART, a regional transit agency authorized pursuant to Chapter 452 of the Texas Transportation Code, was created by voters and funded with a one-cent local sales tax on August 13, 1983. On June 27, 1989, the DART Board of Directors adopted a modified Transit System Plan which was a scaled back version of the initial 1983 service plan. The 1989 Transit System Plan identified a radial pattern for LRT service extending from the Dallas CBD toward the suburban areas to the northern and southern portions of the Dallas metropolitan area. The System Plan specified that further corridor level study (Alternative Analysis) would be needed to plan the details of the LRT service.

Alternatives Analysis

The planning phase of the NC Corridor LRT Extension was managed by DART, in collaboration with the FTA and United States Department of Transportation (USDOT). Parsons Transportation Group served as the engineering consultant.

The project was initiated prior to the adoption of the Major Investment Study (MIS) guidelines as issued by the USDOT. The Alternatives Analysis (AA), completed in August 1994, examined five alternatives within the NC LRT Corridor Extension. The process resulted in the selection of LRT as the locally preferred alternative (LPA). The LPA was adopted by the DART Board of Directors in September 1994, and subsequently endorsed by the NCTCOG Regional Transportation Council. This action incorporated the NC Corridor LRT Extension LPA into the regional Transportation Improvement Program (TIP) in July 1994. The purpose of the LPA was to improve mobility in the Dallas metropolitan area.

The AA initially included preliminary engineering and cursory environmental studies in order to address the wide range of alternatives. The objective was to limit the number of alternatives in order to provide for a more detailed evaluation. Detailed evaluations of a smaller number of reasonable alternatives lead to the selection of a preferred alternative. A number of issues were considered and included alternatives designed to improve mobility, (specifically travel time and travel opportunities, congestion relief, increased mobility for the transit dependent population); social, economic, and environmental effects; safety and operating efficiencies; land use and economic development (specifically transit-supportive land use policies and patterns); and financing.

The FTA requires consideration of at least one Transportation System Management (TSM) alternative. Compared to some fixed guideway alternatives, TSM alternatives can prove to be a relatively low-cost approach to addressing transportation problems, stopping short of major capital expenditures. This type of alternative can also provide a baseline from which the cost effectiveness of other more capital intensive alternatives may be evaluated.

Five alternatives were selected for evaluation within the NC Corridor LRT Extension. Alternatives ranged from doing nothing, referred to as the “No-Build” Alternative, to extending the LRT Starter System as far as the City of Plano and Parker Road, referred to as the LRT/Parker Road Alternative.

No Build Alternative

The No-Build Alterative was studied to determine the potential impact of not introducing transit improvements to the NC Corridor LRT Extension, north of Park Lane. The evaluation of the No-Build Alternative also aided in the consideration of whether or not the benefits of transit improvement were worth the social, economic and environmental impacts in addition to the associated mitigation costs. The No-Build Alternative included only those facilities and services within the Study Corridor that were in existence at that time or were included in the 1995 TIP and thus planned for construction. Major transit capital improvements programs within the study area included in the No-Build Alternative were:

- A one-way, reversible HOV lane on the US-75 from Parker Road to the LBJ Freeway;
- Two-way, concurrent operation HOV lanes on the LBJ Freeway from Valley View Lane (proposed SH 161) to East R. L. Thornton Freeway (IH 30); and
- The North Central Line of DART’s 20-mile LRT Starter System to Park Lane.

The No-Build Alternative as described in the AA included express bus service; local, feeder and cross-town bus service; and rail transit service as previously committed to by the DART Board of Directors. Committed DART projects outside the Study Corridor included other lines within the LRT Starter System as well as commuter rail from Union Station in Dallas to the transit centers in South Irving and at Dallas/Fort Worth (DFW) International Airport. This

overall definition of transit services, as well as the committed highway network, remained constant among all the alternatives.

The bus operating plan for the No-Build Alternative in the Study Corridor represented the level of bus service to be provided in 2010. No major changes from the Fiscal Year (FY) 1995 service levels were made. However, some small changes would be made due to the reassignment of vehicles between routes to balance service and demand. These changes would relieve routes that were experiencing heavy peak-load conditions.

The bus operating plan for the No-Build Alternative assumed that the current ridership level of bus transit service would increase as the population increased. Accordingly, an increase in vehicle miles of transit service was also assumed. As a result, a decrease in transit schedule adherence would occur because lower operating speeds would result from an increase in future traffic congestion. The No-Build Alternative also assumed the continuation of the CBD-oriented radial bus transit service operated by DART. Guidelines derived from the Service Standard Policies and adopted by the DART Board of Directors for establishing improved bus service were incorporated in defining the No-Build Alternative. These guidelines were as follows:

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

Under the No-build Alternative, the DART bus transit system would continue along the existing roadways under mixed-traffic conditions. This would subject the bus system to the same travel speeds and delays as standard operating vehicles, including delays due to peak hour congestion along the NC Corridor roadways, primarily along US-75 south of the LBJ Freeway. The No-Build Alternative would also result in fewer enhancements to the comfort and convenience of transit service within the corridor in comparison to the LRT Alternative. As a result, as the population within the NC Corridor increased, the bus frequency and route capacity levels would also have to increase. The anticipated increases in traffic congestion would make bus transit service under the No-Build Alternative less reliable, regardless of capacity or route expansions.

Transportation System Management-North Central High Occupancy Vehicle Alternative (TSM-NC HOV Alternative)

The TSM-NC HOV Alternative would replace the single one-way reversible HOV lane in the median along US-75 with two one-way concurrent flow lanes from the LBJ freeway south to the Dallas Central Business District (CBD). This physical configuration was necessary to balance inbound and outbound travel demand and traffic flow. DART compared the cross-sectional requirements of concurrent flow lanes to the plans for a widened US-75, which was under construction during the AA, and concluded that there would not be enough width in the ROW to accommodate the proposed HOV lanes. Based on this alternative's inability to comply with federal guidelines, the lack of a desirable buffer zone without the loss of full inside and outside shoulders, and the questionable ability to safely operate, enforce, and access the HOV facility, the Texas Department of Transportation (TXDOT) did not recommend pursuing the implementation of this alternative. In addition, from preliminary

travel model runs, it was concluded that although this alternative would have extended south to the Dallas CBD. Further, express transit service south of Park Lane would have duplicated service that was intended to be provided by the LRT line. This would provide no travel time advantages over the LRT line south of Park Lane.

Transportation System Management-Southern Pacific High Occupancy Vehicle Alternative (TSM-SP HOV Alternative)

The TSM-SP HOV alternative sought to provide for the construction of two-way HOV lanes in the DART ROW, formerly owned by the Southern Pacific Railroad (SPRR), between the Park Lane LRT Station and the East Plano Transit Center located near Parker Road. This alternative was deemed undesirable because the full cross-section of a two-way, two-lane HOV facility with shoulders, and average side slopes for drainage was wider than a typical LRT cross-section (80 feet vs. 70 feet). Serious design and physical constraints would have to exist in the narrow sections of the ROW measuring 50 –to 70 feet wide. Further, costly grade separations would be required at all roadway crossings throughout the corridor to maintain an acceptable operating level of service and avoid potentially congested signalized at-grade intersections. The project would also partially duplicate operations of the committed reversible HOV lane on US-75 north of LBJ Freeway. The bus operating plan would also require passengers to make a transfer from the bus to the LRT system at the Park Lane Station or travel in congested mixed-flow lanes between Park Lane and the Dallas CBD. Preliminary travel model runs indicated that both of these requirements were detrimental to the ridership potential of this alternative due to little or no savings in travel time. The results of this analysis indicated that only about 200 new daily transit riders would be added under this alternative.

LRT/Parker Road Alternative

The LRT/Parker Road alternative consisted of the full development of a double track LRT service to the City of Plano in accordance with the design and operating criteria of the LRT starter system. This alternative would constitute a 12.3-mile extension of the LRT Starter System north of the Park Lane Station in Dallas to the East Plano Transit Center south of Parker Road. Service would be provided by light rail vehicles operating on standard gauge tracks generally located within the former SPRR ROW owned by DART. This alternative would provide for a total of 10 stations including the relocation of the current terminus at Park Lane. Feeder bus service would provide direct connections to the LRT service at the stations.

LRT/Arapaho Road Alternative

The LRT/Arapaho Road alternative would establish the minimum extent to which LRT service could be extended and still prove operationally feasible. The minimum operable segment (MOS) was the shortest extension of the LRT Starter System that would have captured the greatest amount of ridership while reducing construction costs and, in some cases, environmental impacts. It was also the minimum operable “new” segment that would have been cost-effectively constructed and operated. This alternative would extend the LRT Starter System only 6.8 miles, and would have duplicated alignment and station configuration as described in the LRT/Parker road alternative.

Final Alternatives Considered

The initial screening of the above described alternatives was followed by the designation of a final set of five alternatives. Screening activities focused on the TSM-NC HOV and the TSM-SP HOV alternatives which led to the creation of a less ambitious TSM Alternative that didn't involve the addition of major HOV lane facilities beyond that of the No-Build Alternative.

The refined TSM Alternative built upon the committed reversible HOV lane along US-75 north of the LBJ Freeway through the addition of direct access ramps to the facility and operating expanded express bus service on it. This alternative also required the implementation of a new transit center near the proposed SH 190 Freeway; an improved transit center at the existing North Central park-and-ride facility; and an expanded Park Lane Station park-and-ride facility to permanently accommodate parking at the terminus station, which was originally designed to serve only an interim demand. Additionally, direct access ramps would be provided at transit center locations where express busses could enter and exit the HOV lanes. Additional express bus services could take advantage of the improved facilities which would be designed to provide access from park-and-ride lots and transit centers in the corridor to the Dallas CBD. The No-Build Alternative, the LRT/Parker Road Alternative, and the LRT Arapaho Road Alternative were the identical as the initial concepts described earlier.

Engineering, environmental and cost considerations used in the evaluation of the LRT/Parker Road and LRT/Arapaho Road Alternatives laid the framework for the LRT/Parker Road-Intermediate Capacity Alternative. Intermediate Capacity is a strategy of phasing the implementation of full double-track LRT construction and operations in order to meet ridership demands. As a result, LRT service to Arapaho Road in Richardson would be a direct extension of the full LRT Starter System with double tracks and six new stations. Service north of Arapaho Road would be staged or phased, with initial operations on single track, wherever possible, and two new stations. One new station would be constructed at 15th Street in Plano, with a new terminus located at the Parker Road Station adjacent to the East Plano Transit Center. Inherent in the Intermediate Capacity strategy is a build-out assumption, meaning that the full, two-track LRT guideway would be developed north of the Arapaho Station to the Parker Road Station in the future. Therefore, preliminary engineering and final design plans would have to be completed for the full two-track guideway, facilities, and signal control system to the Parker Road Station. System and guideway design plans would also be developed to accommodate future stations at Campbell Road and SH 190. These two stations were not included in the initial phase.

Public Involvement in Alternative Selection

Three public meetings were held in the project vicinity to inform the community and gather input. The meetings were held May 16, 17, and 18, 1994, and were each attended by six public attendees, as well as DART staff, consultants, and other representatives. Despite the low attendance, DART recorded and summarized attendees' comments in the LPA Report (September 1994). Comments primarily focused on the issues listed below:

- Cost differential for at-grade or grade separated rail construction (estimated at $3 million by DART staff),
- Travel time between stations/train speed, and
- What is included in alternative cost estimates.

Selection of the Locally Preferred Alternative (LPA)

Following public review of the Corridor Planning Study: North Central Corridor North of Park Lane, Evaluation of Alternatives Report (April, 1994), the DART Board of Directors reviewed the potential improvements proposed for the Study Corridor and approved the "LRT/Parker Road Alternative-Intermediate Capacity" as the LPA for the Study Corridor. The following provides a brief summary of the rational used for choosing the LPA, as presented in the April 1994 report.

The No-Build Alternative included only those facilities and services within the Study Corridor that had either already existed or were included in the 1992 TIP and were therefore committed for construction. The No-Build Alternative included express bus service; local, feeder, and cross-town bus service; and rail transit services (commuter and LRT) as previously committed to by the DART Board of Directors. The bus operating plan for the No-Build Alternative in the Study Corridor assumed that the level of bus transit service would increase as the population increased.

The overall definition of transit services in the No-Build Alternative, as well as the committed highway network, was that only planned and programmed cost would be incurred. This offered no relief from the current or forecasted congestion in the Study Corridor. There also would have been no improvement of travel times, and travel efficiency would have actually deteriorated. Additionally, the No-Build Alternative offered no improvement in regional mobility, and therefore, job opportunities north of Dallas would have remained out of reach for citizens of south Dallas who are less mobile. Finally, this solution provided no increase in the "people-carrying" capacity within the NC Corridor. Transit time data for each alternative is summarized in Table 1-3.

Table 1-3: Evaluation of Alternatives - Transit Travel Times (in minutes)

Average Transit Travel Time to CBD from:	***No-Build***	***TSM***	***LRT/ Arapaho Road (MOS)***	***LRT/ Parker Road Staged Implementation***	***LRT/ Parker Road Full Development***
LBJ Station/North Central Transit Center	26	26	21	21	21
Arapaho Road Station	35	35	26	26	26
Parker Road Station	40	40	40	32	34

Source: DART Corridor Planning Study: North Central Corridor North of Park Lane, Evaluation of Alternatives Report, April 1994.

The TSM Alternative, which shows a reduction in vehicle miles traveled and an improvement in air quality when compared to the No-Build Alternative, would have required the least amount of capital investment, but its annual operations and maintenance (O&M) costs, at $8.2 million, would have been higher than two of the three other alternatives that rated much higher on the federal cost-effectiveness index. Commuter trips originating in the NC Corridor would have been more efficient with implementation of the expanded Express Bus service through four transit centers; however, improvement of transit travel times would not

have been realized as compared with the No-Build. Some improvement to the congestion situation, however, would have been expected due to greater use of HOV travel modes (particularly expanded Express Bus Service). Regional accessibility, relative to job opportunities in the NC Corridor, would not have been improved by the TSM Alternative. No significant social or environmental impacts would have manifested with implementation of this alternative. The low capital investment was the only category in which this alternative showed a significant benefit.

In general the LRT/Parker Road Full Development Alternative would have resulted in the greatest transportation benefits for the NC Corridor, considering accessibility, ridership, travel time, and emissions reduction. The full extension of the LRT Starter System would have significantly improved regional mobility by offering direct travel access between the NC Corridor and south Dallas. Further, the "people-carrying" capacity in the NC Corridor would have been enhanced, bringing some relief to congestion problems. However, this alternative carried with it a greater magnitude of social and environmental impacts. It would have also required the largest capital investment, exceeding available capital funds by $74 to $84 million and resulting in the highest annual O&M costs ($9.8 million). The computed value of the federal cost-effectiveness index for the LRT/Parker Road Full Development alternative was $12.24.

The LRT/Arapaho Road Alternative and the LRT/Parker Road Intermediate Capacity alternative (the selected LPA) were roughly comparable in terms of benefits and impacts, and their cost would be less than the LRT/Parker Road Full Development Alternative. However, because the LRT/Parker Road Intermediate Capacity alternative involved extending LRT service beyond Richardson to Parker Road in Plano, certain environmental effects (noise, visual/aesthetic, and parkland impacts) were associated with it that would not be associated with the LRT/Arapaho Alternative. The LRT/Parker Road Intermediate Capacity alternative also required a larger capital investment than the LRT/Arapaho Road Alternative. Although it would also exceed the expected availability of capital funds by $18 to $28 million, significant savings would be achieved through the phasing of the systems development. The computed federal cost-effectiveness index for the LRT/Arapaho Road Alternative was $9.83 million, which was an improvement over the $11.25 million computed for the LRT/Parker Road Intermediate Capacity alternative. However, the LRT/Parker Road Intermediate Capacity alternative annual O&M cost of $6.3 million was less than the LRT/Arapaho Road Alternative annual O&M cost of $7.6 million.

The LRT/Arapaho Road Alternative, although fiscally more attractive than the LPA, would have fallen short of the DART Board's stated objective which was to serve the City of Plano. On the other hand, as noted above, the level of investment required to develop the full, two-track LRT system through the implementation of the LRT/Parker Road Alternative would have been a poor choice as it would have exceeded the available capital funding by $74 to $84 million. Nevertheless, the forecast demand at the proposed Parker Road Station in Plano was substantial; therefore, the extension of the LRT service to Plano would have been justified. The LPA offered a reasonable compromise. The LPA was marginally feasible from a financial standpoint and was consistent with the "demand-based" Transit System Plan, which called for the provision of LRT service to Plano. The capital cost estimate for the LPA was $268 million. This represented 107.5 to 111.7 percent of available capital funding ($240 million) identified in the Financial Plan used during this study. Financial estimates, which were based on the best available data, did not necessarily reflect "reasonable" assumptions regarding the future. Therefore, DART concluded that it was reasonable to pursue further investigations for providing LRT service to Plano with the

definition of the LPA, while continuing to review and consider financial conditions and financing opportunities.

LRT service could be extended as a "first phase" to Plano through the development of the single-track service scheme. Basic service, linking Plano to the extended LRT system in Richardson, would be provided until demand justified and financial resources permitted upgrading service through the construction of a second track and additional stations. All engineering, design, and environmental analysis would be conducted in the first phase of the project to facilitate future upgrading as simple construction action.

The Selected LPA

The planned LRT Alternative consisted of a 12.3-mile extension of the LRT service from the Park Lane Station in Dallas to the Parker Road Station at the existing East Plano Transit Center. Stations would be located at Park Lane (reconstructed), Walnut Hill, Forest Lane, LBJ Freeway, Spring Valley, Arapaho Road, Campbell Road (deferred), SH 190 (deferred), 15th Street, and Parker Road. A feeder bus system would transport riders to the LRT stations, thereby expanding the geographic coverage of the LRT system far beyond the effective range of the No-Build Alternative through Dallas, Richardson, Plano and the NC Corridor as a whole. LRT service would operate within the old SPRR ROW which was owned by DART. LRT system operations north of Park Lane to Parker Road would be a direct extension of the LRT Starter System, including guideway, station design, and vehicles. Multi-car trains would operate at maximum speed of 65 miles per hour.

During the initial stages of the planning process, the LRT Alternative consisted of an initial extension of the DART LRT Starter System with double-track LRT service to Arapaho Road in Richardson, including six new stations. Following the completion of these stations, service north of Arapaho Road would be staged, initially operating using a continuously welded, steel rail, single-track guideway wherever possible and adding two new stations—one at 15th street in Plano, and another at Parker Road, with the new terminus located adjacent to the East Plano Transit Center. The second phase would consist of a "built-out" configuration, which would be developed when demand justified, and financial resources permitted upgrading service though the addition of a second set of tracks from the Arapaho Station to the Parker Road Station and adding stations at Campbell Road and SH 190.

Between Park Lane and Arapaho Road, LRT vehicles would operate on double-track, continuously welded steel rails generally located within DART's ROW. However, a single-track segment north of Arapaho was planned as the initial phase of the LRT extension. Turn-outs and passing sidings would have to be installed to permit two-way operations. Train operating speeds are slightly lower for reasons of safety, and the operating headway is twice that of the service south of Arapaho Road. A station at 15th Street would serve downtown Plano, and the new terminus would be located adjacent to the East Plano Transit Center at Parker Road.

Although, the LRT Alternative specified a "build-out" concept, which would eventually result in the development of a full, two-track LRT guideway north of the Arapaho Road Station extending to the Parker Road Station at the East Plano Transit Center, Preliminary Engineering was completed for the full two-track guideway, facilities, and signal control system to the Parker Road Station. Preliminary engineering and ROW determinations were conducted to ensure that system design for the single-track, intermediate operating system did not preclude ultimate development of the full two-track system. The design criteria and standards developed for the LRT Starter System were adapted to this concept of phased

system development beyond the Arapaho Road Station. Plans were developed to accommodate future stations in the vicinities of Campbell Road and SH 190.

The LRT system would provide transit users with covered stations, air-conditioned light rail vehicles (LRVs), and full accessibility for handicapped patrons. This would enhance regional mobility for transit-dependent populations, including physically handicapped patrons, more so than the No-Build Alternative. Additionally, the LRT vehicles would operate on an exclusive guideway of continuous welded rails at speeds of up to 65 miles per hour--a ride quality unachievable with conventional bus transit service. There would also be preemptive signals at all grade crossings to ensure few, if any delays and would provide transit riders with a more reliable transit service. These characteristics were far more justifiable than the No-Build Alternative.

In its meeting on 28 January 1997, the DART Board of Directors approved a resolution amending the DART Service Plan to specify locations for seven of the stations along the NC Corridor LRT Extension. Locations were recommended and approved for the following stations: Park Lane, Walnut Hill Lane, Forest Lane, LBJ Freeway, Spring Valley Road, Arapaho Road, and Parker Road. Since the Campbell Road and SH 190 stations were deferred, they were not included in the recommendation, and no action was taken on the 15th Street Station at the request of the City of Plano. The City of Plano requested additional time to work with DART to finalize the location of the 15th Street Station.

As part of its resolution endorsing the selection of the LPA for the NC Corridor LRT Extension, the Regional Transportation Council requested that DART consider the preservation of available ROW within the DART/SPRR ROW for the addition of future HOV lanes in the NC Corridor LRT Extension as identified in the Mobility 2010 Plan Update. Therefore, definition of the LPA recognized this possibility. However, the use of excess ROW for HOV facilities or other potential projects would be subject to the results of a future MIS. Further, Preliminary Engineering and Environmental Assessment activities for this project have not focused on the design of any such HOV facility.

While the phased implementation of service was an integral part of the selected LPA, the full extension of the LRT system to Parker Road (i.e., the “build out” condition) and impacts thereof were subject to the findings of the Final EIS.

Preliminary Engineering

Carter & Burgess, Inc conducted the Preliminary Engineering and Environmental Impact Statement (PE/EIS) process beginning in October 1994 under the direction of DART. The Final EIS was published in April 1997. The EIS for the NC Corridor LRT Extension was prepared in accordance with regulations developed by the Council on Environmental Quality for NEPA compliance, as well as FTA and FHWA guidance and standards. The environmental evaluations were consistent with guidance detailed in the October 28, 1993 Federal Register notice previously cited. A Record of Decision (ROD) was issued in June 1997.

The NC Corridor LRT Extension short-term impacts were primarily related to temporary construction-related impacts. Some business activities suffered short-term economic losses during the construction period. There were a few permanent displacements associated with this project.

The long-term impacts of the NC Corridor LRT Extension include the projected reduction in vehicle traffic along the corridor’s road network and the benefit to the regional transportation system by decreasing regional vehicle miles traveled (VMT) by 96,560 miles daily in 2010.

While it is anticipated that the project will slightly reduce the overall regional Carbon Monoxide (CO) emissions, Volatile Organic Compounds (VOCs) and Oxides of Nitrogen (NOx), specific intersections near stations may show an increase in localized emission. Appropriate mitigation measures have been implemented for the 115 residences and businesses affected by noise and vibrations created by LRT service. Environmental impacts were documented in the NC Corridor LRT E Extension Final EIS.

Final Design

The DART General Engineering Consultant (GEC) led by LAN/STV was responsible for the final design of the NC Corridor LRT Extension. For purposes of engineering design and construction, the NC Corridor LRT Extension project was divided into three sections: North Central-3 (NC-3), North Central-4 (NC-4), and North Central-5 (NC-5).

The NC-3 section extends 4.1 miles from the Park Lane Station along the former SPRR corridor to Restland Road. It includes three aerial stations located at Park Lane, Walnut Hill, and Forest Lane, and one at-grade station at the LBJ Freeway. Parking is provided at all stations with the exception of the Walnut Hill Lane Station.

The NC-4 section extends 5.2 miles from north of Restland Road along the former SPRR corridor to Glenville Drive. One aerial station was constructed at Spring Valley Road, and two at-grade stations were built at the Arapaho Center and Galatyn Park. Parking is available at all stations with the exception of the Galatyn Park Station. DART has a long-term interlocal agreement with the Galatyn Park land owner that will last for the life of the improvements.

The NC-5 line section extends 3.2 miles from south of Glenville Drive along the former SPRR corridor through the Bush Turnpike Station at State Highway 190 (SH 190) and the Downtown Plano Station at 15th Street, to Parker Road Station at Park Boulevard and Archerwood Street. All stations are at grade, and parking is provided at all stations with the exception of the Downtown Plano Station.

Table 1-4 shows the dates that final design and construction began for each of the NC Corridor LRT Extension line sections.

Table 1-4: North Central Corridor Build-out Details

Line Section	Limits	Final Design	Construction	Contractors
NC-3	Park Lane - LBJ	April 1997	February 1999	GLF
NC-4	LBJ - Galatyn	October 1997	May 1999	Archer Western
NC-5	Galatyn - Parker	April 1998	January 2000	Martin Keby

Source: Dallas Area Rapid Transit

Construction and Operation History

The construction of the North Central LRT Extension was done in line sections, NC-3, NC-4, and NC-5. Construction on the first line section began in February 1999. See table 1 for the responsible construction contractors.

The opening of the NC Corridor LRT Extension project was staged in two phases. Phase one extended to Galatyn Park in Richardson and began revenue service in July 2002 (NC-3

and NC-4). Phase two reached to Parker Road in Plano (NC-5), and began revenue service in December 2002.

Full Funding Grant Agreement (FFGA)

A Full Funding Grant Agreement (FFGA) was awarded for the project on October 6, 1999.

DART had special permission articulated in a Letter of No Prejudice dated January 19, 1999 to proceed with construction of the NC-3 and NC-4 segments of the North Central Corridor LRT line in February and May of 1999.

BEFORE CONDITIONS

Physical Scope

The Before Conditions section of this document is based on transit and roadway services in 2000, two years prior to LRT operation in the NC Corridor. The acquisition was completed retrospectively; therefore some data availability was limited. Any data required as a measure of the service level that could not be obtained for the required year is substituted with the closest comparable data available.

Transit

In 2000, physical components of the DART Transit System consisted of a 20-mile LRT Starter System, HOV lanes, and several Transit Center and Park-and-Ride facilities. Within the NC Corridor, two Transit Centers served local, cross-town and express bus routes: Richardson Transit Center and the East Plano Transit Center located at Parker Road.

DART bus services in the NC Corridor (figure 2-1) operated in mixed traffic and carried one percent of the total travel demand in the corridor. Prior to LRT service there were limits to cross-town transit service due in large part to the dispersed employment locations and population centers in the corridor, and the inability of the current transit service to provide meaningful travel time savings.

Roadway Crossing Configurations

Prior to LRT construction and operation, the SPRR ROW served freight railroad traffic. Roadway crossing configurations complied with specifications suited to heavy freight rail vehicles in a less frequent operational scheme. Figure 2-2 shows roadway crossing configurations as they existed prior to LRT construction.

Cost

Fifty-two bus routes operated some portion of their routes within the NC corridor prior to the extension of the LRT. The fully allocated operating and maintenance costs for these routes in the year 2000 were $41.8 million.

Ridership

Ridership within the NC Corridor primarily consisted of bus riders, however, bus routes often served to provide access to the LRT system interim terminal station at Park Lane. Trips originating within the NC Corridor contributed to total system ridership and represented 24.3 percent of total system boardings, (see table 2-1, below).

Table 2-1: Average Weekday Boardings – Sample Month (January 2000)	
DART Service Area	157, 627 (all modes)
NC Corridor	38,238 (bus routes)

Source: Dallas Area Rapid Transit Service Planning, 2005, see Appendix B-Tab 5 & 6

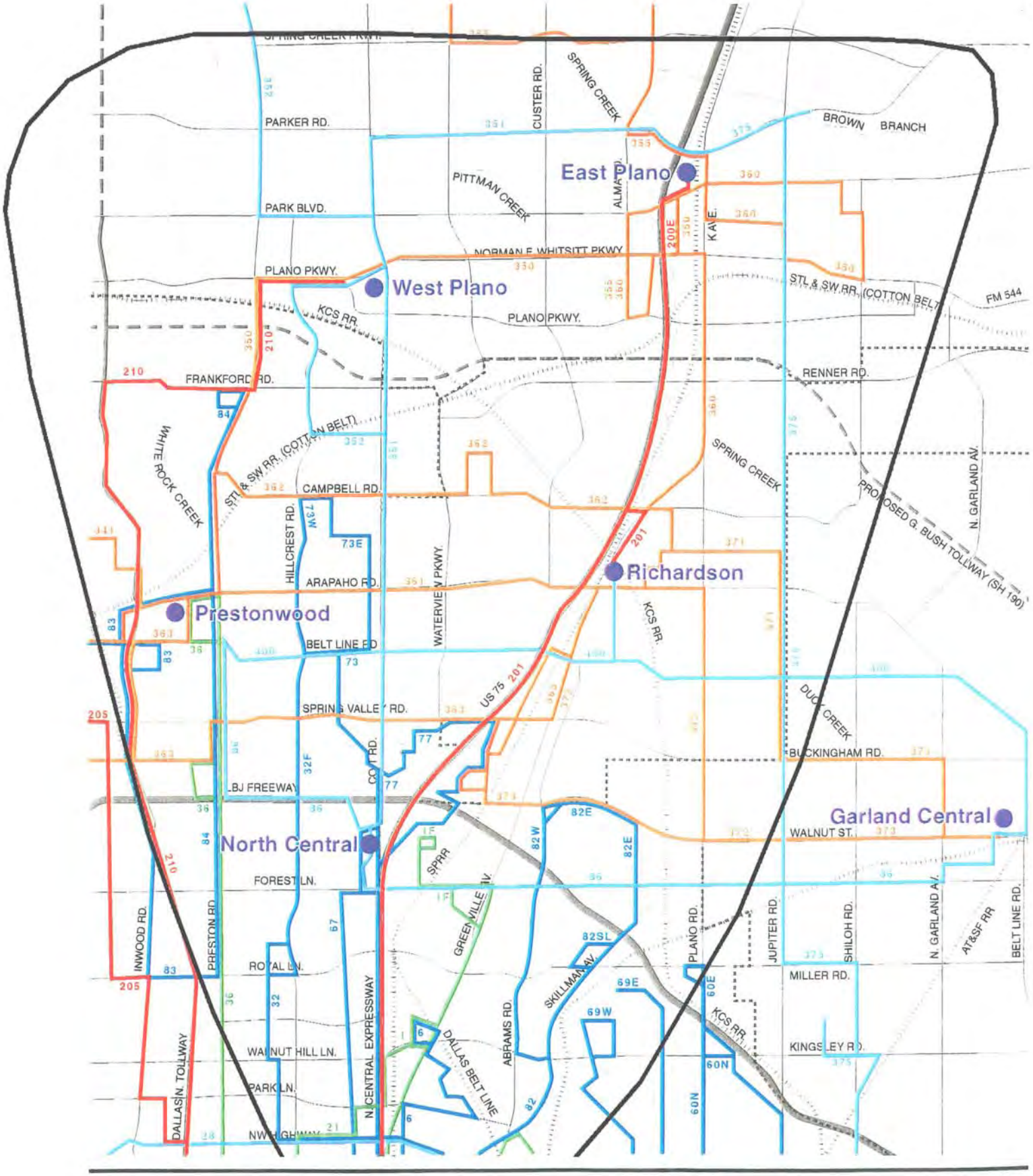


Fig 2-1. Bus Operations Before No-Build Alternative Bus Network

North Central Corridor Extension
Before and After Study - November 2006

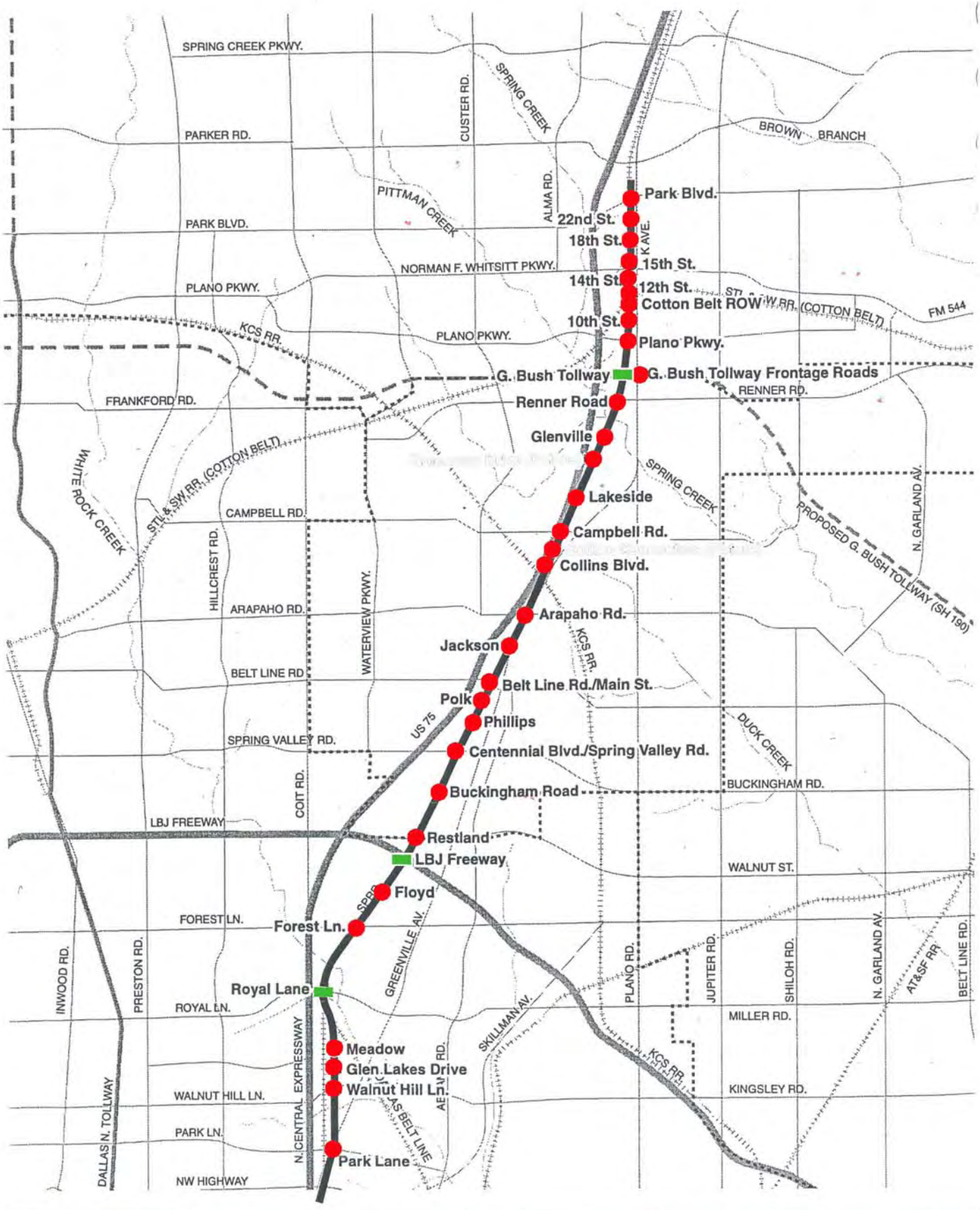


Fig 2-2. LRT Crossing Configuration "Before"

North Central Corridor Extension

Before and After Study - November 2006

Service Levels

Before the NC Corridor LRT Extension became operational in 2002, the DART transit system consisted of the LRT Starter System and an extensive network of bus service including: Cross-town, Express, Local, Rail Feeder, Transit Center Feeder services. The following section describes the LRT starter system and bus system service levels prior to LRT operation.

Transit Service Levels

DART LRT Service

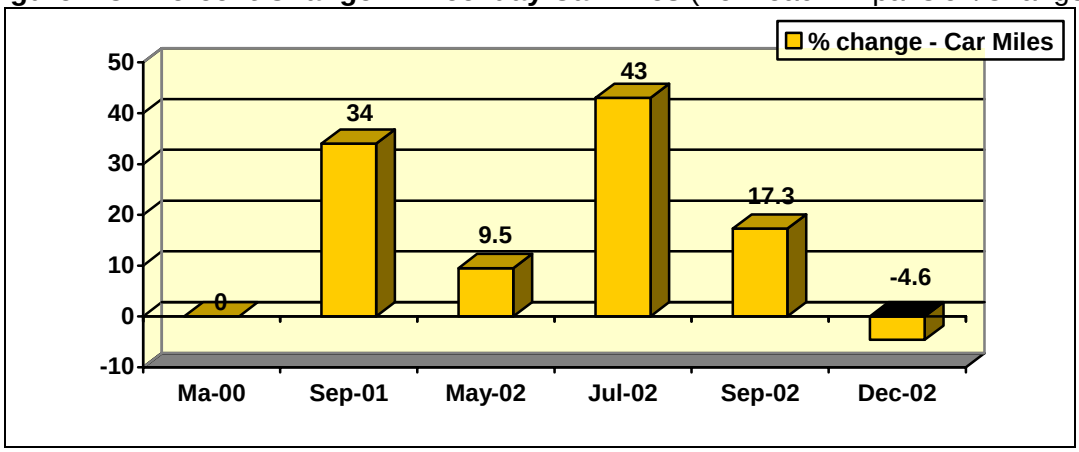
Table 2-2 describes weekday and Saturday car miles and train hours for the LRT system. Numerous changes in the configuration of the LRT system occurred in the Before period due to the opening of new stations and one adjustment to headways in December of 2002, due to budget considerations.

Expansion of LRT service to new stations resulted in a steady increase in both car miles and train hours. However, the lengthening of headways in December of 2002 decreased both car miles and train hours.

Table 2-2: System-wide LRT Service May 2000-December 2002					
Month/Year	Weekday		Saturday		Operating Conditions
	Car Miles	Train Hours	Car Miles	Train Hours	
May 2000	8,237	256	4,074	201	*Starter System*
July 2000	8,237	256	4,074	201	
September 2000	8,432	258	4,074	201	
November 2000	8,432	258	4,074	201	
January 2001	8,445	260	3,917	202	
April 2001	8,445	260	3,917	202	
June 2001	8,445	260	3,917	202	
September 2001	11,034	326	6,031	279	*Blue Line Extended to White Rock Station*
December 2001	11,045	326	6,031	279	
February 2002	11,045	326	6,031	279	
May 2002	12,079	355	6,605	318	*Blue Line Extended to LBJ Skillman*
July 2002	17,271	439	8,976	377	*Red Line Extended to Galatyn Park*
November/ December 2002	20,251	493	10,513	420	*Red Line Extended to Parker Road, Blue Line Extended to Downtown Garland*
October 2003	19,324	457	7,581	300	*Changed headways on weekends and nights from 15 minutes to 20 minutes*

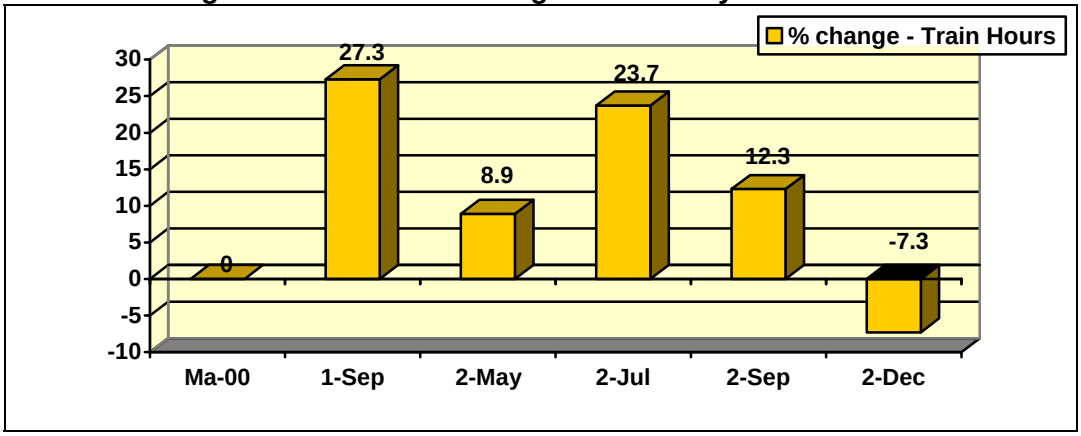
Source: Dallas Area Rapid Transit Service Planning, 2005, see Appendix B-Tab 5 & 6

Figure 2-3: Percent Change in Weekday Car Miles (from each Expansion/Change)



Source: Dallas Area Rapid Transit Service Planning, 2005, see Appendix B- Tab 6

Figure 2-4: Percent Change in Weekday Train Hours



Source: Dallas Area Rapid Transit Service Planning, 2005, see Appendix B- Tab 6

Roadway Service Levels

As described in the Project Description, the existing highway system in the NC Corridor LRT Extension included two freeways (US-75 and IH-635); a tollway (George W. Bush Tollway) and a network of arterial and local streets. Significant levels of congestion occurred along the NC Corridor road network. Due to an anticipated increase in residential, commercial, and industrial development in the corridor, these levels of congestion are expected to worsen by 2010 despite the proposed addition of HOV lanes on US-75, and the widening of the LBJ Freeway. Additionally, many of the existing roadways have limited potential for expansion as a result of existing development that has reduced available ROW.

Transit Markets

Economic and demographic trends affect the market for public transit service. This transit market analysis examines demographics, travel time, employment, development density, and other factors within the NC Corridor LRT Extension study area. The results can be used to demonstrate the strengths of this alignment to the cities of Dallas, Richardson and Plano and their residents.

Demographics

Various demographic factors contribute to transit utilization. Several of these factors are described below and their relationships to transportation decisions are listed.

- Income Level: Higher income persons typically live in lower density areas. Lower income persons typically have fewer cars and may be required to travel longer distances to find work.
- Type of Employment: Service employees are typically on a fixed work schedule. Professionals are typically allowed more flexibility in their work schedules, resulting in the potential to travel during off-peak times.
- Number of People per Household: More people per household equates to more trips generated per day.
- Development Density: A higher density of development allows the opportunity for more transit service, since a greater number of persons in smaller geographic area

are available to use transit. Lower density of development typically do not provide high enough numbers of residents located within a concentrated area to support transit service unless an intermediate boarding area is provided, such as a park and ride facility.

- Number of Vehicles per Household: The more vehicles per households typically results in more auto trips. It also gives people the opportunity to use an automobile for discretionary purposes such as recreational or shorter trips that could be made by walking or biking.

Table 2-3 provides demographic information for users of the North Central Corridor. The first data column represents demographic characteristics of residents within the NC Corridor as delineated in figure 1-2. The second data column describes demographic characteristics of census tracts that were identified by a license plate survey conducted in December of 2000 (Figure 2-5). This survey demonstrated that users of the then existing transit facilities, East Plano Park-and-Ride and Richardson Transit Center, often originated outside of the study corridor and even outside of the DART service area. According to the survey, 44.8% of recorded license plates originated in a census tract outside the study corridor.

Table 2-3: North Central Corridor Demographic Information

Demographic	Census Tracts within the Corridor	Census Tracts Reported by License Plate Surveys
Persons Per Household	2.0	2.6
Percentage of Households with One Person	32.9%	28.2%
Percentage of Households with Two Persons	31.9%	31.0%
Percentage of Occupied Housing Units Rented	52.0%	44.4%
Average Number of workers per Family Household	1.3	1.3
Percentage of Occupied Housing Units with No Vehicles Available	5.2%	5.3%
Percentage of Occupied Housing Units with One or More Vehicles Available	94.8%	94.7%

Source: DART Bus Service Planning survey, 2000; US Census 2000

In 2000, census tracts within the NC Corridor averaged two persons per household, according to the 2000 Census. The majority of occupied housing units, 135,580, or 52 percent, were renter-occupied in 2000. Approximately 32.9 percent of total households were one-person households; 31.9 percent were two-person households. The average number of workers per household was 1.3. In 2000, the percentage of occupied housing units with no vehicles available was 5.2 percent, with 94.8 percent having one or more vehicles available. Data reported for census tracts outside of the study area show similar results. As figure 2-5 demonstrates, most transit user origination points outside of the study area are located relatively close to the study area boundary diminishing any differences between the population samples.

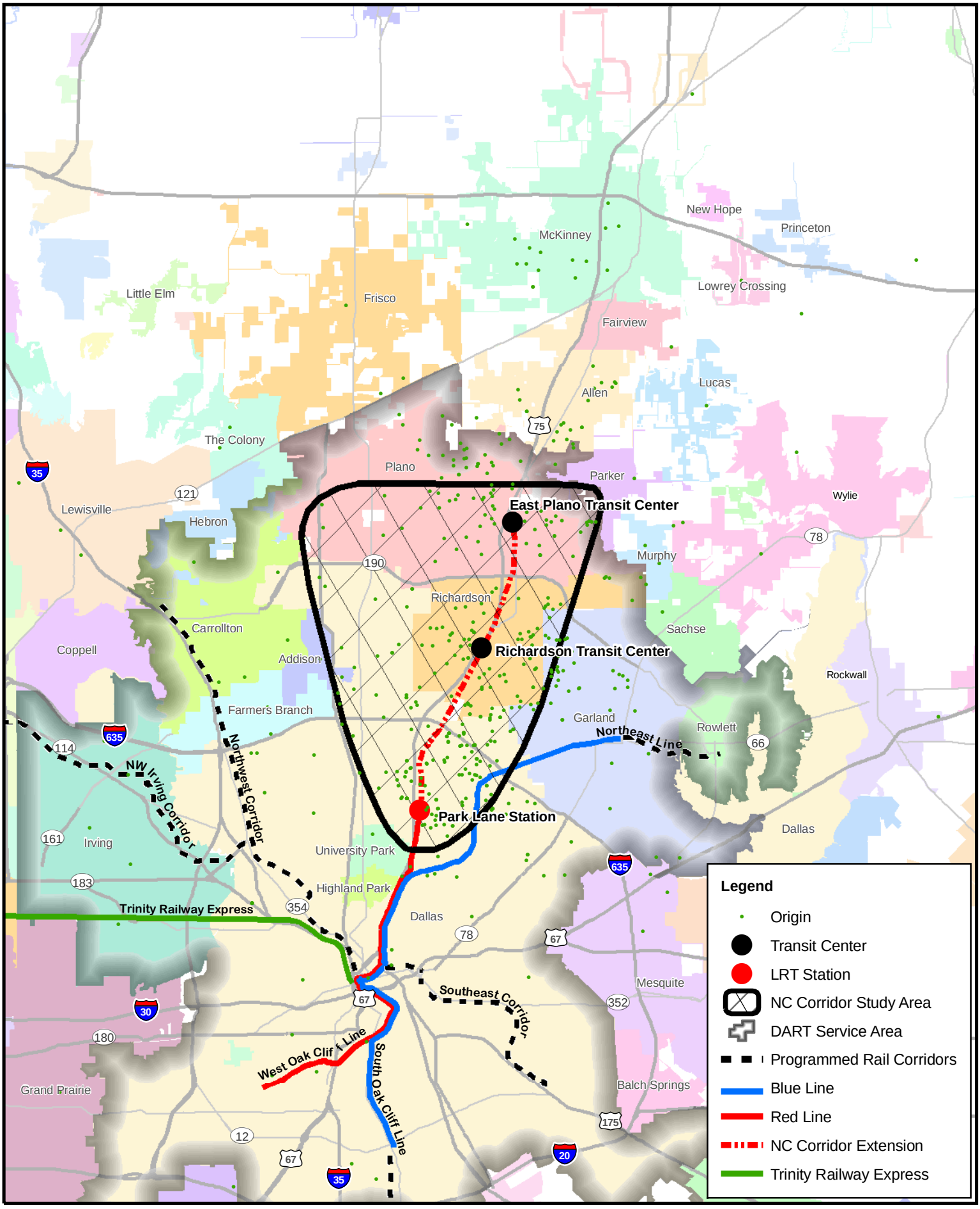


Figure 2-5: Transit User Origination Points, 2000
North Central Corridor Extension
Before and After Study - November 2006

Population and Employment

The transit market is also defined by areas of higher employment and retail concentrations. These areas attract large numbers of people per day, providing an opportunity for people to use transit. Table 2-4 contains data from the U.S. Census and year 2030 projections established by the North Central Texas Council of Governments (NCTCOG). In 2000, NCTCOG estimates report that there were 340,710 people employed within the North Central Corridor; 48 percent of those worked in management, professional, and related occupations. A census survey of employed residents within the North Central Corridor showed that the majority, or 90 percent, of workers, 16 years and over, traveled 15 to 24 minutes to work by means of car, truck or van; 87 percent of those workers drove alone. Only 12 percent carpooled, and less than 3 percent used public transportation.

Table 2-4: 2030 Demographic Projections

Demographic	Year 2030
Projected Population	383,269
Projected Households	168,313
Projected Employment	305,924

*Source: US Census 2000;*North Central Texas Council of Governments.*

Market Condition (Survey Data)

DART's marketing and communications department conducted a ridership survey in 1998. The following, table 2-5, represents the demographics of the customer based on percentage of respondents on both bus and LRT. Many of the responses are similar due to the radial nature of the DART LRT system and its high integration of bus feeder routes, resulting in a high level of multi-modal riders.

Table 2-5: Ridership Survey Before Conditions 1998		
Demographic	**1998**	
	Bus	**LRT**
Choice Rider	62.00%	60.00%
Age		
18-24	16.00%	18.00%
25-34	21.00%	21.00%
35-54	51.00%	51.00%
55-64	8.00%	8.00%
65+	3.00%	2.00%
Level of Education		
Less than 12 years	13.00%	9.00%
High School Graduate	35.00%	27.00%
Some College	34.00%	33.00%
College Degree	15.00%	22.00%
Post Graduate Degree	4.00%	8.00%
Ethnicity		
African American	63.00%	55.00%
Caucasian	23.00%	32.00%
Hispanic	8.00%	7.00%
Native American	2.00%	1.00%
Oriental	1.00%	2.00%
Occupation		
Professional/Managerial	27.00%	44.00%
Sales/Clerical/Service	30.00%	30.00%
Laborer/Craftsman	19.00%	10.00%
Student/Employed	9.00%	5.00%
Retired	5.00%	2.00%
Student Only	3.00%	2.00%
Homemaker	4.00%	4.00%
Level of Income		
<$15,000	40.00%	39.00%
$15,000-$24,999	27.00%	21.00%
$25,000-$34,999	14.00%	16.00%
$35,000-$49,999	9.00%	14.00%
$50,000-$74,999	6.00%	13.00%
$75,000+	4.00%	10.00%

Source: Dallas Area Rapid Transit Marketing/Communications Department

Before Property Values

The information presented regarding property values was not primary collected for this study, but does serve as an indication of the impacts of LRT system as a whole; therefore, is also applicable to the NC Corridor Extension and the Before and After Study.

There are a variety of aspects to consider when marketing the affects LRT will have on neighborhoods within the specific corridor. Location, current and future development, relation to nearby cities, and the potential for ridership are all used to promote LRT prior to inception. However, one of the most common ways to gauge the success of LRT is to consider its effect on economy. In particular, LRT stations are often marketed by their impact on the surrounding neighborhood property values. Two studies were undertaken by the by Bernard L. Weinstein and Terry L. Clower with the University of North Texas Center for Economic Development and Research, to determine the influence DART LRT system has on property values. They are: *The Initial Economic Impacts of the DART LRT System* and *An Assessment of the DART LRT on Taxable Property Valuations and Transit Oriented Development*. The first study was conducted in July 1999, the second in September 2002. The following summary provides a brief description of both studies, their findings, and provides a comparison between the studies.

According to Weinstein's 1999 report, most studies have shown insignificant changes on adjacent property values near rail systems that are similar to DART for a variety of reasons. In San Francisco, studies revealed that the introduction of rail encouraged the decentralization of population and economy, which lowered property values in many of the older neighborhoods. Atlanta's system created some patterned growth; nevertheless, most areas did not see impact on property values. In Washington D.C., studies indicated that rail transit impacts on property values were indirect, and due to land availability and market conditions. However, during the time of the study, Dallas was undergoing unprecedented demographic and economic growth. The Dallas-Fort Worth region was "the nation's strongest metropolitan economy" with a thriving commercial real estate market. Additionally, residential densities were increasing in many parts of Dallas. Demographically, the City of Dallas was changing in ways that would assist in increasing the demands for public transit. These combined factors assisted in increasing property values around rail stations.

According to the 1999 study, appraisal data was collected on 700 commercial and residential properties located within a ¼ mile of the 15 existing Light Rail Transit (LRT) stations located along the Red and Blue Lines, see Figure 2-6. The following provides key data from the report:

- During the period 1994 to 1998, total property values increased in 11 of the station areas examined: Cedars, Cityplace, 8th Street/Corinth, Hampton, Kiest, Lovers Lane, Mockingbird, Park Lane, Tyler/Vernon, VA Hospital and Dallas Zoo area, see tables 2-6 and 2-7.
- Sharp gains in property values have occurred around some DART stations, most notably in the City Place-Mockingbird-Lovers Lane Corridor
- Total valuations around DART stations were about 25 percent greater than in control neighborhoods, chosen based on having comparable characteristics to the study station areas, but not being served by rail.
- Between mid 1997 and mid 1998, total retail sales jumped 36.2 percent in Dallas CBD. By contrast retail sales growth citywide was only 3.6 percent

- Dallas/Fort Worth Region had a strong metropolitan economy and has a booming real estate market.
- Residential densities were increasing in many parts of the metro area.

Figure 2-6: Existing DART Stations, 1999

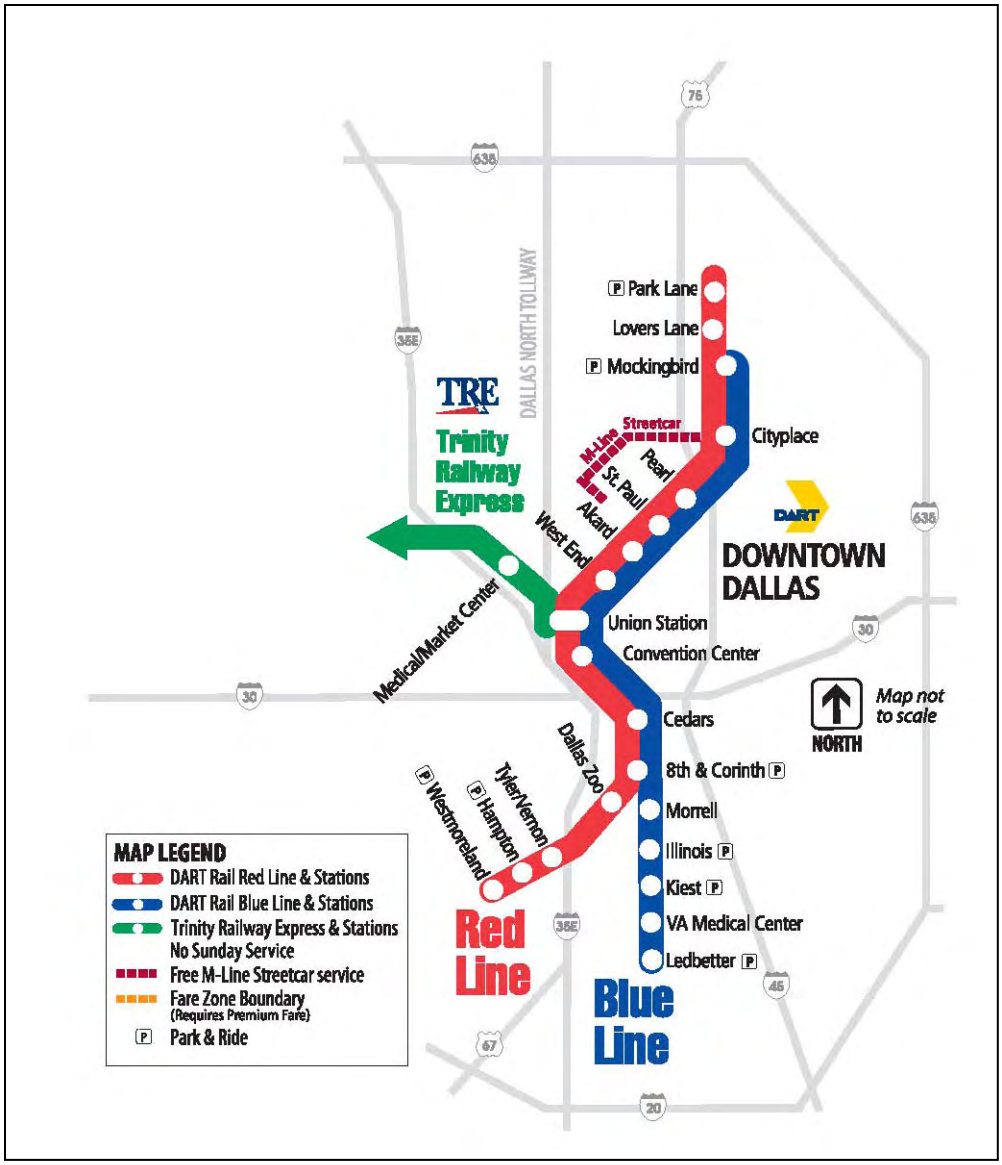


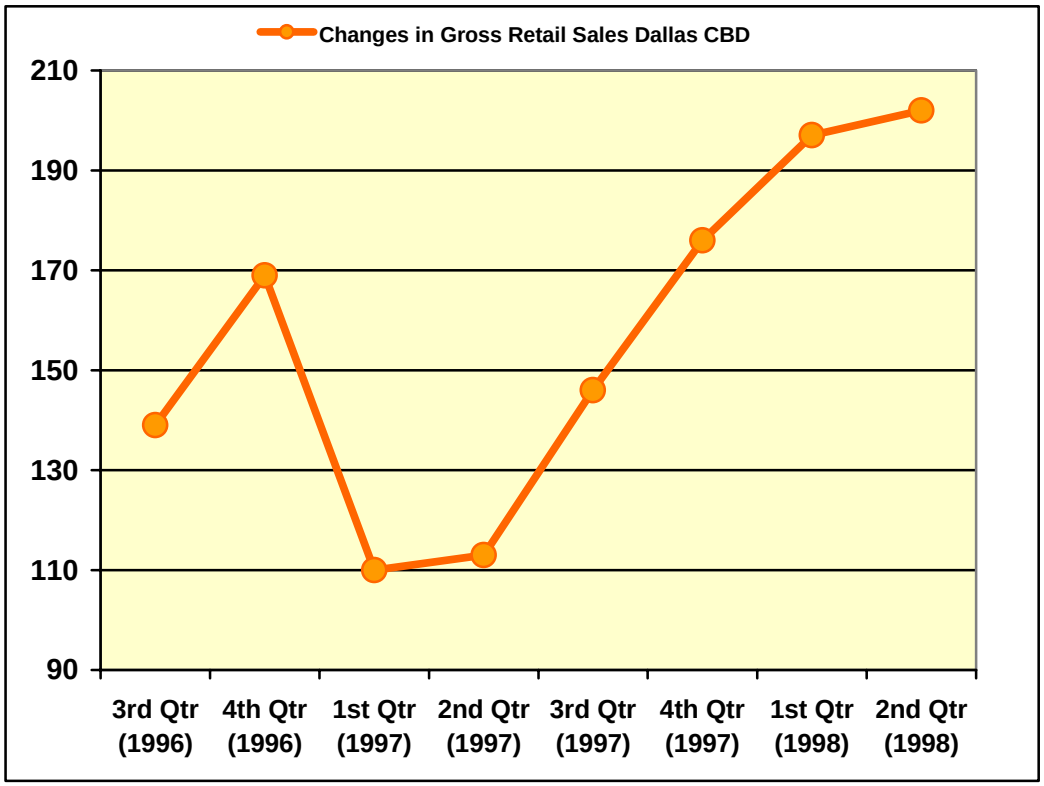
Table 2-6: Average Percent Change in Total Property Values (1994-1998)						
DART Stations	**Retail (% change)**	**Office (% change)**	**Residential (% change)**	**Industrial (% change)**	**Vacant (% change)**	**All Properties (% change)**
Cedars	-23.56	39.82	0	8.18	-30.94	23.57
CBD	33.41	-37.16	26.80	11.95	-3.38	-9.71
City Place	67.26	69.38	-33.14	9.33	-	59.01
Corinth	6.66	-	-24.55	24.82	35.33	.37
Hampton	-	-	42.27	-	--	46.27
Illinois	-39.08	11.49	-10.94	0	-38.26	-30.54
Kiest	83.82	9.05	-10.17	-	44.20	36.75
Lovers	5.29	73.06	30.48	22.85	-	65.77
Mockingbird	78.71	9.35	28.07	-11.62	-	27.20
Morrell	-29.70	-	-6.59	0	-20.56	-12.13
Park Lane	-42.14	64.45	12.42	-36.15	-	2.17
Tyler/Vernon	35.72	-	9.87	-	22.55	12.18
VA Hospital	16.72	.90	65.46	-	-7.05	29.73
Westmoreland	-23.42	49.52	20.85	4.18	-54.41	-20.20
Zoo	3.75	-	14.44	8.12	.63	9.25
Average	**12.39**	**28.97**	**11.02**	**3.79**	**-5.12**	**15.98**

Source: Weinstein, Bernard, Ph.D and Terry Clower, Ph.D. The Initial Economic Impacts of the DART LRT System. University of North Texas Center for Economic Development and Research, 1999.

Table 2-7: Average Percent Change in Land Values by Property Values (1994-1998)						
DART Stations	**Retail (% change)**	**Office (% change)**	**Residential (% change)**	**Industrial (% change)**	**Vacant (% change)**	**All Properties (% change)**
Cedars	-24.90	12.39	0	-6.53	-31.00	-9.66
CBD	1.42	38.22	-5.17	.18	-3.38	18.55
City Place	142.08	37.61	20.74	0	-	44.06
Corinth	2.85	-	13.22	74.23	24.66	25.71
Hampton	-	-	11.56	-	-	11.56
Illinois	38.74	49.92	-.39	0	-11.54	28.71
Kiest	240.14	-4.64	-4.32	-	0	79.51
Lovers	7.56	-15.39	14.14	15.63	-	-5.40
Mockingbird	74.28	-29.27	14.28	-13.80	-	20.44
Morrell	18.71	-	22.85	0	5.97	17.92
Park Lane	-22.74	20.33	24.36	-18.74	-	-3.44
Tyler/Vernon	48.89	-	0	-	32.50	8.41
VA Hospital	23.05	-5.16	-21.20	-	-7.05	5.36
Westmoreland	-42.50	34.53	0	6.28	-54.41	-23.86
Zoo	6.88	-	-.54	-10.28	.27	1.96
Average	**36.75**	**13.85**	**11.02**	**7.68**	**-4.40**	**14.66**

Source: Weinstein, Bernard, Ph.D and Terry Clower, Ph.D. The Initial Economic Impacts of the DART LRT System. University of North Texas Center for Economic Development and Research, 1999.

Figure 2-7: Changes in Gross Retail Sales Dallas Central Business District 1996-1998



Source: Weinstein, Bernard, Ph.D and Terry Clower, Ph.D. The Initial Economic Impacts of the DART LRT System. University of North Texas Center for Economic Development and Research, 1999.

Property Value Changes near LRT Stations 1997-2001

In order to gain a comprehensive view of property value changes near operating LRT lines, an additional study was undertaken between 1997 and 2001. Data exhibits show increases in property values close to DART rail stations at office, residential, and vacant locations. In all sectors of the surveyed area, an increase in property values was detected near DART facilities. According to Weinstein, "Proximity to a current or future DART LRT station appears to have had an additional positive impact on median valuations for most classes of properties." The following, table 2-8, illustrates these phenomena.

Table 2-8: Average Property Value Changes 1997-2001 (in 2001$ total increase)		
	Control	**DART**
Office		
1997	$331,450	$519,240
2001	$369,460	$647,730
Total Change	$38,010	$128,490
% Change	11.5%	24.7%
Residential		
1997	$37,560	$35,605
2001	$44,880	$47,025
Total Change	$7,320	$11,420
% Change	19.5%	32.1%
Residential Vacant		
1997	$3,000	$2,250
2001	$3,000	$2,500
Total Change	$0	$250
% Change	0%	11.1%
Retail		
1997	$230,000	$243,000
2001	$300,000	$311,730
Total Change	$70'000	$68,730
% Change	30.4%	28.3%
Industrial		
1997	$234,900	$221,180
2001	$285,405	$250,000
Total Change	$50,505	$28,820
% Change	21.5%	13%

Source: Weinstein, Bernard, Ph.D and Terry Clower, Ph.D., An Assessment of the DART LRT on Taxable Property Valuations and Transit Oriented Development. University of North Texas Center for Economic Development and Research, 2002

Other Factors

Corridor Demographics 2000

The following census data describes the demographic conditions prior to LRT inception. The corridor encompasses portions of Dallas, Richardson, and Plano. The following table, table 2-9, represents data within census tracts that are wholly or partially enclosed by the NC Corridor Study Area, see figure 1-2.

Table 2-9: Corridor Demographics					
	Population in Corridor	**Employment**	**1999 Income Below Poverty Level**	**Housing Units**	**No Vehicle Available**
Total	383,269	305,924	42,067	168,313	13,830

Source: US Census 2000; North Central Texas Council of Governments

Land Use

Both direct and indirect impacts to land use in the station vicinity would occur with implementation of the LRT Alternative. Direct impacts would occur in relation to acquisitions and displacements resulting from the construction of LRT stations and related access facilities (bus bays and park-and-ride lots). Indirect impacts generally can only be defined through assumptions or suppositions about the propensity for change; generally they are assumed to occur within 1,500 feet of the station. Land use patterns as they existed prior to the opening of the NC Corridor LRT Extension are described below, as shown in figures 2-8 to 2-15.

Park Lane Station

Land use surrounding this station was dominated by commercial/retail land uses with one large office concentration and a few smaller office areas. A large concentration of multifamily housing units was located east of the station.

Walnut Hill Station

The Presbyterian Hospital dominated land use to the south of the Walnut Hill Station. Other uses consisted of office space which was used to support activities at the hospital. To the north of the station, directly across from the hospital was a potential development site.

Forest Lane Station

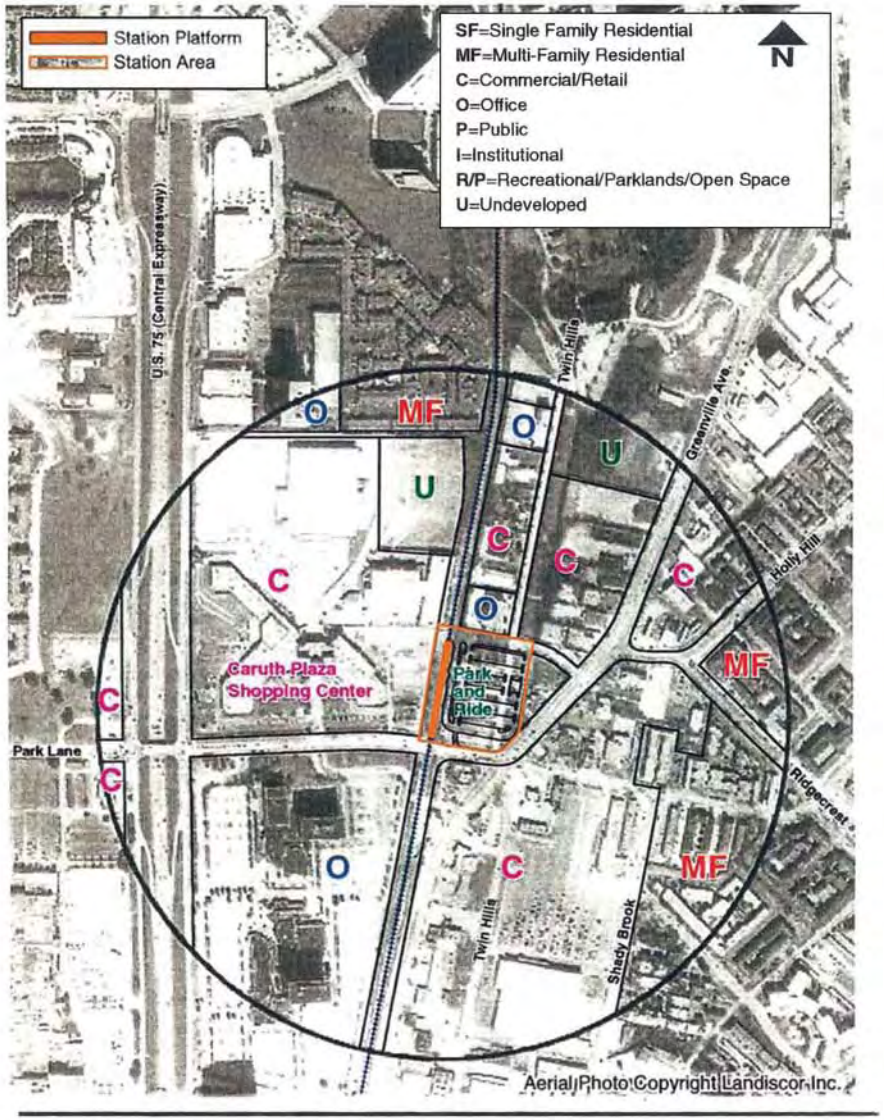
This station served both the Stults and Hamilton Park neighborhoods. The land use to the west was devoted to commercial activities; land use to the east consisted of residential housing. A large undeveloped parcel of land was also located to the west of the proposed station site. White Rock Creek provided a buffer between additional development west of the DART ROW and residential land uses to the east.

LBJ Freeway Station

The land around this proposed station located adjacent to Floyd Road included a mix of uses. The proposed site for the park-and-ride lot to serve this station consisted of 8.6 acres of a recreation area belonging to Texas Instruments (TI). East of this area was an undeveloped subdivision. Land use to the south was devoted to multifamily residential uses. A small creek and green belt served as a buffer separating the residential area from the recreation area. At the time of preliminary planning, TI was in the process of constructing a large manufacturing facility on the north side of LBJ Freeway. This new facility displaced employee parking to a remote parking lot south of the freeway. Continued development of the commercial subdivision east of the proposed station site was expected.

Spring Valley Road Station

Land use around the Spring Valley Road Station encompassed a variety of developments. A large concentration of multifamily residential was located to the east of the station. Single-family residences were abutting the multifamily area. Commercial activities generally dominated the area, with a preponderance of office/commercial developments (i.e. combination facilities incorporating commercial activities and retail or wholesale offices for sales and administration). A small office complex was located south of Spring Valley Road on the west side of the DART ROW, and an undeveloped parcel of land was located to the south of Spring Valley Road next to the office complex.



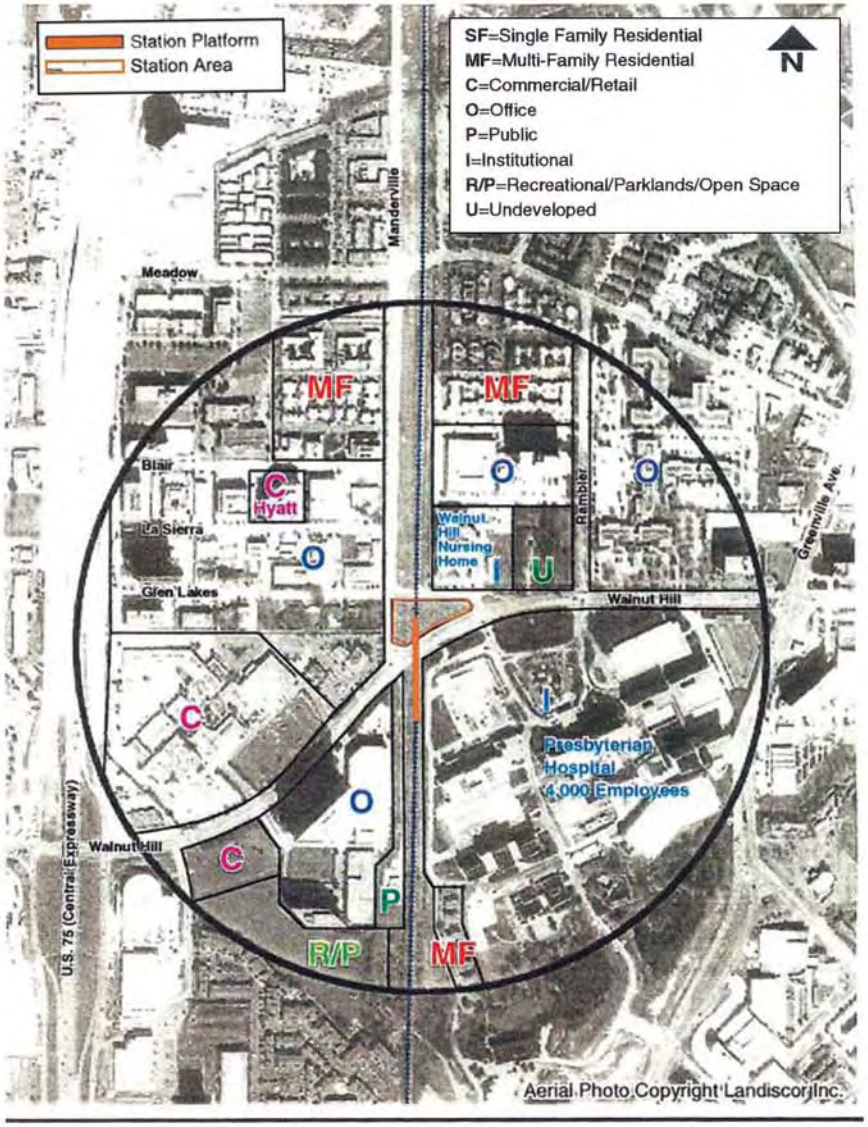
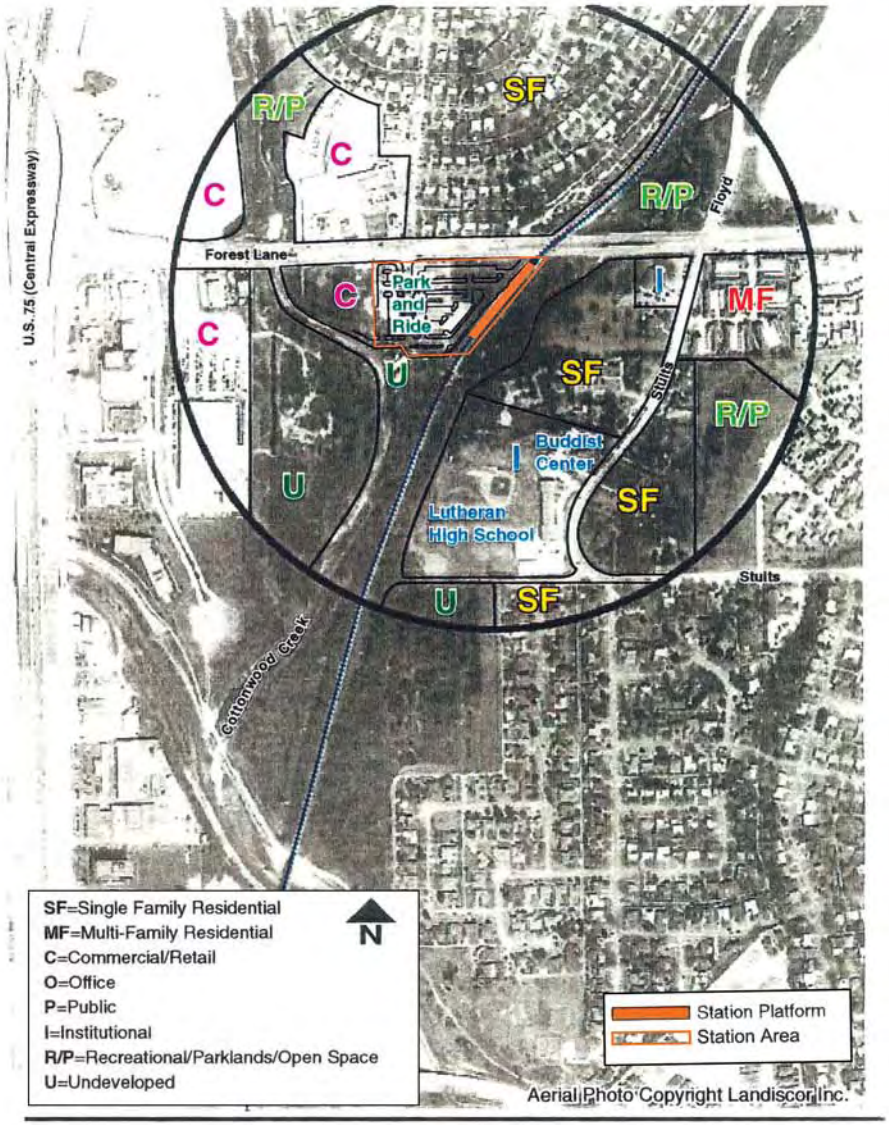


Fig 2-8.
Before Land Uses at Park Lane Station
North Central Corridor Extension
Before and After Study - November 2006

Fig 2-9.
Before Land Uses at Walnut Hill Station
North Central Corridor Extension
Before and After Study - November 2006



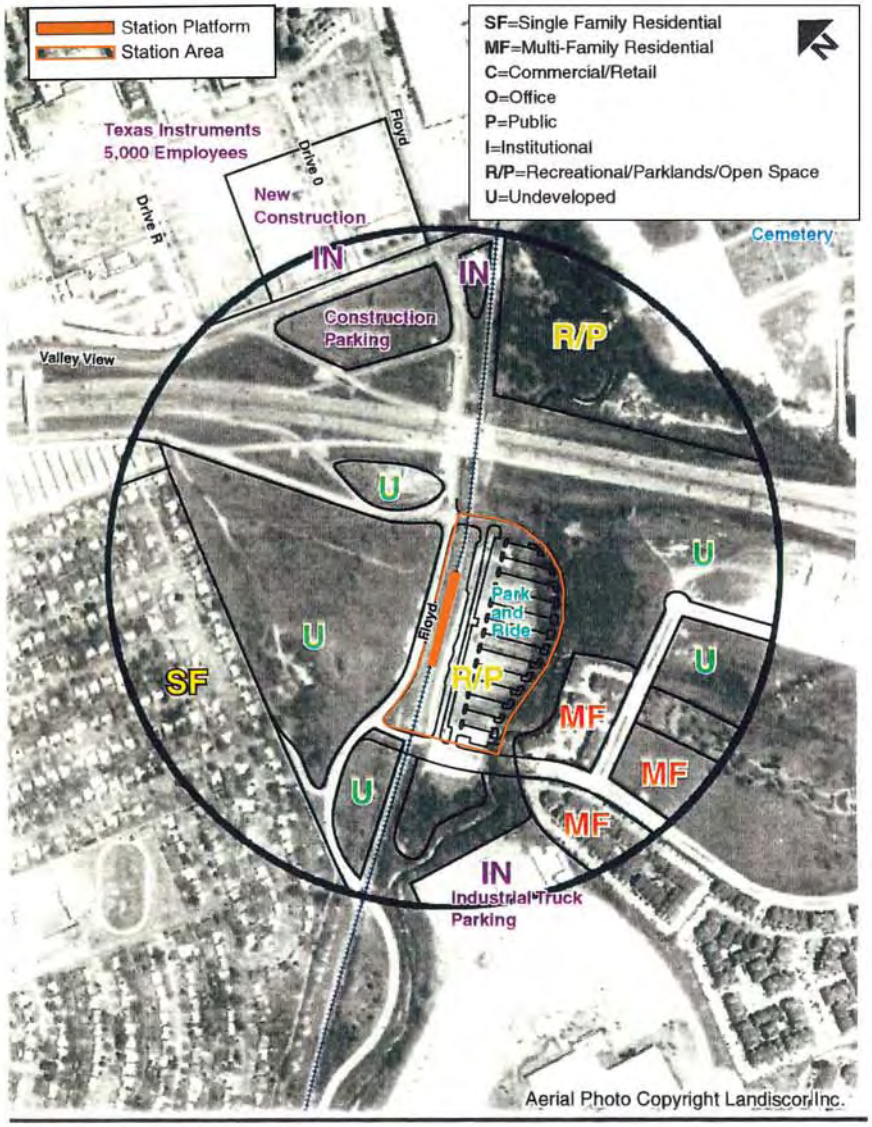
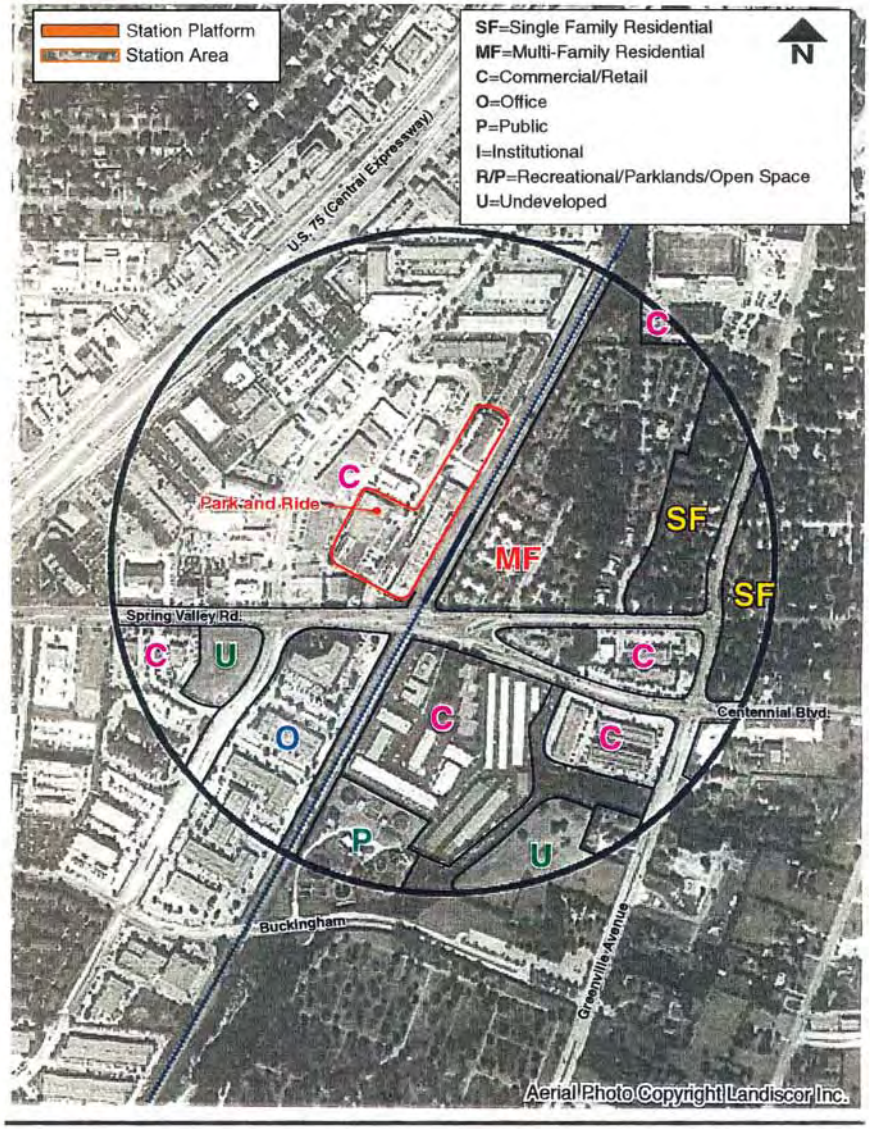


Fig 2-10.
Before Land Uses at Forest Lane Station
North Central Corridor Extension
Before and After Study - November 2006

Fig 2-11.
Before Land Uses at LBJ Station
North Central Corridor Extension
Before and After Study - November 2006



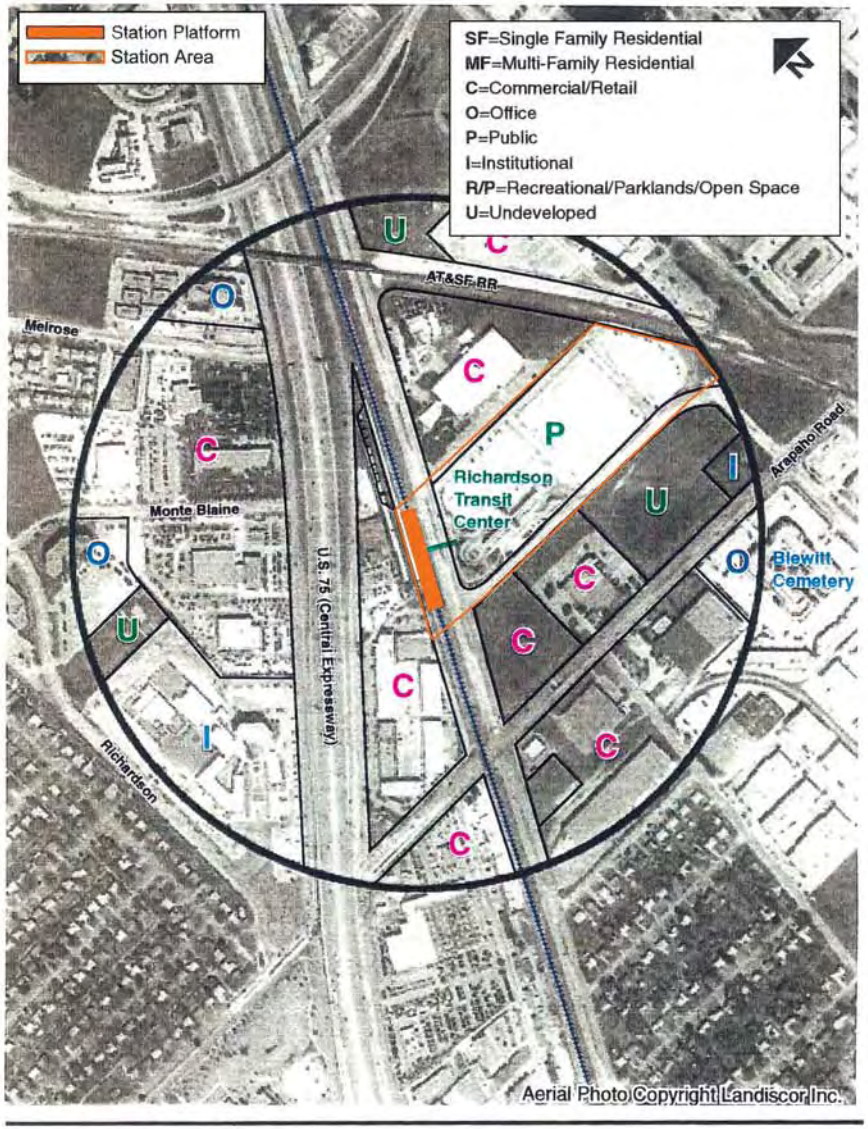
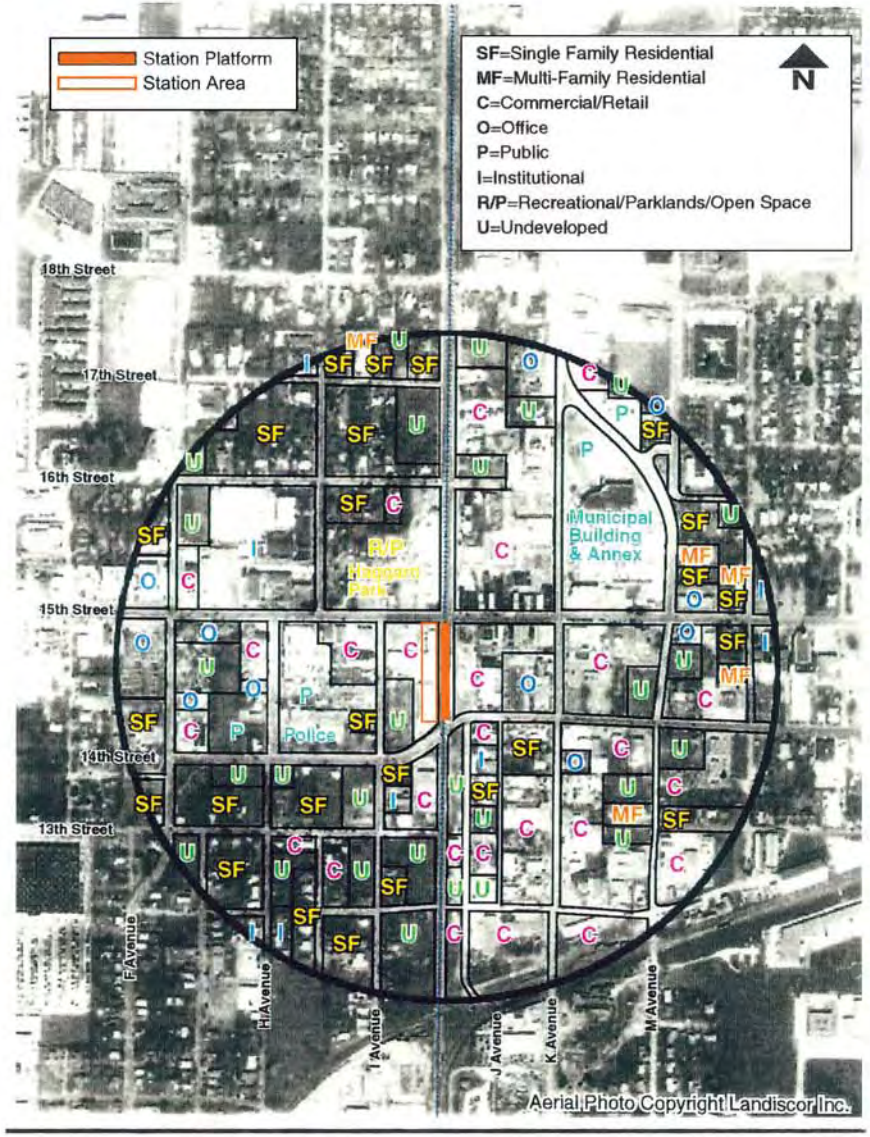


Fig 2-12.
Before Land Uses at Spring Valley Station
North Central Corridor Extension
Before and After Study - November 2006

Fig 2-13.
Before Land Uses at Arapaho Road Station
North Central Corridor Extension
Before and After Study - November 2006



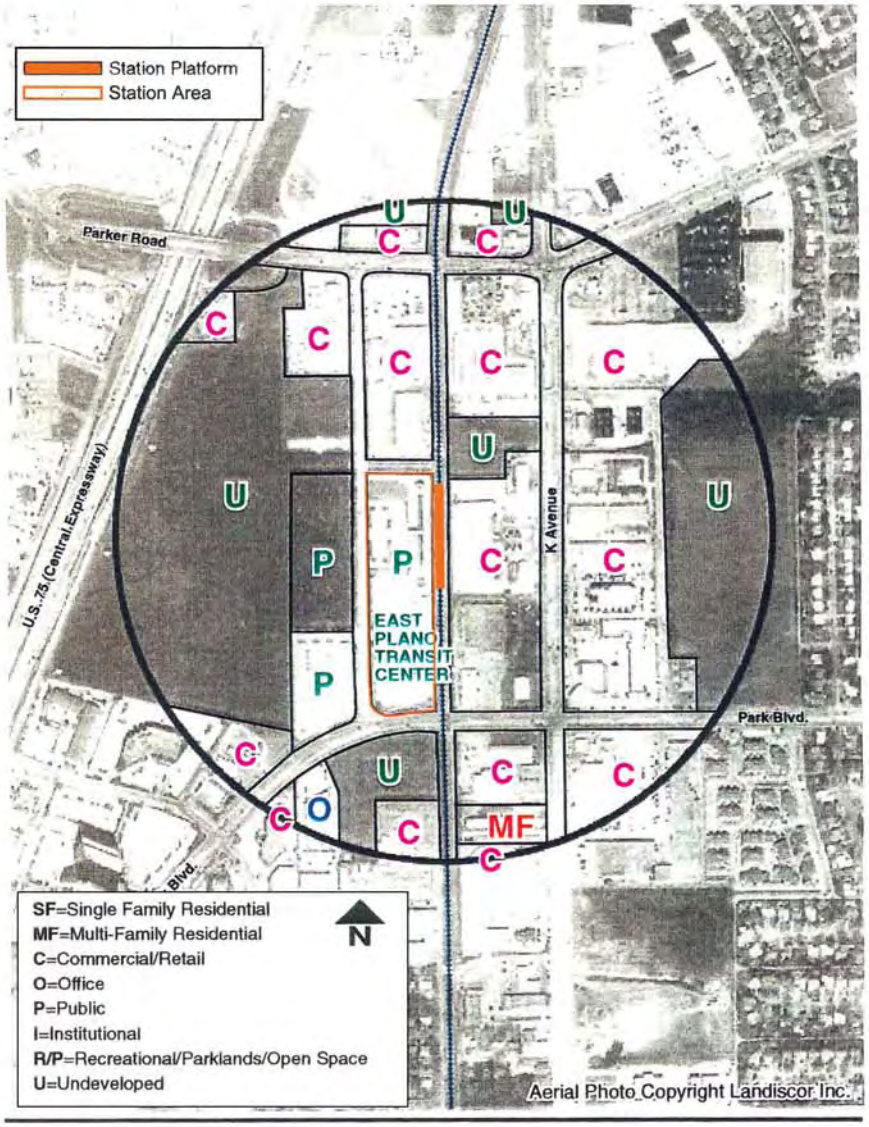


Fig 2-14.
Before Land Uses at 15th Street Station
North Central Corridor Extension
Before and After Study - November 2006

Fig 2-15.
Before Land Uses at Parker Road Station
North Central Corridor Extension
Before and After Study - November 2006

Arapaho Road Station

Land use surrounding this station was dominated by commercial land uses, with the Richardson Transit Center occupying a central location. There was a large undeveloped parcel on the southeast side of the Transit Center and three smaller parcels at the periphery of the 1,500-foot impact area. The large undeveloped parcel next to the Transit Center was expected to attract commercial uses, although the presence of the LRT station could enhance the site's potential for higher density office development. Commercial and office uses ultimately could occupy the other three sites.

15th Street Station

This station, slated for development in the central portion of the downtown Plano area, was situated at site of a vacant retail property and would provide 85 parking spaces. Another alternative under consideration in the Alternatives Analysis would place the station between 14th and 15th streets with no parking facilities. The final decision regarding the amount of parking to be provided at the station would be based on recommendations from the City of Plano. There were several undeveloped parcels within 1,500 feet of the proposed station location.

Parker Road Station

This station area was dominated by commercial and retail land uses. A large undeveloped parcel of land was located directly to the west of the proposed station, and one smaller parcel was situated immediately adjacent the DART ROW. A third large undeveloped parcel was located east of the proposed station on K Avenue. Another small parcel with frontage on Park Boulevard was south of the proposed station. These parcels were zoned to be office or commercial/retail uses.

DOCUMENTATION OF FORECASTS

Physical Scope

During the planning phases of rail implementation, cost estimates and construction plans are initially based on conceptual decisions regarding the desired form of the built system. Later, these conceptual plans are developed into detailed engineering schematics and more thorough cost estimates are produced. The following section documents the conceptual design assumptions guiding development of the project.

LRT Track

The LRT guideway/trackbed alignments are generally centered within the DART/SPRR ROW from north Park Lane to Campbell Road. The alignment from Campbell Road north to Plano offset to permit the initial single track to be centered within the ROW.

Because the LRT Service and Inspection (S & I) Facility south of the Dallas CBD was only designed to accommodate the starter line using 40 light rail-articulated vehicles, the added rail vehicles associated with the North Central LRT extension would increase the need for additional yard storage tracks within the yard site. Additional tracks would also be necessary to perform fleet size maintenance and meet the demands additional vehicles for the NC Corridor create. However, the facility required expansion even in the absence of increase to the rail vehicle fleet. The initial facility design did not provide for performing five and ten year overhaul programs or various other long-term maintenance activities.

Roadway Grade Crossing

Street crossings are either at-grade or grade-separated. At-grade crossing gates, lights, and warning bells are provided. Table 3-1 provides a list of Roadway Grade crossings during the Preliminary Engineering (PE) and FFGA (1999) phase of the project. Changes to the grade crossing configuration forecasts made after the PE phase were justified by further analysis required for the FFGA.

Table 3-1: LRT Roadway Crossing Configurations		
Street	**EIS Configuration**	**FFGA Configuration**
Dallas		
Park Lane	Grade Separated	Grade Separated
Walnut Hill Lane	Grade Separated	Grade Separated
Glen Lakes Drive	Grade Separated	Grade Separated
Royal Lane	Grade Separated	Grade Separated
Forest Lane	Grade Separated	Grade Separated
LBJ Freeway	Grade Separated	Grade Separated
Meadow Road	At-Grade	At-Grade
Floyd Road	At-Grade	At-Grade
Restland Road	At-Grade	At-Grade
Markville Drive	NA	At-Grade
Richardson		
Centennial Blvd./Spring Valley Road	Grade Separated	Grade Separated
Polk Street	Grade Separated	Grade Separated
Belt Line Road/Main Street	Grade Separated	Grade Separated
Arapaho Road	Grade Separated	Grade Separated
Campbell Road	Grade Separated	Grade Separated
Collins Boulevard	Grade Separated	Grade Separated
Greenway Drive	Grade Separated	NA
Pres. George Bush Turnpike (SH 190)	Grade Separated	Grade Separated
Buckingham Road	At-Grade	At-Grade
Phillips Street	**At-Grade**	**Street Closure**
Jackson Street	At-Grade	At-Grade
Lookout Street	**NA**	**At-Grade**
Lakeside Boulevard	At-Grade	At-Grade
Collins Boulevard Connector	At-Grade	At Grade
Lakeside Boulevard	At-Grade	At-Grade
Glenville Drive	At-Grade	At-Grade
Renner Road	**At-Grade**	**Grade Separated**
SH 190 Frontage Road	At-Grade	At-Grade
Plano		
10th Street	Grade Separated	Grade Separated
Cotton Belt ROW	Grade Separated	Grade Separated
Plano Parkway	**At-Grade**	**Grade Separated**
14th Street	At-Grade	At-Grade
15th Street	At-Grade	At Grade
18th Street	At-Grade	At-Grade
22nd Street	At-Grade	At-Grade
Park Boulevard	At-Grade	At-Grade
12th Street	Street Closure	Street Closure

Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.
Full Funding Grant Agreement between Dallas Area Rapid Transit and U.S. Department of Transportation Federal Transit Administration, 1999.

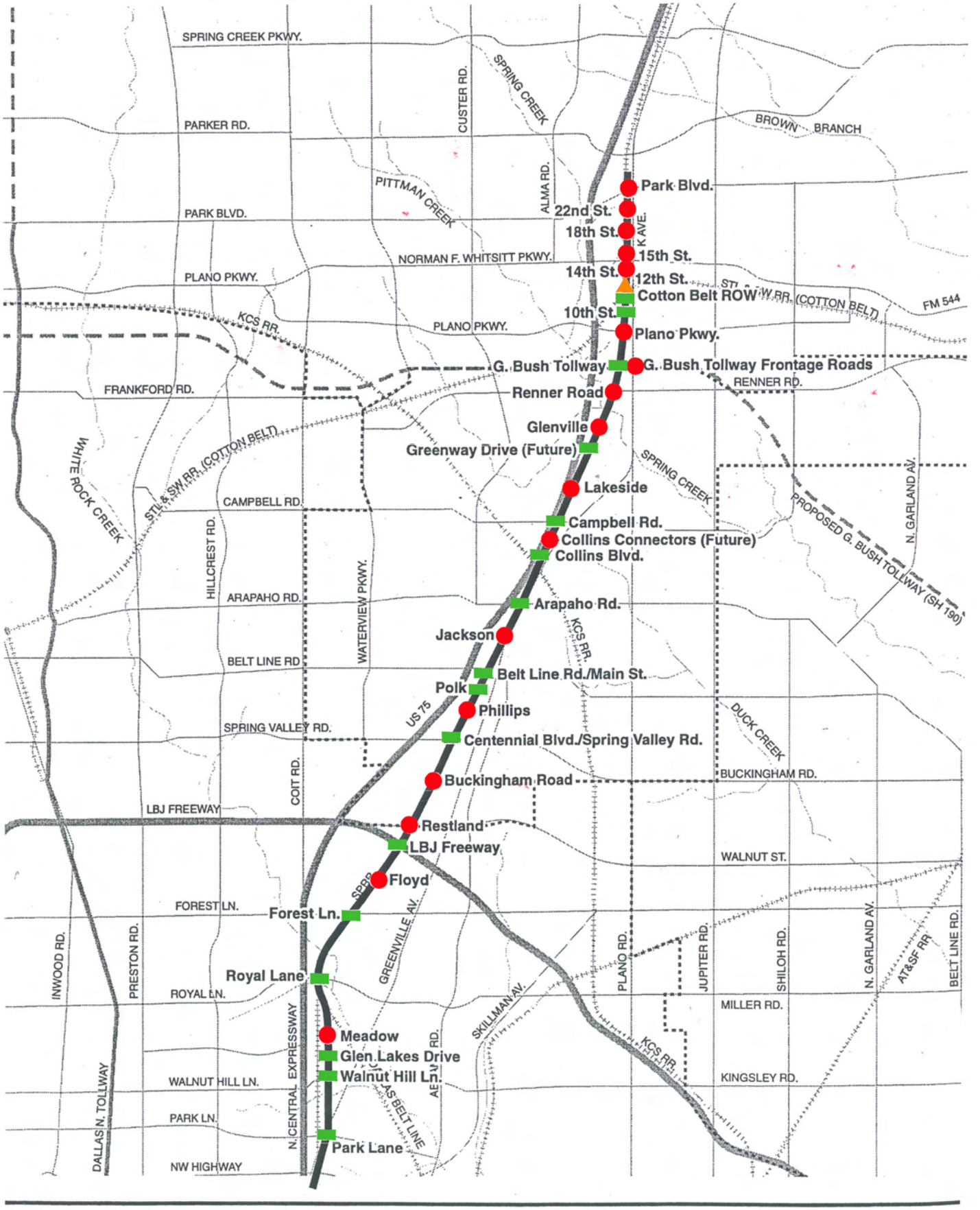


Fig 3-1. LRT Crossing Configuration "Forecasted"

North Central Corridor Extension

Before and After Study - November 2006

Planned Stations

The NC Corridor LRT Extension was intended to include nine new stations and one upgraded station, Park Lane. These stations were planned as described in the *LRT Stations* section of *Project Description*. Eight of the stations were designed during Preliminary Engineering (figures 3-2 through 3-9). The Campbell Road and SH 190 station designs would be deferred until ridership warranted implementation.

Planned Bus Operations

The LRT bus operating plan is based on the No-Build alternative with routes being restructured or relocated to feed the LRT stations. Some of the bus transit routes act strictly as bus feeder service, while others perform the dual role of feeder bus service plus limited Local or CBD service. Two express bus routes (the 200—Plano east Express, and the 201— Richardson Express) paralleling the LRT service were planned to be eliminated. Feeder bus routes and service levels are designed to: (1) meet the anticipated demand in the year 2010 and (2) provide for as many connections as possible between buses and the proposed LRT service. The bus operating plan developed during the Alternative Analysis is included in Figure 3-10. Additional bus vehicles and equipment was planned to be accommodated at existing DART maintenance and storage facilities. The Bus Operating plan assumed that the East Dallas Maintenance and Storage Facility was able to handle required additional buses. However, the electronic shop at the existing LRT Service & Inspection Facility is currently taking on more responsibility than the original design was intended to support. This added work, primarily from the bus shops, will require an expansion to shop facilities. Any new facilities will be constructed on property already owned by DART. The Maintenance and Storage Facility site was originally cleared in the South Oak Cliff Corridor Final Environmental Impact Statement, August 1991.

Fare Collection

The fare structure for service provided within the LRT Alternative follows adopted DART policies of matching LRT fares to local bus fares; in 1997 they cost $1.00. The barrier-free system of fare collection was planned to continue, requiring sufficient fare vending and validation machines at all stations to service expected user demand. DART Transit Police officers check passengers to verify that they have paid the proper fare. Transfers are always free between DART services with one exception: any cash fare difference must be paid when transferring between Hop-A-Bus and regular routes. DART's policy for current and future park-and-ride lots is to provide free parking for all DART system users.

Fig 3-2.
Proposed Station Design - Park Lane Station
North Central Corridor Extension
Before and After Study - November 2006

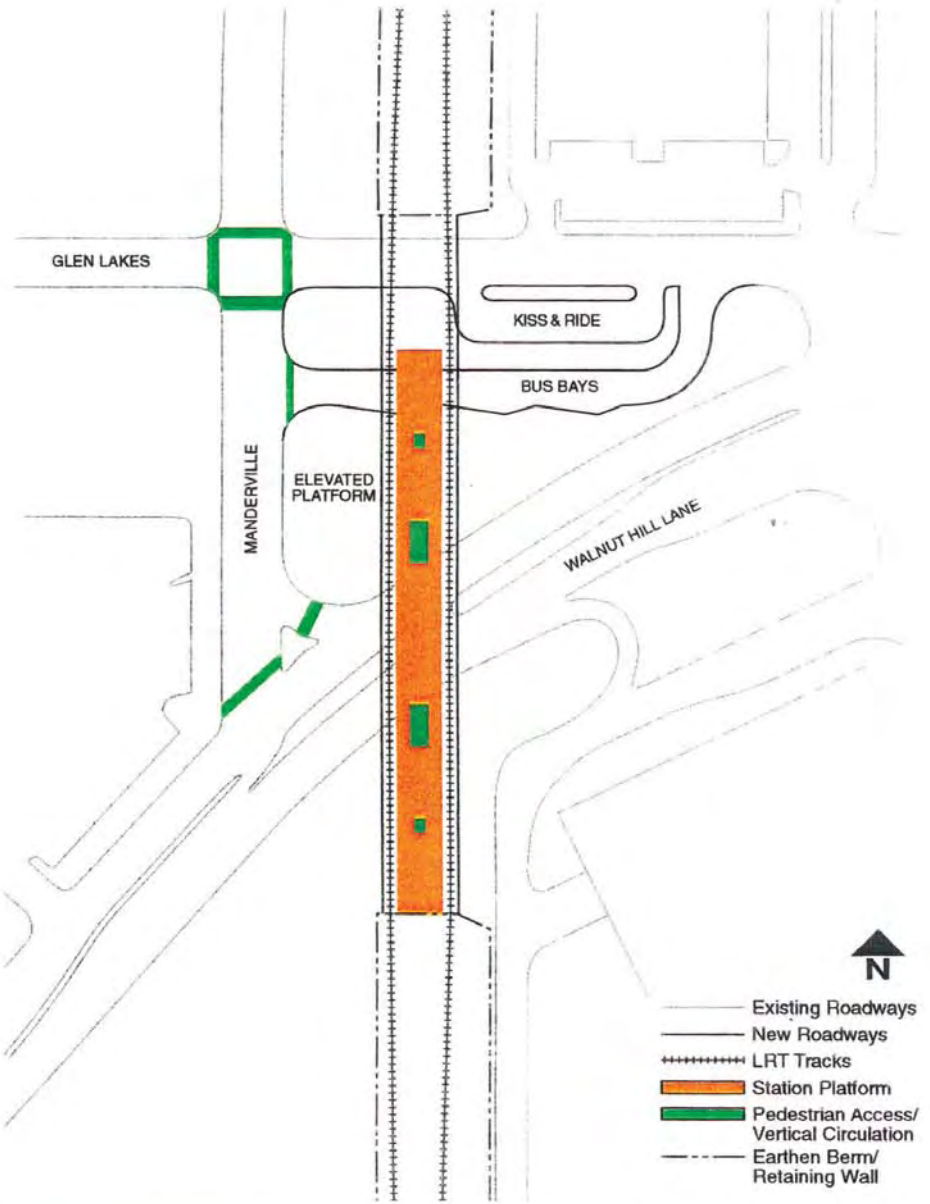


Fig 3-3.
Proposed Station Design - Walnut Hill Station
North Central Corridor Extension
Before and After Study - November 2006

Fig 3-4.
Proposed Station Design - Forest Lane Station
North Central Corridor Extension
Before and After Study - November 2006

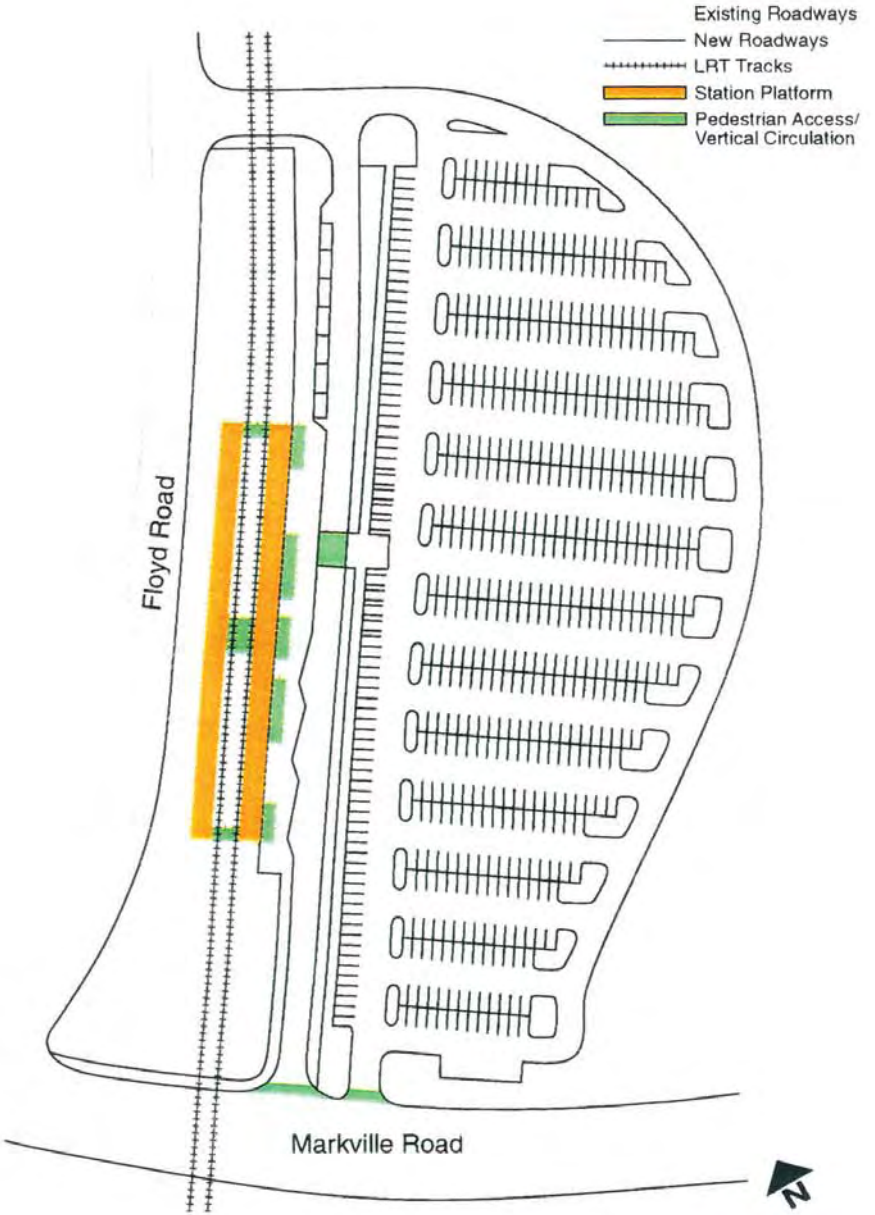


Fig 3-5.
Proposed Station Design - LBJ Station
North Central Corridor Extension
Before and After Study - November 2006

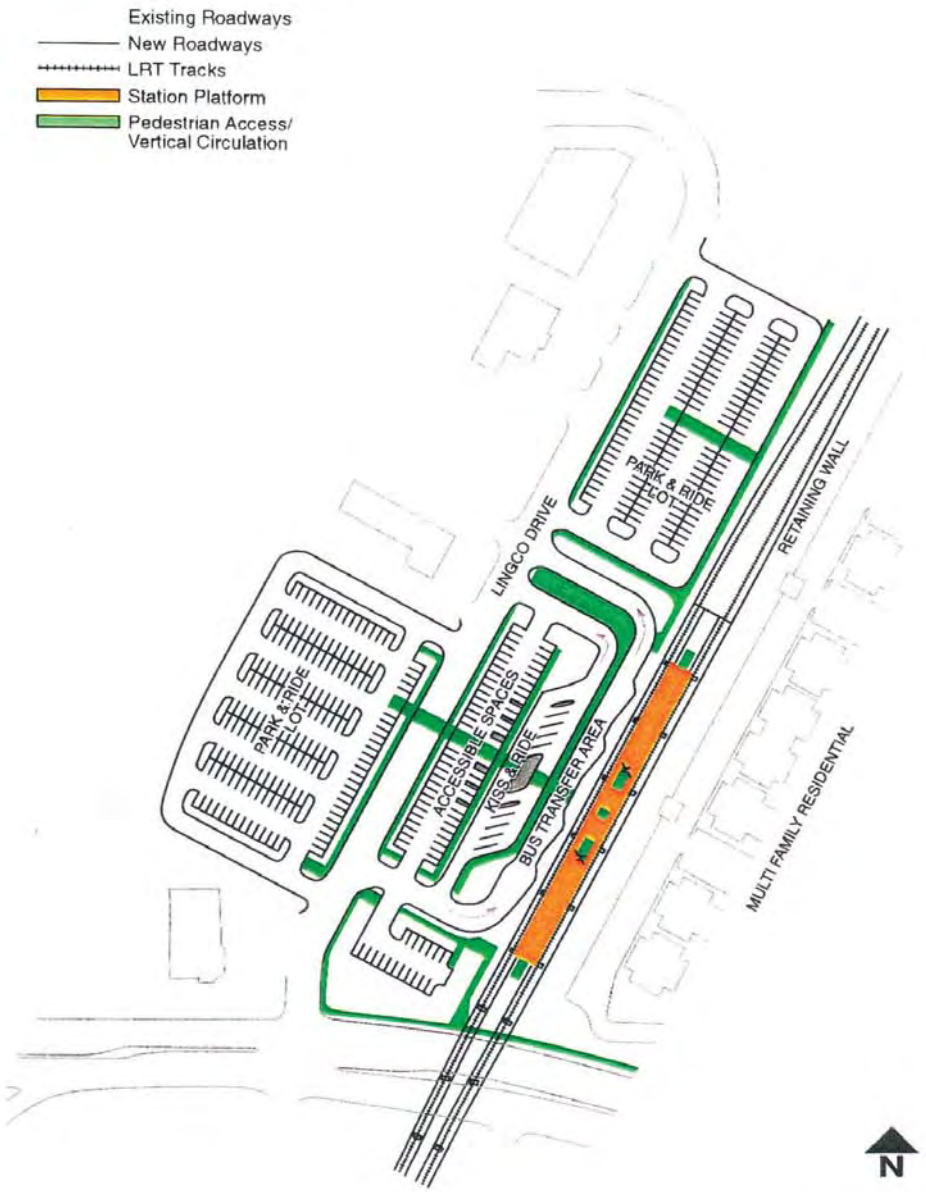


Fig 3-6.
Proposed Station Design - Spring Valley Station
North Central Corridor Extension
Before and After Study - November 2006

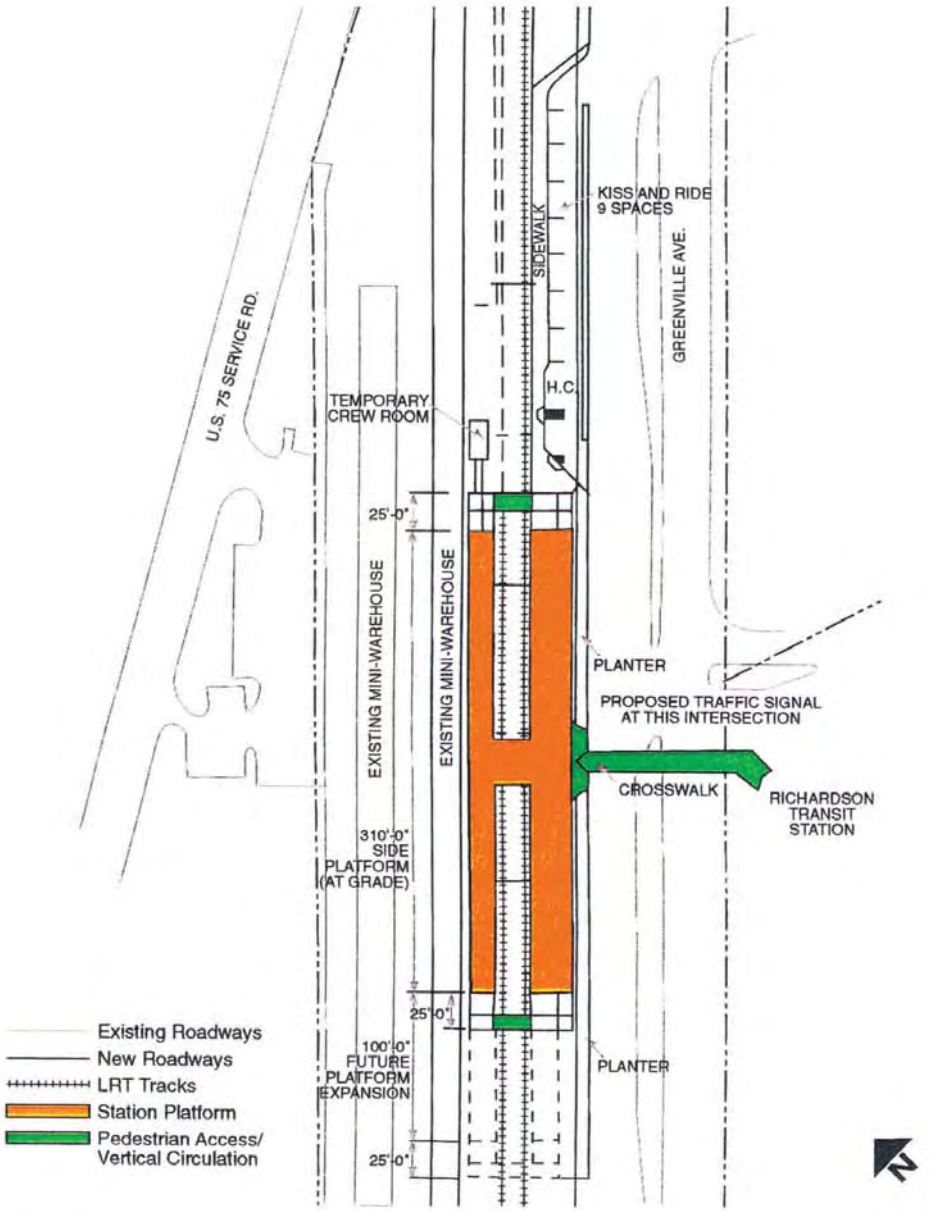


Fig 3-7.
Proposed Station Design - Arapaho Road Station
North Central Corridor Extension
Before and After Study - November 2006

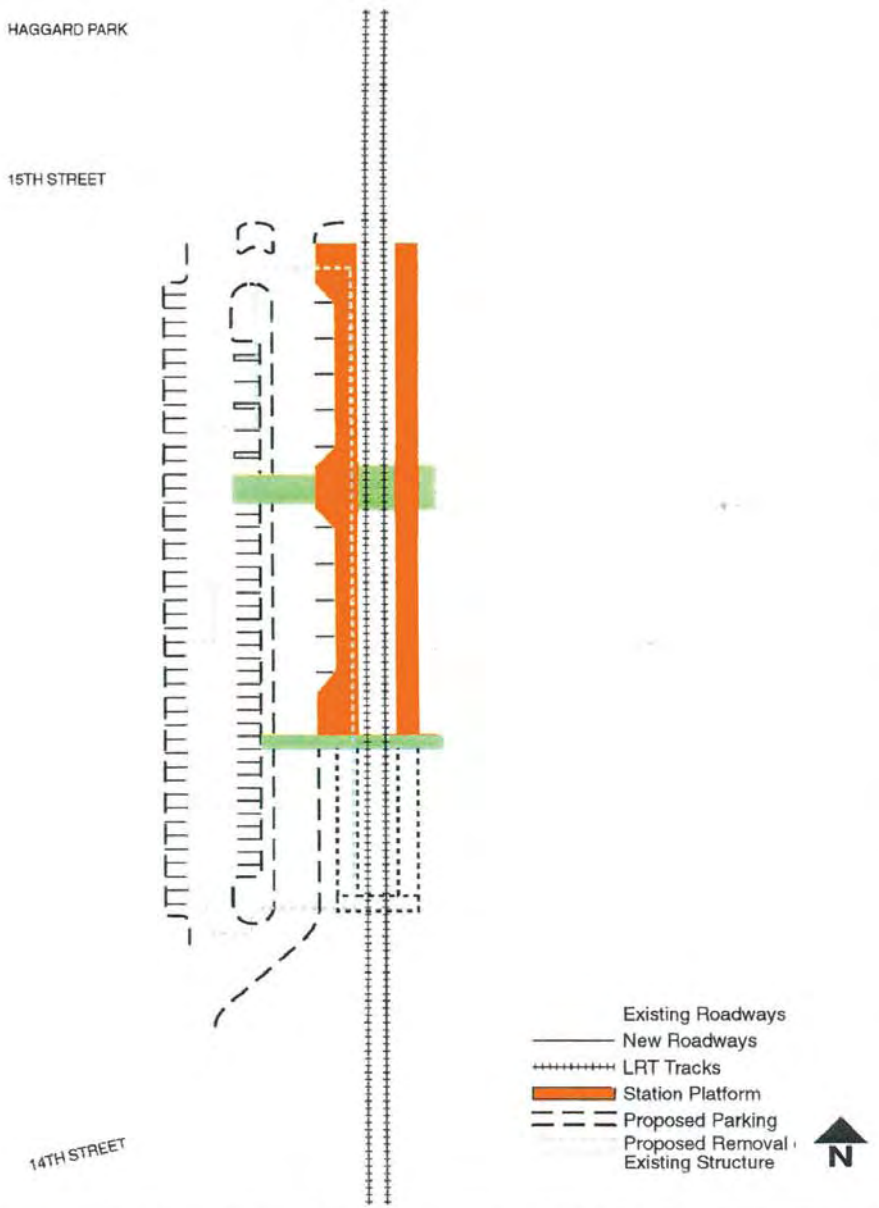


Fig 3-8.
Proposed Station Design - 15th Street Station
North Central Corridor Extension
Before and After Study - November 2006

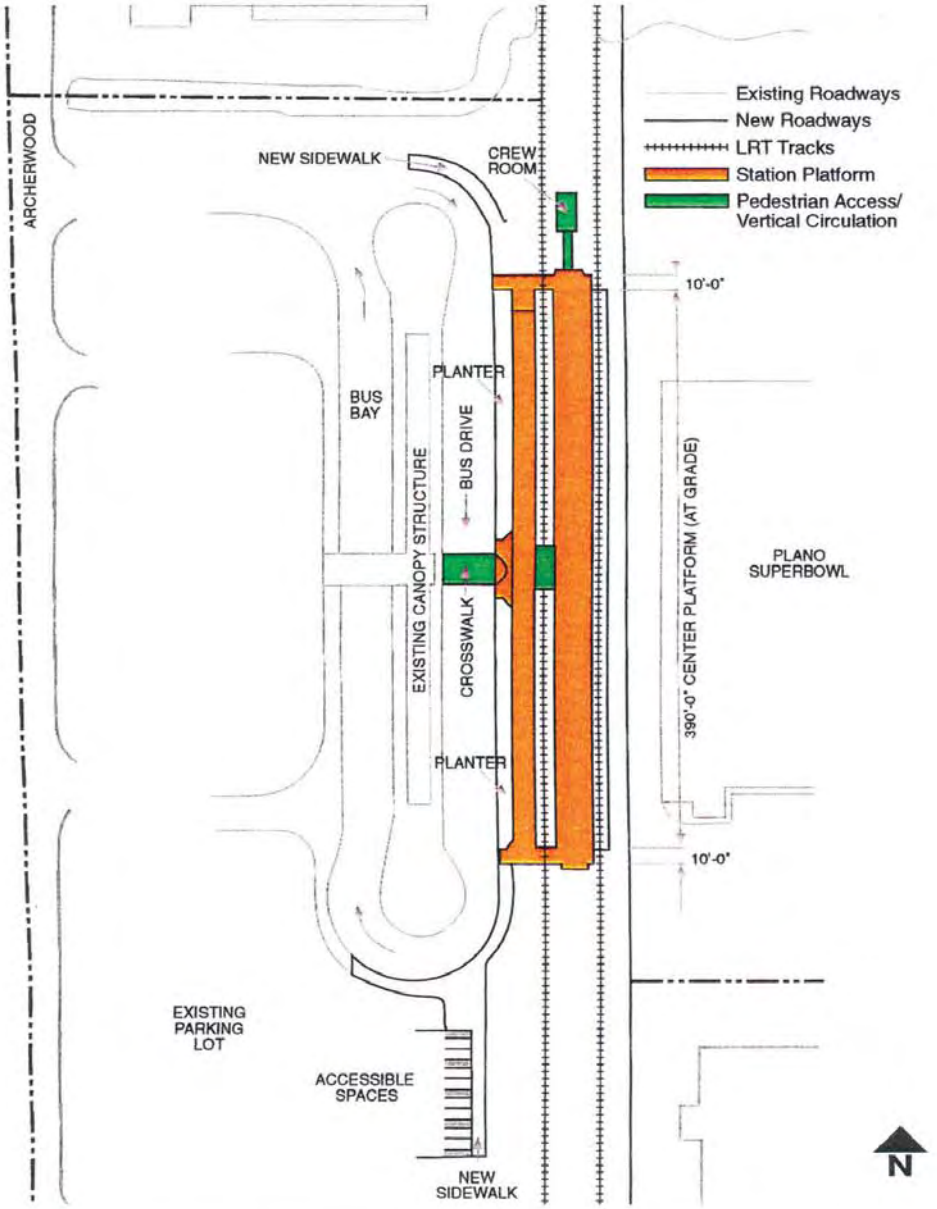


Fig 3-9.
Proposed Station Design - Parker Road Station
North Central Corridor Extension
Before and After Study - November 2006

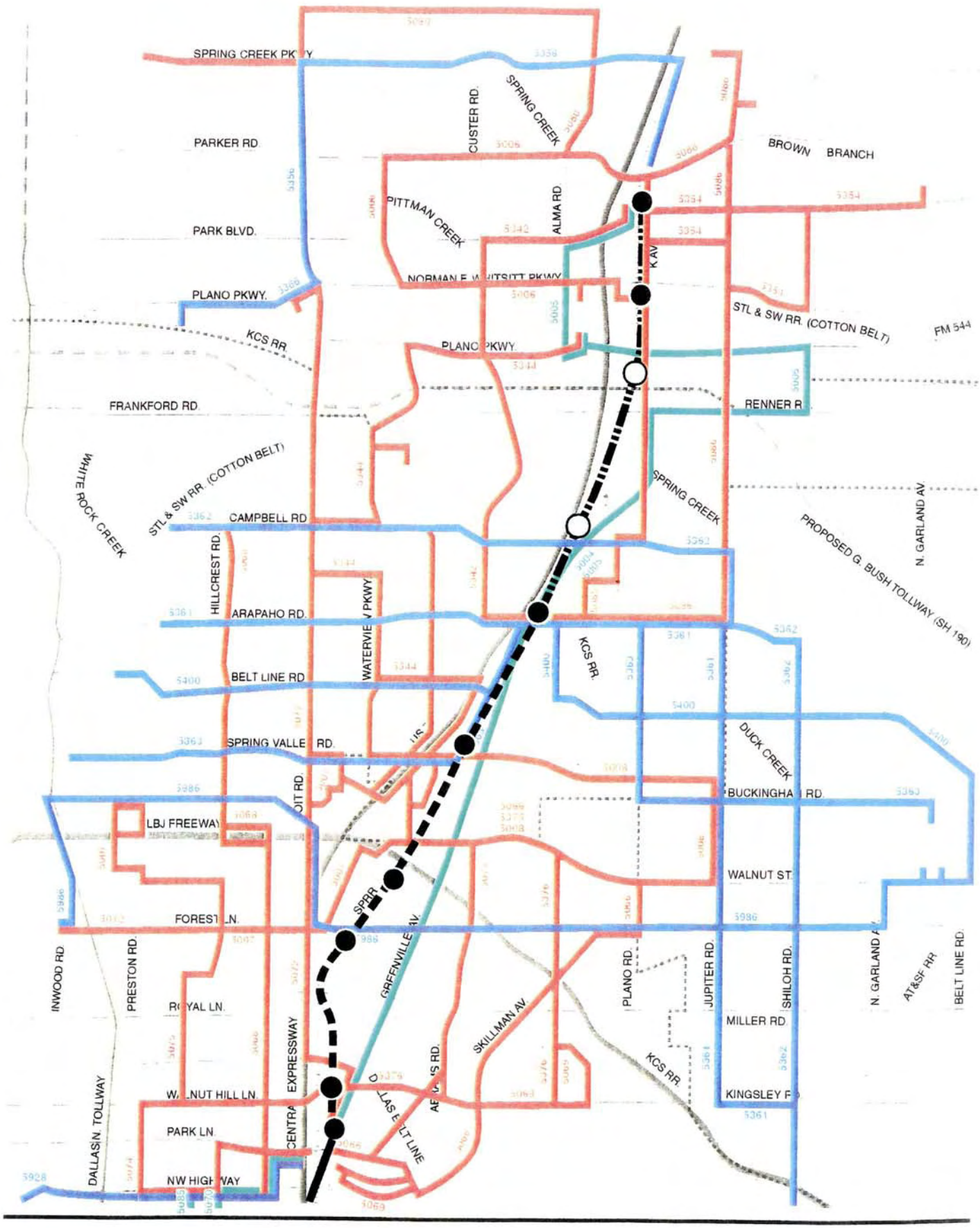


Fig 3-10. LRT Bus Operating Plan
North Central Corridor Extension
Before and After Study - November 2006

- Proposed LRT (Single Track)
- Proposed LRT (Double Track)
- Transit Center / LRT Station
- Deferred LRT Station
- Crosstown
- Circulator
- Local
- Starter System LRT

Costs

Projected Capital Costs

Capital Cost refers to the total investment needed to complete a project and bring it to a commercially operable status. The cost estimate reflected the conceptual engineering and understanding of the principle structural and systems elements. The cost to construct required facilities and acquire necessary system control and operating equipment and vehicles for Phase One of the LRT Alternative (Intermediate Capacity System) was estimated at approximately $303 million (1997$) during final design. Completion of Phase Two of the LRT Alternative (full build-out) required an estimated additional $44 million—or a total of approximately $347 million (1997$). This estimate included expenses for the development of civil/structural elements, accommodation of known site conditions, purchase and installation of system control components, and vehicle acquisition. The cost to develop the transit stations was also included in the total capital cost estimate.

The capital cost estimates for Phase One and Phase Two of the LRT alternative following the completion of the Alternatives Analysis were approximately $290 million and $362 million, respectively, in constant 1997 dollars. At the completion of the preliminary engineering phase, the capital cost estimations in 1997 dollars were refined to $303 million for Phase One and $347 million for Phase Two. Table 3-2 illustrates the change in capital cost estimates from the AA to FFGA.

Table 3-2: Capital Cost Estimates (in 1997 Dollars)

	AA	PE	Final Design	FFGA
Phase One	$290 Million	$303 Million	$303 Million	NA
Phase Two (Complete Build)	$362 Million	$347 Million	$347 Million	$416.3 Million

Source:
North Central Corridor North of Park Lane Locally Preferred Alternative Report. U.S. Department of Transportation Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1994.
Full Funding Grant Agreement between Dallas Area Rapid Transit and U.S. Department of Transportation Federal Transit Administration, 1999.

Projected Operating Cost

The operating and maintenance (O&M) cost for the NC Corridor LRT Extension was estimated, using fully allocated cost methodology, in accordance with standard industry practice. The fully allocated cost methodology called for the application of cost factors to individual, projected operating characteristics of the system (miles, hours, and boardings) and key physical elements (vehicles and facilities). Total annual O&M costs for Phase One (intermediate capacity system) of the LRT Alternative were estimated at $190 million (1997$) during final design. Vehicle operations (measured in miles and hours of operation) drive the great majority of total O&M costs (70 percent). The bus system accounted for 84 percent of total operating costs of Phase One of the LRT Alternative. Phase Two (full build-out) LRT service between Arapaho Road Station and Parker Road added an estimated $4 million (1997$) in operating cost. Table 3-3 illustrates the change in operation and maintenance cost estimates from the AA to FFGA.

Table 3-3: Operation and Maintenance Cost Estimates (in 1997 Dollars)				
	AA	**PE (1997$)**	**Final Design (1997$)**	**FFGA (1997$)**
Phase One	$197 Million	$190 Million	$190 Million	$190 Million
Phase Two (Complete Build)	$200 Million	$194 Million	$194 Million	$194 Million

Source:
North Central Corridor North of Park Lane Locally Preferred Alternative Report. U.S. Department of Transportation Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1994.
Full Funding Grant Agreement between Dallas Area Rapid Transit and U.S. Department of Transportation Federal Transit Administration, 1999.

Ridership

Ridership forecasting was performed throughout the various stages of the planning process. The following section provides the projected ridership for 2010 developed during the Environmental Impact Statement process. Included in this analysis is a forecast of Transit System Level of Service Performance Measures, Total Transit Riders, and Daily LRT Alternative Station Volumes.

The transit trips anticipated for each alternative were estimated in terms of either “linked” or “unlinked” passenger trips. The forecast of linked passenger trips included all travel from the point of origin to the point of final destination as a single trip, regardless of whether or not there was a transfer from one mode of transportation to another. Therefore, the linked trip counted all of the individual segments of travel as one trip. The forecast of unlinked trips counted each segment of a trip on an individual mode as a separate trip, regardless of transfer. Linked trips provided an estimate of the number of people who used the transit system, while unlinked trips provided a measure of the number of persons using each route or mode of travel. Thus, for the following analysis of transit patronages, including both linked and unlinked passenger trips are used to describe estimated ridership characteristics for each alternative in the year 2010, see table 3-4.

Table 3-4: 2010 Transit System Level of Service Performance Measures		
Performance Measures	**Alternative**	
	No Build	**LRT Alternative**
Unlinked Transit Trips		
1) Local Bus	197,000	187,300
2) Express Bus	47,900	39,100
3) Fixed Guideway	45,900	70,200
4) Total	290,800	296,600
Linked Transit Trips		
1) Fixed Guideway	44,800	68,700
2) Total	195,500	203,600
3) Added Transit Riders	-	8,100
Passenger Miles		
1) Total	1,497,800	1,586,700
2) Percent Change	-	5.93
Passenger Hours		
1) Total	86,779	86,866
2) Percent Change	-	.10

Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.

To determine the projected total system wide transit ridership for each alternative, the forecast of unlinked transit trips in 2010 was developed using the NCTCOG travel demand model. These unlinked transit trips included ridership by mode including local bus, express bus and LRT. The total daily unlinked transit trips ranged from 290,800 for the No-Build Alternative to 296,600 trips for the LRT alternative.

Ridership forecasts for the LRT Alternative included passengers who accessed the LRT system at stations from automobiles, walking, and from bus transfers. These estimates were developed using linked trips to count only those riders using the LRT system and to prevent double counting. This was done by eliminating the effect of transfers on the total number of system riders to account for the "net" increase in system ridership. The resulting forecast of 2010 linked trips produced by the NCTCOG model indicates that the system-wide LRT ridership increased from 44,800 with the No-Build Alternative to 68,200 for the LRT Alternative. This shows that approximately 23,400 daily passengers would potentially use the NC Corridor LRT Extension system in 2010.

The stations proposed for the LRT Alternative were selected due to their proximity to population and employment centers, major existing transportation facilities, and ease of access from bus, drive or walk access. Table 3-6 shows the anticipated daily volumes of transit passengers for each of the LRT Alternative stations.

The NCTCOG model used to generate the figures in table 3-5 has an output which represents production and attraction (P-A) trips instead of origin destination (O-D) trips. The P-A results for a station equates to the O-D in only the AM period. In the P-A format a single peak period is calculated, instead of a split into AM and PM peak periods. Two trips account for every production or attraction: a production at one station which has an attraction at another station. This format helps to identify stations that are origin stations and the stations

that serve as destination stations. In P-A format combining all boardings and alightings for a rail line results in a balance. However, because the NC Extension is only part of the Red line which continues toward Downtown Dallas, table 3-5 shows an imbalance in boardings and alightings. This imbalance indicates that NC Extension stations serve primarily as origination points.

Table 3-5: Daily LRT Alternative Station Volumes in 2010

Station	Boardings	Alighting	Total Station Volume	Total Station Riders
Park Lane	6,685	1,193	7,878	3,939
Walnut Hill	1,922	926	2,848	1,424
Forest Lane	3,008	773	3,781	1,890
LBJ Freeway	2,528	903	3,431	1,715
Spring Valley	3031	472	3,503	1,752
Arapaho Road	2,510	777	3,287	1,644
Campbell Road	623	849	1,472	736
SH 190	1,331	439	1,770	885
15th Street	790	110	900	450
Parker Road	4,950	246	5,196	2,598
Total	27,379	6,688	34,066	17,033

Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.

Bus transit service in the corridor operated in mixed traffic and carried one percent of the total travel demand in the corridor. This was due to the limited availability of cross-town transit service, the dispersed locations of employment and population centers within the corridor, and the inability of the current transit service to provide meaningful travel time savings.

The LRT alternative provided an exclusive guideway that, when connected with the DART Starter System, could increase mobility to origins and destinations throughout the DART Service Area. The DART system under the LRT Alternative was forecasted to increased ridership, passenger miles, and passenger hours as opposed to the No-Build Alternative. These levels of service measures are commonly used to assess transit system performance.

Passenger Miles

Total system-wide transit passenger miles were estimated to increase from 1.49 million to 1.58 million daily miles, an increase of six percent. Total system-wide transit ridership is projected to increase by 8,100 riders per day for linked trips and 6,800 trips per day for unlinked trips, an increase of three percent. Total system-wide passenger hours were, however, projected to increase less than one percent from 86,779 to 86,886 hours. While system-wide passenger miles were expected to increase six percent and system-wide passenger trips three percent with the LRT Alternative, system-wide passenger hours were expected to climb only one tenth of one percent, see table 3-6.

Table 3-6: Forecasted Ridership Change					
		AA	PE	Final Design	FFGA
Daily system-wide passenger miles	Before	1.49 Million	1.49 Million	1.49 Million	1.49 Million
	After	1.58 Million	1.58 Million	1.58 Million	1.58 Million
Daily system-wide ridership	Before Unlinked	290,800	290,800	290,800	290,800
	Before linked	195,500	195,500	195,500	195,500
	After Unlinked	296,600	296,600	296,600	296,600
	After Linked	203,600	203,600	203,600	203,600
Daily system-wide passenger hours	Before	86,779	86,779	86,779	86,779
	After	86,886	86,886	86,886	86,886

Source:
North Central Corridor North of Park Lane Locally Preferred Alternative Report. U.S. Department of Transportation Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1994.
North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.
Full Funding Grant Agreement between Dallas Area Rapid Transit and U.S. Department of Transportation Federal Transit Administration, 1999.

The LRT Alternative, park-and-ride lots, and feeder bus network provided incentives for commuters to use transit and, thereby, decreased auto travel on US-75 to the Dallas CBD. The following predictions were taken from the 1997 EIS/Preliminary Engineering Final Draft.

Projected Service Levels

Transit Service Levels

An Operating Plan, a short range, detailed plan with precise specifications of objectives and intended actions concerning fundraising, financial sustainability, governance, operations management, and leadership, was developed for the NC Corridor LRT Extension project, and included a variety of detailed information concerning the following: the phases of LRT service, headways for each track segment, operating speeds, number of trains, hours of operation, passenger boarding and alighting times, geographic coverage, frequency of service, travel time and cost savings, estimated capital cost, and operation and maintenance costs. This plan was changed throughout the planning process to include the most updated information available. The data presented describes elements of the Operating Plan during the Preliminary Engineering and Environmental Impact Statement phases.

Forecasted Frequency of Service

The forecasted operations plan for Phase One of LRT service along the double-track segment between Park Lane and Arapaho Road used peak-hour headways of 10 minutes and an off-peak headway of 15 minutes. Headways on the single-track segment north of Arapaho Road were 20 minutes in the peak-hour and 30 minutes in the off-peak. Phase Two operations provided 10 minute peak-hour headways and 15 minute off-peak headways north of Arapaho Road. The LRT vehicles are capable of speeds of up to 65 miles per hour, but achieved operating speeds are usually lower due to factors such as track curvature, station spacing, and safety considerations. Initially, two-vehicle trains operate most of the day, with some three-vehicle trains operating during peak periods and single vehicle trains operating in the evenings. The trains have an average station dwell time of 20 seconds for passenger boarding and alighting. The higher level of service provided by the LRT Alternative was projected to generate an increase in ridership, passenger miles, and passenger hours compared to the No-Build Alternative, see table 3-7.

Table 3-7: Headways

		AA	PE	Final Design	FFGA
Peak Headways (minutes)	Park Lane to Arapaho Road	10	10	10	10
	Arapaho Road to Parker Road	20	10	10	10
Train Speed (mph)		55	65	65	65
Dwell Time (seconds)		30	20	20	20

Source:
North Central Corridor North of Park Lane Locally Preferred Alternative Report. U.S. Department of Transportation Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1994.
Full Funding Grant Agreement between Dallas Area Rapid Transit and U.S. Department of Transportation Federal Transit Administration, 1999.

Travel Time and Cost Savings

Another important factor in choosing the LRT Alternative was that it reduced travel times from the NC Corridor LRT Extension to the Dallas CBD as compared to the No-Build Alternative. (See table 3-8) For transit riders destined to the Dallas CBD, the LRT Alternative could potentially save five minutes from the LBJ station, nine minutes from the Arapaho station, and six minutes from the Parker Road Station.

According to DART estimates, the LRT would account for 873,104 hours annually in travel time savings. Multiplied by FTA's recommended rate of $11.70/hour, this equals $10,215,321 in travel time savings. The No-Build and LRT Alternatives would both use the DART bus network to transfer riders to and from the LRT system. However, with the No-Build Alternative, transit patrons would have to use the DART bus system to transfer to the

LRT system at the current Park Lane Station and to other bus routes at the transit centers, including the North Central Transit Center, the Richardson Transit Center, and the Plano Transit Center. The No-Build Alternative would have required 95,300 transfers daily.

With the LRT Alternative, many transit riders would use the feeder bus network to transfer to the eight proposed LRT stations along the NC Corridor LRT Extension. Further, there were almost as many transfers for this alternative as there were for the No-Build Alternative because the feeder bus network supplied a large number of transit riders to the LRT extension. The LRT Alternative would require 93,000 transfers daily, a difference of 2,300 from the No-Build Alternative, see table 3-9.

The result of more passengers traveling longer distances with reduced travel times is improved system-wide efficiency.

.

Table 3-8: Forecasted Average Travel Times To Dallas CBD from Select Origins

Travel Times in Minutes	No-Build Alternative	LRT Alternative
LBJ Station/North Central Transit Center	26	21
Arapaho Station/Arapaho Transit Center	35	26
Parker Road Station/Plano Transit Center	40	34

Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.

Table 3-9: Forecasted Transfers

	AA	PE	Final Design	FFGA
No-Build Transfers	95,300	95,300	95,300	95,300
LPA (LRT Build) Transfers	93,000	93,000	93,000	93,000

Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.

Roadway Service Levels

Freeway Congestion

Under the LRT Alternative, traffic along US-75 was projected to decrease by approximately 900 vehicles per day at Forest Lane, approximately 1,200 vehicles per day at Arapaho Road, and approximately 700 vehicles per day at Park Boulevard. However, these decreases were estimated to be less than one percent of the total ADT. On the LBJ freeway near the interchanges of Preston Avenue and Abrams Boulevard, traffic was estimated to increase by less than one-tenth of one percent to approximately 600 vehicles per day on US-75 at the LBJ Freeway. This increase was also less then one percent of total ADT. In conclusion, regional freeway ADT for the year 2010 was not expected to increase or decrease significantly with the LRT Alternative. However, the LRT Alternative would provide a choice for CBD bound commuters.

Table 3-10: Projections 2010 Freeway ADT in the North Central Corridor			
Local and Figure Reference	**Average Daily Traffic**		
	No-Build	**LRT**	**Change**
North Central Expressway (US-75)			
Forest Lane	193,300	192,400	-900
LBJ Freeway	184,200	184,800	+600
Arapaho Road	177,800	176,600	-1200
Park Blvd.	150,800	150,100	-700
LBJ Freeway			
Preston	239,600	240,400	+800
US-75	262,600	262,600	0
Abrams	200,900	201,100	+200
SH 190 Freeway			
Independence Parkway	86,100	85,900	-200
US-75	59,400	59,300	-100
Jupiter Road	59,400	59,300	-100

Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.

Arterial Street Congestion

Information taken from the 1997 EIS acknowledged that congestion delays were expected to continue on many of the arterials in the NC Corridor, even with the introduction of the LRT Alternative. However, several arterials were expected to experience a decrease in ADT. The greatest reductions were expected at Greenville Avenue and Royal Lane (approximately 1,500 vehicles per day); Coit Road at Spring Valley (approximately 1,000 vehicles per day); and Coit Road at Arapaho (approximately 800 vehicles per day). Smaller decreases were anticipated on Preston Road at Arapaho, Greenville at Campbell, Jupiter at Arapaho, Coit at Parker, and Walnut Hill Lane at Preston. The arterial road network in the NC Corridor LRT Extension would have had greater reductions in ADT than the regional freeway network. However, these decreases amounted to less than one percent of the total ADT on individual road.

Table 3-11: 2010 Arterial ADT in the North Central Corridor			
Local and Figure Reference	**ADT**		
	No-Build	**LRT**	**Increase**
Preston Road at Forest Lane	22,000	22,000	0
Skillman at Northwest Highway	32,500	32,500	0
Greenville Avenue at Royal Lane	49,800	48,300	-1,500
Greenville Avenue at Spring Valley	35,000	34,000	-1,000
Coit Road at LBJ Freeway	98,000	97,000	-1,000
Plano Road at Arapaho	23,600	23,500	-100
Plano Road at Park Boulevard	16,700	16,700	0
Greenville at Campbell	59,000	58,700	-300
Belt Line at Jupiter	26,300	26,300	0
Jupiter at Arapaho	28,000	27,800	-200
Belt Line at Preston	29,800	29,900	-100
Coit at Parker	31,300	31,100	-200

Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.

Regional and Local Impacts

The LRT Alternative was anticipated to have a beneficial impact to the regional transportation system by aiding in the reduction of regional Vehicle Miles Traveled (VMT), particularly compared to the No-Build Alternative. It was anticipated that the LRT Alternative would reduce regional VMT by 96,560 miles traveled daily by 2010. The No-Build Alternative, on the other hand, would show an increase of 18,460 vehicle miles traveled daily by 2010. The LRT Alternative would also add people carrying capacity and thereby reduce roadway congestion from levels that would otherwise occur in the NC Corridor LRT Extension without the alternative. However, some localized areas might experience limited increases in traffic congestion as a result of gates at LRT grade crossing. The gates create brief interruptions to the flow of traffic to allow for the safe crossing of LRT vehicles. These impacts are defined in greater detail in the following sections.

Grade Crossing and Intersection Impacts

The LRT alternative used an existing railroad alignment, for former SPRR, which crosses several roadways in the corridor. These roadways range in size from two-lane local streets to six-lane major arterials. A few major arterials and freeways in the corridor including Royal Lane, the LBJ freeway, Collins Boulevard, and main lanes along the George Bush Tollway already had grade-separated crossings. However, a number of local streets also had at-grade crossings with the proposed LRT Alternative alignment. The light rail vehicles would create delays at the at-grade crossings because the railroad crossing gates interrupted traffic flow, particularly during peak traffic periods.

To assess potential transportation impacts as a result of the LRT Alternative on local street networks at the grade-crossing and nearby intersections, a detailed analysis of year 2010 street volumes, intersection capacity, and simulation of grade crossing movements of the proposed LRT system was performed. This analysis began with the identification of the study areas and development projected peak hour traffic volumes for the year 2010 for the proposed LRT grade-crossings in Plano and Richardson. Turning movement volumes were developed for each study intersection for the AM and PM peak hours.

Both Plano and Richardson provided 2010 peak hour direction volumes for the analysis of the roadway crossings. Existing turning movement percentages were used to link volumes in order to produce the projected 2010 peak hour volumes. Some of the projected turning movements were lower than existing volumes. In these cases, the existing volumes were multiplied by growth factors supplied by the transportation department of each city to ensure a worst case scenario.

Turning movement volumes were developed for Dallas based on 24-hour traffic projections provided by the NCTCOG. Peak turning movement and 24-hour traffic counts were then conducted in the study area. K-factors (the ratio of the existing peak hour to the existing daily volumes) were applied to the 24-hour volumes to produce peak hour link volumes. Existing directional splits and turning movement percentages were also applied to the link volumes. Many of the projected 24-hour volumes were lower than the existing volumes as was the case in Richardson and Plano. In these instances, the existing volumes were multiplied by growth factors supplied by the City of Dallas Department of Transportation to ensure a worst case scenario.

Existing roadway geometrics near each crossing were inventoried to identify lane configurations and queue storage capacities, and distances between intersections under

study. The existing geometrics were assumed to remain in place until 2010, except at locations where improvements were planned. At these locations, the planned improvements were assumed to exist for the base case in 2010.

Networks were then coded in TRANSYT-7F (intersection analysis computer software) for each crossing. These networks included the crossing and several nearby intersections identified as part of the study area. All networks were assumed to operate at 120-second cycles in 2010. Optimized signal timings were developed for each network using the 120-second cycle and assumed that no LRT vehicles would cross at the crossings. At locations with insufficient capacity for 2010 volumes, lanes were added, where reasonable to accommodate the projected volumes. The final step in the analysis was the simulation of an LRT vehicle arriving at different points in the signal cycle and crossing the arterial streets at grade. The rail crossings were assumed to be closed for 50 seconds to include gate warning time, train clearance time, and time to reopen the gates. Four runs were made for each network. The train was assumed to arrive at the 0-, 30-, and 90-second points in the 120-second cycle. The results of each run were averaged to arrive at an estimate of the typical impact of a train arriving at a random point in the cycle disrupting traffic.

After the model runs were completed, the results were assessed for reasonableness and adjusted where necessary. Based upon this analysis it was determined that a number of intersections and grade crossings would have a reduced level of service upon implementation of the LRT Alternative. On the other hand, several streets in downtown Plano, including 14th Street, 15th Street and 18th Street, weren't anticipated to cause delays during the AM peak from this alternative; therefore, only PM peak hour conditions were analyzed.

To analyze the anticipated conditions at intersections, a 2010 Level of Service (LOS) was determined for the major grade crossings in the corridor. LOS is a qualitative measure describing vehicle operating conditions at an intersection or segment of roadway during any given period. LOS is determined by the volume to capacity ratio (V/C ratio) of a street or intersection and corresponding average vehicle delays. LOS A, B, C generally are considered acceptable, and LOS D often is considered acceptable in more densely populated and traveled portions of various urban areas. LOS E represents traffic volumes close to full capacity of street or intersection and resulting congestion and slow traffic. LOS F generally represents stop-and-go, near breakdown, traffic conditions.

At each LRT Alternative grade crossing, the LOS either remained the same or was reduced by at least one level. The LOS for the Renner Road crossing of the LRT alignment was reduced from A to C because of the interruption of an otherwise unimpeded traffic flow. However, LOS C indicated that traffic operations would still be considered acceptable. At other locations, the anticipated intersection delays were influenced by backups related to the grade crossing closures. However, while many intersections were affected, none were reduced to an unacceptable LOS as a result of the LRT Alternative during AM peak hour.

According to the NC Corridor LRT Extension FEIS, during the PM peak hour, the LOS reductions were more severe than during the AM, particularly at the LRT Alternative grade crossings. Effects on the intersections are also more dramatic during the PM peak hours, in part due to higher traffic volumes, which create longer backups during grade-crossing closure for passing trains. The SPRR crossing at Buckingham Road was anticipated to reduce the LOS from A to E, however, none of the remaining intersection impacts reduced the LOS by more than two levels. In addition, LRT crossing did not create unacceptable vehicle queuing at the crossings or the adjacent intersections.

Table 3-12: Level of Service (LOS) Criteria for Signalized Intersection		
Level of Service	**Average Total Delay (minutes)**	**Description**
A	5	Very low delay; most vehicles do not stop at all.
B	>5 and < 15	More vehicles stop than with LOS A, increasing the average delay.
C	>15 and <25	The number of vehicles stopping is significant; however, many still pass through the intersection without stopping.
D	>25 and <40	Congestion is readily apparent with many vehicles stopping and individual cycle failures are noticeable (not all vehicles waiting in the intersection queue are able to get through the intersection on the first green indication).
E	>40 and <60	Poor progression; long cycle lengths and frequent cycle failures.
F	>60	Unacceptable operations which include many cycle failures caused by arrival flow rates exceeding intersection capacity.

Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.

Several local roads would continue to have at-grade crossing with LRT alternative alignment. These include Meadow Road, Floyd Road, Restland Road, Buckingham Road, Phillips Street, Jackson Street, the Collins Boulevard ramps, Lakeside Boulevard, Glenville Road, the SH 190 frontage roads, Plano Parkway, 14th Street, 15th Street, 18th Street, 22nd Street, Renner Road, and Park Boulevard. At the request of the Plano City Council, DART agreed to reevaluate the at-grade crossing of Plano Parkway during final design. As a result of this reevaluation, the configuration of this grade crossing was open to change to an aerial crossing.

The LOS for the Renner, 15th street, and Park Boulevard crossings of the LRT alignment would be reduced by two to three levels because of the interruption of the flow of traffic by the lowering of the crossing gates to permit the safe crossing of the LRT vehicles. While this is a reduction in the LOS, the resulting conditions were still considered acceptable for traffic operations. It was therefore determined that there were no safety hazard or queuing problems at these grade crossings or the nearby intersections. The LRT vehicles would have signal pre- emption at these crossings, and all LRT grade crossings would be clearly marked with lights and crossbars to reduce the potential for accidents. At Buckingham Road, eastbound queues from the crossing back into the intersection with Sherman during the PM peak, which would cause a reduction in the level of service from “A” to “E”.

Table 3-13: 2010 Intersection Impacts by Alternative AM and PM Peak Hour (EIS 1997)					
Arterial	**Intersection**	**AM Level of Service**		**PM Level of Service**	
		No-Build	**LRT**	**No-Build**	**LRT**
Meadow Road	Greenville	C	C	C	C
	SPRR Crossing	A	B	A	B
	NB Frontage	B	C	C	C
	System Delay	B	C	C	C
Restland Road	SPRR Crossing	A	C	A	B
	Floyd Road	D	D	D	D
	System Delay	B	C	C	C
Buckingham Road	Greenville	C	C	D	D
	SPRR Crossing	A	B	A	E
	Sherman	C	C	D	D
	System Delay	C	C	C	D
Renner Road	New Road	B	B	B	B
	Plano	F	F	C	D
	SPRR Crossing	A	C	A	C
	NB Frontage	C	D	D	D
	System Delay	D	D	C	D
Plano Parkway	SPRR Crossing	A	B	A	B
	Ave. K.	C	C	D	D
	System Delay	B	C	C	C
Park Boulevard	Archerwood	A	B	B	B
	SPRR Crossing	A	B	A	C
	Ave. K	C	C	D	D
	System Delay	B	B	C	C

Source: *Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.*

In order to facilitate the grade separation between the LRT Alternative and the Cottonbelt railroad in Plano, it was necessary to close 12th Street at the existing at-grade crossing within the LRT Alignment. This closure was necessary due to the embankment requirements of the approach to the Cottonbelt separation. In 1997, there were a total of three at-grade crossings along the LRT alignment in this area—10th Street, 12th Street, and 14th Street. The subjected section of 12th Street was a short street, extending a distance of two blocks from H Place eastward across the railroad track to Avenue J. With the closure of 12th Street, there would no longer be adequate access across the tracks via the 10th street and 14th Street at-grade crossings. However, traffic volumes are very low because of the low-density nature of development in the area. DART would provide a cul-de-sac at the terminus of 12th Street, and the remaining crossings accommodated existing and future traffic demand. There were no anticipated negative impacts created by 12th Street at the LRT alignment.

AFTER CONDITIONS (2005)

Physical Scope (As Built)

LRT Line

This section outlines the conditions following the completion of the NC Corridor LRT Extension, which begins in Dallas near Park Lane with double track service to Parker Road in Plano. Included in this project are 10 stations with at-grade or elevated platforms, depending on the profile of the guideway. Elevated stations have platforms 400 feet long; at grade stations have 300-foot, low level platforms expandable to 400 feet. Weather protection for patrons includes canopies covering the platforms for at least one-third of their length. All platforms and LRT vehicles have full accessibility for elderly and physically challenged patrons during all hours of operation. Typical patron amenities at each station include bench seating, windscreens, trash receptacles, newspaper racks, and artwork.

Roadway and Grade Crossings

Figure 4-1 is an illustration of the LRT Crossing Configuration "As Built". There are 20 at-grade crossings, 16 grade separated crossings and one street closure. The one street closure, 12th Street in Plano, was closed due to cost and safety concerns.

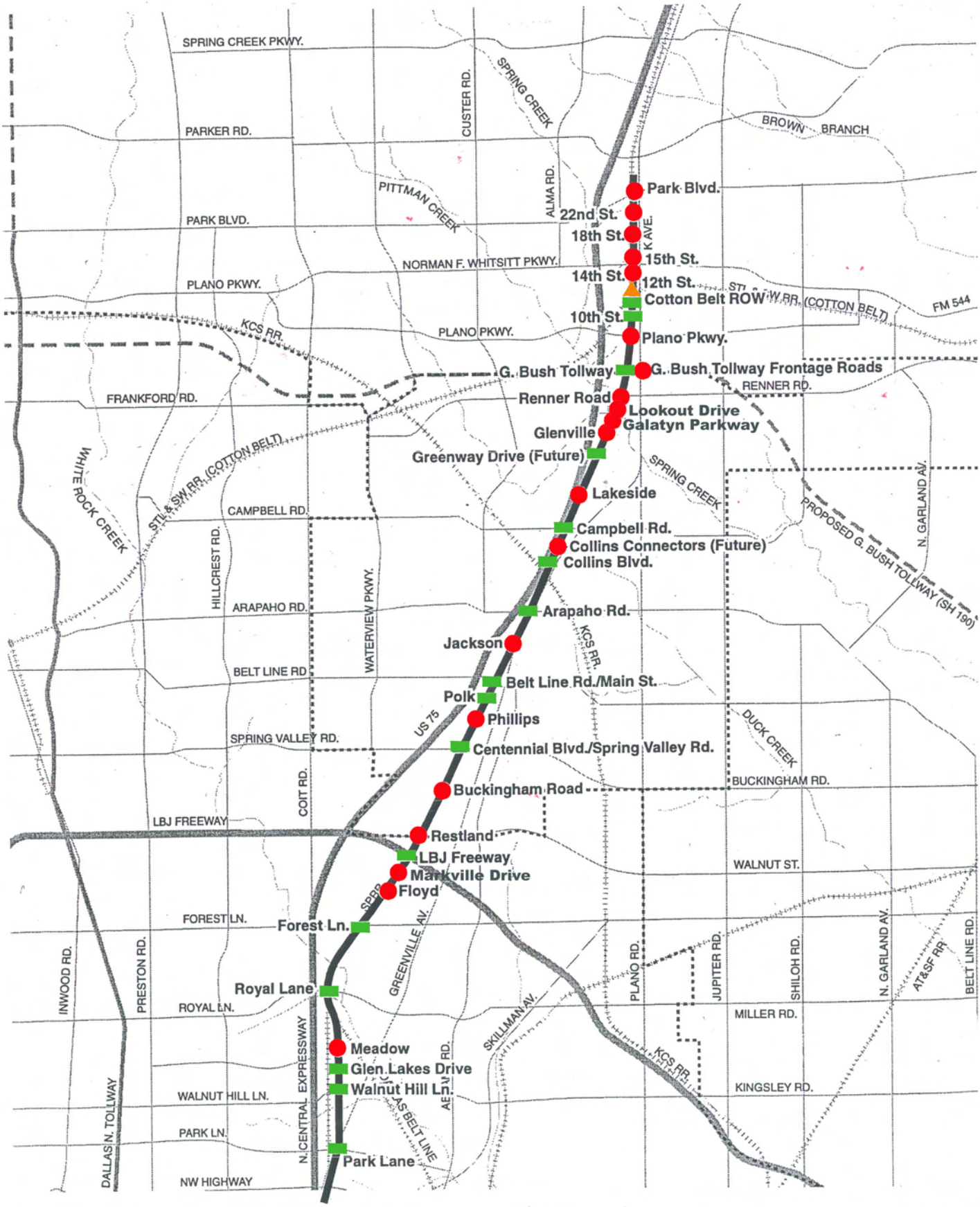


Fig 4-1. LRT Crossing Configuration "As Built"

North Central Corridor Extension

Before and After Study - November 2006

Stations As Built

The eight stations originally planned for Phase I construction were built as planned and described in the *LRT Stations* section of *Project Description*. Two other stations were also built. They are: Galatyn Park Station and Bush Turnpike Station. Descriptions of these stations can also be found in the *LRT Stations* section of *Project Description*. Figures 4-2 through 4-11 show each station as-built.

Cost

Capital Cost As Built

As described in the Documentation of Forecast Section, capital cost estimates reflect engineering, principle, and structural elements. In previous sections, capital costs were estimated, however, in this section, the amounts presented in Tables 4-1 and 4-2 reflect post construction.

Table 4-1: LRT Buildout Phase 1 Cost Summary (Post Construction in millions of dollars)

	Control Budget	Current Commitment	Expended to Date**
LRT General*	$35.31	$29.30	$29.09
North Central-3	$123.1	$107.0	$105.6
North Central-4	$82.20	$77.0	$75.5
North Central-5	$64.50	$61.20	$59.9
S&I Facility Expansion/VAF	$16.81	$16.81	$16.81
Systems	$84.37	$81.84	$81.69
Vehicles	$79.68	$79.58	$79.37
LRT Buildout Total	**$485.98**	**$452.73**	**$447.95**

** LRT General includes annual work programs for the project controls/systems Integration Consultant, the technical services personnel, the professional liability insurance program, owner controlled insurance program (OCIP), the CADD computer equipment, LRV management services and the renovation of the project management floor at DART headquarters.*

***Expended to date values reflect activity through 11/30/04*

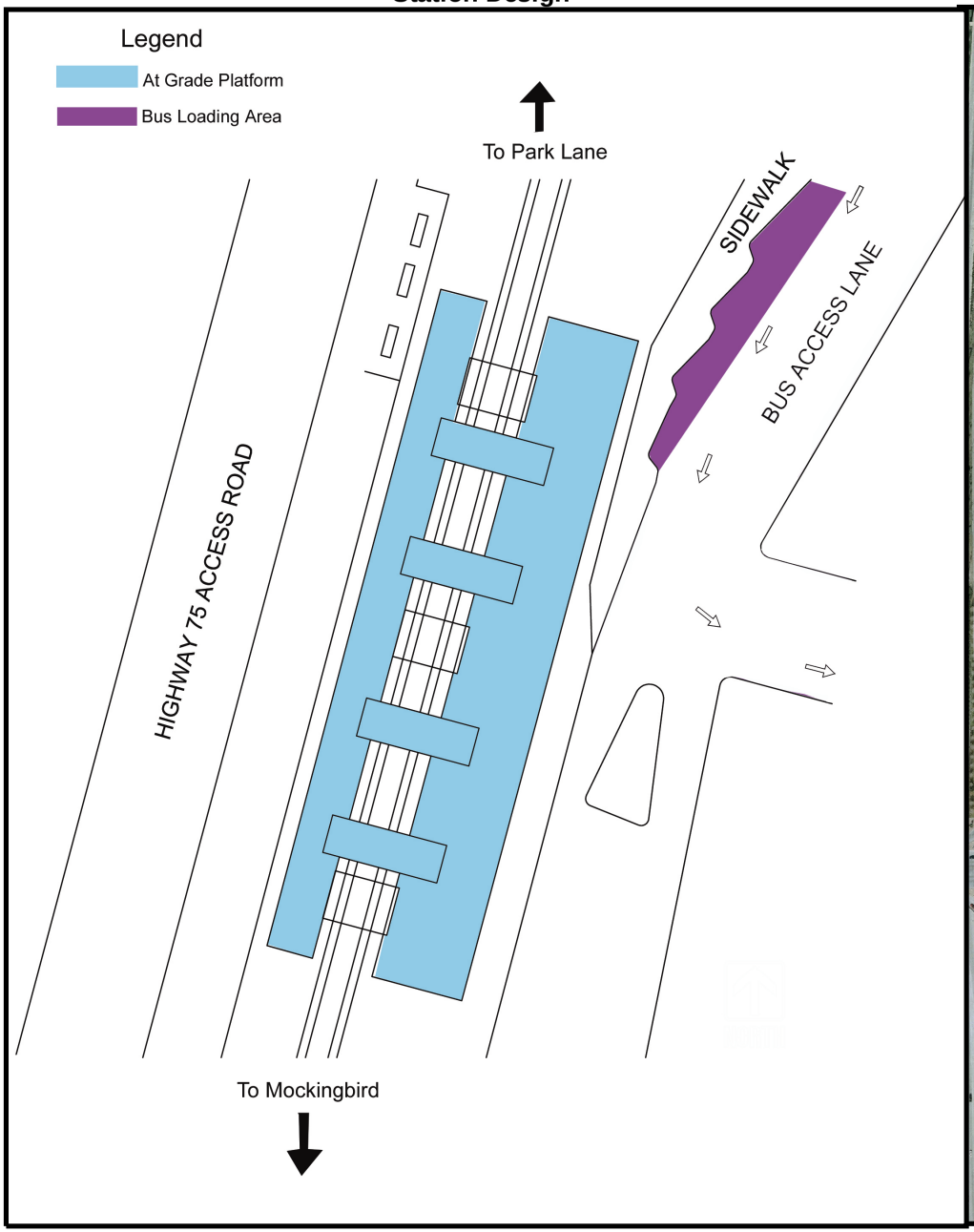
Source: Project Development Progress Report 1st Quarter FY 2005

Table 4-2: LRT Buildout Phase 1 Related Projects FFGA Amendment 10 Cost Summary (in millions of 2003 dollars)

	Control Budget	Current Commitment	Expended to Date
Bush Turnpike Station	$12.5	$12.7	$12.6
Parker Road Station Phase II Parking	$2.6	$1.7	$1.6
Walnut Hill Park	$1.3	$0.2	$0.0
S&I Facility-Phase II Expansion	$29.4	$7.0	$3.7
Purchase of 20 LRVs	$63.0	$60.9	$11.2
Total	**$108.8**	**$82.5**	**$29.1**

Source: DART Finance Department

Station Design



2005 Land Use with 2003 Aerial Photography

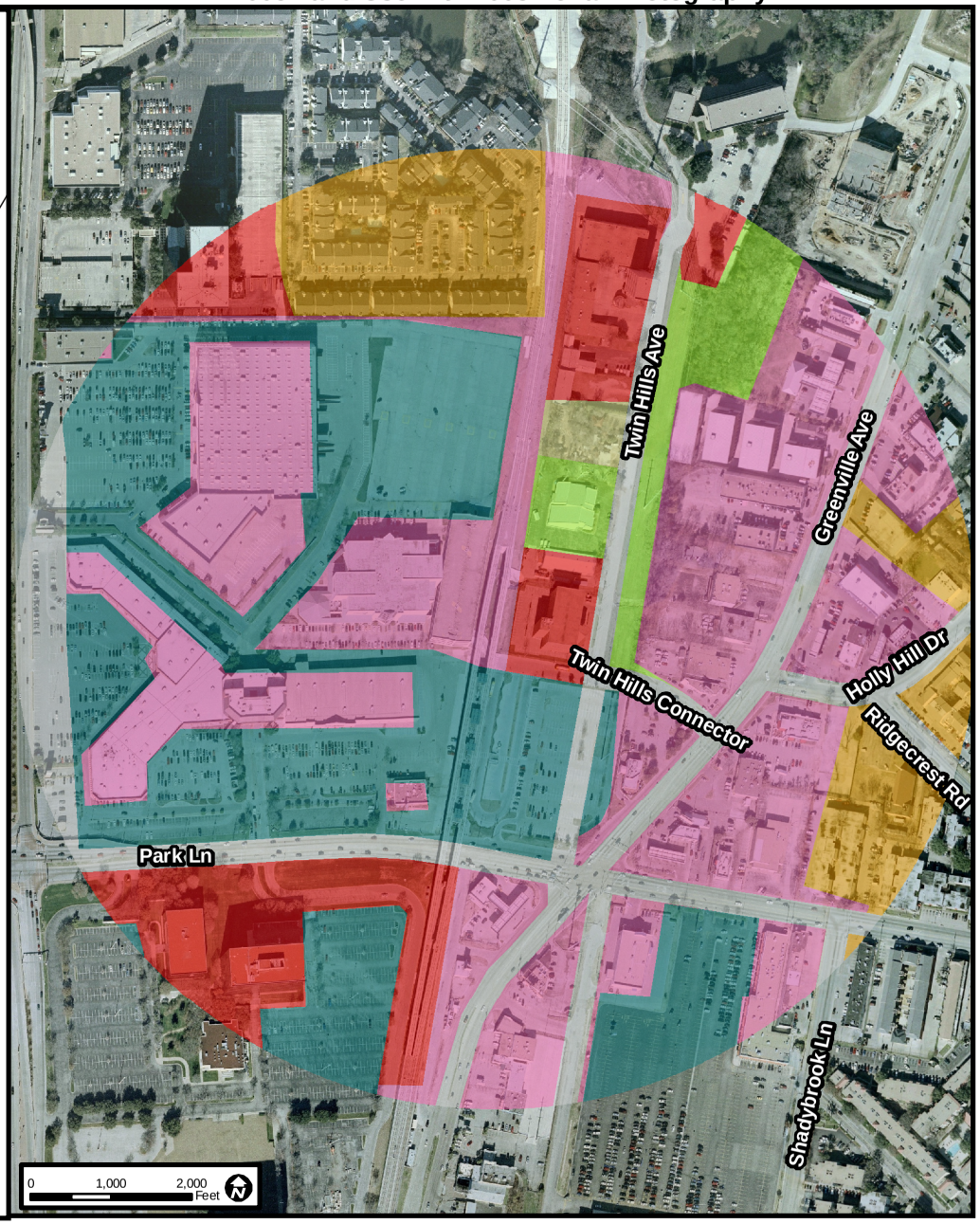
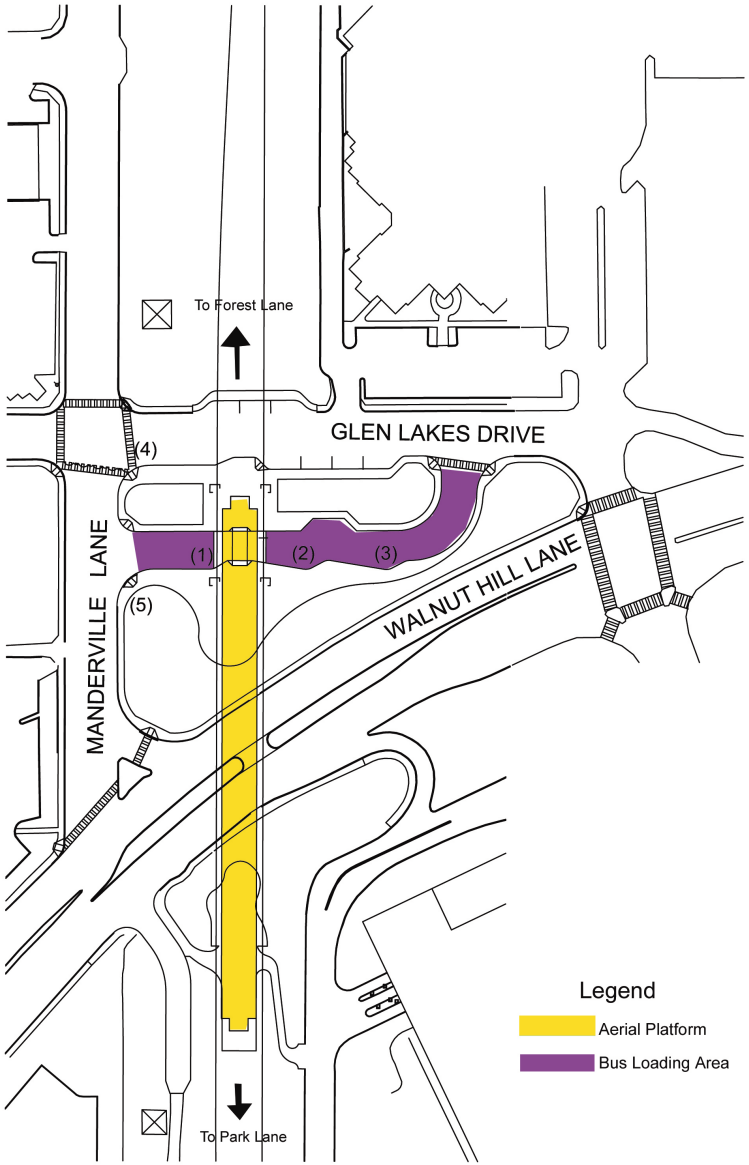


Fig 4-2. Park Lane Land Use and Station Design
North Central Corridor Extension
Before and After Study - November 2006

Station Design



2005 Land Use with 2003 Aerial Photography

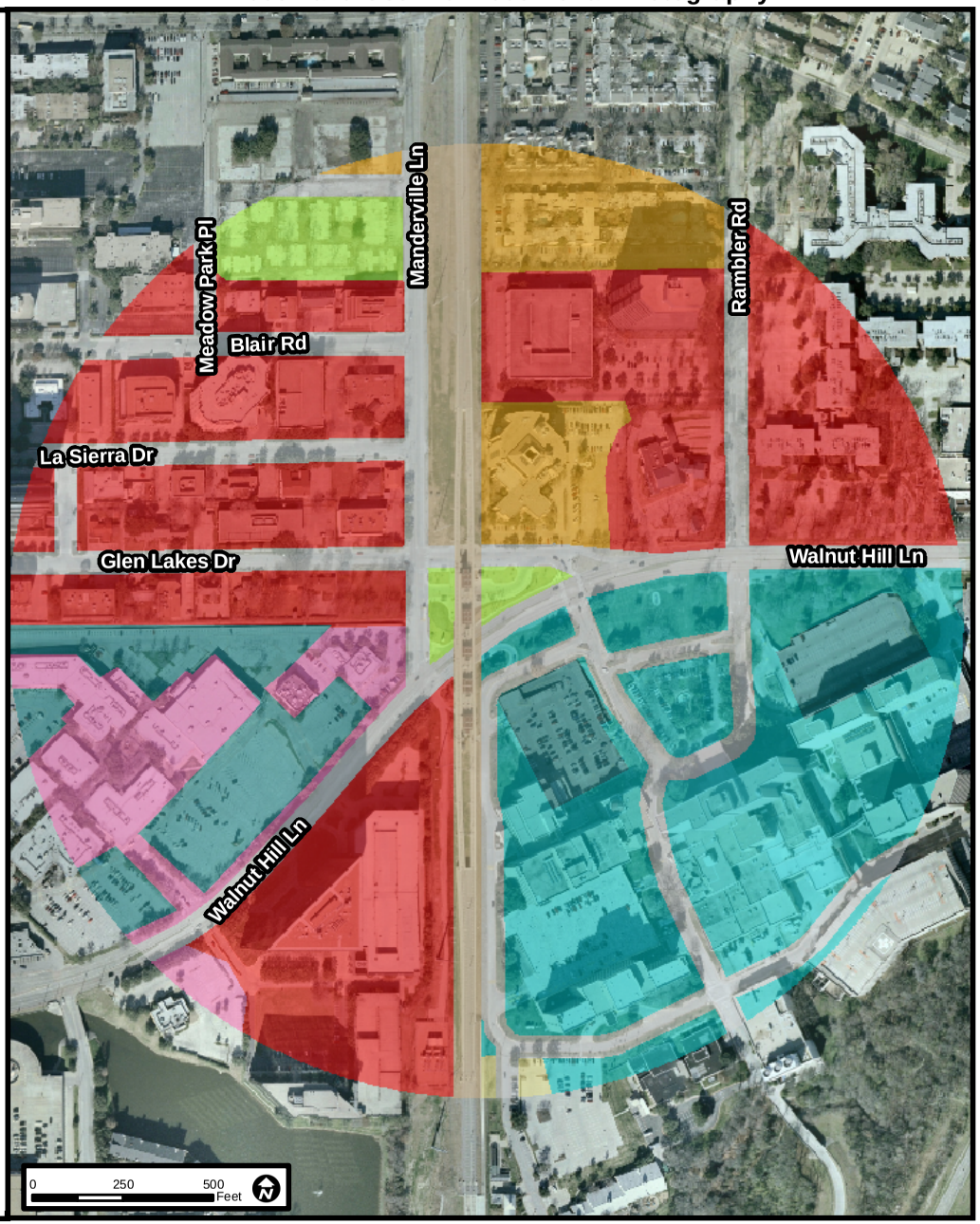


Fig 4-3. Walnut Hill Land Use and Station Design

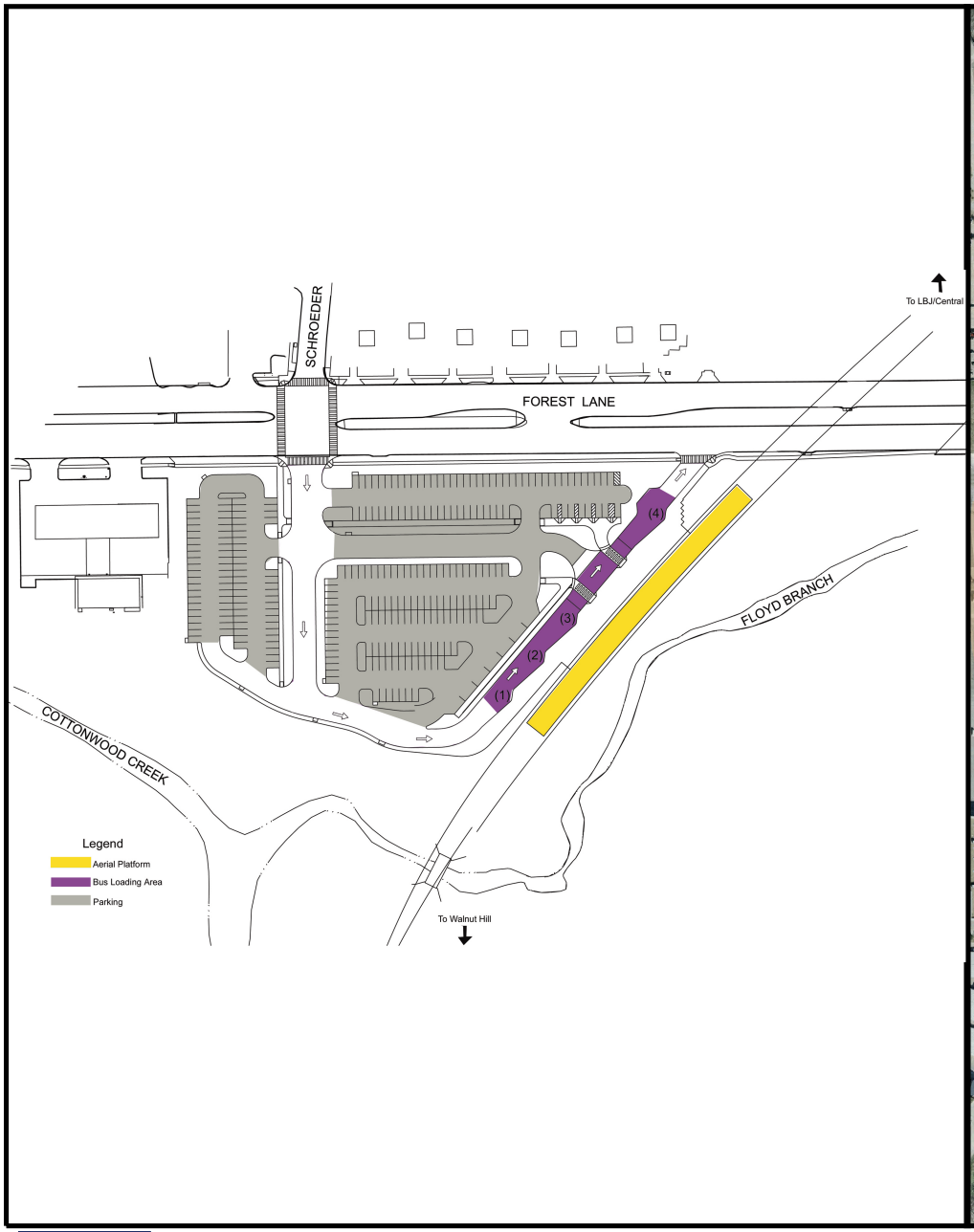
North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

Station Design



2005 Land Use with 2003 Aerial Photography

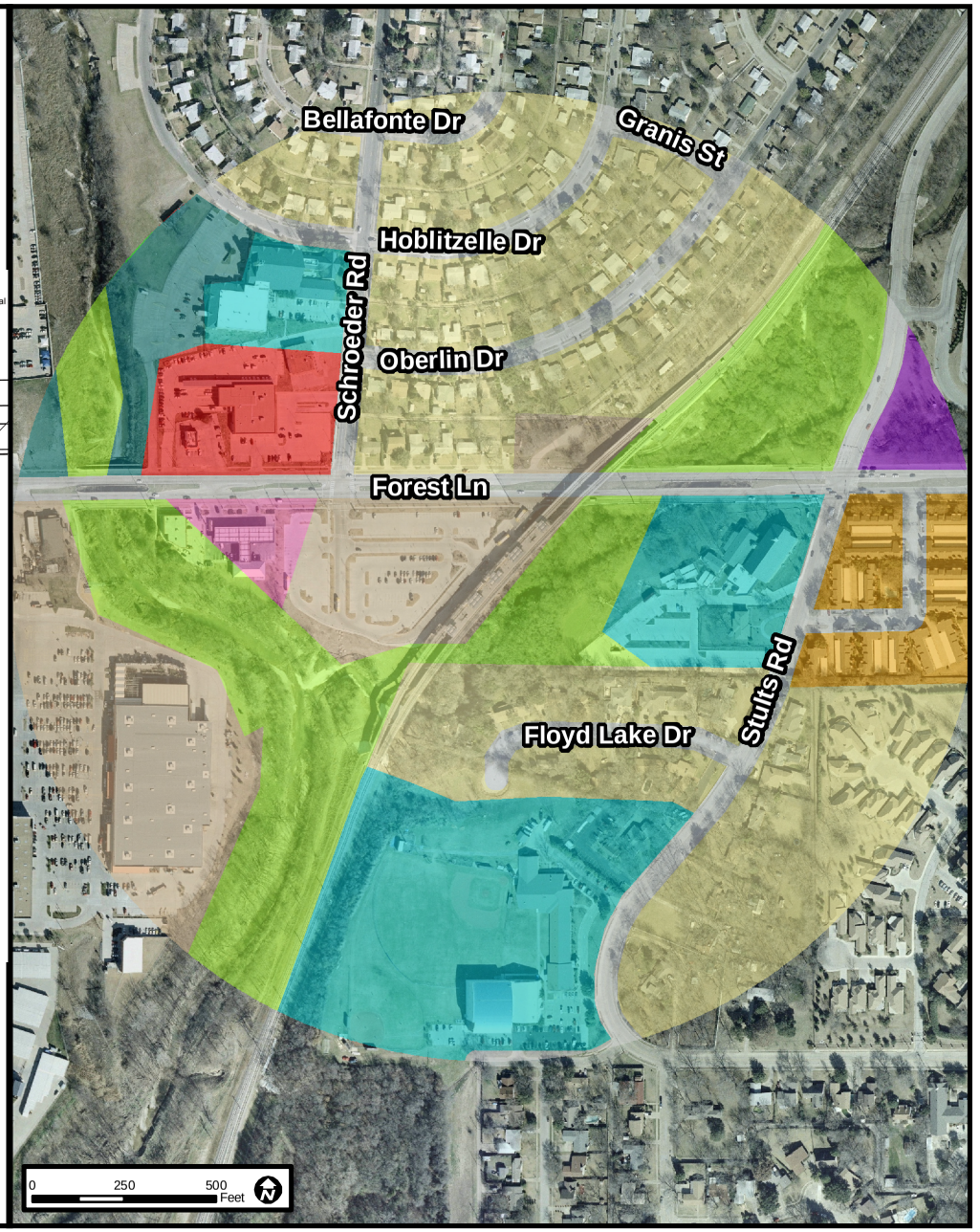


Fig 4-4. Forest Lane Land Use and Station Design

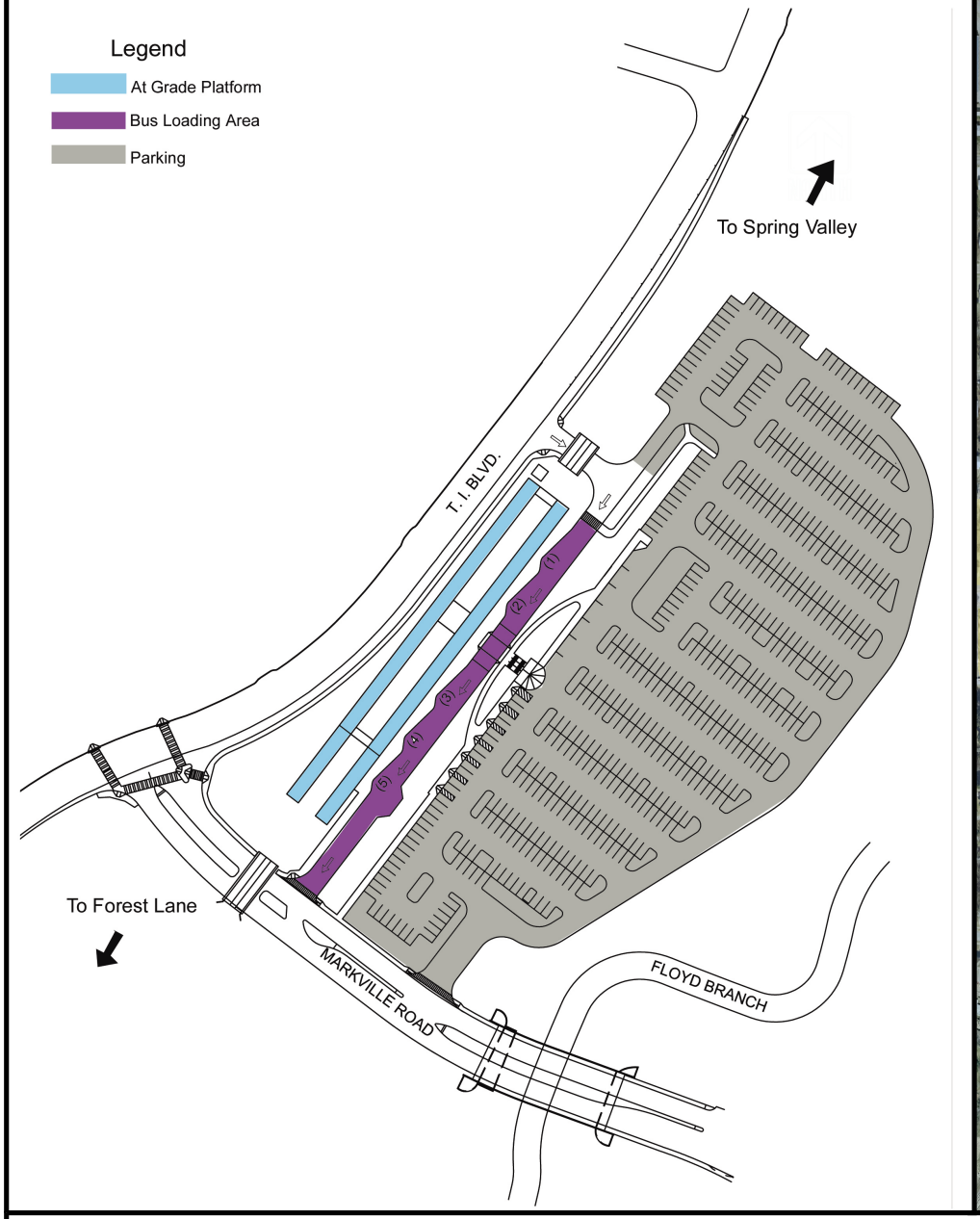
North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

Station Design



2005 Land Use with 2003 Aerial Photography

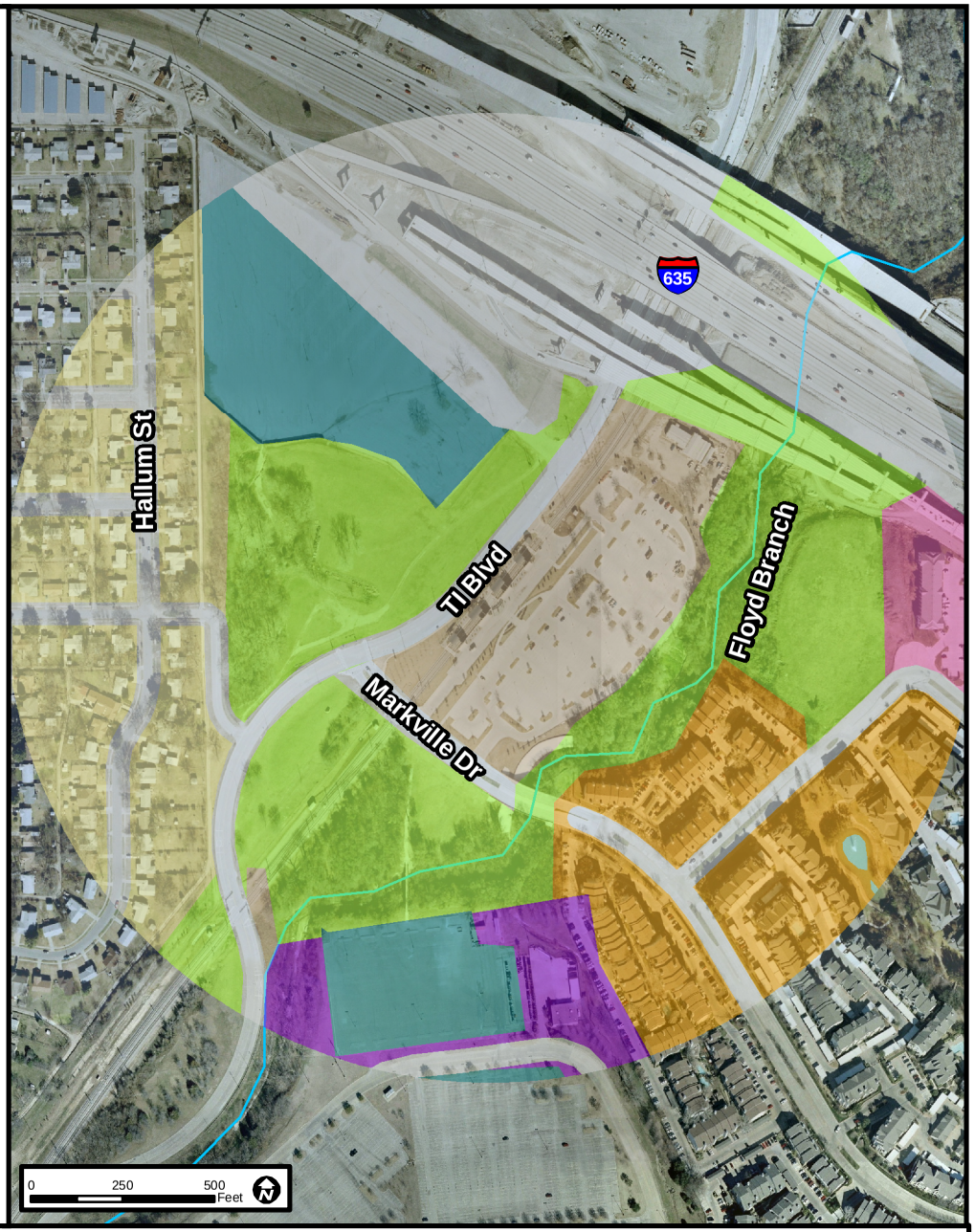


Fig 4-5. LBJ\Central Land Use and Station Design

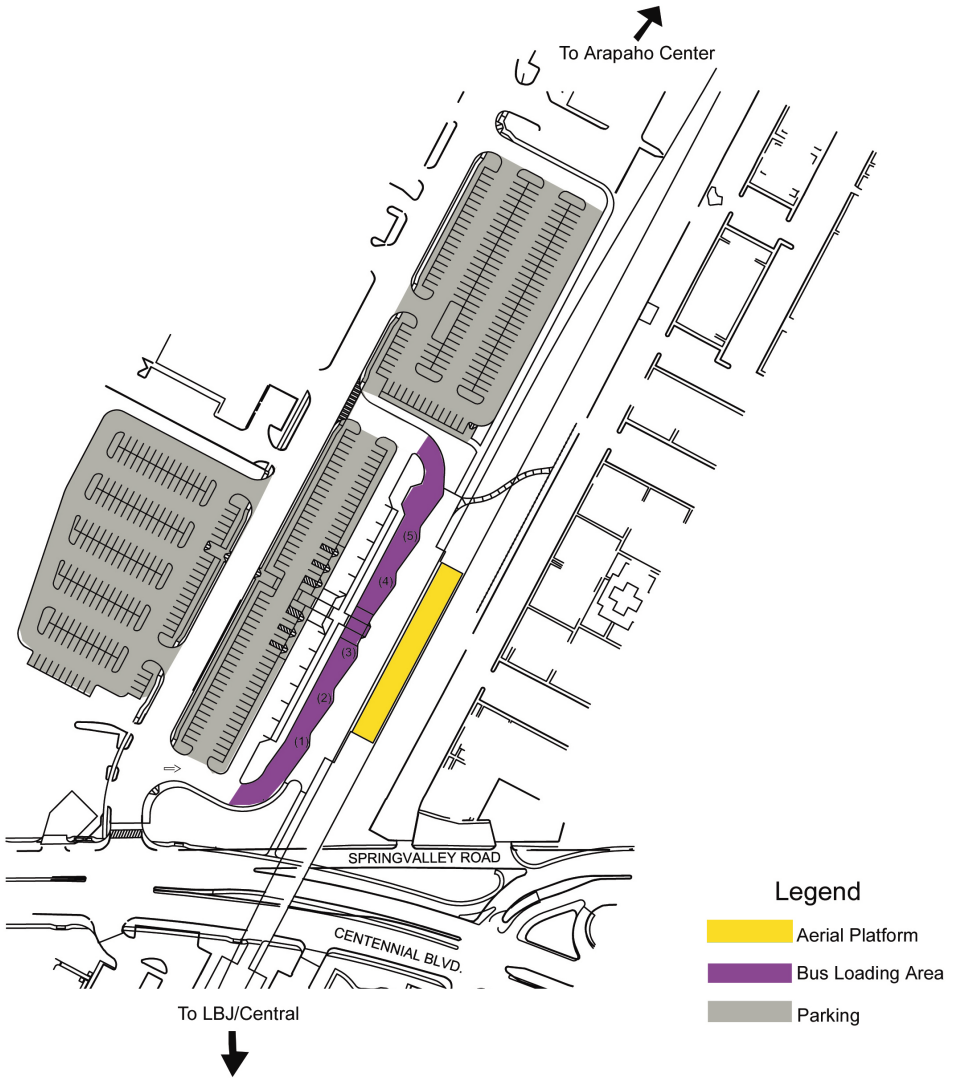
North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

Station Design



2005 Land Use with 2003 Aerial Photography

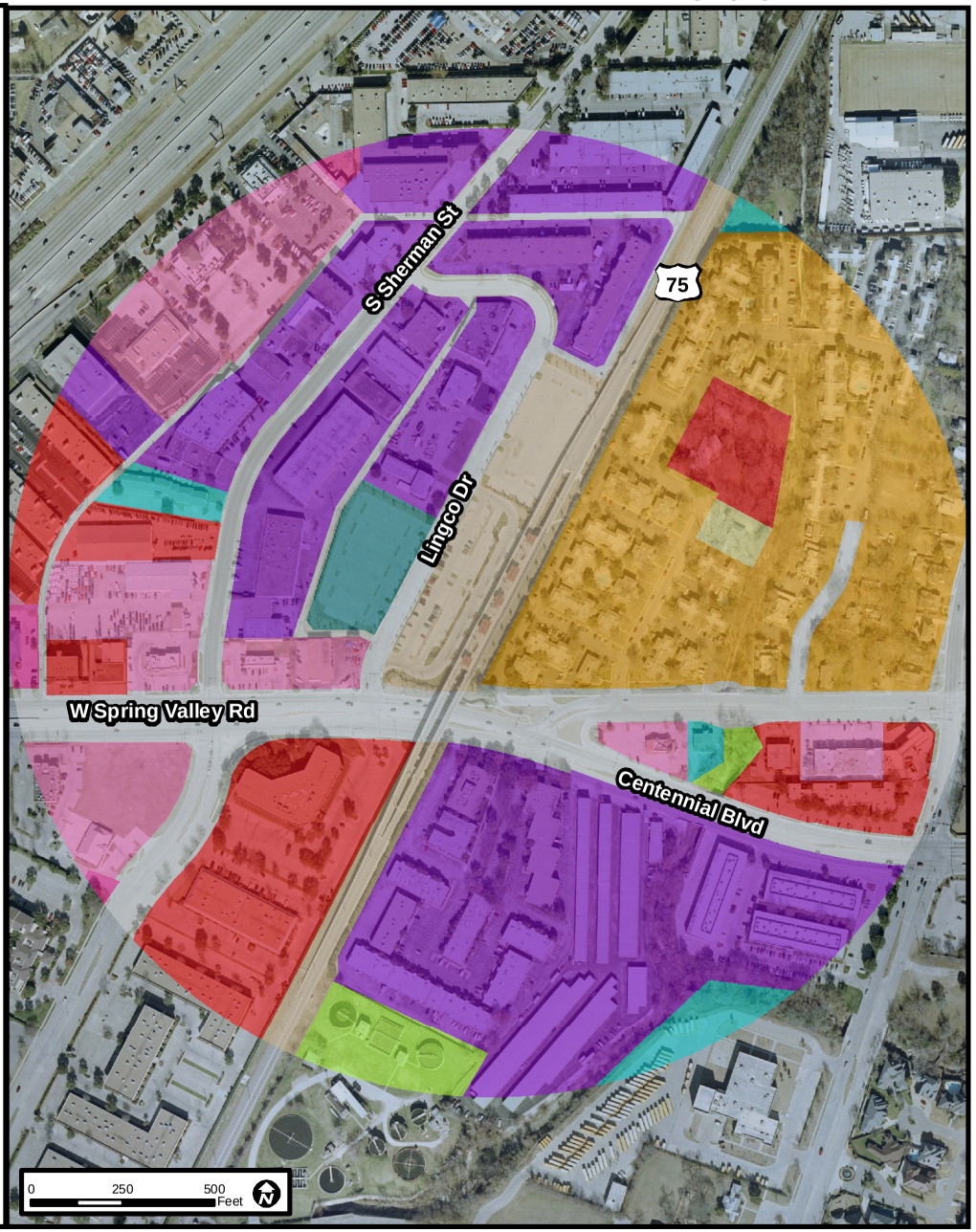


Fig 4-6. Spring Valley Land Use and Station Design

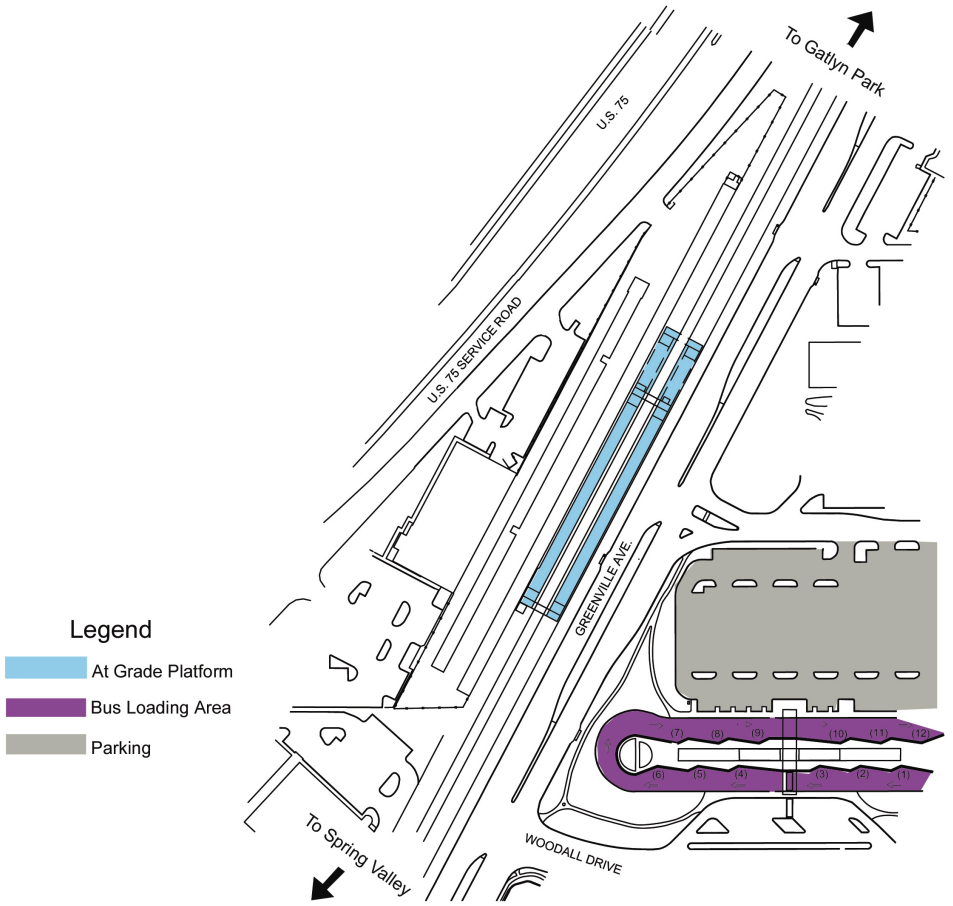
North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

Station Design



2005 Land Use with 2003 Aerial Photography

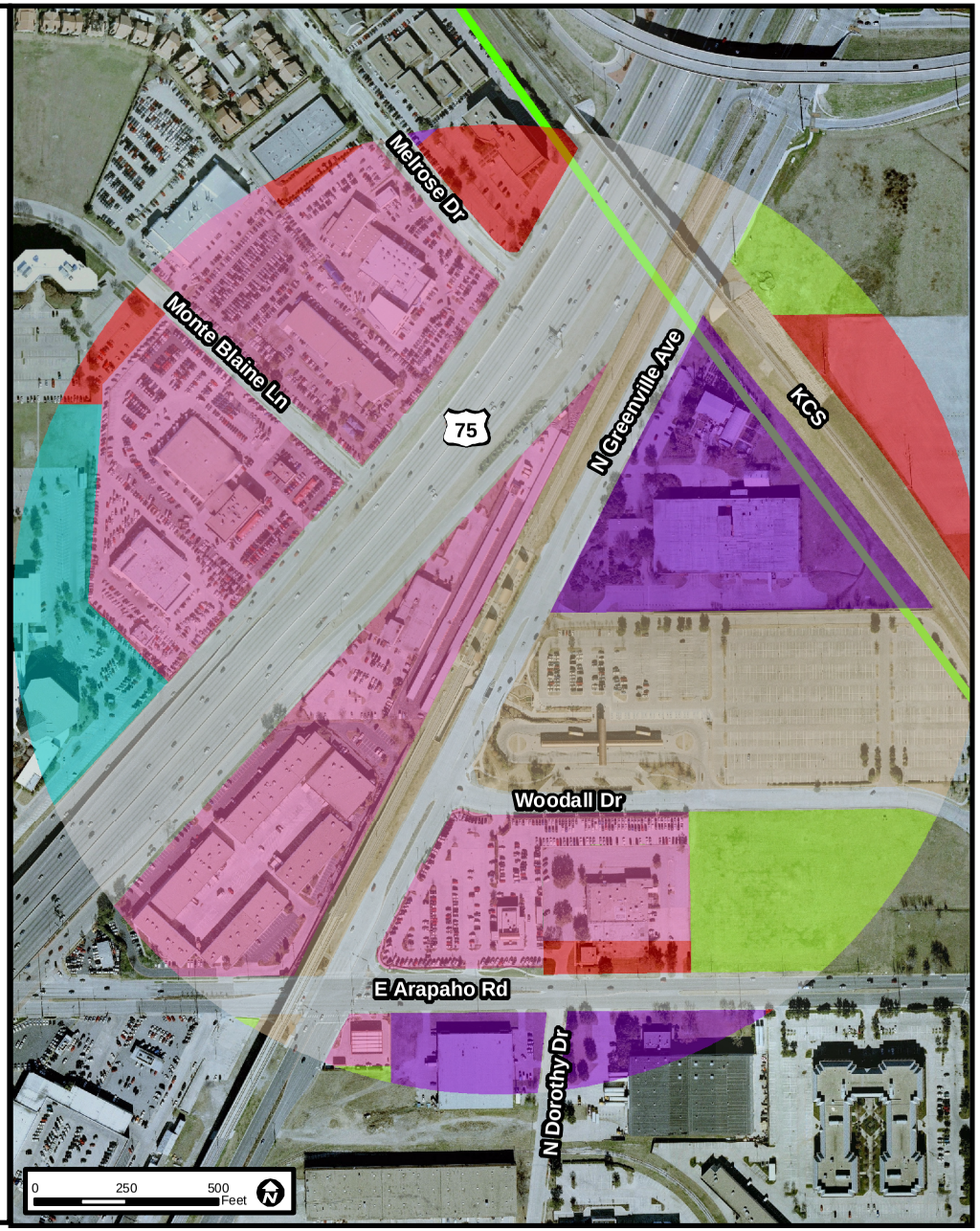
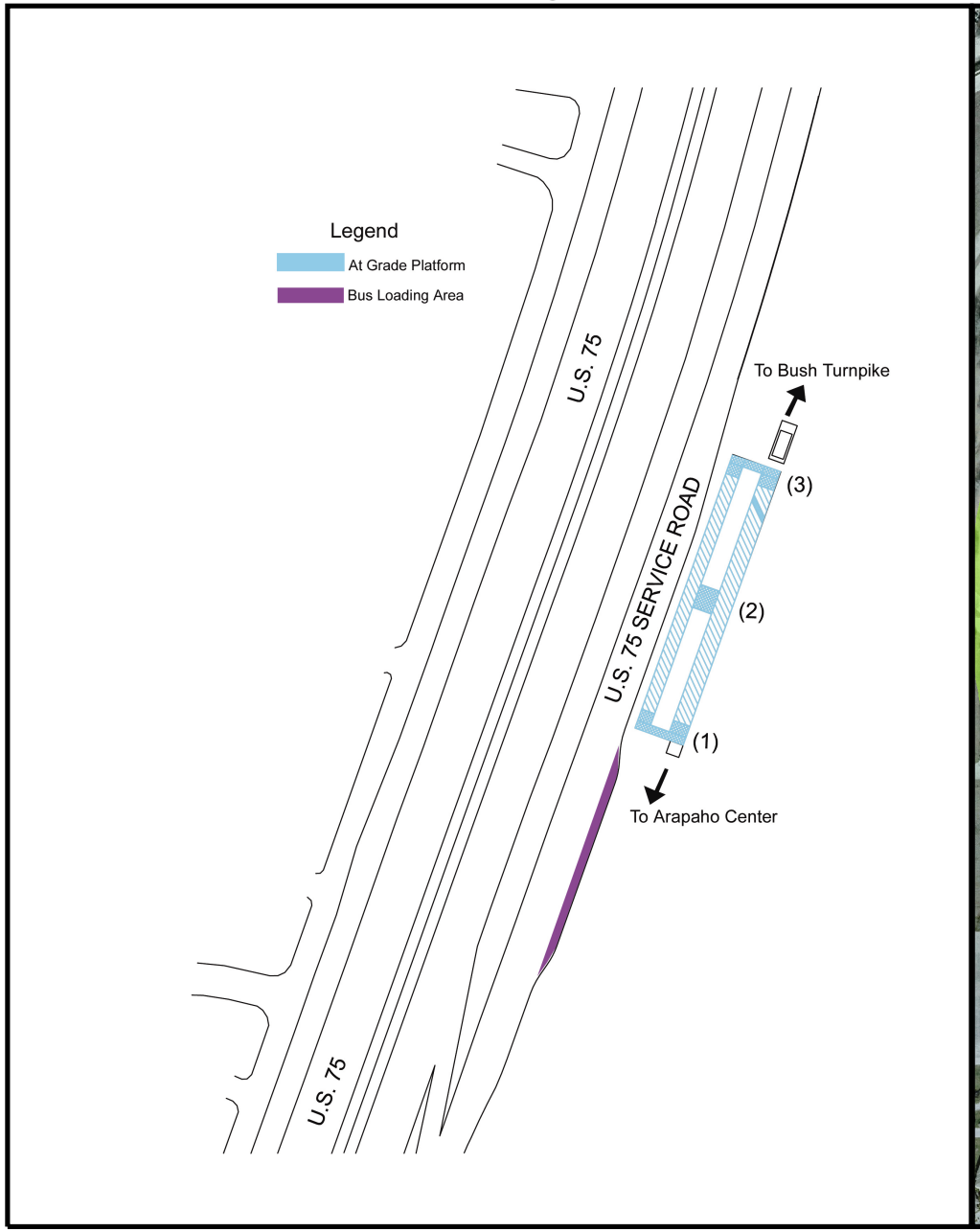


Fig 4-7. Arapaho Center Land Use and Station Design
North Central Corridor Extension
Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

Station Design



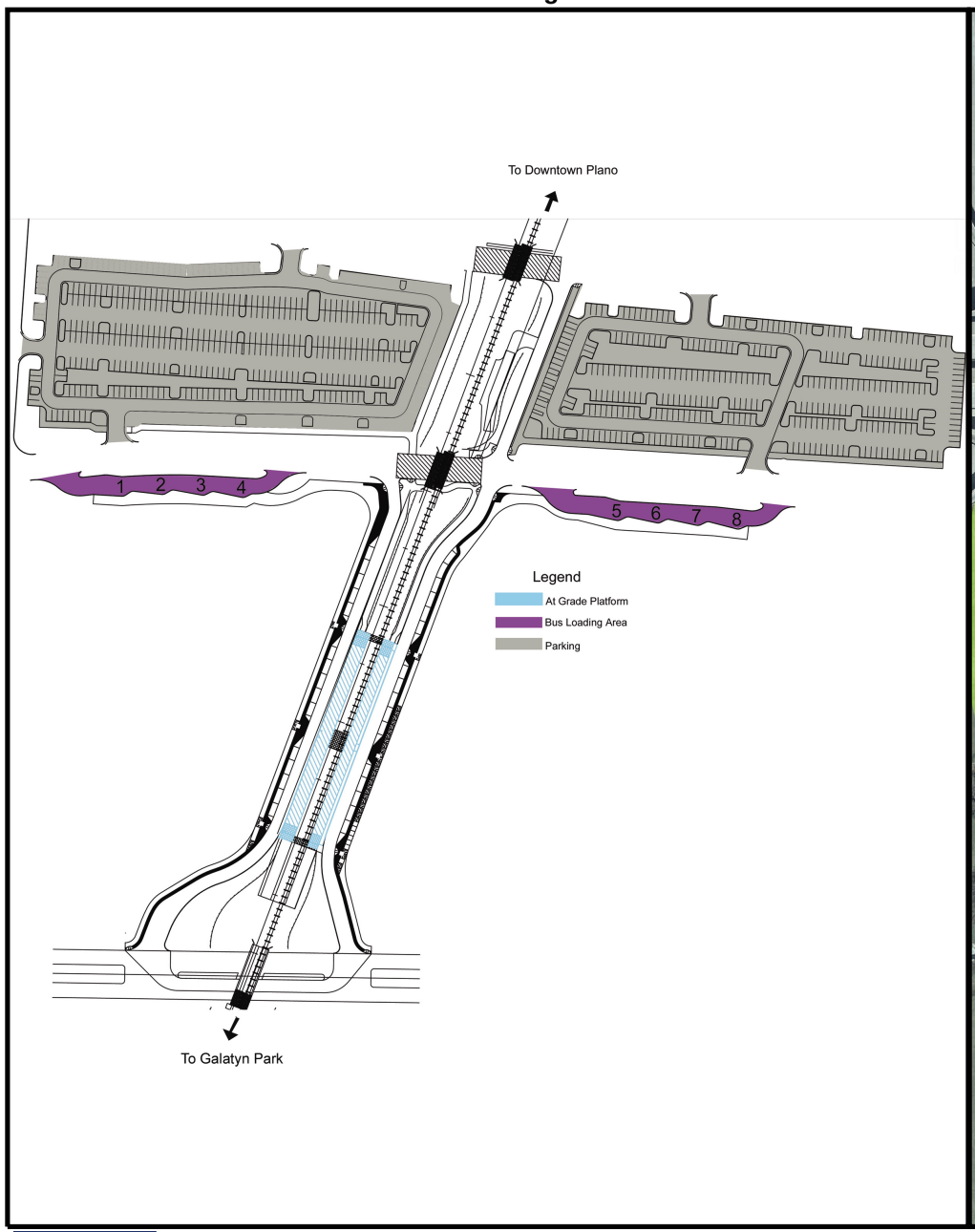
2005 Land Use with 2003 Aerial Photography

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

Fig 4-8. Galatyn Park Land Use and Station Design
North Central Corridor Extension
Before and After Study - November 2006

Station Design



2005 Land Use with 2003 Aerial Photography

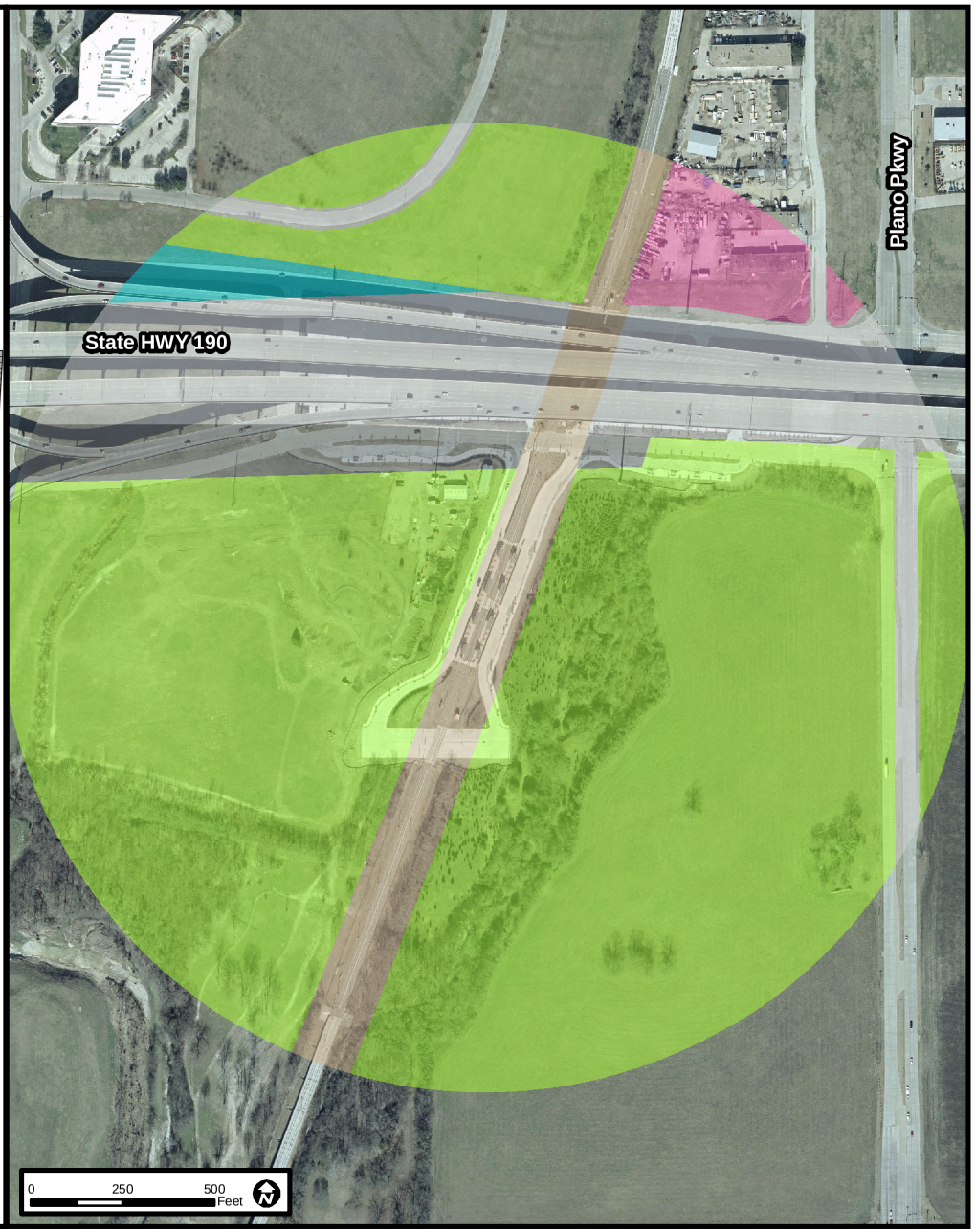


Fig 4-9. Bush Turnpike Land Use and Station Design

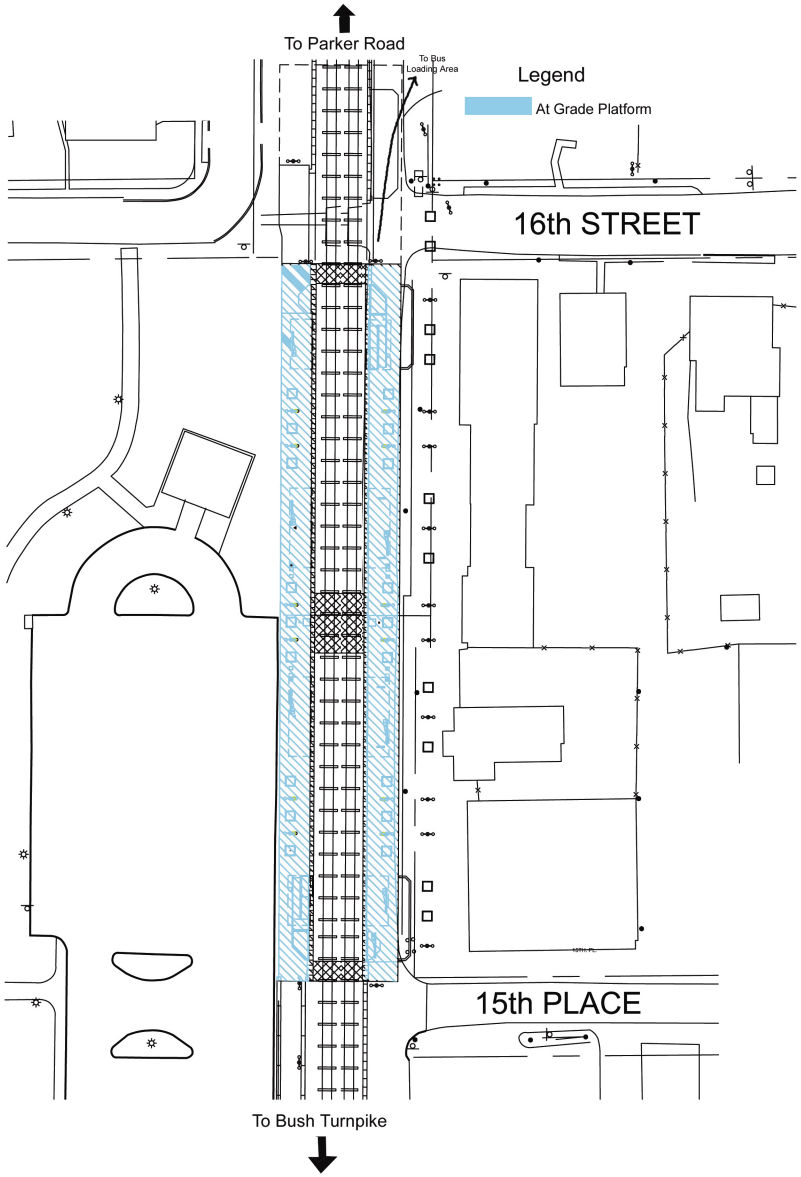
North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

Station Design



2005 Land Use with 2003 Aerial Photography

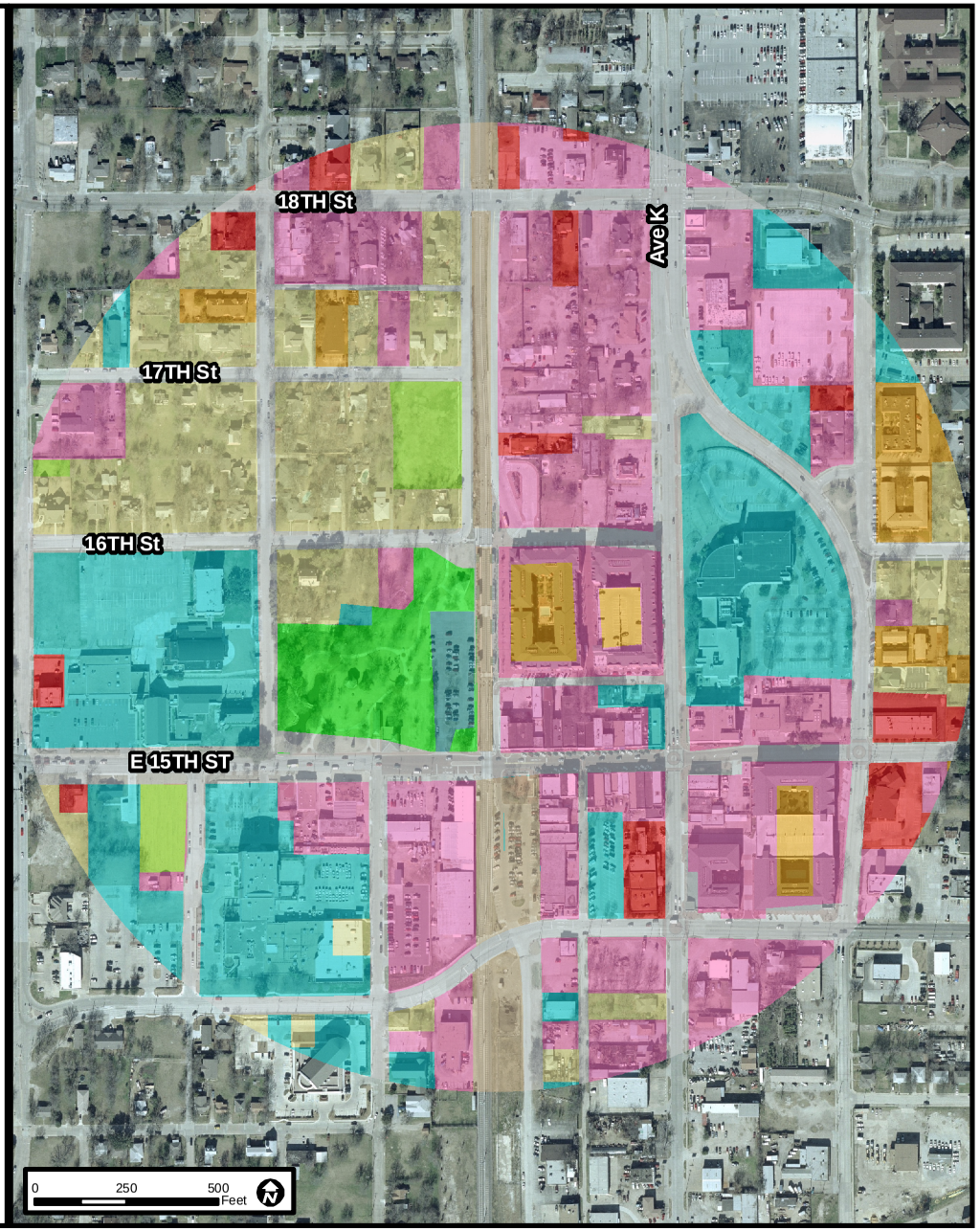


Fig 4-10. Downtown Plano Land Use and Station Design

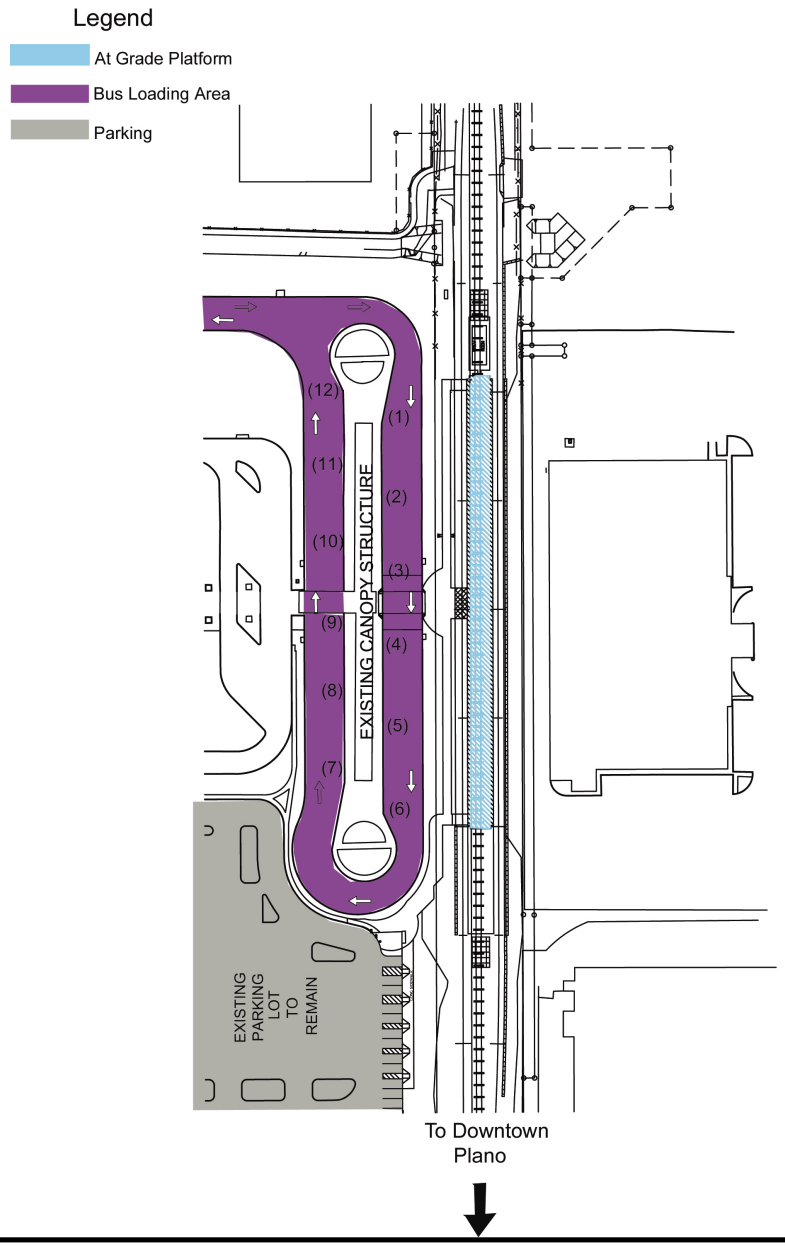
North Central Corridor Extension

Before and After Study - November 2006

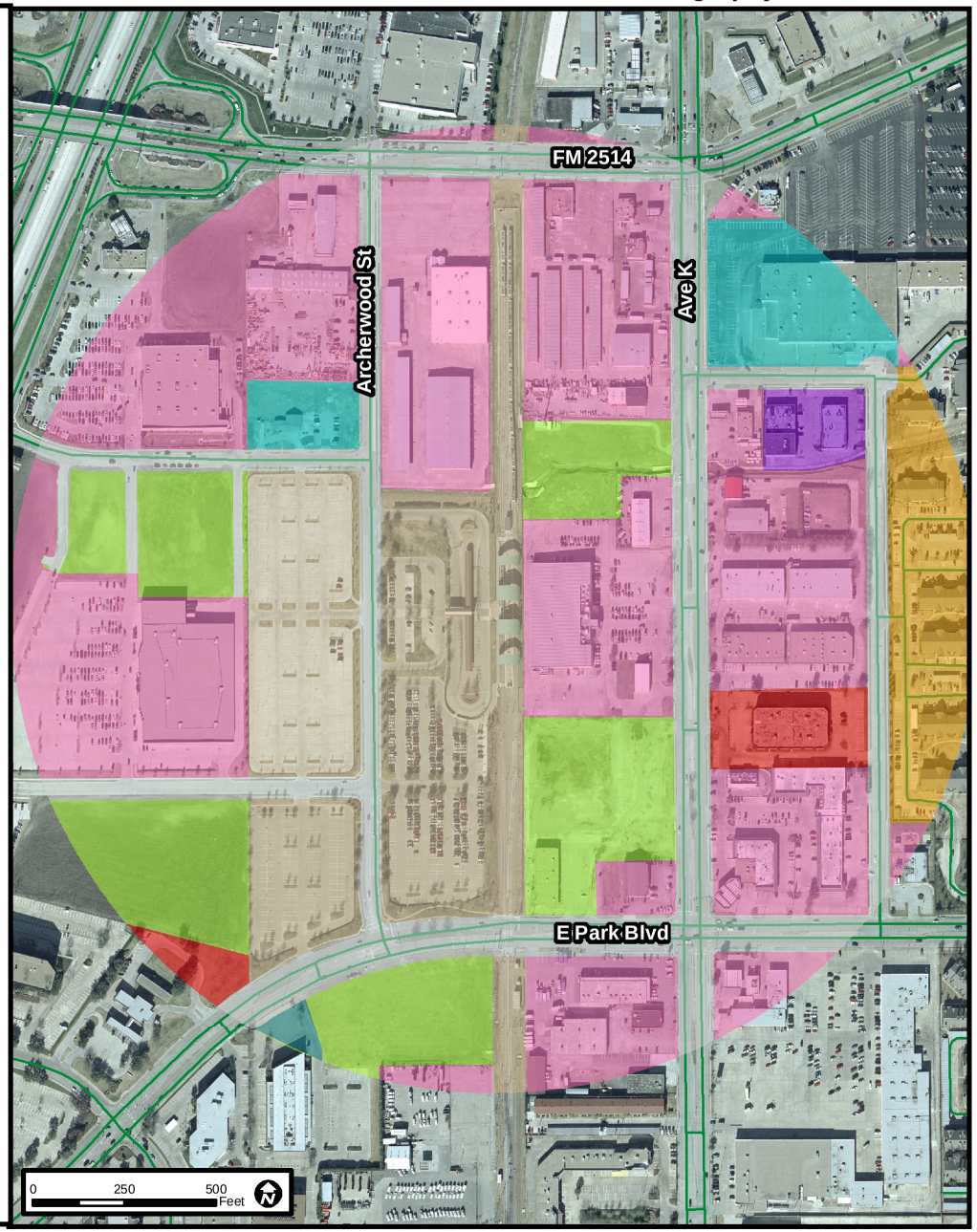
Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

Station Design



2005 Land Use with 2003 Aerial Photography



Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

Fig 4-11. Parker Road Land Use and Station Design

North Central Corridor Extension

Before and After Study - November 2006

Operating Cost

Total O&M costs for the DART Transit System in 2004 were $289,706,513. These operating costs include bus operations, all LRT operations and other O&M costs. Table 4-3 provides detail of this data.

Table 4-3: FY 2004 O&M Actuals by Mode					
	Direct	**Indirect**	**Total D&I**	**G&A**	**Sub-Total Mode Cost**
Bus	$130,974,726	$28,113,404	$159,088,130	$18,100,795	$177,188,925
Light Rail	$36,643,266	$18,668,221	$55,311,487	$6,316,992	$61,628,479
Commuter Rail	$15,046,815	$1,044,483	$16,091,298	$1,813,181	$17,904,479
HOV	$1,979,436	$3,104,568	$5,084,003	$581,646	$5,665,649
Paratransit	$20,509,435	$3,067,441	$23,576,876	$2,675,043	$26,251,919
General Mobility	$958,996	$0	$958,996	$108,066	$1,067,062
Operating Total	$206,112,673	$53,998,117	$260,110,790	$29,595,723	**$289,706,513**

Source: Dallas Area Rapid Transit Service Planning, See Appendix B-Tab 10

Ridership

Average monthly rail ridership in 2004 was 56,210 for the DART LRT System. Table 4-4 lists average weekly station boarding data for LRT stations within the NC Corridor. The average number of weekday bus riders in January 2005 is 132,736 for the entire DART Bus system. When considering only those bus routes that serve the NC Corridor, average weekday ridership for January 2005 is 44,138 riders.

Table 4-4: Average Weekday Station Boardings	
Station	**2004**
Park Lane	2,273
Walnut Hill	1,366
Forest Lane	1,372
LBJ/Central	575
Spring Valley	996
Arapaho Center	1,321
Galatyn Park Station	245
Bush Turnpike	918
Downtown Plano	581
Parker Road	2737
Total	**12,384**

Source: DART, See Appendix B – Tab 6

Service Levels

Transit Service Levels

LRT Service Levels

The following rail service tables describe weekday and Saturday car miles and train hours for the LRT system. Changes in service miles and hours identified in the table below are a result of non-revenue trips made to the yard to increase or reduce the rail car consists due to changes in ridership demands, see table 4-5.

Changes in October of 2003 due to additional yard work resulting in a reduction in train hours and car miles on weekdays. Additional changes made in January 2004, but had relatively little impact on service levels.

Table 4-5: System-wide LRT Service

Month/Year	Weekdays		Saturday		Sunday	
	Car Miles	Train Hours	Car Miles	Train Hours	Car Miles	Train Miles
March 2003	19,324	457	7,699	300	7,551	293
June 2003	19,352	457	7,699	300	7,551	293
Month/Year	**Weekdays**		**Saturday**		**Sunday**	
	Car Miles	**Train Hours**	**Car Miles**	**Train Hours**	**Car Miles**	**Train Miles**
October 2003	17,078	400	7,671	300	7,551	293
Changes: Additional yard work for making and breaking car consist.						
Month/Year	**Weekdays**		**Saturday**		**Sunday**	
	Car Miles	**Train Hours**	**Car Miles**	**Train Hours**	**Car Miles**	**Train Miles**
January 2004	17,041	402	7,658	300	7,539	293
Changes: Removed yard work (make/break) and relief shuttle from run assignment						

Source: DART, See Appendix B – Tab 6

Bus Service Levels

Current bus operations within the NC Corridor LRT Extension (figure 4-12) include the following routes: 7 local routes, 2 express, 8 suburban routes, 7 crosstown routes, 19 rail routes, and 10 shuttle routes. Crosstown Routes provide service to the Lake Ray Hubbard Transit Center, Irving/Las Colinas Transit Center and Addison Transit Center (see table 4-6).

Table 4-6: Bus Routes Within NC Corridor LRT Extension

Route Type	2005	Route Number
Local Routes	7	1, 21, 31, 36, 60, 183, 184
Express Routes	2	210, 234
Suburban routes	8	316, 341, 344, 350, 360, 361, 372, 374
Crosstown Routes	7	400, 410, 428, 451, 463, 486, 488
Rail Feeder Routes	19	501, 503, 505, 506, 519, 534, 536, 551, 560, 562, 564, 566, 567, 569, 570, 571, 572, 582, 583
Shuttle Routes	10	702, 760, 768, 821, 824, 826, 827, 828, 829, 830

Source: Dallas Area Rapid Transit Service Planning, July 2005

Roadway Service Levels

Roadway Congestion

US-75 is a major highway running north and south which provides commuter's access south to the CBD and north into Plano and on to McKinney. Additionally, the Northwest Corridor rail line runs parallel to this highway. Commuters that utilize park and ride lots often use US-75 and arterial roads to gain access to the stations. Local bus routes and rail station feeder routes also use or cross US-75 to connect passengers with the LRT system. Therefore, traffic impacts due to the rail and rail crossing affect transit patrons as well as those traveling in private vehicles. Table: 4-7 provides data concerning several major roadway intersections with US-75 in the City of Richardson.

Table 4-7: Major Roadway Intersections with US-75

Roadway	24 Hour Volume (1,000's)	
	West of US-75	East of US-75
Spring Valley Road	51,100	41,600
Belt Line Road	34,300	30,500
Arapaho Road	35,900	42,000
Campbell Road	44,400	41,600
Renner Road	18,500	28,100

Note: Current intersection volume data for City of Dallas and City of Plano is unavailable at the present time.

Source: North Central Texas Council of Governments

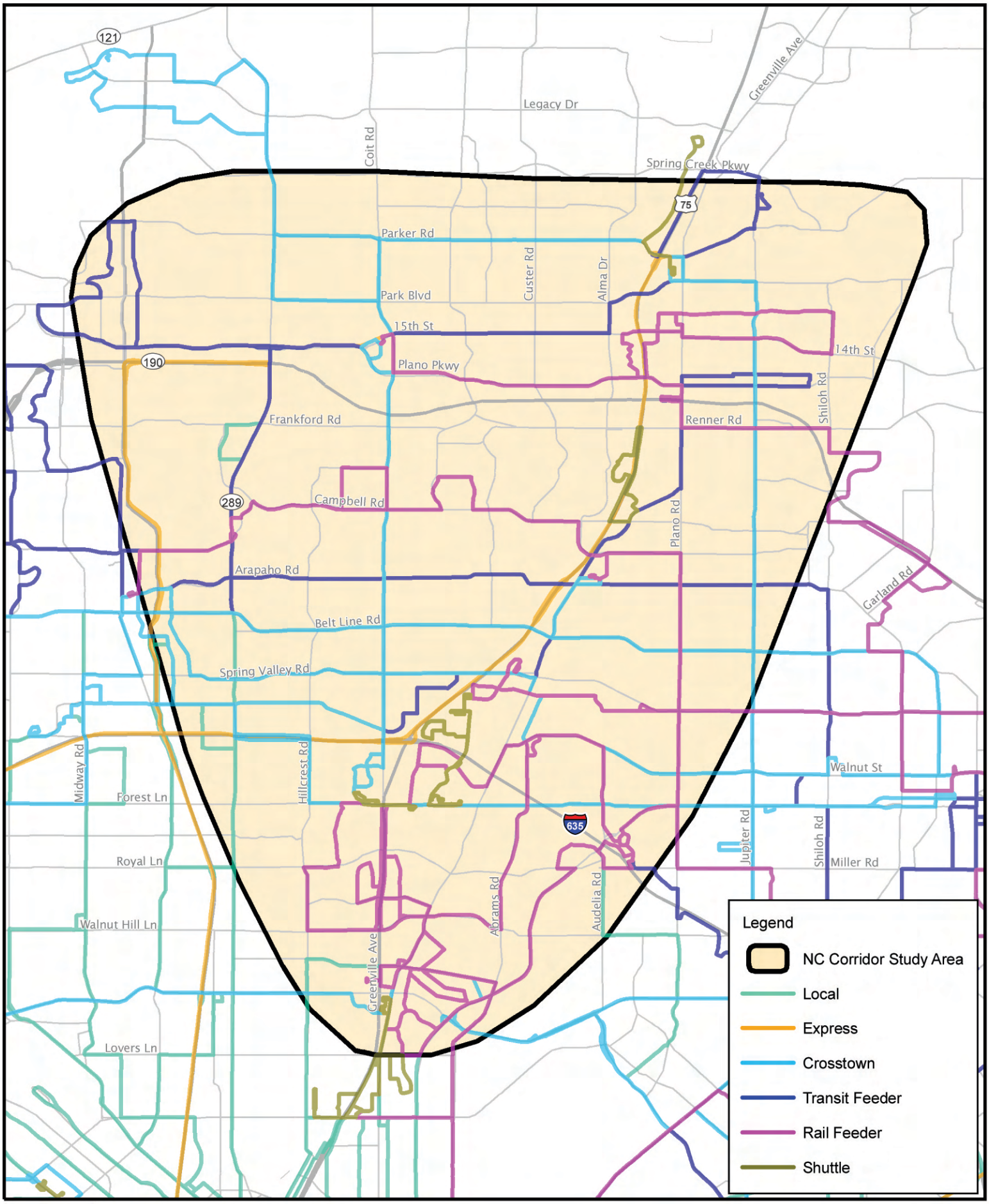


Fig 4-12. Bus Operations 2006
North Central Corridor Extension
Before and After Study - November 2006

0 0.5 1 2 Miles

Freeway Congestion

Table 4-8 provides average daily traffic information for major thoroughfares in the NC Corridor. These routes gauge traffic conditions, which often impact a commuter's decisions to drive or choose LRT transit. Furthermore, this information provides a comparison between traffic conditions prior to the inception of LRT vs. those once the NC Corridor LRT Extension began.

Table 4-8: Freeway ADT in the North Central Corridor 2004	
Local Reference	**Average Daily Traffic**
North Central Expressway (US-75)	
Forest Lane	207,000
LBJ Freeway	242,000
Arapaho Road	252,000
Park Blvd.	221,000
LBJ Freeway	
Preston	278,000
US-75	226,000
Abrams	189,000
SH 190 Freeway	
Independence Parkway	96,600
US-75	-
Jupiter Road	57,300

Source: North Central Texas Council of Governments, 2005

Arterial Congestion

Rail stations located near single family neighborhood rely on arterial street connectivity to provide access to potential riders for bus traffic, as well as private vehicle traffic. The location of a rail station has the potential to increase congestion on arterial streets if traffic planning is not addressed. Table 4-9 documents current traffic volumes in key arterial street intersections near rail stations.

Table 4-9: Arterial ADT in the North Central Corridor 2004	
Local Reference	**Average Daily Traffic**
Preston Road at Forest Lane	35,648
Skillman at Northwest Highway	30,493
Greenville Avenue at Royal Lane	30,461
Greenville Avenue at Spring Valley	17,000
Coit Road at LBJ Freeway	54,373
Plano Road at Arapaho	36,000
Plano Road at Park Boulevard	19,077
Greenville at Campbell	9,500
Belt Line at Jupiter	33,900
Jupiter at Arapaho	35,500
Belt Line at Preston	26,405
Coit at Parker	49,453

Source: North Central Texas Council of Governments

Market Conditions

As described by Bernard Weinstein and Terry Clower in the previously mentioned economic studies conducted by the North Texas Center for Economic Development and Research (see page 31), the presence of a rail system, especially stations has an impact on economic and development activities, as well as travel patterns. These factors influence market conditions within the corridor.

Demographics

In May of 2005, DART Service Planning conducted a license plate survey at station park-and-ride facilities within the NC Corridor and found that, like in 2000, transit facility utilization continued to extend beyond the boundaries of the NC Corridor and the DART study area (see Figure 4-13). The increase in transit users from outside the corridor in 2005 that is displayed in Figure 4-13 can be attributed to the opening of six park-and-ride stations (Forest Lane, LBJ, Spring Valley, Arapaho, Bush Turnpike, and Parker Road) that were not constructed in 2000. Of the license plates surveyed in 2005, 60.5% originated outside the study corridor, which is approximately a 15% increase from 2000. The figure also illustrates a greater geographic range of transit users in 2005 relative to the 2000 survey data. Table 4-10 describes certain demographic characteristics of census tracts where transit users originated. These characteristics are similar to conditions in license plate surveys conducted in 2000.

Table 4-10: North Central Corridor Demographic Information

Demographic	Census Tracts Reported by 2005 License Plate Surveys
Average Persons Per Household	2.6
Percentage of Households with One Person	27.7%
Percentage of Households with Two Persons	29.9%
Percentage of Occupied Housing Units Rented	44.5%
Average Workers per Household	1.3
Percentage Occupied Housing Units with No Vehicles Available	5.9%
Percentage Occupied Housing Units with One or More Vehicles Available	94.1%

Source: DART Bus Service Planning survey, 2005; US Census 2000

In 2005, the Corridor area averaged 2.27 persons per household, according to NCTCOG. In the year 2005, the study area, consisting of portions of Dallas and Collin counties, had a population of 393,307. This is an increase in growth from the 2000 population of 383,269, according to NCTCOG (see table 4-11).

Table 4-11: North Central Corridor Demographic Data

	Year 2005
Population	393,307
Households	173,122
Employment	332,253

Source: North Central Texas Council of Governments, 2005 Forecast.

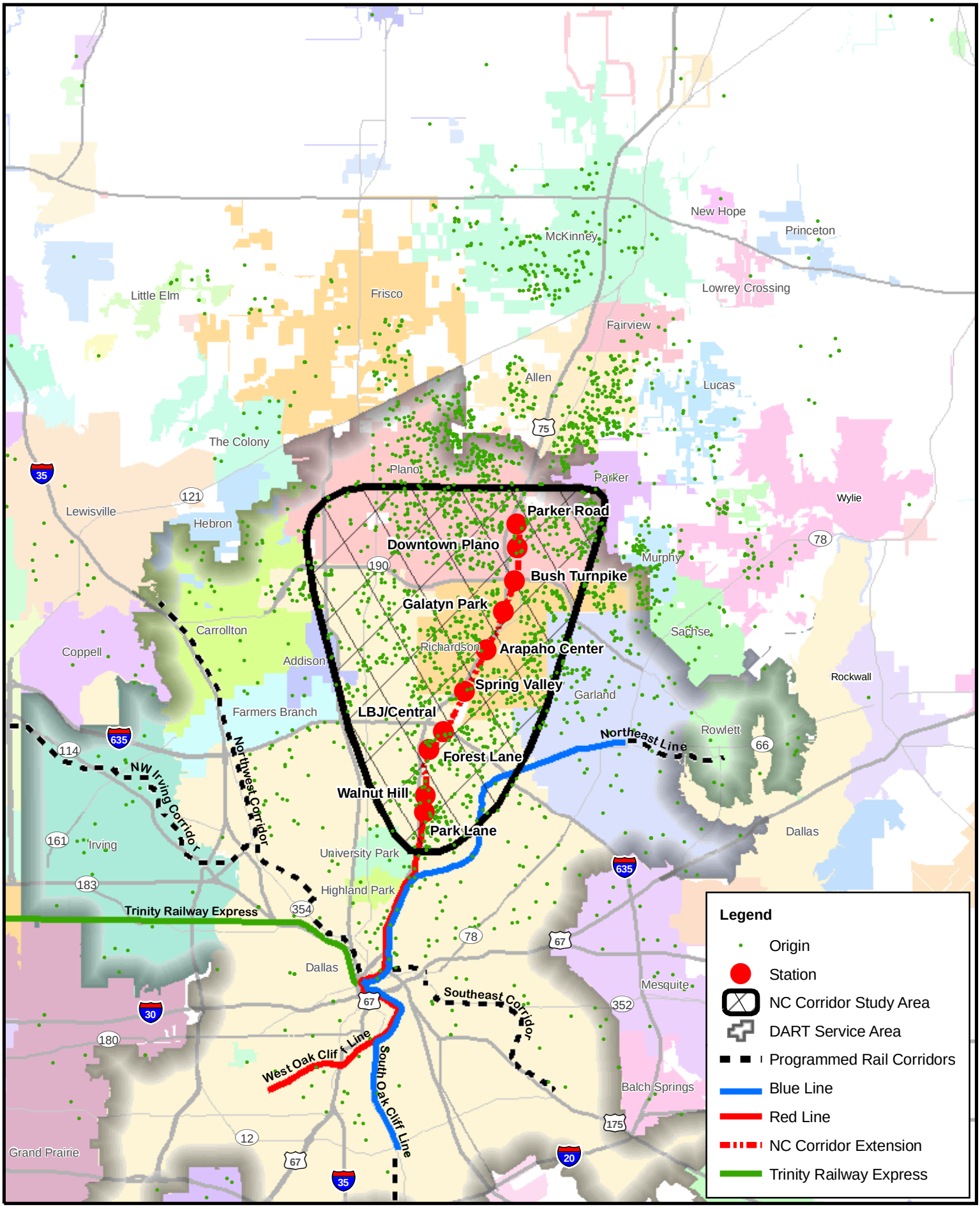


Figure 4-13: Transit User Origination Points, 2005
North Central Corridor Extension
Before and After Study - November 2006

Marketing Condition (Survey Data)

DART's marketing and communications department conducted a ridership survey in 2005. Table 4-12 represents the demographics of the customer based on percentage of respondents on both bus and LRT.

Table 4-12: Ridership Survey After Conditions (2005)	2005	
	Bus	LRT
Choice Rider	59.00%	82.00%
Age		
18-24	12.00%	6.00%
25-34	15.00%	19.00%
35-54	55.00%	53.00%
55-64	14.00%	19.00%
65+	4.00%	2.00%
Level of Education		
Less than 12 years	13.00%	7.00%
High School Graduate	28.00%	14.00%
Some College	30.00%	29.00%
College Degree	23.00%	33.00%
Post Graduate Degree	6.00%	17.00%
Ethnicity		
African American	45.00%	29.00%
Caucasian	35.00%	54.00%
Hispanic	14.00%	11.00%
Native American	2.00%	2.00%
Oriental	2.00%	5.00%
Occupation		
Professional/Managerial	34.00%	56.00%
Sales/Clerical/Service	25.00%	21.00%
Laborer/Craftsman	18.00%	8.00%
Student/Employed	7.00%	6.00%
Retired	0.00%	0.00%
Student Only	0.00%	0.00%
Homemaker	3.00%	2.00%
Level of Income		
<$15,000	39.00%	17.00%
$15,000-$24,999	17.00%	12.00%
$25,000-$34,999	10.00%	12.00%
$35,000-$49,999	16.00%	19.00%
$50,000-$74,999	11.00%	22.00%
$75,000+	7.00%	19.00%

Source: DART Marketing/Communications Department

Land Use

Rail stations in the NC Corridor (Figures 4-2 through 4-11) show “After” Condition land use near stations, once LRT service began operation in the corridor.

ANALYSIS OF CHANGES

Physical Scope

LRT Line Changes

The LRT line was designed and built primarily as planned; however, changes to the build-out scheme were made. Initially, the line was planned as double track service from Park Lane Station to Arapaho Center Station with single track service north of Arapaho Center Station. During final design, the DART Board of Directors approved a decision to build the entire line as double track, due to the potential for increased ridership, and additional costs associated with converting the section north of Arapaho Center Station from single track to double track at a later date.

Roadway and Grade Crossings Changes

There were several crossing configuration changes throughout the NC Corridor LRT Extension project. These changes ranged from adding new streets, halting plans to build designated streets, or changing planned at grade crossings to grade separated crossings. Tables 5-1 and 5-2 provide detail of these configuration changes. Figure 5-1 graphically demonstrates the differences between the before, forecasted and after conditions.

Table 5-1: LRT Roadway Crossing Configurations

Location	Crossing	Forecasted Crossing Configuration	Configuration Changes
Dallas	Markville Drive	Street was not planned	New Street
Richardson	Renner Road	At Grade	Grade Separated
Richardson	Greenway Drive	Shown to be future street	Not Built
Richardson	Lookout Drive	Street not planned	New Street
Richardson	Galatyn Park	Street not planned	New Street
Plano	Plano Parkway	At Grade	Grade Separated

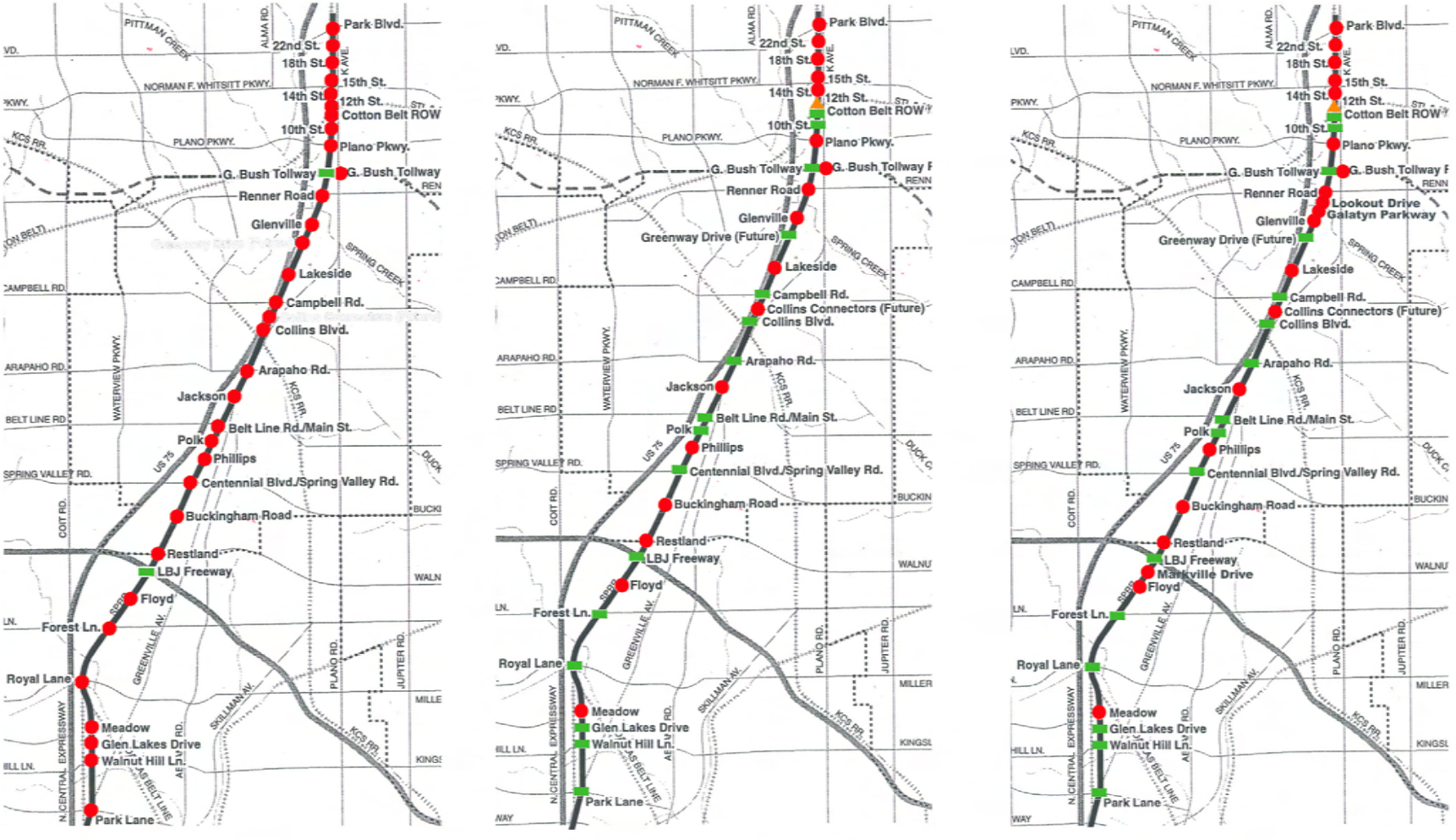
Source: Dallas Area Rapid Transit

New streets were added at three locations; Markville Drive, Lookout Drive, and Galatyn Park. These streets coincided with the new construction of industrial facilities and were needed to improve access to the new developments. The Renner Road and Plano Parkway configuration changed in accordance design modification requirements to the rail line. Greenway Drive was forecasted to be constructed prior to operation but was removed.

Table 5-2: Changes in Roadway Crossing Configurations 2004

Street	Before Conditions	After Conditions
Renner Road	At-Grade	Grade Separated
Phillips Street	At-Grade	Street Closed
Lookout Drive	Street was not built	Street built at-grade crossing
Galatyn Parkway	Street was not built	Street built at-grade crossing
Plano Parkway	At Grade	Grade Separated
East Plano Parkway	At-Grade	Grade Separated

Source: DART NC-3 through NC-5 Guideway Plan & Profile Certified As-Built Sheets



Before (2000) **Forecast** **After** (2004)

DART

Fig 5-1. LRT Crossing Configuration Comparison

North Central Corridor Extension

Before and After Study - November 2006

LRT System

At-Grade Crossing

Grade Separated

Street Closure

N

Changes to LRT Stations

There were numerous station changes throughout the planning process that were incorporated prior to North Central Extension LRT operation. Station pedestrian circulation patterns were improved at Arapaho Station; Galatyn Park Station was introduced instead of the planned deferred Campbell Road Station; and the Bush Turnpike Station was constructed ahead of schedule including additional parking. Parking was also added to the Parker Road Station and is currently under development at Walnut Hill Station.

Walnut Hill

According to the Environmental Study conducted for the Walnut Hill Station Parking Facility (see appendix A), the business owners in the adjacent to the station expressed concern that there was insufficient parking for transit users during the North Central Final Environmental Impact Statement (FEIS) process. With the pending implementation of the LRT, the need for parking was anticipated. Consequently, DART proposed adding a parking facility at this location to address such concerns. The proposed parking facility will have 208 parking spaces composed of 202 regular and 6 handicap parking spaces located in an unutilized area of retail, offices, institution and multi-family residences.

Arapaho Center

According to the Richardson Station-Greenville Avenue Pedestrian Underpass Environmental Study (see appendix A), the LRT track and planned LRT platform for the Richardson station parallel Greenville Avenue along the west side. The existing Richardson Transit Center is located on the east side of Greenville Avenue just north of Woodall Drive. The original design in the FEIS was an at-grade pedestrian crossing at Greenville Avenue from the platform to the existing Transit Center/Park and Ride. The traffic signal and crosswalk markings were to be installed to control pedestrian crossing at Greenville Avenue from the parking platform to the existing Transit Center. The City of Richardson and several members within the community expressed concern over the safety of the at-grade pedestrian crossing. A pedestrian underpass was therefore suggested. DART and the City of Richardson developed a cost sharing deal for the alternative crossing that allow traffic flow along Greenville Avenue to be maintained, and will provide for a grade separated and perceived safer pedestrian crossing free of potential automobile/pedestrian conflicts. Access to the station at-grade will be eliminated and the platform has been revised to discourage the access. The kiss-and-ride area north of the platform was eliminated to reduce traffic. The Greenville Avenue crossing will consist of two bridges (for the southbound and northbound lanes), and a third bridge along the east side to replace the existing sidewalk. The underpass was estimated to cost approximately $3 million. DART will contribute 10% of this cost, or $300,000. The City of Richardson will contribute an additional 10% of the funding. The remaining 80% of funding is being provided through the City of Richardson from a grant received under the Federal Highway Administration Congestion Mitigation and Air Quality Program (CMAQ) program.

Galatyn Park Station/Campbell Road Deferred

According to the Galatyn Park Light Rail Transit Station Environmental Fact Sheet (see appendix A), the NC Corridor LRT Extension's Final EIS assessed the potential environmental impacts of implementing LRT in the NC Corridor LRT Extension with the exception of two deferred LRT stations to be located in the vicinity of Campbell Road and SH 190. These stations were deferred given the potential to plan these stations as joint development projects due to their location in growing employment sectors. An opportunity

arose to the Galatyn Park Station. This station is located adjacent to the City of Richardson's 500-acre Galatyn Park located between Campbell and Renner Road. This station replaced the deferred Campbell Road station. These changes included the addition of LRT station platform and related amenities within the DART owned ROW.

DART worked cooperatively with the developer and land owner, Hunt Petroleum Corporation, and the City of Richardson, to locate the platform adjacent to a central plaza that will serve as the gateway to the development. A service plan Amendment and revision to the DART financial plan was necessary to reflect the new station. DART has extended the northern terminus of the Line Section NC-4 from the Arapaho Road LRT Station to include the Galatyn Park Station. This included the development of the station in phase one of the full development LRT double-track alignment (NC3-NC4). It was expected that the station would not be open for revenue service until the Galatyn Park development was completed and the station is warranted.

Bush Turnpike/Deferred SH 190 Station

According to the SH 190 Light Rail Transit Station Environmental Study (see appendix A), DART has initiated planning for a station in the vicinity of the newly opened SH 190 George Bush Turnpike. The station platform is located immediately south of the eastbound SH 190 turnpike facility and has pedestrian connections to the platform. Approximately 1,000 parking spaces are provided in this area. Bus activity takes place along the eastbound frontage road, east and west of the rail alignment. Access to the stations park-and-ride is provided from the eastbound and westbound SH 190 service roads, and from a proposed Infocom Drive South of the platform. Low capacity, one-way roads run parallel to the platform connecting the frontage road to Infocom Drive. The proposed changes in project definition include the addition of an LRT station platform and related amenities within the DART owned right-of-way. Additional property has been made available by the North Texas Tollway Authority (NTTA) for the adjacent park-and-ride. The Preliminary Engineering drawings were prepared for the study. DART has worked with the cities of Richardson and Plano (which border the station the south and the north, respectively) to locate the LRT station so as to best capture commuters and serve adjacent residents and businesses, both existing and planned. A Service Plan Amendment for the station was approved by the DART Board on November 23, 1999. In addition, the Fiscal Year 1998 Budget and FY 97 Financial Plan amendment were approved on September 30, 1997 which included the acceleration of the double track alignment to Plano. Line Section NC05 was previously planned to be developed as an initial single-track alignment with passing sidings to reflect intermediate capacity LRT operations until a second track and additional stations were added during phase two.

Parker Road Station

According to the East Plano Transit Center Parking Expansion Categorical Exclusion (see appendix A), to meet the interim needs of North Plano, DART constructed a bus transit center in 1993. The East Plano Transit Center currently provides bus service to the Dallas Central Business District and serves as a transfer center for local routes. The East Plano Transit Center facility was intended to offer local bus service and LRT service upon completion of the NC Corridor LRT Extension. With the pending implementation of the LRT, the need for additional parking is anticipated. DART proposed to place an additional 619 parking spaces on DART owned property adjacent to the East Plano Transit Center. This was accomplished in two phases. Parking added in phase one proximate to the bus and rail platforms was reconfigured to accommodate the additional handicap-parking required for

ADA compliance. The addition of 546 parking spaces was completed in Phase two. Phase three added 72 spaces.

2000 Land Use with 1995 Aerial Photography

2005 Land Use with 2003 Aerial Photography

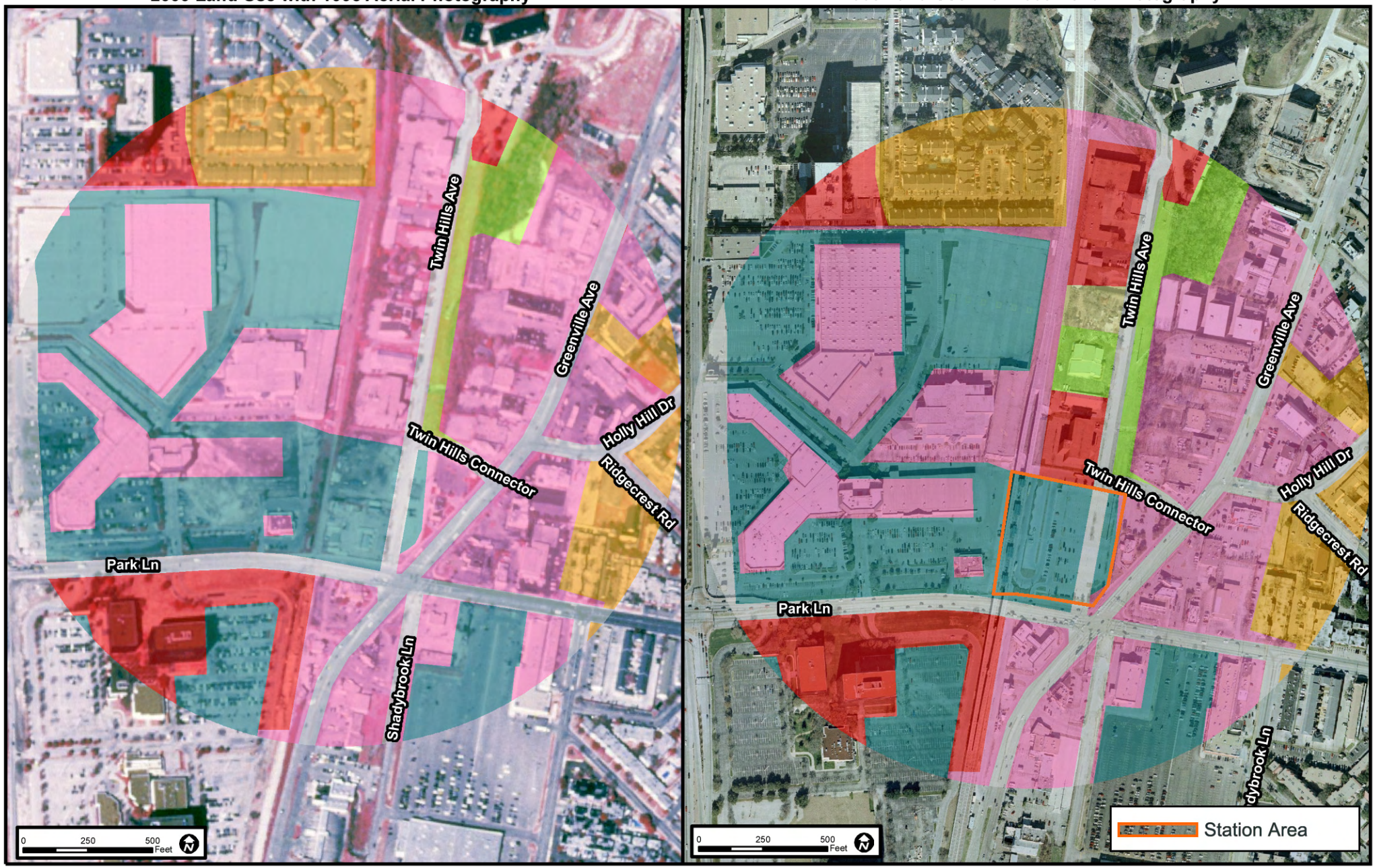


Fig 5-2. Park Lane Land Use Comparison 2000/2005

North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

2000 Land Use with 1995 Aerial Photography

2005 Land Use with 2003 Aerial Photography

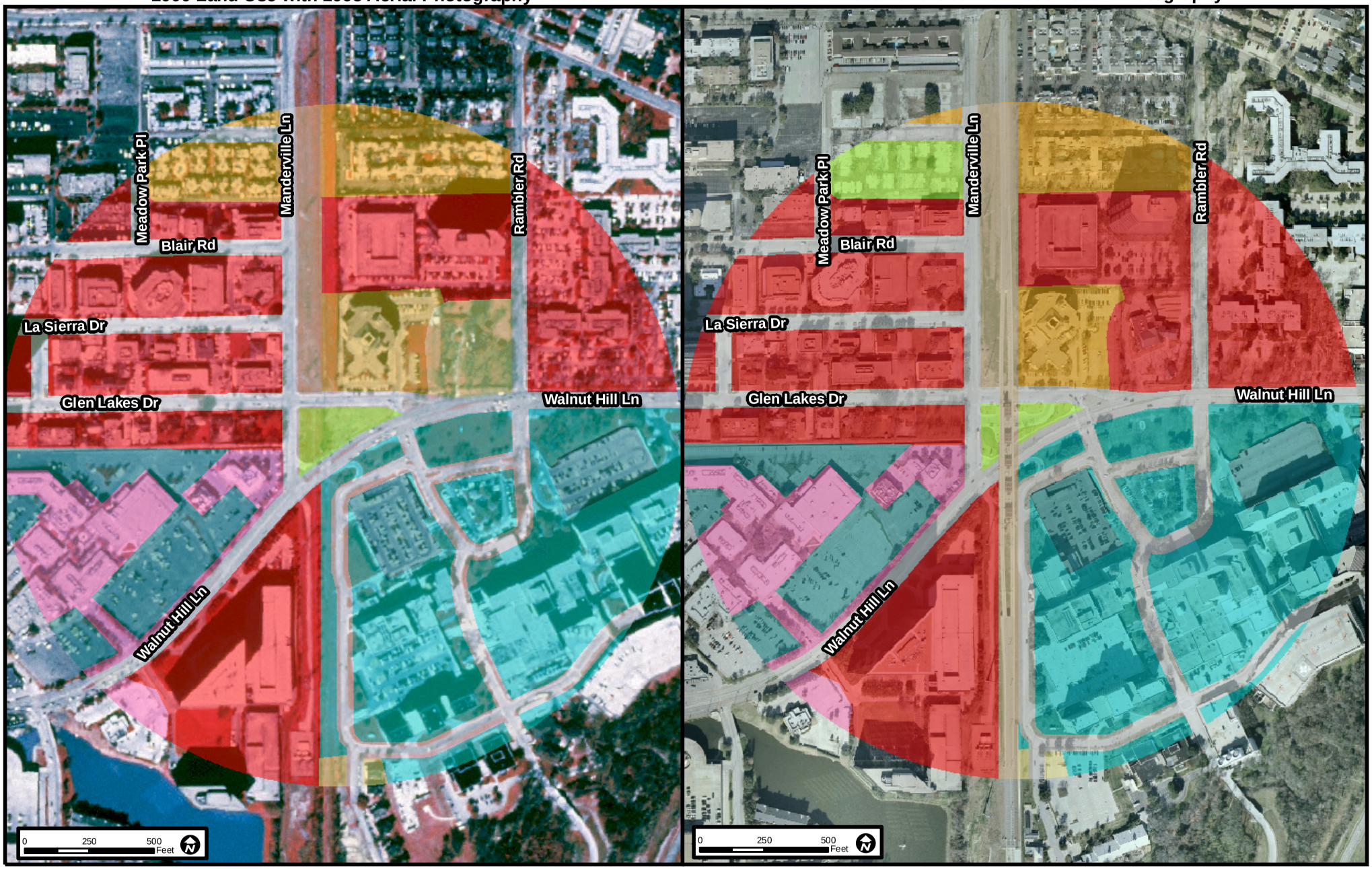


Fig 5-3. Walnut Hill Land Use Comparison 2000/2005

North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

2000 Land Use with 2001 Aerial Photography

2005 Land Use with 2003 Aerial Photography

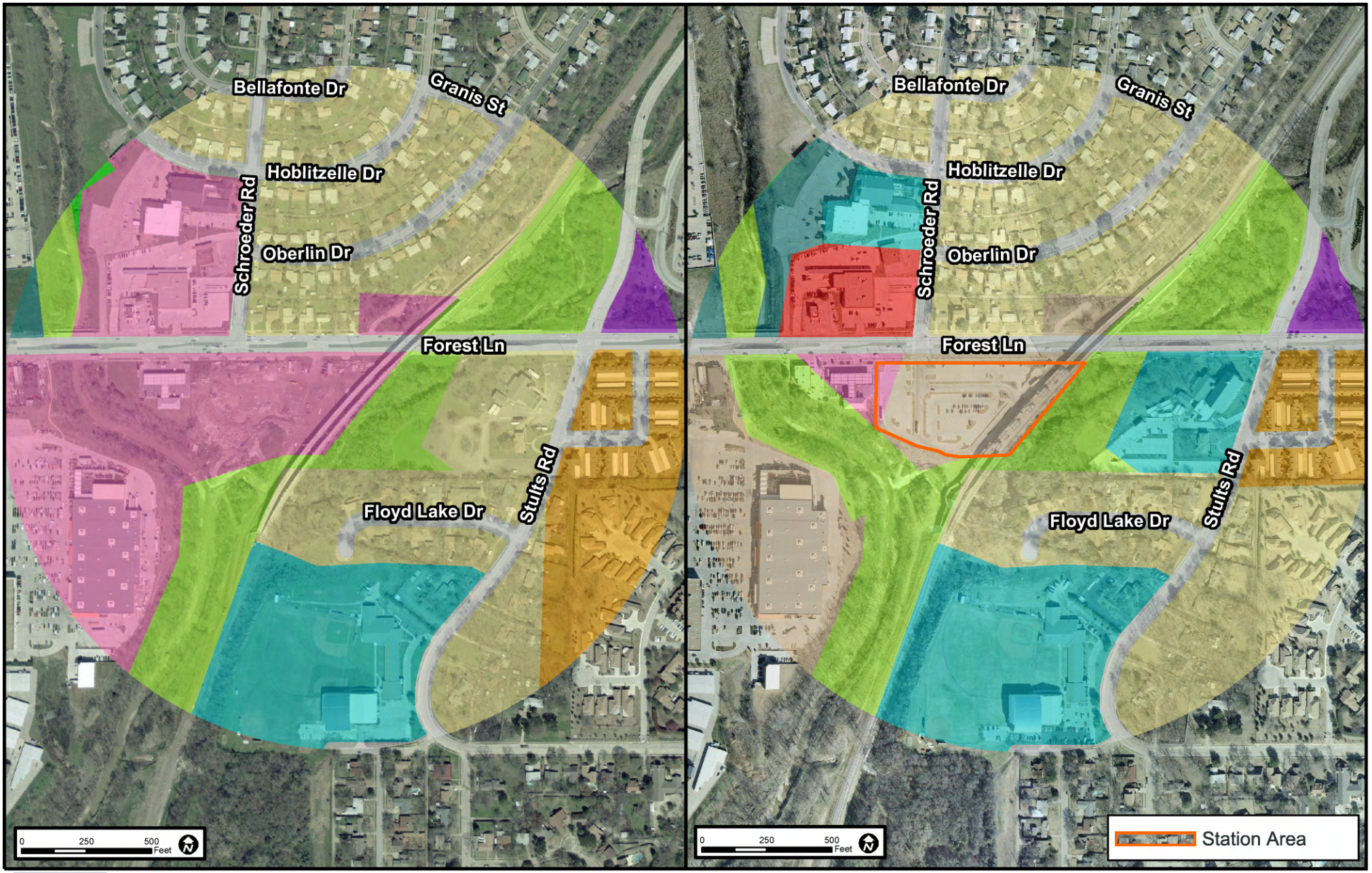


Fig 5-4. Forest Lane Land Use Comparison 2000/2004
North Central Corridor Extension
Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

2000 Land Use with 2001 Aerial Photography

2005 Land Use with 2003 Aerial Photography

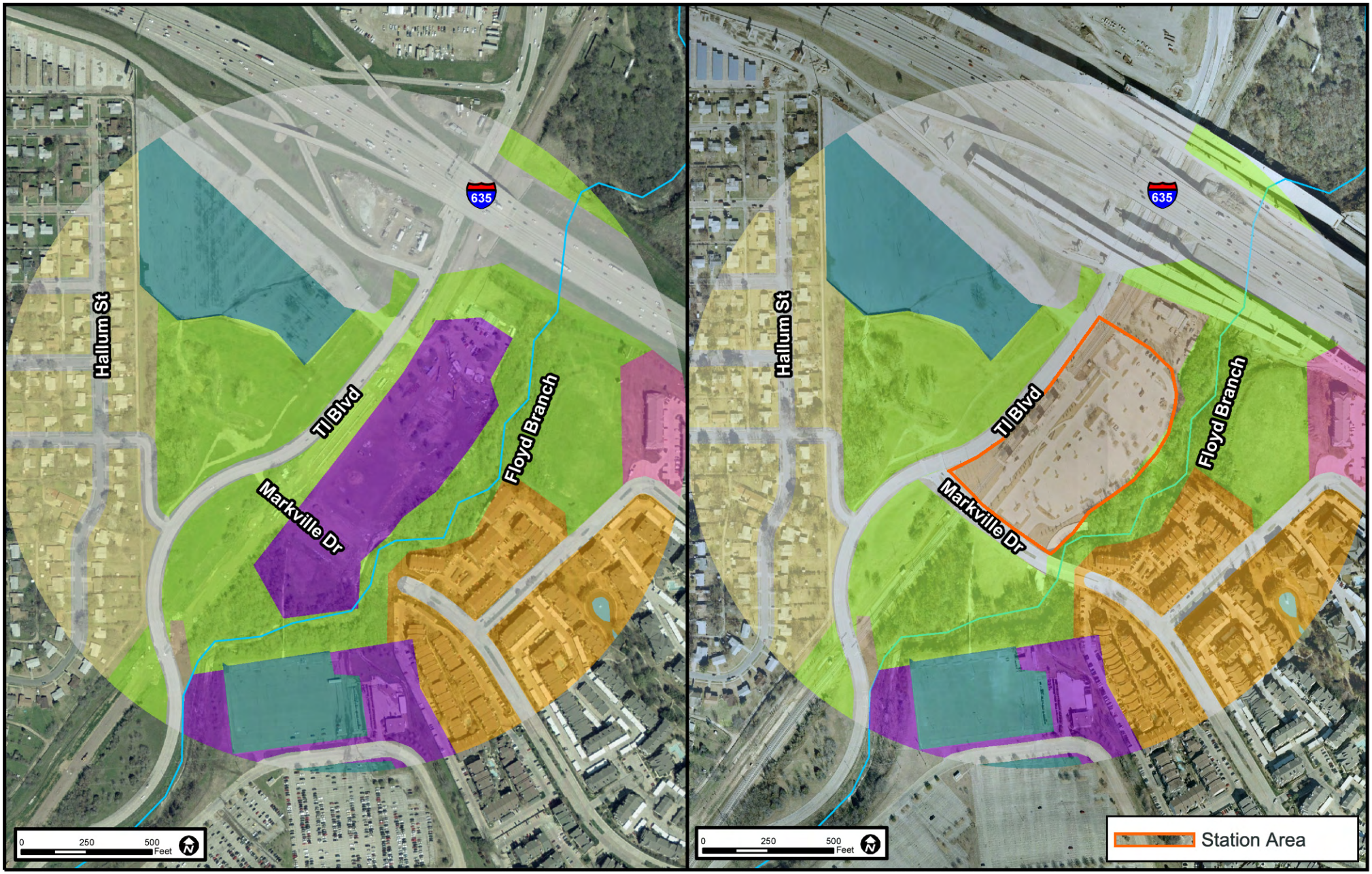


Fig 5-5. LBJ\Central Land Use Comparison 2000/2004

North Central Corridor Extension

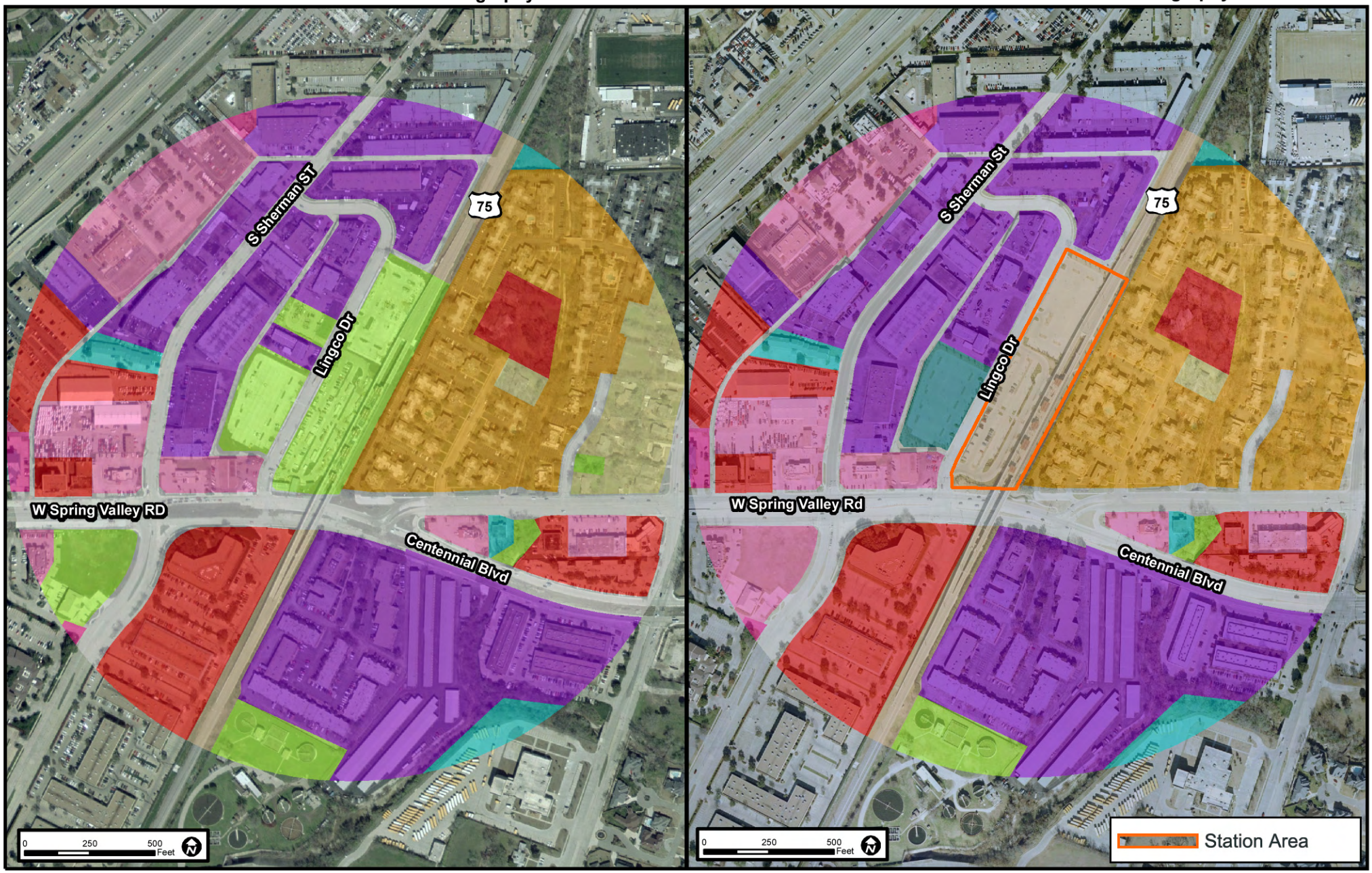
Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

2000 Land Use with 2001 Aerial Photography

2005 Land Use with 2003 Aerial Photography



DART

Fig 5-6. Spring Valley Land Use Comparison 2000/2005

North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

2000 Land Use with 2001 Aerial Photography

2005 Land Use with 2003 Aerial Photography

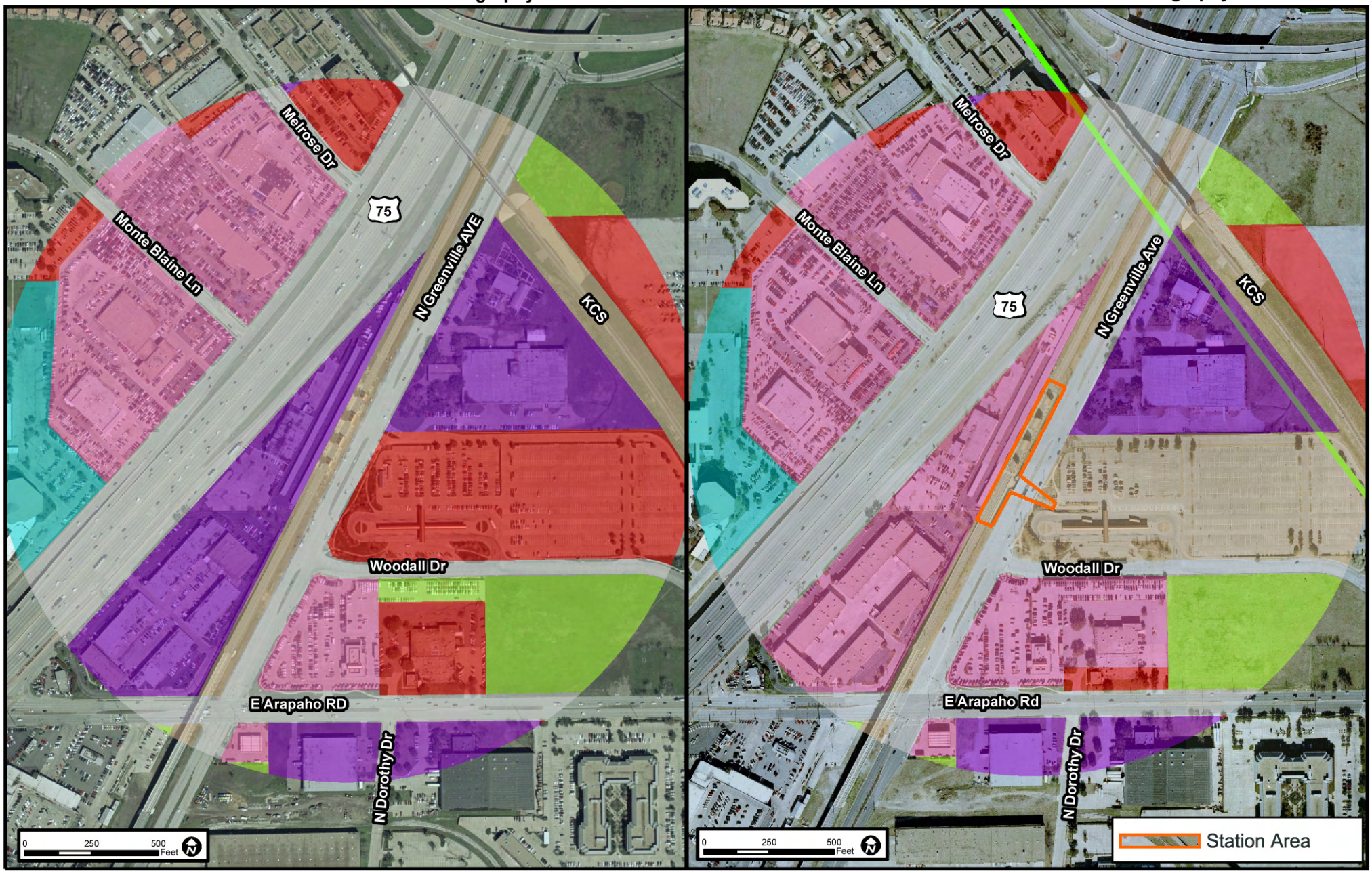


Fig 5-7. Arapaho Center Land Use Comparison 2000/2005

North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

2000 Land Use with 2001 Aerial Photography

2005 Land Use with 2003 Aerial Photography

DART

Fig 5-8. Galatyn Park Land Use Comparison 2000/2005

North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

2000 Land Use with 2001 Aerial Photography

2005 Land Use with 2003 Aerial Photography

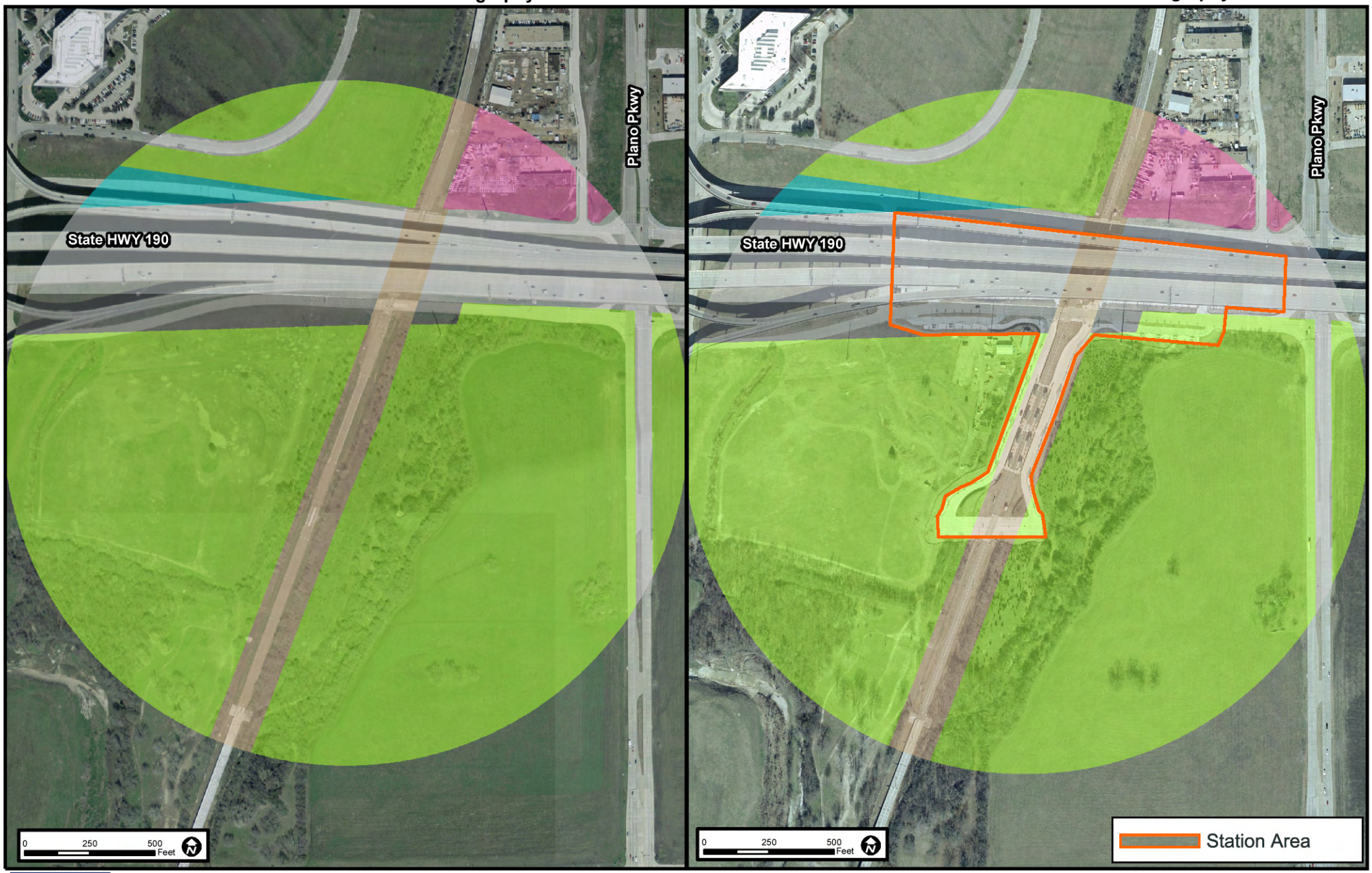


Fig 5-9. Bush Turnpike Land Use Comparison 2000/2005
North Central Corridor Extension
Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

2000 Land Use with 2001 Aerial Photography

2005 Land Use with 2003 Aerial Photography

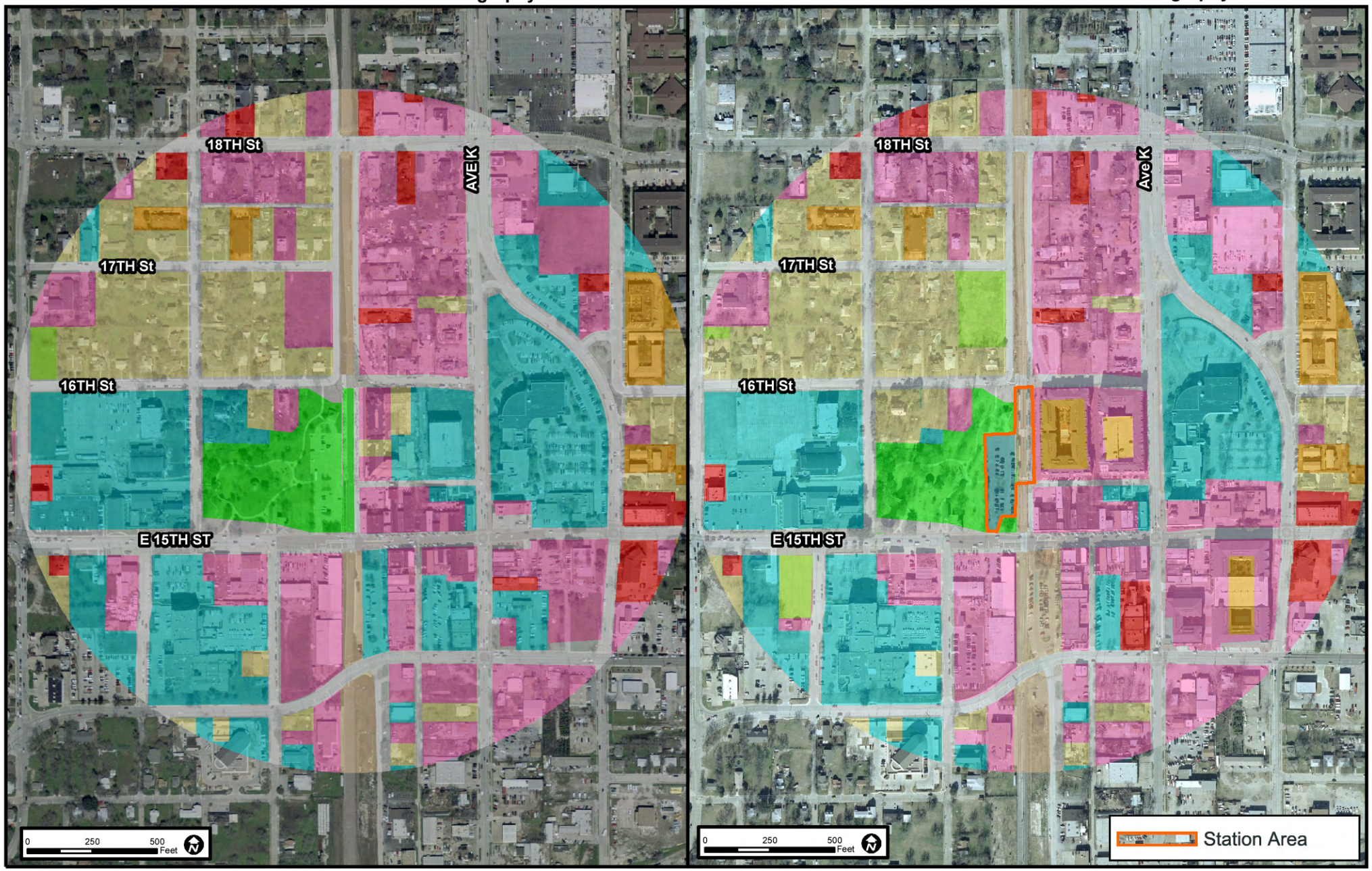


Fig 5-10. Downtown Plano Land Use Comparison 2000/2005

North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

2000 Land Use with 2001 Aerial Photography

2005 Land Use with 2003 Aerial Photography

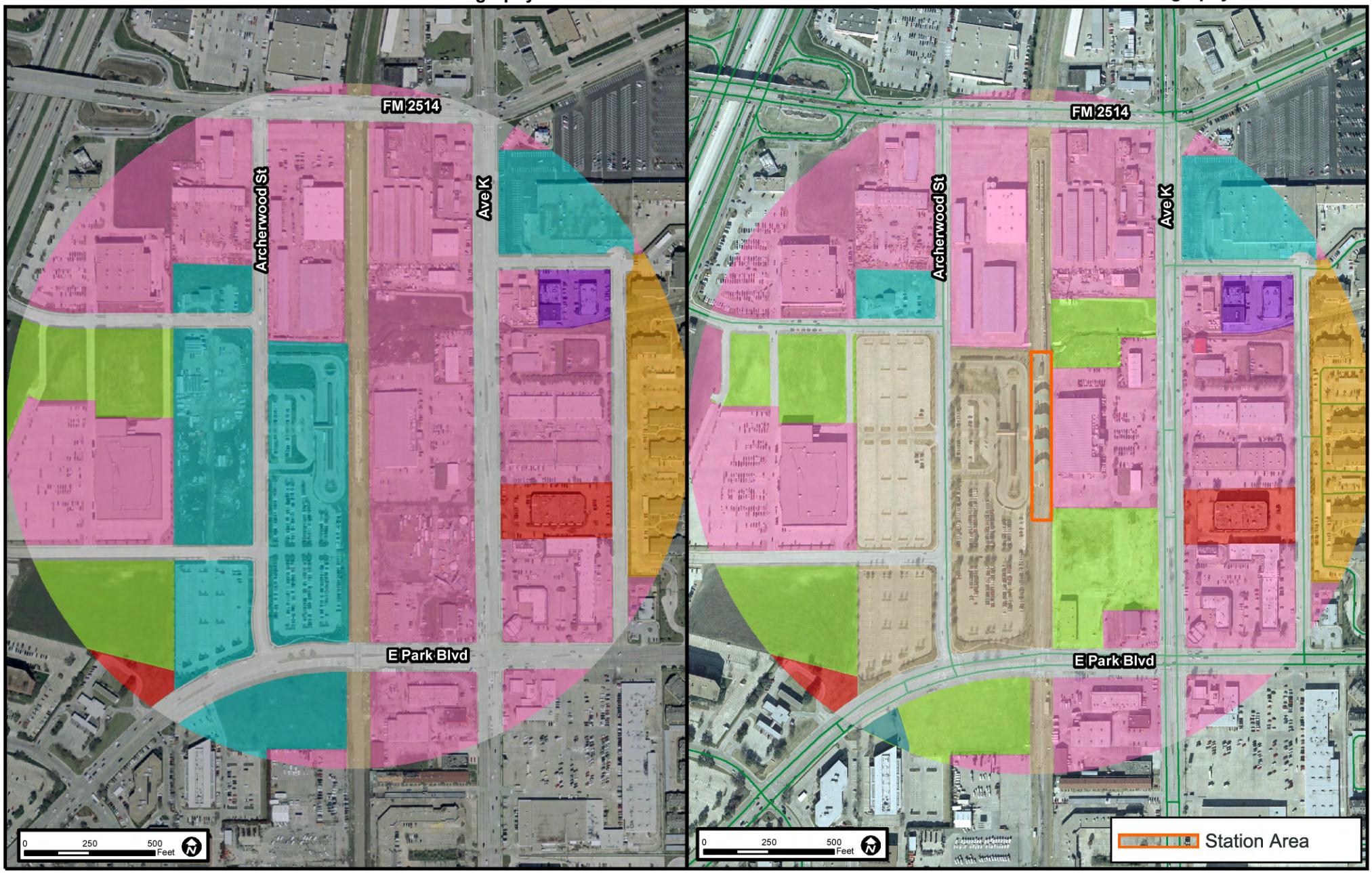


Fig 5-11. Parker Road Land Use Comparison 2000/2005

North Central Corridor Extension

Before and After Study - November 2006

Legend

Single Family	Institutional	Stadium	Utilities	Airports	Expanded Parking
Multi-Family	Office	Industrial	Parks	Runway	Under Construction
Mobile Homes	Retail	Transportation	Landfill	Parking Garage	Vacant
Group Quarters	Hotel/Motel	Roadway	Flood Control	Parking (CBD)	Water

Cost

Capital Cost

The actual Capital Cost following the completion of the North Central LRT extension was $448 million (2002$). These costs were above the cost estimated in the 1997 EIS.

Table 5-3: Capital Cost: Projected vs. Achieved	
Milestone	**Capital Cost**
Alternatives Analysis (1994$)	$268 Million
Preliminary Engineering/EIS (1997$)	$334 Million
Post Construction (2002$)	$448 Million

Source: Dallas Area Rapid Transit

Increases in the capital cost estimates are attributed to revisions to the projects definition. These revisions include the following:

- An increase to the number, from 21 (EIS estimate) to 37 (FFGA), of LRT vehicles required due to updated operating plan;
- The addition of LRT grade separation over Forest Lane due to the final location of the Forest Lane Station. As a result of the station's location, bus and vehicular access along Forest Lane made necessary the grade separation at Forest Lane. The total additional cost for these amendments were 3.8 million dollars (1.8 million for construction and improvements to the at-grade crossing and two million for the construction of the aerial station);
- Revision of the characteristics of the Campbell Road Station (Galatyn Park Station), and SH-190 Station from being deferred (1997 EIS), to fully operational stations (1999 and 2003 FFGA);
- An extension of double tracking north of Arapaho Road Station resulting in building the entire project double track (1999 FFGA), instead of only building double track from Park Lane Station to Arapaho Road Station (1997 EIS).

Operation & Maintenance Costs

Table 5-4: Analysis of Changes in System-wide O&M Cost	
Year	**O&M Cost**
1997	$187 Million
2002	$304 Million
2004	**$289,706,513**

Source: Dallas Area Rapid Transit

Table 5-4 shows an increase from $187 million dollars in operating cost for 1997 to $304 million dollars in 2002. This increase was due to DART's LRT build out which extended LRT in the NC Corridor to Plano and to Garland in the Northeast Corridor (see figure 1-2). In 2004 that figure had decreased to $290 million dollars due to some reduction in DART's total transit services to accommodate changes in the local economy.

Ridership

Changes in Total System Ridership

The 1997 MIS projected ridership by station for 2010. Actual ridership is approaching and in some cases has exceeded these estimations. In the "after" year 2005, Variations in ridership have resulted in operational changes, additional parking, planned future development and increased commuter traffic. The following tables and figures provide weekday average ridership by station from 2002-2004.

Table 5-5: Average Weekday LRT Boardings By Year

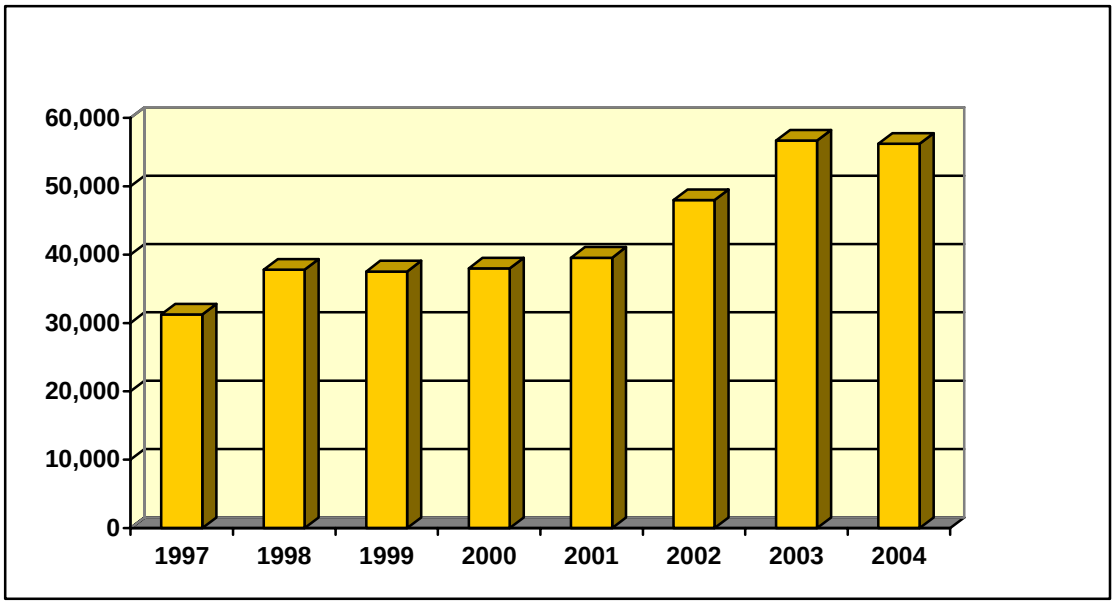
North Central Extension Stations	Weekday Average Boardings by Station			
	2002	2003	2004	2010 Projections (EIS)
Park Lane	4,306	2,743	2,273	3,939
Walnut Hill	1,186	1,267	1,366	1,424
Forest Lane	1,135	1,271	1,372	1,890
LBJ/Central	499	522	575	1,715
Spring Valley	1,021	993	996	1,752
Arapaho Center	2,684	1,862	1,321	1,644
Galatyn Park Station	800	459	245	736
Bush Turnpike	285	766	918	855
Downtown Plano	414	550	581	450
Parker Road	1398	2644	2737	2,598
Total	13,728	13,077	12,384	17,003

Source: DART, see Appendix B – Tab 6

While trends in ridership show a cumulative decrease from 2002 to 2004, frequency was reduced and bus route configurations changed in response to budgetary constraints resulting in lower ridership. Park Lane Station saw a 56 percent decrease in boardings from 2002 to 2003 due to the extension of light rail in the NC Corridor, allowing riders from the north to board at alternative locations. Prior to the LRT opening the Park Lane Station was the terminus station for this line. As the system was extended, boardings at this location reflected a non-terminus pattern. Additionally, the Galatyn Park Station saw a marked decrease from 2002-2004. This can be attributed a decrease in employment at the Telecom Corridor, which is served by this station. However, the Bush Turnpike Station and Parker Road Station experienced increased boardings resulting from parking expansions for commuters. Downtown Plano saw increases as a result of Transit Oriented Development that has developed near the station. Bus ridership in the corridor increased slightly due to the LRT extension. Ridership projections reflect an increase in total boardings for the extension over 2002 levels.

Figure 5-12 demonstrates the initial increase in system ridership resulting from the opening of the NC Corridor LRT Extension stations in 2002. System-wide rail ridership continued to increase in 2003, but decreased slightly in 2004 due to lengthened headways and a reduction in bus feeder service implemented in response to decreased sales tax revenues, DART's primary funding source.

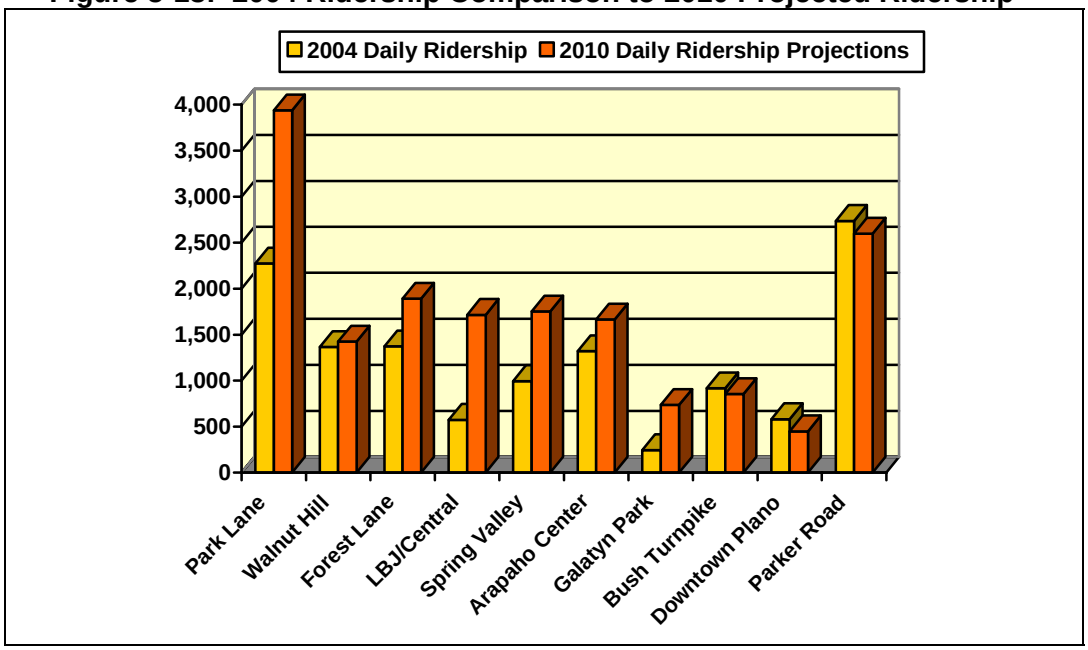
Figure 5-12: System-wide Rail Ridership Monthly Average (by year)



Source: DART Service Planning, see Appendix B – Tab 6

Figure 5-13 isolates a comparison of the Forecasted year, 2010,and the After Conditions year, 2004. For most stations, 2004 ridership approaches the 2010 estimate. However, for Bush Turnpike Station, Downtown Plano Station and Parker Road Station, 2004 ridership exceeds anticipated ridership for 2010.

Figure 5-13: 2004 Ridership Comparison to 2010 Projected Ridership



Source: DART, see Appendix B – Tab 6; North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.

These three stations are located adjacent to or north of a major east-west freeway facility, President George Bush Turnpike, which serves as the perceived gateway to the suburbs. Residential development near these stations has been increasing at an exponential rate over the past decade and the availability of roadway facilities, available land and transit services supply residents of these communities convenient methods of accessing the Dallas CBD and other urban centers.

2004 ridership at Park Lane Station and LBJ/Central Station is much lower than the 2010 ridership projections. Current construction and future development plans impact both of these stations. The Park Lane Station is located near two ongoing development projects, both are retail in nature. Northpark Center, a regional shopping center, is currently undergoing renovations resulting in over 2 million square feet of building area, more than doubling the current number of retail stores. Once complete, two new department stores, over 200 retail stores and a multiplex movie theatre will provide a destination for transit patrons.

LBJ/Central Station is currently impacted by the High Five construction project, a major undertaking for the Texas Department of Transportation. Construction began on access roads and new HOV lanes in January 2002 and mainlane construction was fully underway by early 2004. The project involves two major freeways, US-75 and IH 635. Construction has rerouted arterial streets, eliminated service roads and impacted access to businesses and facilities proximate to the project. Access to the LBJ/Central Station continues to be compromised by the construction project and resulting traffic complications. TxDOT anticipates completion of the project in January 2007, although construction is reported to be ahead of schedule by 12 months. Once complete, vehicular access to the station will be improved and utilization is expected to increase.

Changes in Bus Operations

Coinciding with new rail service, bus routes were redefined to provide feeder service to the rail systems and express routes that offered competing service with LRT were eliminated. Previously the corridor was served by 4 local routes, 1 express route, 9 suburban routes, 7 crosstown routes, 3 shuttle routes, and 9 rail routes. Change due to LRT resulted in current routes as follows: 4 local routes, 1 express, 8 suburban routes, 8 crosstown routes, 3 shuttle routes, and 19 rail routes. Table 5-6 illustrates the change in bus operations for the NC Corridor LRT extension.

Table 5-6: Change in Bus Operations for NC Corridor LRT Extension

Year	1997	2002	2005
Local Routes	4	4	4
Express Routes	0	1	1
Suburban routes	9	9	8
Crosstown Routes	1	7	8
Rail Feeder Routes	8	9	19
Shuttle Routes	0	3	3

Source: DART, see appendix B – Tab 1

Total bus operations also experienced change due to LRT. Previously, the system was served by 30 local routes, 14 express routes, 40 suburban routes, 18 crosstown routes, and

36 rail routes. Change due to LRT resulted in current routes as follows: 32 local routes, 10 express, 26 suburban routes, 20 crosstown routes, and 52 rail routes. Table 5-7 illustrates change in total bus operations.

Table 5-7: Change in Total Bus Operations						
Year/Average Weekday Ridership (AWR)	**1997**	**1997 AWR**	**2002**	**2002 AWR**	**2005**	**2005 AWR**
Local Routes	31	81,081	30	71,019	32	59,334
Express Routes	10	2,192	14	9,512	10	5,884
Suburban routes	28	12,303	40	13,780	26	10,078
Crosstown Routes	15	26,207	18	33,077	20	33,320
Rail Feeder Routes	20	15,905	38	17,006	52	24,027

Source: DART, see appendix B – Tab 3

Service Levels

Changes in Transit Service Levels

Rail service levels changed as a result of operational changes in response to rider demand. As a result, 10 minute peak headways were adjusted to roughly four to six minutes in the a.m. peak period. Table 5-8 provides forecasted and operational peak headways.

Table 5-8: A.M. Peak Headway Changes	
Forecasted	20 Minutes
After Operation	10 Minutes
Current Operation	4-6 Minutes

Source: Dallas Area Rapid Transit Service Planning

Changes in Roadway Service Levels

2005 traffic volumes in the corridor have already exceeded 2010 projections. This is due in large part to the population increases throughout the Dallas/Fort Worth metropolitan region. Tables 5-9 and 5-10 provide the projected ADT conditions, current conditions, and change in condition.

Table 5-9: Projected vs. Current ADT in the North Central Corridor			
Local and Figure Reference	**Average Daily Traffic**		
	Projected 2010 ADT (1997 EIS)	**Current Conditions**	**Change**
North Central Expressway (US-75)			
Forest Lane	192,400	207,000	+14,600
LBJ Freeway	184,800	242,000	+57,200
Arapaho Road	176,600	252,000	+75,400
Park Blvd.	150,100	221,000	+70,900
LBJ Freeway			
Preston	240,400	278,000	+37,600
US-75	262,600	226,000	-36,600
Abrams	201,100	189,000	-12,100
SH 190 Freeway			
Independence Parkway	85,900	96,000	+10,100
Jupiter Road	59,300	57,300	-2,000

Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.

Table 5-10: Comparison of Arterial ADT in the North Central Corridor			
Local and Figure Reference	**ADT**		
	Projected 2010 ADT (1997 EIS)	**Current Conditions**	**Difference**
Preston Road at Forest Lane	22,000	35,648	+13,648
Skillman at Northwest Highway	32,500	30,493	-2,007
Greenville Avenue at Royal Lane	48,300	30,461	-17,839
Greenville Avenue at Spring Valley	34,000	17,000	-17,000
Coit Road at LBJ Freeway	97,000	54,373	-42,627
Plano Road at Arapaho	23,500	36,000	+12,500
Plano Road at Park Boulevard	16,700	19,077	+2,377
Greenville at Campbell	58,700	NA	NA
Belt Line at Jupiter	26,300	33,900	+7,600
Jupiter at Arapaho	27,800	35,500	+7,700
Belt Line at Preston	29,900	26,405	-3,495
Coit at Parker	31,100	49,453	+18,353

Source: North Central Corridor LRT Extension Final Environmental Impact Statement. W.S. Department of Transportation, Federal Transit Administration. Dallas, Texas: Dallas Area Rapid Transit, 1997.

In the Mobility 2025: The Metropolitan Transportation Plan, 2004 Update the Metropolitan Planning Organization for the North Central Texas region, the North Central Texas Council of Governments, stated that:

> *. . . population for the DFW Metropolitan Planning Area (MPA) will grow by about 63 percent, and employment by 64 percent, from 2000 to 2025. . . . By 2025, the DFW Metropolitan Area is expected to have nearly eight million residents supporting approximately five million jobs. On average, the region is expected to add population at a rate of nearly 120,000 persons per year and employment at a rate of about 72,000 jobs per year over the 25-year period. These projections represent 30-year increases of 3.5 million residents, 1.3 million households, and 2.1 million jobs. The rate of growth projected through the three decades is at a magnitude never before experienced in the DFW Metropolitan Area. . . According to additional information released by U.S. Census in 2002, Collin County* [SH 190 Station, Downtown Plano Station, and Parker Road Station] *experienced the greatest percentage of growth in Texas during 1990 and 2000 with an increase of 86 percent.*

The dramatic increases in population and employment from 1990 to 2000 and expected future increases account for increases and surpassing traffic numbers that have occurred since development of these stations.

Transit Market

Demographics

While employment growth is the largest change occurring and projected to continue in the NC Corridor, the rate of population and household growth deserves notice. Growth in these two areas from 2000 to 2005 have produced roughly a third of the total growth anticipated from 2000 to 2030. Demographic forecasts, conducted by NCTCOG, assume that growth will slow as areas within the NC Corridor become more densely developed.

Table 5-11: North Central Corridor Demographic Information

Location	Year 2000*	Year 2005**	*Growth 2000 to 2005*	Year 2030**	*Growth 2005 to 2030*
Population	383,269	393,307	*10,038*	414,544	*21,237*
Households	168,313	173,122	*4,809*	184,781	*11,659*
Employment	305,924	332,253	*26,329*	483,751	*151,498*

*Source: *US Census 2000, **NCTCOG*

Land Use

Figures 5-2 through 5-11 show land uses within ¼ mile of stations for both 2000 and 2005. The stations were the greatest degree of changes in land use patterns occurred were those with relatively large amounts of vacant land surrounding the station in 2000. The most significant land use changes within the NC Corridor were changes related to transportation infrastructure, such as park and ride lots near LRT platforms and expansions to IH 635. Other land use changes involved transit oriented type developments which include retail space and multi-family residential uses.

Marketing Condition (Survey Data)

DART's marketing department conducted rider surveys in 1998 and 2005. These studies demonstrate changes in demographic patterns system-wide in conjunction with the LRT expansion. The following table represents the percentage of respondents in each survey that illustrate demographic characteristics of LRT and bus riders in the years indicated.

From 1998 to 2005, the customer demographics have changed. According to the survey results, the number of college degreed and above passengers has increased. The ethnicities have changed to include a larger percentage of Caucasian passengers and a smaller percentage of African Americans. Also, the level of income has increased based on percentage. Another observation is the percentage of Choice riders has increased on LRT by 22%.

Table 5-12: DART Ridership Survey Summary	1998		2005	
	Bus	LRT	Bus	LRT
Choice Rider	62.00%	60.00%	59.00%	82.00%
Age				
18-24	16.00%	18.00%	12.00%	6.00%
25-34	21.00%	21.00%	15.00%	19.00%
35-54	51.00%	51.00%	55.00%	53.00%
55-64	8.00%	8.00%	14.00%	19.00%
65+	3.00%	2.00%	4.00%	2.00%
Level of Education				
Less than 12 years	13.00%	9.00%	13.00%	7.00%
High School Graduate	35.00%	27.00%	28.00%	14.00%
Some College	34.00%	33.00%	30.00%	29.00%
College Degree	15.00%	22.00%	23.00%	33.00%
Post Graduate Degree	4.00%	8.00%	6.00%	17.00%
Ethnicity				
African American	63.00%	55.00%	45.00%	29.00%
Caucasian	23.00%	32.00%	35.00%	54.00%
Hispanic	8.00%	7.00%	14.00%	11.00%
Native American	2.00%	1.00%	2.00%	2.00%
Oriental	1.00%	2.00%	2.00%	5.00%
Occupation				
Professional/Managerial	27.00%	44.00%	34.00%	56.00%
Sales/Clerical/Service	30.00%	30.00%	25.00%	21.00%
Laborer/Craftsman	19.00%	10.00%	18.00%	8.00%
Student/Employed	9.00%	5.00%	7.00%	6.00%
Retired	5.00%	2.00%	0.00%	0.00%
Student Only	3.00%	2.00%	0.00%	0.00%
Homemaker	4.00%	4.00%	3.00%	2.00%
Level of Income				
<$15,000	40.00%	39.00%	39.00%	17.00%
$15,000-$24,999	27.00%	21.00%	17.00%	12.00%
$25,000-$34,999	14.00%	16.00%	10.00%	12.00%
$35,000-$49,999	9.00%	14.00%	16.00%	19.00%
$50,000-$74,999	6.00%	13.00%	11.00%	22.00%
$75,000+	4.00%	10.00%	7.00%	19.00%

Source: DART Marketing/Communications Department

FINDINGS AND RECOMMENDATIONS

In 1999, FTA entered into its first Full Funding Grant Agreement (FFGA) under the Transportation Efficiency Act for the 21st Century (TEA 21) with DART to extend the 20-mile LRT Starter System into North Dallas, Richardson and Plano. Those funds provided the means to increase overall LRT monthly ridership by nearly 50 percent.

Data collected during this evaluation also provided insight into the effect of LRT service on the NC Corridor LRT Extension.

- LRT has been a motivation for development in the suburban areas of the NC Corridor, namely Galatyn Park and Downtown Plano stations. The 12-story Renaissance Hotel was built just east of Galatyn Park Station. Richardson's Eisemann Center for the Performing Arts was built across from the hotel. At the Downtown Plano Station, a residential and retail complex called Eastside Village, which was constructed in anticipation of the station opening, was then expanded during its second phase of development to include additional loft apartments and retail space. Twenty townhomes and thirty-one condominiums have also been built within two blocks of the station. Plans for mixed-use development exist near Park Lane Station, and Richardson has rezoned the area around Spring Valley Station to allow high-density, mixed-use development.
- In most cases, by 2005 ridership in the NC Corridor either surpassed or is approaching 2010 projections.
- Total transit ridership (bus and LRT ridership combined) has increased over 30% following LRT operation in the NC Corridor.
- In most intersections analyzed, traffic volumes have surpassed projected 2010 numbers contributing to decreased mobility within the NC Corridor.
- Availability of adequate parking influences the attractiveness of rail facilities impacting total boardings in the NC Corridor. The construction of additional parking spaces has impacted ridership at Bush Turnpike Station and Parker Road.

Lessons Learned

- Collection of data prior to LRT operation crucial for future Before and After Studies, especially regarding cost factors and transit markets.
- The total efficiency and effectiveness of the LRT system is impacted by numerous factors outside the control of DART, such as economic conditions and developments and construction near station sites. However, factors controlled by DART, such as parking availability, station locations and bus system interactions, also affect ridership noticeably.

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