UPTOWN-WEST LOOP PLANNING STUDY

Alternatives Analysis Findings Report

Metropolitan Transit Authority of Harris County | February 2004

Prepared By

DMJM HARRIS

Table of Contents **Page**

Table of Contents (cont.) **Page**

Table of Contents (cont.) **Page**

Table of Contents (cont.) **Page**

Table of Tables

Table of Tables (cont.) **Page**

Table of Figures **Page**

Table of Figures (cont.) **Page**

Alternatives Analysis Report

Introduction

The Metropolitan Transit Authority of Harris County (METRO), in cooperation with the Texas Department of Transportation (TxDOT), the Houston-Galveston Area Council (H-GAC), the Federal Transit Administration (FTA) and Federal Highway Administration (FHWA), is conducting a planning study, known as the Uptown-West Loop Planning Study, with the intent to prepare an Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act of 1969, as amended (NEPA), to evaluate transit improvements in the Uptown-West Loop Corridor of the Houston metropolitan area. NEPA requires that federal decision making consider the potential adverse impacts of a project and its alternatives on the natural and human environment. If significant environmental impacts are anticipated, a plan for mitigating these impacts must be proposed to be eligible for federal funds. Documentation must show that all reasonable alternatives were analyzed and considered.

On January 9, 2002, a Notice of Intent (NOI) was published in the Federal Register, Vol. 67, No. 6, and in local publications, announcing METRO's intent to prepare an EIS. The publications corresponded with the implementation of METRO Mobility 2025, a long-term plan to improve transportation efficiency and effectiveness throughout the Houston region. Both the plan and the environmental process direct that the process begin with a scoping effort in order to solicit agency and public comment on transportation alternatives.

The purpose of the Uptown-West Loop Planning Study was to examine a comprehensive range of transit improvements within the study area following the Transportation Equity Act for the 21st Century (TEA-21) relative to major transportation investments. The entire planning exercise was predicated on a cooperative and collaborative process whereby public agencies and the community assist in the development of a project definition, general scope of potential solutions and the foundation for evaluation criteria. The planning study provides an analysis of the potential benefits, costs and consequences (economic, social and environmental) of alternative transportation investment strategies in the study area.

This report details the evaluation of each alternative relative to alignment and transportation mode. The report will articulate discernable characteristics and the trade-offs of each alternative for minimizing impacts, creating operational efficiencies, and satisfying project goals and objectives.

The Uptown-West Loop planning Study and other planning studies being conducted in other METRO Mobility 2025 corridors concluded in winter 2003. Findings from all studies provided input during assembly of the Draft Transit System Plan.

Based on the technical evaluation of alternatives and public input, the Draft Transit System Plan was adopted by the METRO Board in April 2003. A series of public meetings was conducted in May and June 2003 to elicit public comments on the Draft Plan. METRO's Final System Plan (METRO Solutions) was adopted by the METRO Board in August 2003.

With adoption of the System Plan, the METRO Board of Directors approved the Uptown-West Loop Locally Preferred Investment Strategy (LPIS).

This *Alternatives Analysis – Findings Report* documents the process that led to the findings submitted to METRO for assembly and inclusion in the Draft Transit System Plan that included the selection of the LPIS in the Uptown-West Loop Corridor. As required by federal project development processes, the LPIS must be included in the Houston-Galveston Metropolitan Transportation Plan (MTP) and the Transportation Improvement Program (TIP), which are developed by H-GAC, the regional metropolitan planning organization (MPO). Once the LPIS is documented in the Final Report, the EIS will be prepared to fulfill the NEPA requirements for transportation improvements that require federal funds.

1.0 Purpose and Need

The function of this chapter is to articulate the role and need for advanced high capacity transit improvements in the Uptown-Wes Loop Corridor. This chapter will begin to outline what transportation goals and objectives should be satisfied by any future transportation investment. This chapter provides an introduction for the Uptown-West Loop Planning Study and describes the characteristics of the corridor and provides a regional context. Regional and corridor needs that have been identified in previous studies and during the preliminary planning activities of this study also are summarized.

1.1 Study Area Setting and Context

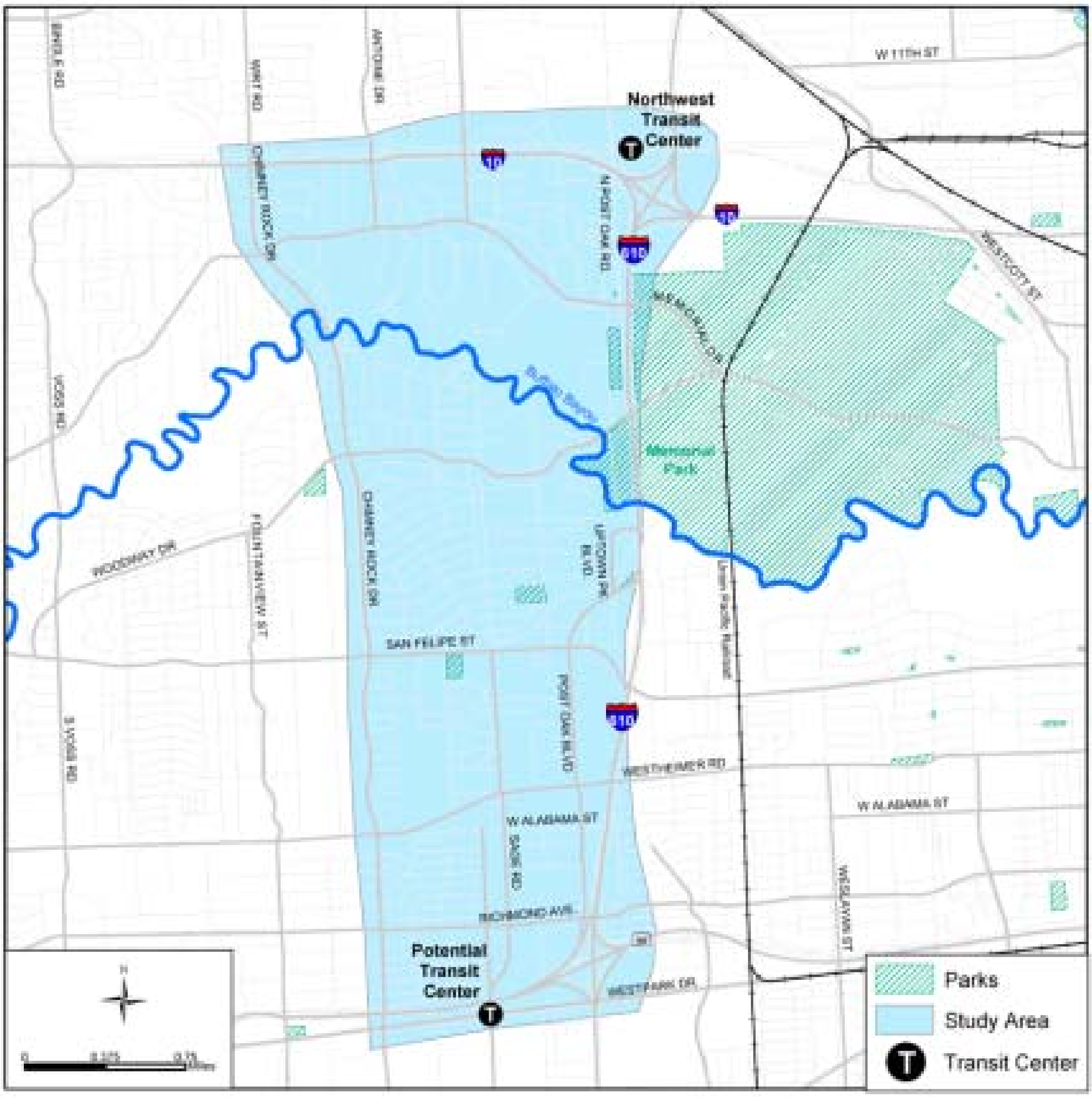
This section presents an overview of the socio-economic, land use, transportation system and travel demand characteristics that give rise to the need for transportation improvements in the Uptown-West Loop Corridor. These study area characteristics are described in terms of broad regional influences and specific corridor issues.

1.1.1 Study Area Description

The Uptown-West Loop study area is generally bounded by IH-10 (Katy Freeway) on the north, U.S. 59 (Southwest Freeway) on the south, IH-610W (West Loop) on the east, and Chimney Rock on the west (Figure 1.1). The corridor extends approximately four miles along IH-610W and is located five miles west of Houston's Central Business District. IH-610W is the primary north-south freeway in the corridor and provides access to the Uptown/Galleria area, Northwest Transit Center (NWTC), and Memorial Park. The study area is traversed by Buffalo Bayou and contains a mix of residential – moderate to high-density multi-family and single family – and commercial land uses throughout the corridor.

With a study area employment base of approximately 80,000 in the primary business district, the Uptown/Galleria area ranks as the nation's largest suburban business district (15th largest Central Business District) and accounts for 13 percent of Houston's total office space. The Uptown business district generated in excess of $1.9 billion (not including automobile sales) in annual retail sales in 2000, as reported by the State of Texas, Office of the Comptroller. The Uptown/Galleria area also boasts more than 6,300 hotel rooms, approximately 23 million square feet of office space and more than half of Houston's high-rise residential condominiums. Census figures for 2000 show that approximately 25,000 residents live within the study area.

FIGURE 1.1
UPTOWN-WEST LOOP STUDY AREA



As the primary north-south transportation facility in the corridor, IH-610W provides a strategic connection to other regional freeway corridors including U.S. 290, IH-10, U.S. 59, and other segments of the IH-610 beltway that circles inner Houston. Access to and from IH-610W is provided at Woodway Dr., Post Oak Blvd., San Felipe St., Westheimer Rd., and Richmond Ave. These thoroughfares also serve as principal east-west arterials that connect the Uptown-West Loop study area. N. Post Oak Rd., Post Oak Blvd., Chimney Rock Rd. and IH-610W frontage roads are the primary local north-south streets. Other than IH-610W, Chimney Rock Rd. is the only continuous arterial providing north-south access within the study area.

Memorial Dr. and Woodway Dr. provide access to Memorial Park to the east and residential areas to the west. METRO provides various local transit services to the Uptown-West Loop study area. Commuter transit services are provided via connections at the NWTC, or as direct service on the 283 and 284 bus routes. Bus service in the study area operates in mixed-flow traffic, impacting travel time and reliability.

1.1.2 Regional Context

The Uptown-West Loop study area is located within Harris County, the third most populous county in the U.S. and one of 13 counties that comprise the Gulf Coast Planning Region of Texas (Figure 1.2). Based on the 2000 Census, more than 4.7 million people reside within this region, nearly one million more than in 1990, and about twice as many people since 1970. By 2025, the region is forecast to add nearly three million people, a 64 percent increase from 2000.[1] This 13-county region had an average annual employment in the year 2000 of about 2.4 million, a 26 percent increase over 1990 employment levels. The region gained over 200,000 jobs in the first half of the 1990s. By 2025, the region is expected to add approximately two million jobs.[2]

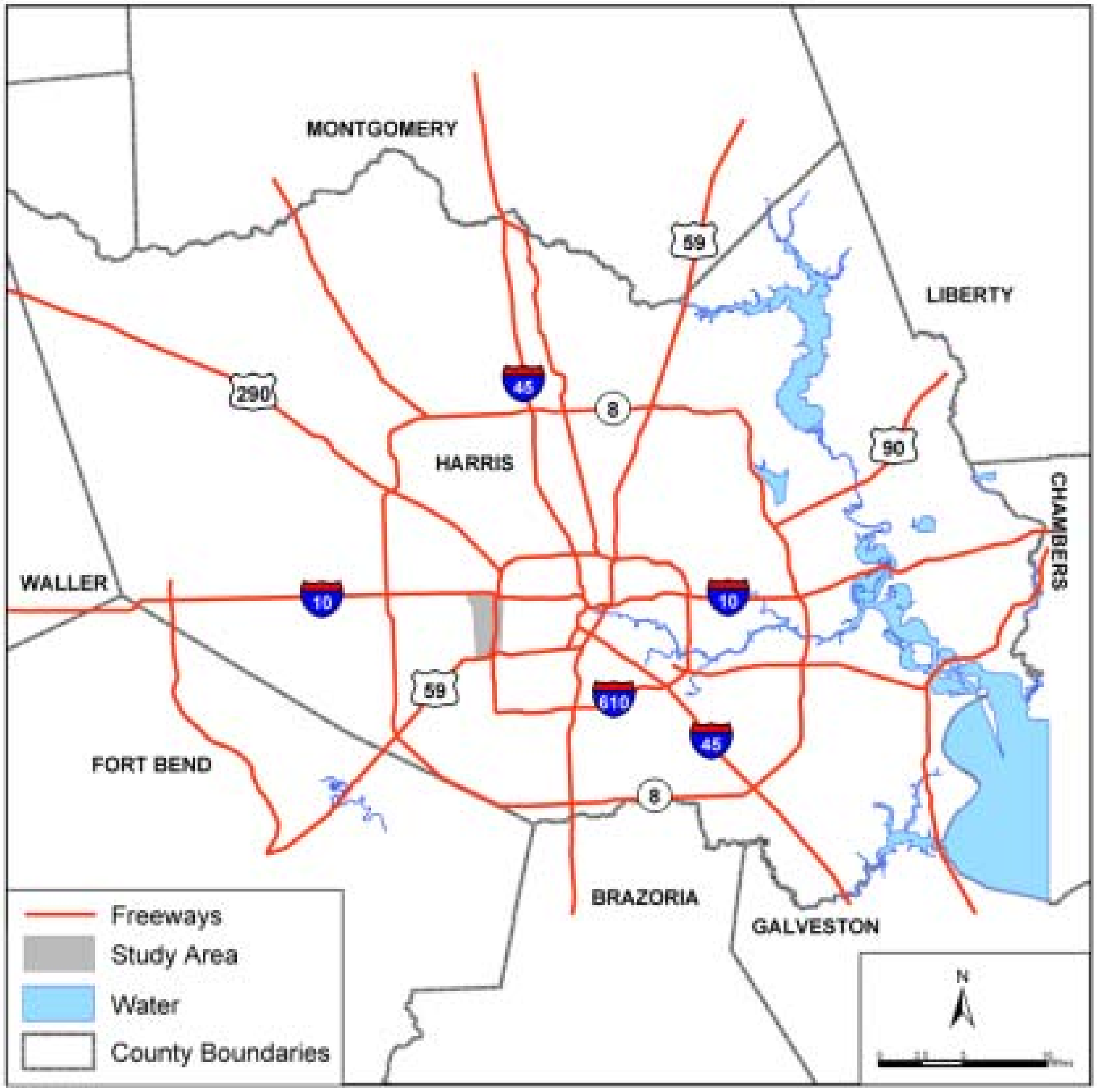
Regional mobility needs require an extensive transportation system that includes roadways, transit facilities, airports, and water ports. A few of the major regional elements of the transportation system are:

- 25,785 centerline miles of freeways and major roadways including: IH-10, IH-14, U.S. 59, IH-610W, Beltway 8, US 225, and U.S. 290
- 71 miles of HOV lanes (113 miles are planned)
- 130 transit routes served by 1,402 buses (fleet)
- 35 commuter transit routes, 26 park & ride lots and eight express routes
- Five rail freight yards and one Amtrak station
- 14 Transit Centers

[1]U.S. Census Bureau, 2000. 2000 Summary File 2, (Jan. 21, 2003); (2025) H-GAC-endorsed forecasts prepared by REMI Policy Insight, 2025 Forecast, Jan. 9, 2003.

[2]Ibid.

FIGURE 1.2
REGIONAL CONTEXT



- Three commercial airports - Ellington Field, Bush Intercontinental and Hobby serving over 40 million passengers annually
- Four Ports - Brazosport, Port of Galveston, Port of Houston and Port of Texas City handling over 250 million tons of cargo per year

Even with this extensive transportation system in place, traffic congestion continues to be a serious regional problem. H-GAC, the region's MPO, reports that time spent commuting in and around the Houston area jumped from 47 hours to 58 hours between 1996-1997. The average peak period travel speed on Houston's freeway system decreased from 48 mph in 1996 to 45 mph in 1997. In terms of additional travel time and wasted fuel, the annual cost of congestion increased from $770 per driver in 1996 to $960 in 1997. H-GAC reports that the annual cost of congestion in 2000 was $1.9 billion for the Houston region.[3]

As with other large US metropolitan areas, the combined factors of population, economic growth, traffic congestion and meteorological conditions have led to severe air quality problems. The Houston region is in non-attainment with federal air quality standards for ground-level ozone. This has prompted the adoption of a variety of measures designed to help bring the region into compliance with Clean Air Act Amendments (CAAA) of 1997 for air quality standards for the one-hour ozone standard by 2007, the 8-hour ozone standard by 2010, and new fine particulate matter standards.

Regional needs that could be addressed through transportation and mobility improvements in the Uptown-West Loop study area include:

- Accommodating regional population and employment growth
- Supporting regional economic development efforts
- Contributing to improved regional air quality

1.1.3 Corridor Context

IH-610W is the primary north-south transportation facility in the corridor providing regional access to Houston's Uptown/Galleria (Uptown-West Loop) area and to the City of Bellaire. The freeway facility connects with other portions of the IH-610 beltway that circles inner portions of the city. In addition, IH-610W provides a strategic connection to other regional freeway corridors including U.S. 290, IH-10, and U.S. 59. Access to and from IH-610W is provided at Woodway Dr., Post Oak Blvd., San Felipe Street, Westheimer Rd., and Richmond Ave. These thoroughfares also serve as principal east-west arterials within the Uptown-West Loop study area. N. Post Oak Rd., Post Oak Blvd., Chimney Rock Rd. and IH-610W frontage roads are the primary local north-south streets. Other than IH-610W, Chimney Rock is the only continuous north-south arterial within the corridor. Memorial Dr. and Woodway Dr. provide access to Memorial Park to the east and residential areas to the west. METRO provides local transit services to the Uptown-West Loop study area, as well as commuter transit services via connections at the NWTC. The 283 and 284 routes offer direct commuter service. Bus service in the study area operates in mixed-flow traffic which has an impact on travel time and reliability.

[3] 2022 Metropolitan Transportation Plan

METRO's recent West Loop Corridor Major Investment Study[4] (MIS) determined traffic is very heavy on IH-610W in both the northbound and southbound directions throughout the entire day, with no defined peak direction. The average daily traffic (ADT) operational design capacity for the freeway facility is 150,000 vehicles at level of service (LOS) C. Current ADT for the facility is over 275,000 at LOS F and the volume is expected to grow to approximately 350,000 ADT by 2020.

Approximately 60 percent of IH-610W traffic is through traffic. The other 40 percent of IH-610W traffic is local traffic generated by the Uptown/Galleria area. IH-610W contains no high occupancy vehicle (HOV) facilities for buses, vans, and carpools. The MIS also reports that unlike typical suburban areas, the IH-610W corridor offers midday, evening, and weekend attractions, as well as commuter destinations, that tend to create an all-day, seven days per week travel market.

The following general assessment of the corridor's transportation problems is derived from the West Loop Corridor MIS (a description of the West Loop Corridor MIS is provided in Section 1.2.4 Previous Studies). The MIS based its understanding of the problems on input provided by corridor stakeholders, local governmental transportation agencies, and the study team's knowledge of the corridor.

- Transit ridership and operations are negatively affected by congested traffic conditions, inadequate transit facilities, and insufficient service levels
- Traffic congestion is exacerbated by conflicts between local trips and through trips, and the limited number of north-south parallel arterial streets which forces north-south traffic to use IH-610W
- Bicycle and pedestrian facilities within the corridor are inadequate and discontinuous
- Transportation capacity within the corridor is constrained and unable to accommodate current travel demand at an acceptable level of service
- The physical appearance of IH-610W has a diminishing effect on the aesthetic appeal of the corridor, and conflicts with the coordinated landscape/architectural program of the Uptown/Galleria area
- Traffic generated noise levels have an adverse effect on sensitive receptors (those land uses that are particularly affected by noise) located within the corridor

[4]*Houston West Loop Corridor Major Investment Study Final Report/Environmental Assessment*, Metropolitan Transit Authority of Harris County, Texas, June 2001.

- Transportation ROW is limited in its ability to accommodate additional improvements. Highly developed and expensive private property adjacent to this ROW limits expansion options

Study area needs that could be addressed through transportation improvements in the Uptown-West Loop study area include:

- Improving mobility and access for existing and projected study area population and employment
- Serving current and future land use and development patterns
- Responding to a variety of travel markets and patterns
- Providing transportation alternatives that help improve reliability and travel time

1.1.4 Previous Studies

The Uptown-West Loop area poses a variety of challenges in addressing mobility needs. The corridor has been the focus of numerous transportation planning studies over many years with proposed alternatives and various strategies outlined to meet the mobility needs of the corridor. The Uptown-West Loop Planning Study will address needs identified by previous studies and planning activities.

Previous studies in the corridor have included the analysis of HOV and transit options, improvements at key intersections, and fixed guideway transit. Specific improvements were developed by METRO, and in consultation with the community, these projects were refined and integrated into the Regional Bus Program (RBP). The RBP was implemented in the early 1990’s to provide a more efficient and flexible bus system with a service increase to the Uptown area of approximately 400 percent. This increase is defined by the number of buses operating each day throughout the area, primarily a result of increased park & ride service to enhance employee accessibility. A complete list of planning studies conducted for or affecting the study area is provided in Table 1.2 at the end of this section.

Summary of Recent Studies:

- *The Uptown Houston Regional Bus Program* - The Uptown Houston Regional Bus Program, Operating Plan and Capital Program Definition (September 1997), provided further refinement to improve mobility in the area aimed at enhancing transit service and by identifying specific projects to improve bus operations. The proposed refinements for implementation to be included in the RBP and pursued as demand and the necessary roadway improvements permit, and in conjunction with METRO's system wide implementation of the RBP components, included the following:

- Woodway bridge and street reconstruction
- McCue reconstruction and extension to San Felipe (under construction by others)
- Queue By-Pass – Post Oak and Westheimer & Post Oak and San Felipe
- San Felipe widening (under construction by others)
- Richmond Transit Center
- Uptown transit amenities including shelters, sidewalk improvements, and pedestrian lighting

- *West Loop Corridor Major Investment Study (MIS)* - In addition to the RBP and other projects internal to the Uptown-West Loop area, METRO conducted the "Houston West Loop Corridor Major Investment Study (MIS)" between IH-10 and Westpark Dr. to analyze potential alternatives and coordinate the construction of new transit facilities in the freeway corridor with TxDOT's reconstruction of IH-610W. The alternatives included in the "Major Investment Study Final Report/Environmental Assessment June 2001" are listed in the Table 1.1.

Table 1.1
Houston West Loop MIS Alternatives (METRO)

Alternative 1 (No-Build)	Alternative included any projects committed as a part of METRO's Regional Bus Plan (RBP) and TxDOT's Transportation System Management (TSM) improvements.
Alternative 2 (Low Cost)	Alternative included all projects in the No-Build Alternative plus limited capital investments to improve METRO operations in the corridor. This alternative incorporates elements such as High Occupancy Vehicle (HOV) ramps connecting the IH-610W frontage roads with the NWTC. Complementary bike and pedestrian improvements will be incorporated as opportunities are identified.
Alternative 3 (Diamond HOV Lane)	Alternative included all projects in the No-Build Alternative, some elements of the Low-Cost Alternative in conjunction with a diamond HOV lane in each direction on the IH-610W from the Northwest Center to near U.S. 59.
Alternative 4 (Barrier-Separated HOV Lane)	Alternative included all projects in the No-Build Alternative, some elements of the Low-Cost Alternative, and grade-separated HOV lanes (one in each direction) in the center of the IH-610W from the NWTC to near U.S. 59.

The end result of the Houston West Loop Corridor MIS was to provide a preservation project to reserve future options for transit facilities in the corridor. METRO contributed funding to TxDOT so that the design and construction of IH-

610W at the NWTC and the Post Oak Blvd. overpass will be done in such a way as to not preclude METRO from implementing a future transit facility.

- *Uptown Connector Draft Transit Plan* - The Uptown Connector Draft Transit Plan, funded by the Uptown Houston District and completed in October 2000, was conceived to provide a link to regional HOV systems, to bypass freeway and arterial congestion and provide efficient and reliable transit service. The connector would provide service for both line-haul and collection/distribution functions supporting regional access to the Uptown-West Loop study area. The following elements were recommendations in the study:

  - Enhance the NWTC hub and linkage to Post Oak Blvd.
  - Post Oak Blvd. portal preservation
  - A new Post Oak Blvd. Transit Center
  - Westpark portal preservation
  - A new Southwest Transit Center

- *Uptown Master Plan* - The Uptown Master Plan, currently nearing completion, is being funded by the Uptown Houston District and will provide refined strategies to address specific issues in the Uptown-West Loop area. The plan, which will serve as an update to the original Uptown Master Plan, will provide a set of roadway, transit, pedestrian, urban design guidelines and proposed improvements for the area. This plan integrates components of the Uptown Tax Increment Reinvestment Zone (TIRZ) Plan, approved as a requirement in the formation of the Uptown TIRZ # 16, which cites specific transportation improvements including street reconstruction and extensions.

- *IH-610W* - TxDOT is in final design on plans to reconfigure the entrance and exit ramps as braided ramps along IH-610W between Westpark and IH-10 to increase access and maximize freeway capacity. Braided ramps, which remove merging conflicts created with egress and ingress in the current configuration, will also increase the number of main lanes available by elevating and separating the facility within the existing ROW. The plans accommodate the expansion of IH-610W to 24 lanes at IH-10 and 20 lanes at U.S. 59. TxDOT is also extending the frontage roads south of Richmond along Post Oak and under the U.S. 59 and IH-610W interchange; the northbound frontage road will be extended under the interchange as well. The northbound frontage road will continue and extend past Memorial Dr. providing access to IH-10 East and West. In addition, TxDOT has made interim improvements to IH-610W by converting the outside shoulders to travel lanes, relocating and widening exit ramps, and resurfacing the roadway along IH 610.

∉ *West Park Toll Road* - Though not complete, it is anticipated that the Westpark Toll Road will have an impact on the Uptown-West Loop Corridor. For example, Post Oak Blvd. will become the westbound access point to the Westpark Toll Road while the eastbound lanes will have access to both Westpark Dr. and Post Oak Blvd.

Table 1.2
Previous Planning Studies

Previous Planning Studies		
Title	**Agency**	**Date**
AUTHORIZED VEHICLE LANE WEST LOOP AND SOUTHWEST FREEWAYS		
West Loop Authorized Vehicle Lane Conceptual Design	METRO	3/84
Demand Estimation Authorized Vehicle Lanes West Loop and Southwest Freeways	METRO	4/84
Cost Effectiveness Analysis Authorized Vehicle Lane: West Loop and Southwest Freeways	METRO	5/84
BUILDING A REGIONAL SYSTEM		
System Connector Alternative Analysis	METRO	7/86
Building a Regional System: Report to the Board on the Results of Alternative Analysis, Appendix	METRO	3/87
Board Communications: Refinement of System Connector Alternatives to Maximize Service in the Post Oak Corridor	METRO	5/87
Traffic Safety Study IH 610 Northbound Entrance And Exit Ramps From Post Oak to Woodway	METRO	9/88
Consideration of Busway Alternative for System Connector Loop Corridor Memorandum	METRO	10/88
COMPREHENSIVE TRANSPORTATION PLAN		
Comprehensive Transportation Strategy, Arterial Street and Freeway Improvements Program	Uptown Houston Association	5/89
Comprehensive Transportation Strategy, Executive Summary	Uptown Houston Association	3/91
Uptown Houston Comprehensive Transportation Strategy: West Loop Corridor Summary	Uptown Houston Association	5/91
Uptown Houston Regional Bus Program: Operating Plan and Capital Program Definition	METRO	10/97
The Uptown Connector: Draft Transit Plan	Uptown Houston Association	10/00
Houston West Loop Corridor Major Investment Study	METRO	1998/2001
The Uptown Master Plan	Uptown Houston Association	2002
WEST LOOP ENVIRONMENTAL ASSESSMENT AND ACCESS RAMP IMPROVEMENTS		
Environmental Assessment: Interstate Highway 610 (West Loop)	TxDOT	8/91
Categorical Exclusion IH-610W (West Loop) *granted 8/93 and re-evaluated 2001	TxDOT	12/92*
West Loop HOV Carpool Demand	METRO	6/93
IH-610 HOV Access Ramp Traffic Analysis	METRO	3/94
Houston West Loop Corridor: Major Investment Study Final Report/Environmental Assessment	METRO	6/97
LONG RANGE TRANSPORTATION		
Vision 2020: Metropolitan Transportation Plan (MTP)	Houston-Galveston Area Council	10/97

1.1.5 City/County Growth, Development and Mobility Issues

The study area is wholly contained within the City of Houston, which is the county seat of Harris County. Harris County's population grew by nearly 21 percent between 1990 and 2000 from about 2.8 million to 3.4 million persons, a period during which the nation's population increased by only 13.2 percent. The county's population is expected to grow by another one million people by 2025.[5] Harris County is highly industrialized with employment centered in trade, services, and manufacturing. Between 1990 and 2000, Harris County annual average civilian employment rose by more than 15 percent and the unemployment rate fell from 5.1 percent to 4.3 percent.[6]

Houston is the region's principal city, primary economic engine and the nation's fourth largest city. According to US Census Bureau figures, the city's population grew by more than 22 percent between 1980 and 2000, from about 1.6 million to over 1.9 million persons. Of the ten largest US cities, Houston's growth rate between 1990 and 2000, of nearly 20 percent, was the third highest. Texas Workforce Commission figures show that the total employed in Houston grew by an average of about 1.5 percent per year for the period between 1990 and 2000, from about 840,000 to 975,000 persons.

Steady growth and development has given rise to a variety of mobility problems and issues for the Houston area. As H-GAC's *Goals for Tomorrow* report (1998) explains, the region is faced with the following challenges:

- Projected population growth will require major transportation investments to maintain an acceptable level of mobility for residents and provide for efficient goods movement
- Financing mobility improvements will increasingly be the responsibility of local government
- Developing mechanisms for jointly financing development and improvements to major regional transportation facilities and,
- The region faces the possibility of air quality sanctions that could impact transportation funding

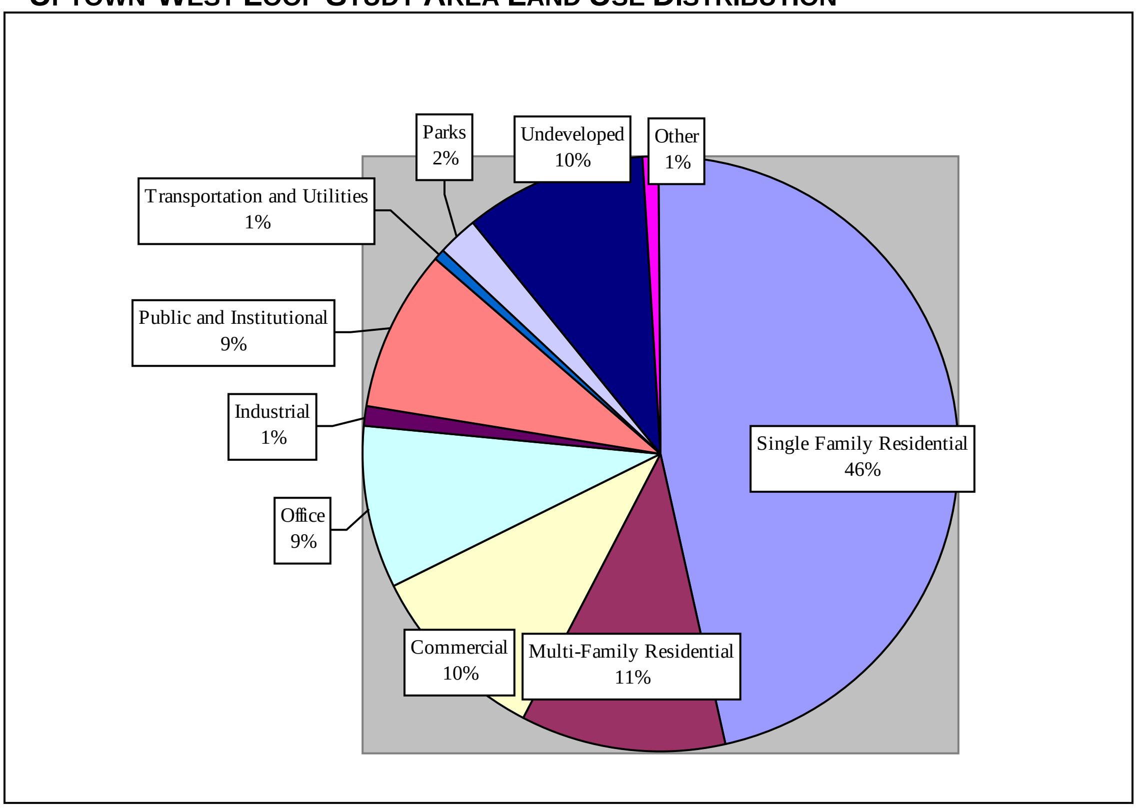
[5] U.S. Census Bureau, 2000. 2000 Summary File 2, (Jan. 21, 2003); (2025) H-GAC-endorsed forecasts prepared by REMI Policy Insight, 2025 Forecast, Jan. 9, 2003.

[6] Texas Workforce Commission, 1990 and 2000.

1.1.6 Corridor Overview/Land Use

The study area contains a diverse assemblage of land uses, including single and multi-family housing, several high-rise office buildings and hotels, a variety of commercial development, Memorial Park and the Galleria mall. Figure 1.3 describes land use in the study area by percent distribution and Figure 1.4 shows the geographic location. The study area contains a total of 137.7 million square feet of area (3,160.4 acres). Residential development comprised the majority of the land use in the study area in 2000 (approximately 46 percent single-family and 11 percent multi-family totaling 79.3 million square feet). Commercial and office land uses comprised 19.8 percent of the study area making the Uptown-West Loop area second among the dozen major concentrations of office market locations in the Houston area. The Uptown-West Loop study area contained 28.2 million square feet of net rentable area as of December 31, 2000, second only to Houston's Central Business District which had 30.9 million square feet. Ten percent of the study area, or almost 14 million square feet (316 acres), was undeveloped at the end of 2000. [7]

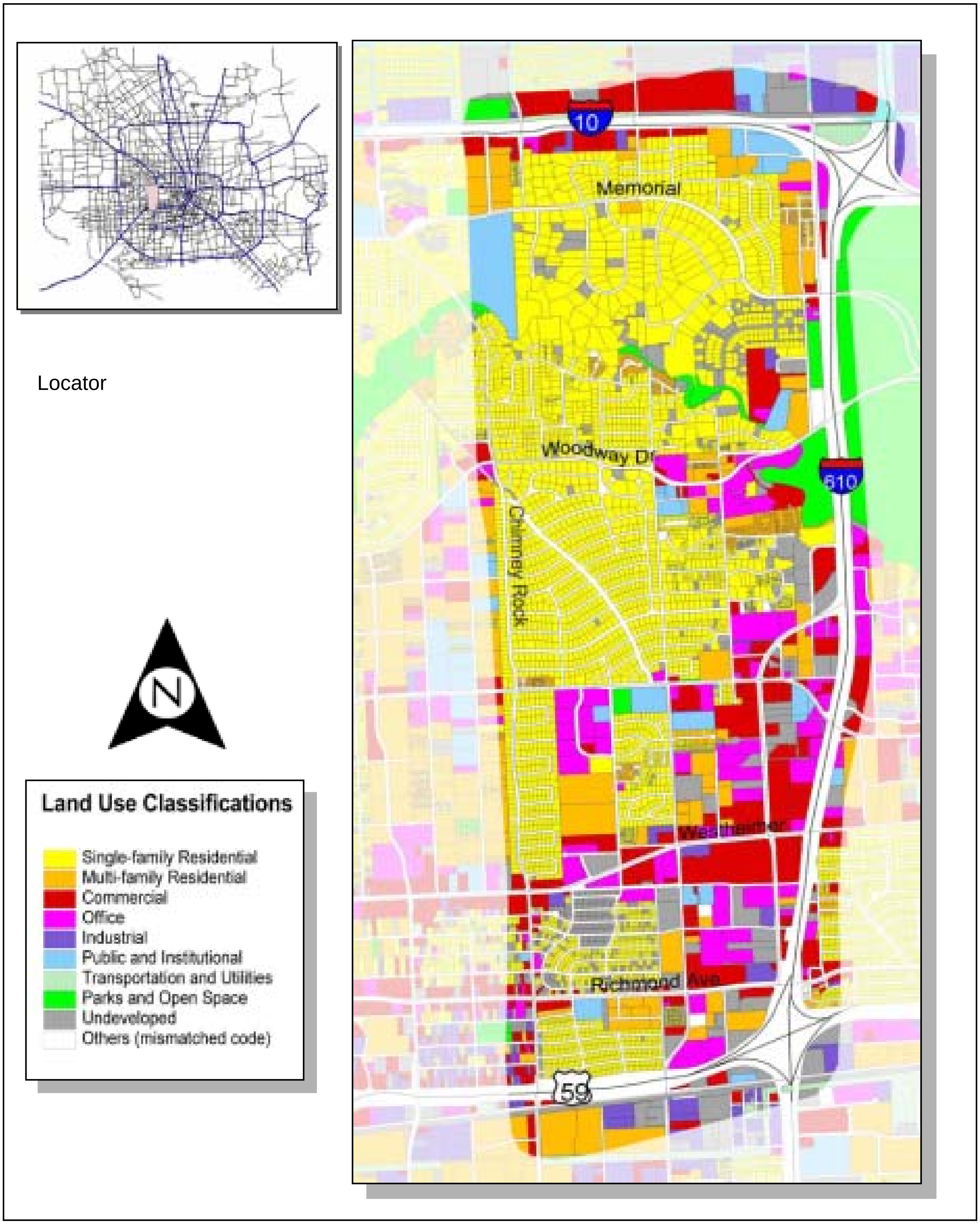
FIGURE 1.3
UPTOWN-WEST LOOP STUDY AREA LAND USE DISTRIBUTION



Source: City of Houston Planning Department, December 2001

[7] *COHGIS – Release 7 (2001),* City of Houston, Planning and Development Department

FIGURE 1.4
LAND USE MAP



Source: City of Houston Planning Department, December 2001

1.1.7 Corridor Growth

This subsection presents information about growth trends specific to the study area focusing on building permits, gross retail sales, employment, population and traffic volumes. The data sources for this information are the US Census Bureau, H-GAC, METRO, the Texas State Comptroller's Office, TxDOT and the City of Houston. While each entity analyzes its data differently, the geographical limits of the zones are comparable, except for zip codes, which use a slightly smaller area.

Since 1970, the study area has become increasingly urbanized with a dense patchwork of residential communities and commercial activities. Between 1980 and 2000, the area experienced steady population growth. Both study area population and employment are expected to change significantly over the next 25 years. Between 2000 and 2025, the number of employees who will be working within the study area (primarily in or near the Galleria area) is expected to increase by 38 percent. The projected population increase between 2000 and 2025 is 56 percent. The corridor's urban character should become even more pronounced by 2025 as employment and population densities increase.

Building Permits

According to the City of Houston, there was an increase in residential development throughout the 1990s within the study area. Table 1.3 shows the change in the number of building permits by category for Zip Code 77056, which contains the majority of the study area. Zip Code 77056 is bounded by Chimney Rock Rd. to the west, Buffalo Bayou to the north, IH-610W to the east, and U.S. 59 to the south (see Figure 1.1 for corridor description).

Between 1996 and 2000, the number of building permits granted in all permit categories increased 25.5 percent, from 145 to 182, and total square footage permitted increased by 62.5 percent, from 1,059,546 square feet to 1,721,974 square feet (Table 1.3). In terms of the number and type of permits, as well as square footage permitted, development increased from 1996 to 2000 primarily for residential land uses. Land available for residential development was, in part, derived from the subdivision/re-plat of large single family residential tracts to smaller zero lot-line or multi-family development. In addition, a number of multi-family structures have begun construction, indicating that there may be a larger growth in residential development than the data suggests. Community facilities are also being constructed, presumably to serve those residential areas. Although no commercial uses were permitted in Zip Code 77056, some retail permits were granted and a large amount of square footage for parking garage uses were permitted.

Table 1.3
1996 and 2000 Building Permits Granted in Zip Code 77056 (Houston, Texas)

Zip Code 77056	Number of building permits			Square footage		
Permit Type	**1996**	**2000**	**Percent change**	**1996**	**2000**	**Percent change**
Single family residence	123	168	36.6%	514,458	886,722	72.4%
Multiple family residence	7	2	-71.4%	315,179	608,096	92.9%
Community facility	3	2	-33.3%	17,512	23,000	31.3%
Commercial	2	0	-100.0%	10,938	0	-100.0%
Retail	8	6	-25.0%	201,459	26,368	-86.9%
Parking garages	2	4	100.0%	0	177,788	n/a
TOTAL	145	182	25.5%	1,059,546	1,721,974	62.5%
Community facilities includes churches, hospitals, schools						
Commercial includes amusement and recreational, industrial, service stations, office, banks and other professional						
Retail includes stores and other mercantile buildings Parking garages does not include residential garages and car ports *Source: City of Houston Planning Department, December 2001.*						

Retail Sales

The Uptown-West Loop area exhibited strong retail sales growth throughout the 1990s according to first quarter returns for 1991, 1996 and 2001 from the State Comptroller's Office. Retail sales within the study area increased by $145,679,170 or 55.9 percent between 1991 and 2001 in Zip Code 77056 (Table 1.4). Growth in retail sales for the Uptown-West Loop Study area is expected to continue as new and expanded retail development occurs. The opening of Uptown Park as a retail activity center and the expansion of the Galleria across W. Alabama St. demonstrate this growth in the corridor.

Table 1.4
First Quarter Gross Retail Sales

Zip Code	1991	1996	2001	$ Change, 1991-2001	Percent Change 1991-2001
77056	$260,579,930	$349,439,760	$406,259,100	$145,679,170	55.9%

Source: State of Texas Comptroller's Office, 2001

1.1.8 Employment Projections

Growth in retail sales during the 1990s suggests the presence of a growing employment base, a trend that is expected to continue over the next 25 years. H-GAC projects that by 2025, there will be 130,044 people working in the study area, an increase of 38 percent over 2000 when 94,101 people worked in the study area (Table 1.5 and Figure 1.5).

H-GAC used 2000 employment figures to project 2025 employment levels. H-GAC's Traffic Analysis Zones (TAZ) located within the study area and their associated data are shown in Table 1.5 below. A map depicting study area TAZs is provided in Exhibit 1.4.

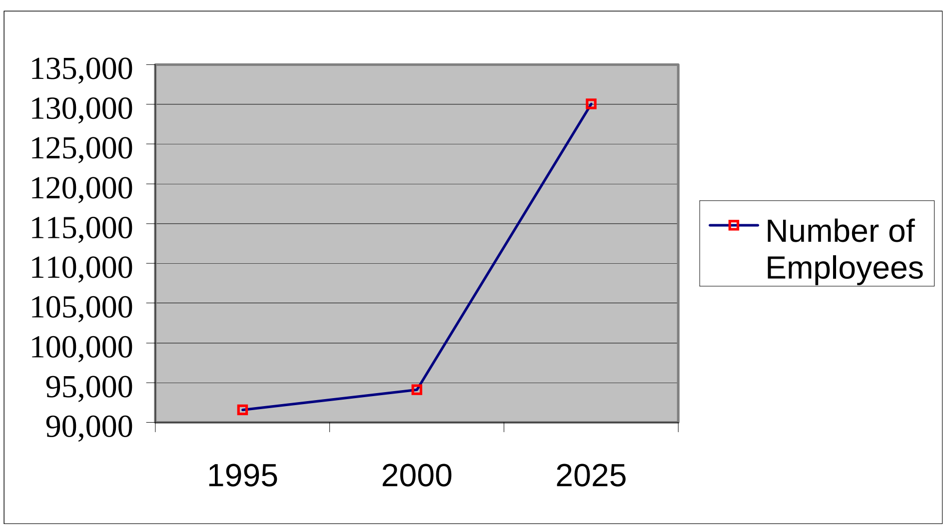
Employment density averaged 31.2 employees per acre in the study area in 2000, and by 2025 is expected to increase to an average of 43.1 employees per acre, with a particularly high concentration near the Galleria. The Galleria's development is concentrated on West Alabama Street, west of IH 610. As shown on Figures 1.6 and 1.7, employment density increases the most in this area, both west and east of IH-610W.

Table 1.5
Current and Projected Study Area Employment, by TAZ 2000 - 2025

TAZ	2000	2025	Percent Change, 2000-2025
932	18,897	22,660	19.9%
933	869	3,249	273.9%
934	7,891	10,046	27.3%
935	1,954	2,447	25.2%
936	1,463	2,446	67.1%
944	142	410	188.4%
945	8,090	11,135	37.6%
946	4,124	6,133	48.7%
947	3,926	5,639	43.6%
948	4,454	7,279	63.4%
949	12,939	18,060	39.6%
950	4,888	7,392	51.2%
951	8,663	11,915	37.5%
952	1,675	2,090	24.8%
953	1,665	1,812	8.8%
954	1,943	2,569	32.3%
955	161	624	288.8%
957	128	258	101.9%
969	1,063	1,461	37.5%
972	299	527	76.0%
2622	4,259	5,918	39.0%
2623	4,607	5,972	29.6%
Study Area	94,101	130,044	38.2%

Source: H-GAC 2002. 1998 TAZ Zonal Classification; 2000 and 2025 Projections (2002 Interim Release, Subject to Revision)

FIGURE 1.5
CURRENT AND PROJECTED STUDY AREA EMPLOYMENT 1995 – 2025



Source: H-GAC 2002. 1998 TAZ Zonal Classification; 2000 and 2025 Projections (2002 Interim Release, Subject to Revision)

FIGURE 1.6
STUDY AREA EMPLOYMENT DENSITY 2000

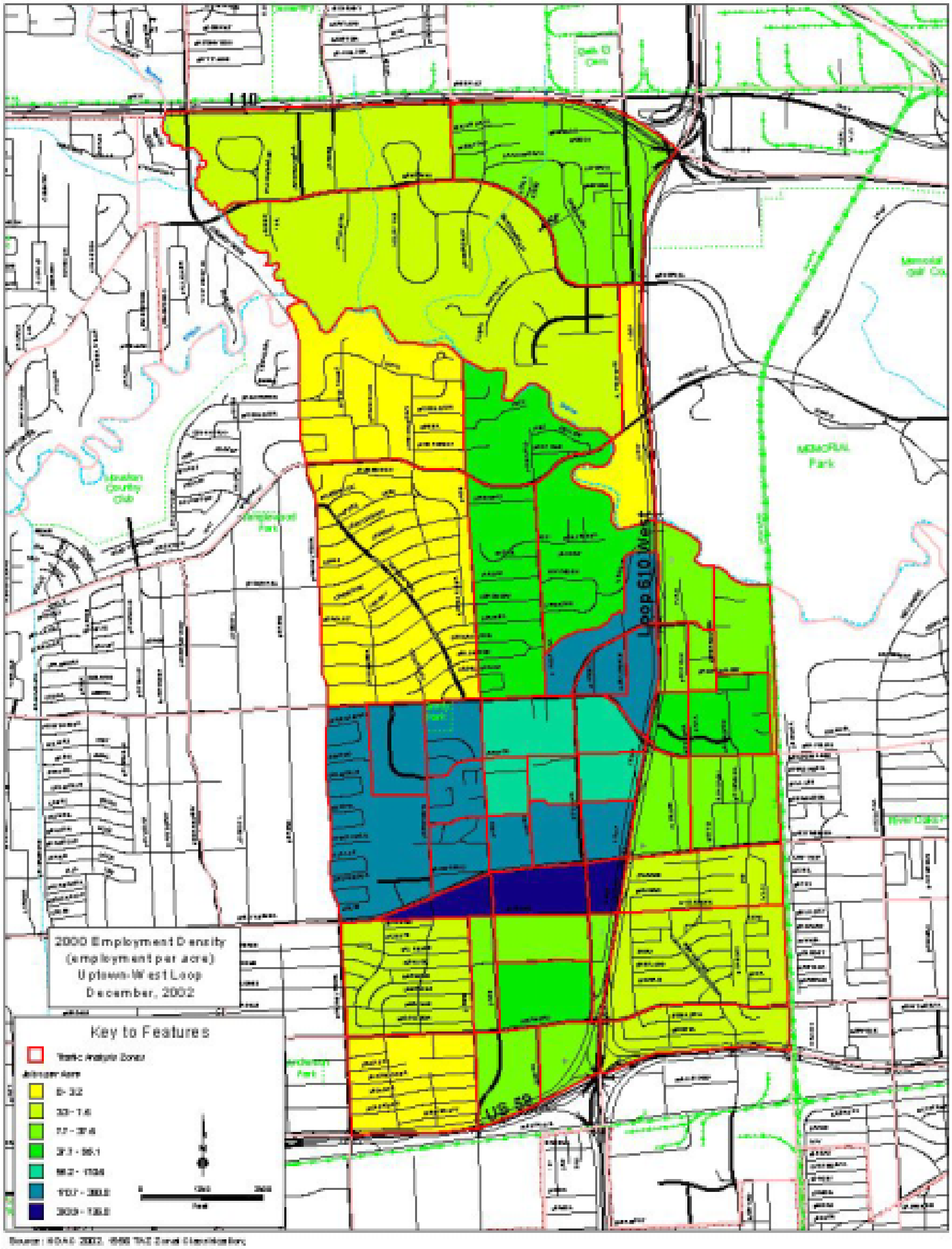
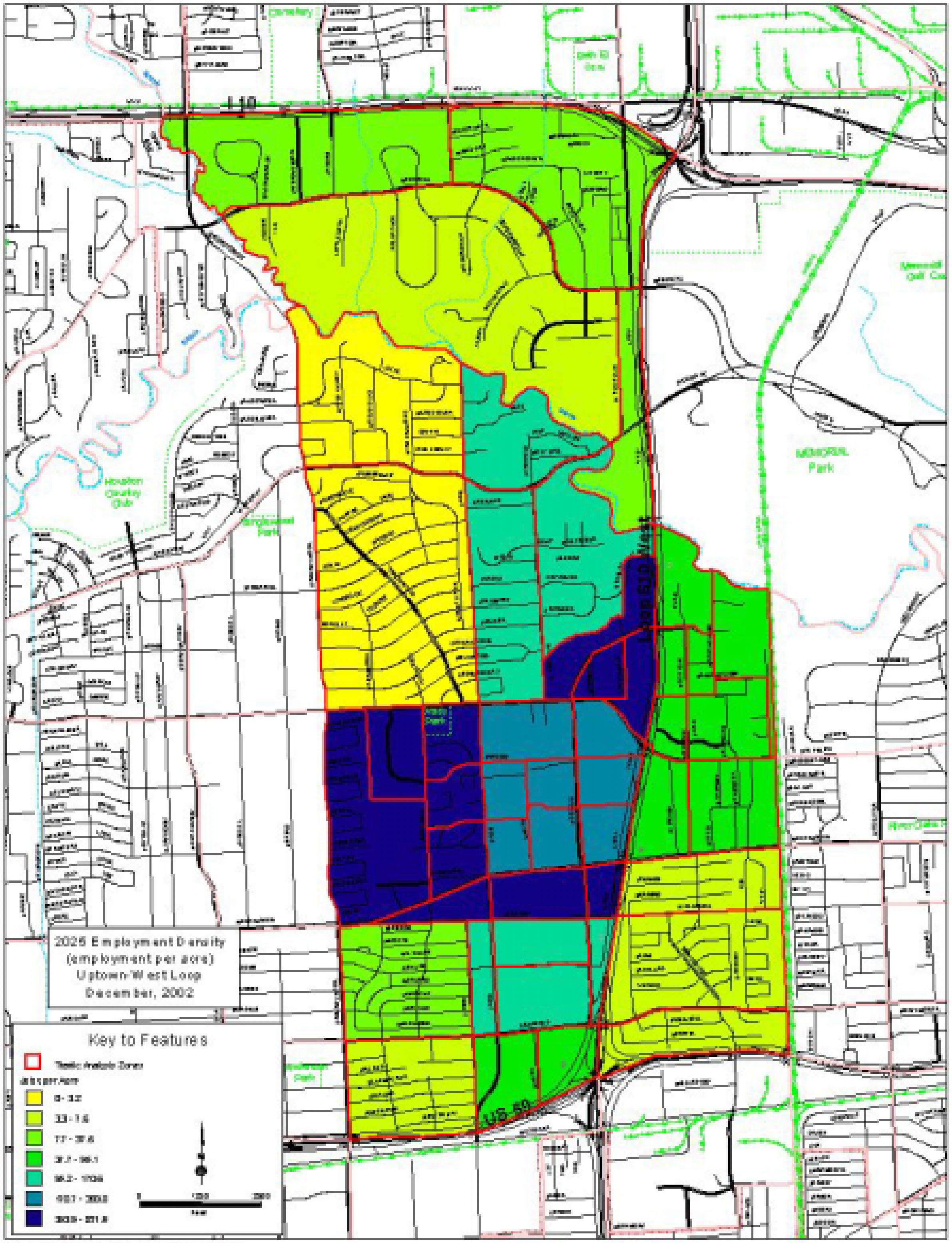


Figure 1.7
Study Area Employment Density 2025



Source: H-GAC 2002, 1995 TAZ Zonal Classification, 2025 Employment Projections

Population Trends

Population History (U.S. Census, by Census Tracts and Block Groups). Population in the study area showed increases in some areas and decreases in others between 1970 and 2000. The study area, defined by the 2000 US Census Block Groups shown on Exhibit 1.1, is bounded by Chimney Rock Rd. to the west, IH-10 to the north, IH-610W to the east, and U.S. 59 to the south. A summary of the Census Data for the study area from 1970-1990 is shown in Table 1.6 and the complete set of data, listed by Tract and Block Group for each year, is in Exhibit 1.1. Between 1970 and 2000, the population in the study area increased by 8.5 percent, from 22,585 persons in 1970 to 24,504 persons in 2000. Census Tract 4301, located in the southwest corner of I-10 and IH-610W, grew the most since 1970, increasing by 48.6 percent. The area just north of U.S. 59 and adjacent to IH-610W on the east and west (1970 Tract 419 which was comprised of 2000 Tracts 4319 and 4116) grew by 22.4 percent during that time period, increasing from 3,485 persons in 1970 to 4,264 persons in 2000. The area adjacent to Tract 4319 (which includes Tract 4320, Block Group 1 and Tract 4327, Block Group 1) decreased in population between 1970 and 2000 43.9 percent, from 3,847 persons in 1970, to 2,159 persons in 2000. Table 1.6 below summarizes historical Census data**.**

Table 1.6
Study Area Population (1970 - 2000)

	1970	**1980**	**1990**	**2000**	**1970 - 2000 Percent Change**
Study Area	22,585	20,292	22,046	24,504	8.5%

Source: U.S. Census Bureau, 2000

Population Projections (H-GAC, by TAZ)

Projections of future population for the study area by H-GAC show a 56.6 percent overall increase in population between 2000 and 2025. As with the employment projections, H-GAC used 2000 population figures to project 2025 population. H-GAC's Traffic Analysis Zones (TAZ) that are located within the study area and their corresponding population data are shown on Table 1.7. The study area census tracts that correlate to these TAZs are shown in Exhibit 1.2. The study area TAZ map is provided in Exhibit 1.4.

According to H-GAC, all TAZs except one (TAZ 969) show population increases between 2000 and 2025. The largest percentage increases are expected in TAZs 951 and 948 (121.6 percent and 112.1 percent, respectively) located in the central-most part of the study area. TAZ 949 is also expected to experience one of the largest absolute population changes (increase of 2,273 persons).

There are 14 new or under-construction medium to high density residential development projects within the Uptown-West Loop project area. These developments will contain a total of 2,544 units when completed. Twelve of the residential developments have 100 or more units; three of those developments have 300 or more units. The developments are located in TAZs 951, 945, 933, and 935, which are expected to increase between 28 and 121 percent in population between 2000 and 2025.

TAZ 969, which is located in the southwestern-most part of the study area, shows a population decrease between 2000 and 2025. Although H-GAC projects a population decline in TAZ 969, recent residential construction in these areas may actually increase population. The neighborhoods located in this TAZ have been undergoing redevelopment in recent years at densities that appear to be higher than in previous years.

Table 1.7
Current and Projected Study Area Population, by TAZ 2000-2025

TAZ	2000	2025	Percent Change, 2000-2025
932	7	11	58.7%
933	748	1,101	47.2%
934	271	331	22.3%
935	1,852	2,385	28.8%
936	2,185	2,876	31.6%
944	1,494	1,646	10.2%
945	2,560	3,904	52.5%
946	751	1,346	79.2%
947	625	893	43.0%
948	2,364	5,015	112.1%
949	3,013	5,286	75.4%
950	424	843	98.9%
951	753	1,669	121.6%
952	1,312	2,441	86.1%
953	1,311	2,024	54.4%
954	1,324	2,265	71.1%
955	35	74	111.6%
957	1,000	1,182	18.2%
969	1,114	839	-24.7%
972	1,827	2,594	42.0%
2622	368	752	104.4%
2623	423	852	101.5%
Study Area	**25,761**	**40,331**	**56.6%**

Source: HGAC 2002. 1998 TAZ Zonal Classification; 2000 and 2025 Projections (2002 HGAC Interim Release, Subject to Revision)

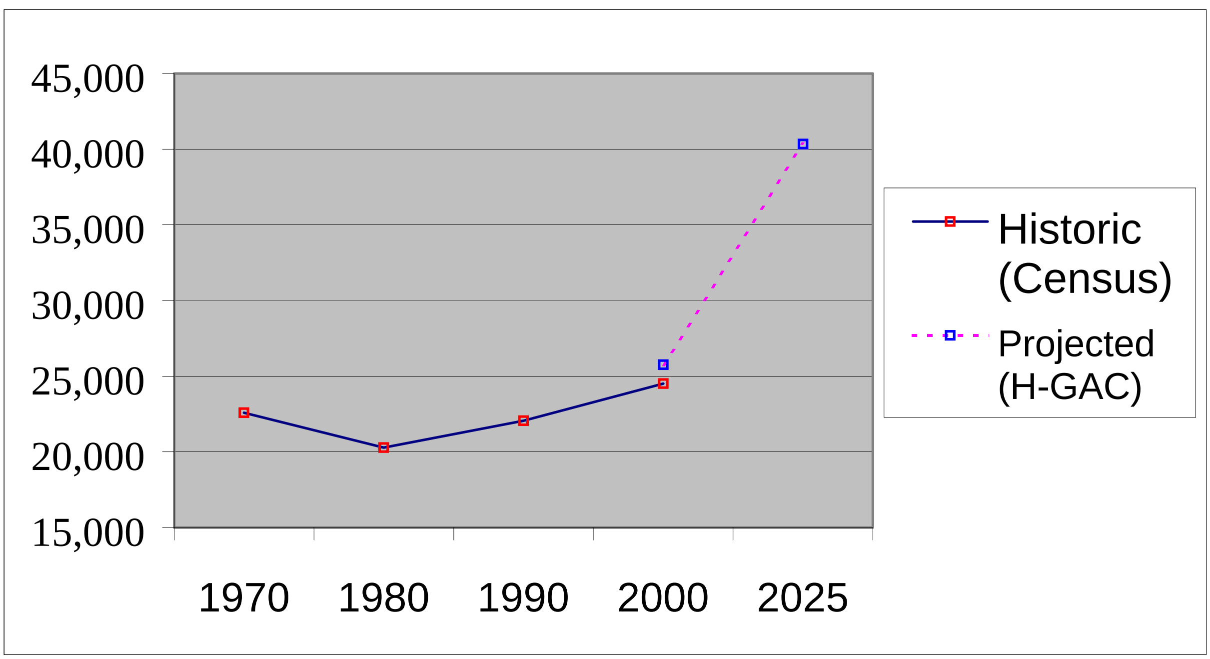
H-GAC's 2000 population figure is slightly higher than the actual 2000 population as reported by the US Census. Both 2000 population figures are shown below in Table 1.8, along with H-GAC's 2025 population projection. The 2000-2025 population change projected by the US Census Bureau is approximately 64.6 percent, and the H-GAC population change projected is approximately 56.6 percent. H-GAC's 2000 population projection is approximately five percent higher than the actual 2000 Census population. This may be due to slight differences in the zonal and tract geographies (Table 1.8 and Figure 1.8).

Table 1.8
Study Area Population, 2000 - 2025

2000 Population	2025 Forecast (H-GAC)	Projected 2000 - 2025 Percent Change
24,504 (US Census)	40,331	64.6 %
25,761 (H-GAC)	40,331	56.6 %

Sources: US Census Bureau, 2000 and H-GAC, 2000, 2025 (1998 TAZ Zonal Structure)

FIGURE 1.8
HISTORIC AND PROJECTED STUDY AREA POPULATION 1970-2025



Source: US Census Bureau, 1970-2000 and H-GAC, 2000-2025

Regional and Interregional Traffic

Traffic volumes increased steadily throughout the 1990s on the segment of IH-610W between IH-10 and U.S. 59, which is one of the busiest highway corridors in Houston. Table 1.9 shows average daily traffic at locations along IH-10, IH-610W and U.S. 59 within the study area. Traffic volume increased on all three facilities between 1991 and 2000. Traffic along U.S. 59 in the study area increased the most, from 193,000 vehicles per day in 1991 to 337,000 vehicles per day in 2000. Traffic also increased along IH-10, from 201,000 vehicles per day in 1991 to 212,000 vehicles per day in 2000. IH-610W traffic grew overall between 1991 and 2000, but it actually decreased slightly between 1995 and 2000 (Table 1.9).

Table 1.9
Study Area Traffic Volume (1991, 1995 and 2000)

	1991 Avg Daily Traffic (Vehicles per Day)	1995 Avg Daily Traffic (Vehicles per Day)	2000 Avg Daily Traffic (Vehicles Per Day)	Percent Increase 1991- 2000
IH-10 (½ mile west of IH-610W)	201,000	203,000	212,000	5.5%
IH-610W (1/4 mile south of IH-10)	214,000	250,000	249,000	16.4%
U.S. 59 (½ mile west of IH-610W)	193,000	284,000	337,000	74.6%

Source: TxDOT Houston District Traffic Count Division, 2000

The rise in traffic volumes on all three of these major highways has resulted from Houston's population and economic growth throughout the 1990s. With the increased population and retail activity in the study area through the 1990s, overall mobility within the corridor has declined. Anticipated employment growth over the next 25 years will likely place additional pressure on the area's already congested roadways.

1.1.9 Origin/Destinations

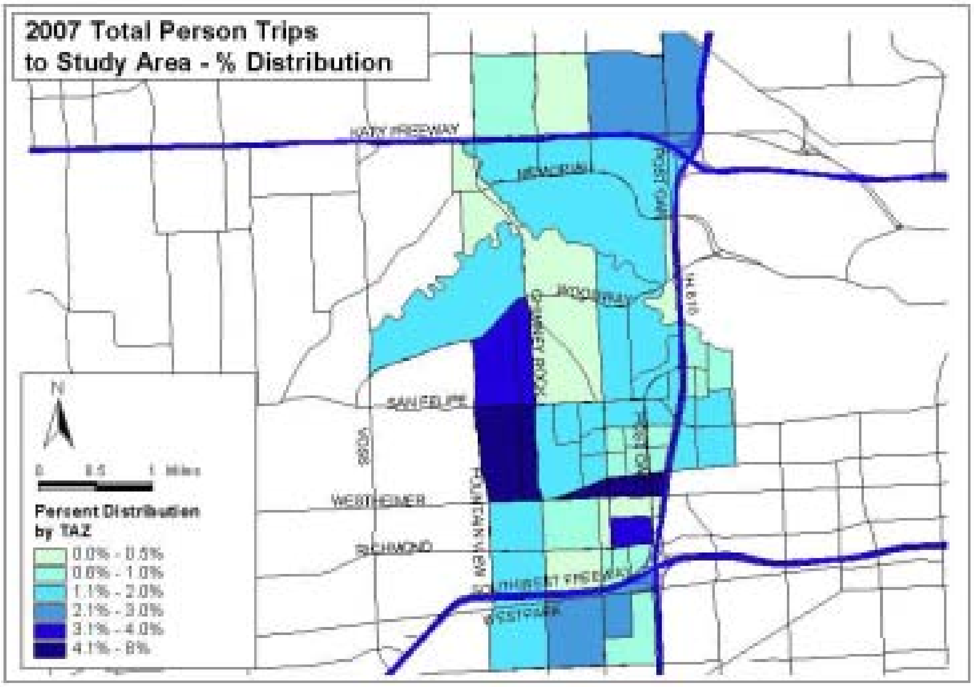
Travel forecasting models are used to project future traffic and are the basis for the determination of the need for new road capacity, transit service changes and changes in policy. Travel models follow a sequence of steps that answer specific questions relative to travel choice. Choices that travelers make in response to a given system of highways and transit are simulated. Travel demand data sets generated for the H-GAC 2022 Metropolitan Transportation Plan (MTP) and adjusted for the 2025 horizon of the METRO Mobility 2025 plan have provided the basis for preliminary analysis on origins and destinations of persons traveling to and from the Uptown-West Loop study area.

The distribution of all trips (total person trips), with Uptown-West Loop study area as the destination (aggregated to Traffic Analysis Zones, TAZ), is dispersed throughout the corridor with heavy concentrations at major activity centers. Analysis year 2007 person trips to the corridor yield heavy concentrations in and near Galleria locations, office and retail development along Post Oak Blvd., and IH-610W locations between Westheimer and San Felipe (refer to Figure 1.9). Significant concentrations of trip destinations also occur between Chimney Rock and Fountainview in the vicinity Woodway and Westheimer. The total volume of destinations at these locations may merit additional analysis. Comparisons between trip data, land use and employment density for this area highlight irregularities. As shown in Figure 1.10, this trend continues through 2025. Trip projection model runs between year 2007 and 2025 yield the most significant increases in total trips for TAZ areas along Post Oak Blvd. from San Felipe to Richmond. In addition, traffic volume along thoroughfares feeding into this area exhibit high volume to capacity ratios (v/c) (Section 1.2.1).

Trip origination for all trips with destinations to the Uptown-West Loop study area appears to concentrate along the U.S. 59, IH-10, and the U.S. 290 corridors in 2007. The heaviest concentration of originations occur between Sam Houston Tollway and IH-610W along U.S. 59 (refer to Figure 1.11). The percentage of all trip originations destined for the study area increases along IH-10, U.S. 59 and the Westpark Tollroad corridors for 2025 and extends to the far west and southwestern regions of the metropolitan area. The TAZ aggregation for the west to southwestern edge of the H-GAC service area captures nearly 10 percent of all trips destined for the Uptown-West Loop study area in year 2025 (refer to Figure 1.12). Significant demographic changes in population projected for areas in Ft. Bend County and Brazoria County sharply effect the transportation model simulations, thus generating the growth in trip volumes.

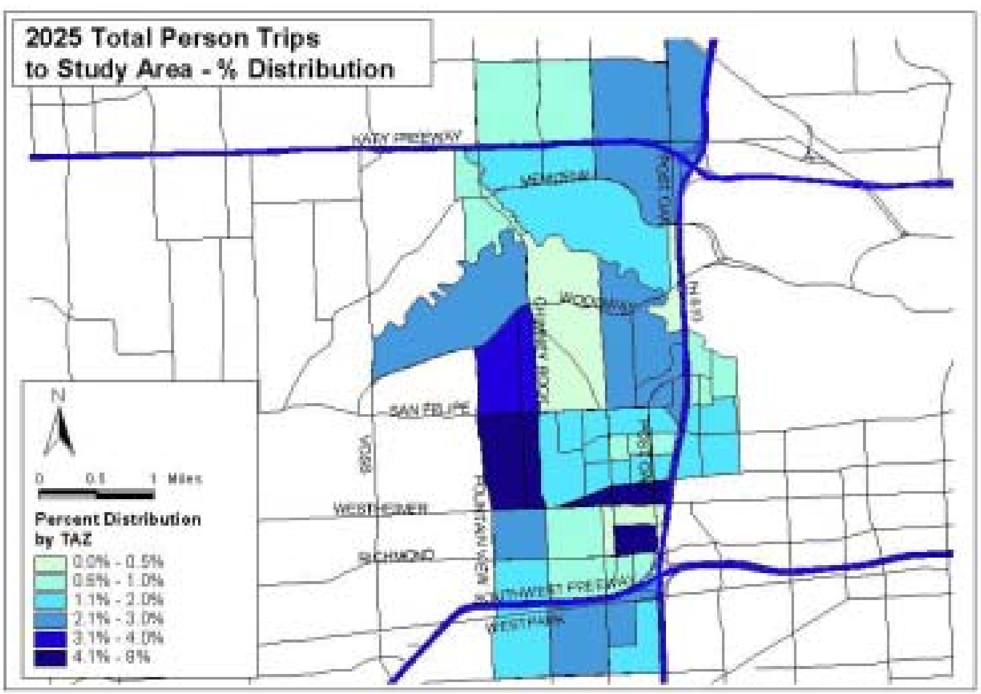
The Uptown-West Loop Planning Study takes into consideration how the logical termini are determined for the transit improvements considered. The trends demonstrated in Figures 1.11 and 1.12 emphasize the importance of creating transit connections and integrated facilities that create a “complete” network that will attract riders traveling along the IH-10, U.S. 59 and Westpark corridors.

FIGURE 1.9
2007 TOTAL PERSON TRIPS TO STUDY AREA - % DISTRIBUTION



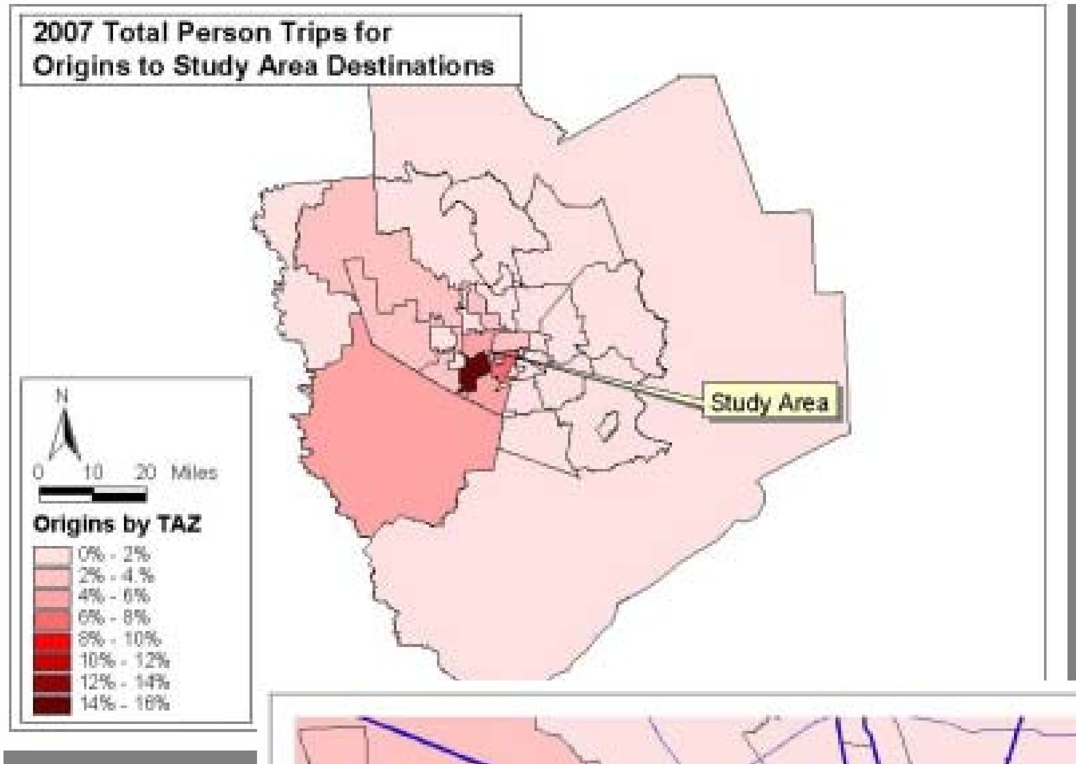
Source: METRO- Zonal aggregation based on H-GAC 2022 MTP, 2002

FIGURE 1.10
2025 PERSON TRIPS TO STUDY AREA - % DISTRIBUTION

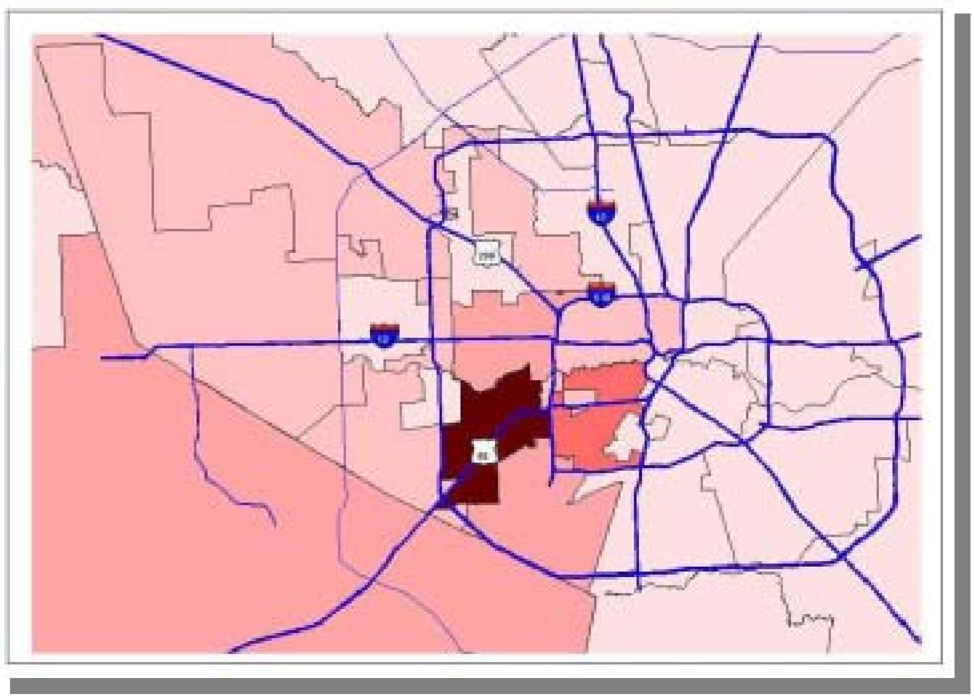


Source: METRO- Zonal aggregation based on H-GAC 2022 MTP, 2002

FIGURE 1.11
2007 TOTAL PERSON TRIPS FOR ORIGINS TO STUDY AREA DESTINATIONS

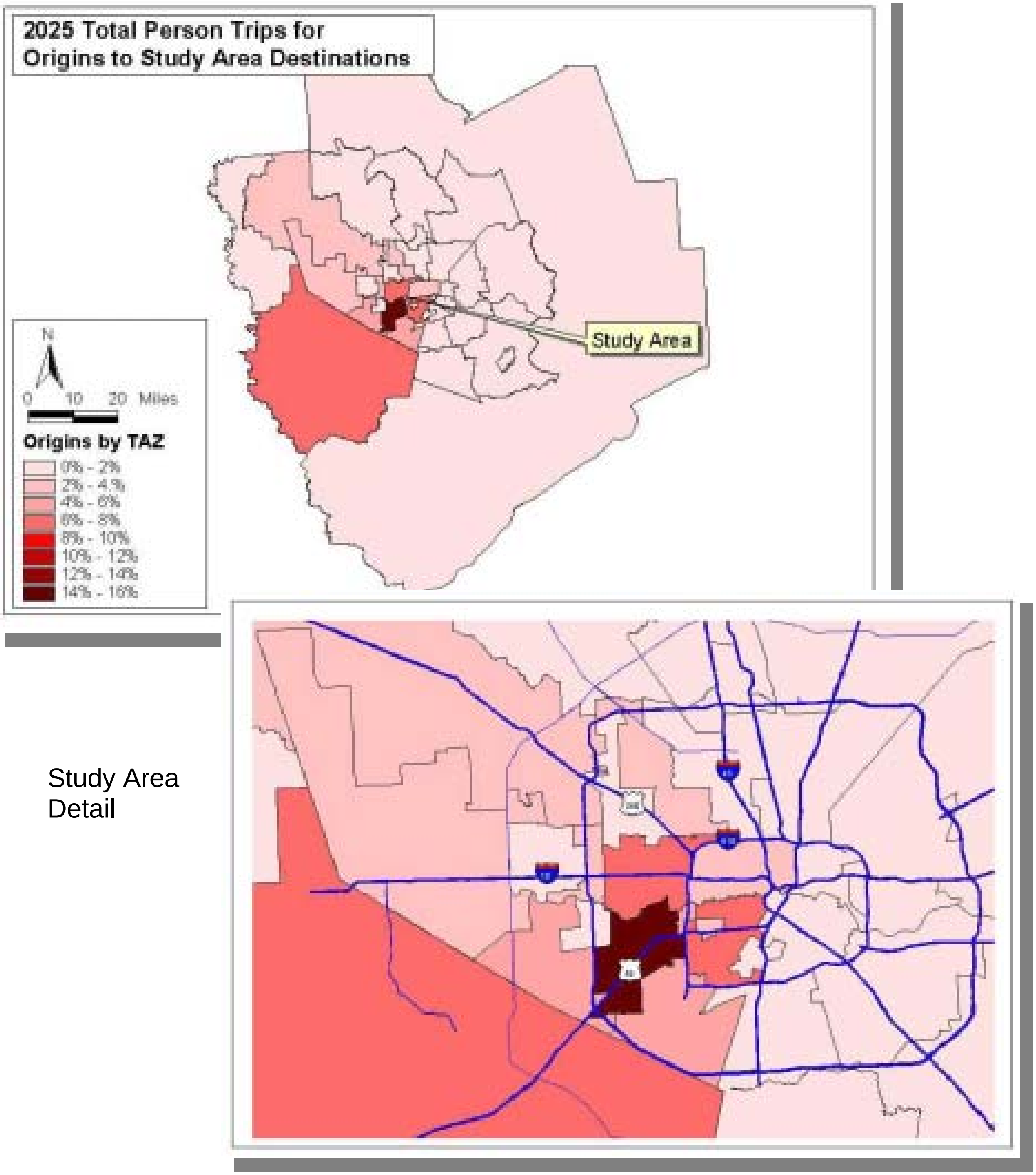


Study Area Detail



Source: METRO- Zonal aggregation based on H-GAC 2022 MTP, 2002

FIGURE 1.12
2025 TOTAL PERSON TRIPS FOR ORIGINS TO STUDY AREA DESTINATIONS



Source: METRO- Zonal aggregation based on H-GAC 2022 MTP, 2002

1.2 Transportation Facilities and Services Related to the Study Area

The Uptown-West Loop area matured into a significant activity center over the last 30 years without sufficient transportation infrastructure to support the access and circulation needs of a growing population and employment base. The study area is deficient in freeway capacity and access. Major thoroughfares and collectors, pedestrian facilities and amenities, quality street environments, and parking and transit facilities are inadequate to support the level of activity occurring in the area.

1.2.1 Existing Roadway Facilities, Volume to Capacity Ratio and Safety

IH-610W is one of the most congested areas of Houston during both the peak hours and off peak hours. IH-610W ROW generally includes eight travel lanes, inside and outside shoulder lanes, and continuous one-way, three-lane frontage roads from Woodway Dr. to Richmond Ave. As defined by the Highway Capacity Manual, 2000 edition, a typical freeway with a free flow speed of 55 mph has a capacity of 2,250 passenger cars per hour per lane (pc/h/l). IH-610W south of IH-10 has 4 travel lanes in each direction, giving it a capacity of 9,000 passenger cars per hour in one direction. Currently, IH-610W is operating at 275,000 average daily trips (ADT), which correlates to a design hourly volume (DHV) of 17,875 vehicles per hour in one direction. With a DHV of 17,875 vehicles in one direction and a capacity of 9,000 vehicles in one direction, IH-610W is operating at nearly double the original design capacity at a level of service (LOS) F during peak hours. The volume is expected to grow to approximately 350,000 ADT by 2020.

TxDOT has presented plans to reconfigure the entrance and exit ramps as braided ramps along IH-610W between Westpark Street and IH-10 to increase access and maximize freeway capacity. Braided ramps, which remove merging conflicts created with egress and ingress in the current configuration, will also increase the number of main lanes available by elevating and separating the ramp facilities within the existing ROW. TxDOT plans to extend the frontage roads south of Richmond along Post Oak Bovd. and under the U.S. 59 and IH 610 W interchange; the northbound frontage road will be extended under the interchange as well. The northbound frontage road will continue and extend past Memorial Dr. providing access to IH-10 East and West. In addition, TxDOT has made interim improvements to IH-610W by converting the outside shoulders to travel lanes, relocating and widening exit ramps, and resurfacing the roadway along IH-610W.

It is anticipated that the Westpark Toll Road will have some positive impacts on the Uptown corridor. For example, Post Oak Blvd. will become the westbound access point to the Westpark Toll Road while the eastbound lanes will have access to both Westpark Dr. and Post Oak Blvd. This reconfiguration in the southern portion of the study area will ultimately provide more access points for ingress and egress to the uptown area.

Existing Roadways

There are six major north/south roadway facilities in the study area, as follows:

- Chimney Rock – Chimney Rock is the only north/south major thoroughfare in the study area that provides access between IH-10 to U.S. 59
- Sage – Sage begins at Woodway and continues south beyond U.S. 59
- S. Post Oak Lane – S. Post Oak begins at Woodway and terminates at San Felipe
- Post Oak Blvd. – Post Oak Blvd. begins at IH-610W and curves south to Richmond Ave.
- N. Post Oak Rd. – N. Post Oak Rd. connects from the IH-10 frontage road to Memorial Dr. where it becomes one way southbound and serves as the IH-610W southbound frontage road
- IH-610W – IH-610W is a high speed, high capacity freeway facility that provides access throughout the study area from IH-10 to U.S. 59

There are eight major east/west roadway facilities in the study area, as follows:

- U.S. 59 – U.S. 59 is a high speed, high capacity freeway facility that provides access on the southern end of the project area providing access to Chimney Rock and IH-610W
- Richmond Ave. – Richmond Ave. provides east/west access throughout the study area
- W. Alabama St, – W. Alabama St. extends from Westheimer to Sage where it becomes one way eastbound to Post Oak Blvd.
- Westheimer – Westheimer provides east/west access throughout the study area. It is the largest major thoroughfare in terms of volume and number of lanes in the study area
- San Felipe – San Felipe provides east/west access throughout the study area
- Woodway Dr.– Woodway Dr. provides east/west access through the study area
- Memorial Dr.– Memorial Dr. provides east/west access through the study area

- IH-10 – IH-10 is a high speed, high capacity freeway facility that provides access to the northern end of the project area and access to Chimney Rock and IH-610W as well as N. Post Oak Rd. via the IH-10 frontage road

In comparing corridors, the east/west versus the north/south, the review shows there is limited access from U.S. 59 to IH-10, which contributes to the overall capacity and congestion problems in the study area.

Volume to capacity ratios (v/c) are used to designate levels of traffic congestion. Volume to capacity ratio is a measure of traffic demand, which is expressed as a volume compared to the traffic carrying capacity of the corridor. A v/c ratio of .8, for example, indicates that a traffic corridor is operating at 80 percent of its capacity. Generally, the higher the v/c ratio, the greater the degree of congestion. While v/c is typically a good measure of the congestion along a roadway it is not always a true indicator of the problem. In some instances along major thoroughfares, the congestion could be a result of poor traffic signal timing, or signal progression instead of a true capacity problem that is the result of insufficient lanes to move traffic efficiently.

Table 1.10 shows the a.m. and p.m. peak hour, north/south and east/west v/c ration in the study area for the year 2007. The results of the v/c analysis for the study area are outlined below:

- The majority of the AM peak hour traffic is southbound and eastbound
- The majority of the PM peak hour traffic is northbound and westbound
- The most significant congestion occurs along IH-610W northbound, which operates at twice its designed capacity during the PM peak hour
- IH-610W is operating above capacity in both the northbound and southbound directions during the AM and PM peak hours
- The volume on U.S. 59 exceeds capacity in the eastbound direction during the AM peak hour
- The volume on U.S. 59 exceeds capacity in both the eastbound and westbound directions during the PM Peak hour
- The volume on IH-10 exceeds capacity in the eastbound direction during the AM and PM peak hours

In general, major thoroughfares located within the study area exhibit higher levels of congestion at or near the freeways.

Table 1.10
Year 2007 Volume to Capacity Ratio

North/South Thoroughfares		**AM Peak**		**PM Peak**	
Chimney Rock		NB	SB	NB	SB
	IH-10 to Memorial	0.74	1.18	1.11	1.03
	Memorial to Woodway	0.87	1.55	1.53	1.22
	Woodway to San Felipe	0.47	0.81	0.63	0.57
	San Felipe to Westheimer	0.67	1.15	1.10	1.04
	Westheimer to Richmond	0.43	1.02	1.15	1.08
	Richmond to U.S. 59	0.52	1.19	0.87	1.54
Sage Rd.		NB	SB	NB	SB
	Woodway to San Felipe	0.68	0.92	1.14	0.78
	San Felipe to Westheimer	0.87	0.83	0.93	0.88
	Westheimer to West Alabama	0.62	0.36	0.69	0.57
	West Alabama to Richmond	1.04	0.25	1.01	1.12
	Richmond to U.S. 59	1.52	0.40	0.82	1.53
S. Post Oak Ln.		NB	SB	NB	SB
	Woodway to San Felipe	0.57	0.95	1.03	0.76
Post Oak Blvd.		NB	SB	NB	SB
	IH-610W to San Felipe	0.53	1.53	1.90	0.95
	San Felipe to Westheimer	0.86	0.40	0.70	1.10
	Westheimer to West Alabama	0.66	0.32	0.51	0.25
	West Alabama to Richmond	0.99	0.75	0.65	1.26
N. Post Oak Rd.		NB	SB	NB	SB
	IH-10 to Memorial	0.47	0.86	0.87	0.57
	Memorial to Woodway	1.06	1.32	1.67	1.40
IH-610W		NB	SB	NB	SB
	IH-10 to Memorial	1.33	1.89	2.21	1.65
	Memorial to Woodway	1.33	1.89	2.21	1.65
	Woodway to San Felipe	1.22	1.77	2.23	1.64
	Post Oak Blvd to San Felipe	1.25	1.33	1.76	1.58
	San Felipe to Westheimer	1.29	1.25	1.64	1.60
	Westheimer to Richmond	1.13	0.85	1.18	1.34
	Richmond to U.S. 59	1.46	1.09	1.49	1.77

East/West Thoroughfares

		AM Peak		PM Peak	
U.S. 59		EB	WB	EB	WB
	Chimney Rock to Sage	1.31	0.87	1.09	1.50
	Sage to IH-610W	1.39	0.90	1.18	1.66

Richmond Ave		EB	WB	EB	WB
	Chimney Rock to Sage	0.69	0.24	0.18	0.99
	Sage to Post Oak Blvd	0.75	0.32	0.60	1.00
	Post Oak Blvd to IH-610W	1.25	1.00	1.45	1.45

W. Alabama		EB	WB	EB	WB
	Westheimer to Sage	0.79	-	0.39	-
	Sage to Post Oak Blvd	1.05	-	0.34	-

Westheimer Rd.		EB	WB	EB	WB
	Chimney Rock to West Alabama	1.21	0.28	0.74	0.99
	West Alabama to Sage	0.63	0.31	0.43	0.99
	Sage to South Post Oak	0.69	0.46	0.99	1.19
	South Post Oak to Post Oak Blvd	0.69	0.68	1.03	0.83
	Post Oak Blvd to IH-610W	0.73	1.11	1.47	1.04

San Felipe St.		EB	WB	EB	WB
	Chimney Rock to Sage	0.98	0.88	0.58	0.95
	Sage to South Post Oak	0.81	0.82	1.04	1.10
	South Post Oak to Post Oak Blvd.	1.17	1.16	1.58	1.62
	Post Oak Blvd to IH-610W	0.42	0.43	0.52	0.56

Woodway Dr.		EB	WB	EB	WB
	Chimney Rock to Sage	1.07	0.64	0.97	1.22
	Sage to South Post Oak	0.74	0.60	0.92	0.91
	South Post Oak to North Post Oak	1.09	1.40	1.60	1.31
	North Post Oak to IH-610W	0.77	0.96	1.02	0.85

Memorial Dr.		EB	WB	EB	WB
	Chimney Rock to IH-610W	0.76	0.89	1.02	0.91

IH-10		EB	WB	EB	WB
	Chimney Rock to IH-610W	1.23	0.83	1.22	0.89

Source: H-GAC 2022 MTP, 2002

Table 1.11 shows the existing number of lanes and pavement conditions for IH-610W and arterial roads located within the corridor.

Table 1.11
Existing Conditions

Street	# of Lanes	Pavement Condition
IH-610W	8	good
N. Post Oak Rd.	4	good
Post Oak Blvd.	6	good
Sage Rd.	2	good
Chimney Rock	4	good
Memorial Dr.	4	good
Woodway Dr.	4	good
San Felipe St.	2/3	Under construction - needs repair
Westheimer Rd.	6	good
Richmond Ave.	6	good

Source: City of Houston, MTFP, 2001, and Field Observation, Conducted 2002

1.2.2 Existing Transit Services/Ridership

METRO provides transit service in the Uptown-West Loop Corridor study area for local circulation and longer commute rides. Figure 1.13 and Exhibit 1.3 provide a listing of routes that cross or otherwise travel within some portion of the Uptown-West Loop Corridor. Many of the routes listed provide service through the area or serve transfer points located on the periphery of the study area en route to the Central Business District. For internal circulation, METRO bus routes provide service to major Uptown/Galleria destinations. The (82) Westheimer, (53) Westheimer Ltd., (25) Richmond and the (33) Post Oak routes are the primary routes for internal circulation in the study area. These are also some of METRO’s most heavily used weekday routes. Transfers are very heavy where these routes intersect. The primary circulation routes for the study area are shown in Table 1.12.

METRO’s NWTC is located at the north end of the study area at N. Post Oak Rd. and IH-10, and serves as a park & ride and transfer point for the METRO bus system. Post Oak Blvd. is a heavily traveled north/south thoroughfare and transit corridor that connects the NWTC and parallels IH-610W traveling south toward U.S. 59 and the Westpark Toll Rdd providing local, express, and park & ride service. There is a proposed transfer facility on the southern end of the study area. Generally, bus operations are negatively impacted by the congested roadways within the Uptown-West Loop Corridor.

Table 1.12
Internal Study Area Circulation Routes

Route	Name	YTD Average Oct 00' - Sept 01'	Average September 2001
17	Tanglewood	950	1,086
25	Richmond	7,583	8,205
33	Post Oak	6,814	7,560
35	Fairview	378	404
49	Chimney Rock	891	1016
53	Westheimer Ltd.	6,130	6,540
82	Westheimer	10,900	11,762
93*	N.W. Greenway Shuttle	280	312
283	Kuykendahl/GW/Uptown	232	250
284	Kingwood/GW/Uptown	193	221
285	Uptown Greenway	400	478

Note: Daily boardings are for the entire route, not only the study area
**Routes not described as part of 2025 Baseline Alternative*
Source: METRO – Monthly Ridership Report, September 2001

FIGURE 1.13
UPTOWN-WEST LOOP SERVICE AREA AND SYSTEM MAP

Source: METRO

1.3 Transportation Goals and Objectives

Based on the transportation needs, opportunities, and constraints identified in Uptown-West Loop study area, the following goals and objectives were established for the Uptown-West Loop Planning Study. The specific evaluation criteria that will be used to screen alternatives developed for the Uptown-West Loop Planning Study are based on the overall goals defined for the project. This process allows the METRO Board of Directors to assess the degree to which each alternative 1) addresses specific problems or deficiencies identified in the Purpose and Need, and 2) satisfies project goals. The transportation goals and objectives for the Uptown-West Loop Planning Study include the following:

Goals

- Increase ridership and improve mobility and access for existing and future transit riders, local residents, commuters, and travelers who have origins and/or destinations in the Uptown-West Loop area;

    a. Improve access to/from and within the study area by providing additional, faster and more reliable transit service
    b. Provide integrated, seamless transit connections to residential areas and major activity centers throughout the region
    c. Improve multi-modal access to the study area by better integrating the area's transit and highway systems, including important METRO facilities
    d. Support pedestrian linkages both within the study area and to adjacent communities

- Promote the operating efficiency of METRO services in the Uptown-West Loop area;

    a. Reduce delay for transit services within and through the study area
    b. Provide highway and street priority to transit services to the maximum extent possible without compromising the performance of the general traffic system
    c. Optimize the integration of transit services internal to the study area with other regional transit services.

- Develop cost-effective transportation improvements in the corridor;

    a. Design transit services and facilities to be consistent with expected transit markets
    b. Make maximum use of existing highway, street and transit resources
    c. Minimize project capital and operating costs by using innovative technologies and implementation and operating strategies (e.g. physical and service improvements that minimize human, material and financial resource requirements)

- Provide transportation improvements that enhance the urban environment and support the urban design initiatives of the Uptown/Galleria area;

    a. Identify transit alternatives that minimize impacts on immediate residential, recreational, commercial, shopping and other land uses and contribute to regional environmental goals (e.g., air quality improvement) and preserve ecologically sensitive areas and historic and cultural resources

b. Improve transit in ways that will encourage and support transit-friendly, pedestrian-oriented development
c. Provide transit service that supports and is consistent with the character of existing and future land use and development throughout the corridor
d. Provide stops/stations that encourage transit use and are compatible with and enhance the character of their surroundings
e. Integrate transit facility designs with urban design initiatives within the public ROW
f. Lay out and design alternatives to maximize the potential for joint development opportunities

The goals and objectives presented in this section of the Purpose and Need address specific issues identified in previous studies related to the corridor as well as integrate established goals and objectives developed as part of previous planning activities in the corridor. The goals and objectives also conform to METRO's Mobility 2025 Plan and the H-GAC 2022 MTP.

1.4 Specific Problems Related to the Study Area

1.4.1 Transit/Roadway Deficiencies

Inadequate north/south corridors in the study area limit how transit can serve the area. High Occupancy Vehicle (HOV) facilities are not available on IH-610W and there is no transfer center on the southern side of the study area to support commuter services. There are no routes west of Post Oak Blvd. that serve north/south transit needs from the NWTC to U.S. 59 and Westpark corridors. In the east/west direction there are no routes that provide direct access to the NWTC. Route 82, which serves Westheimer, links the Uptown/Galleria area with the Hillcroft Transit Center and Downtown.

Transit deficiencies that have been identified in the corridor and to be addressed in the planning study include the following:

- How to improve bus operations in congested mixed-flow traffic conditions
- How to integrate priority transit treatments
- How to improve service to the Uptown-West Loop study area from the US 290, IH-10, and U.S. 59 freeway HOV facilities
- How to enhance local bus service to and from the study area to other regional destinations during off peak periods

- How to improve connections to all activity centers
- Traffic congestion exacerbated by conflicts between local trips and through trips
- Improving commuter service
- An inadequate street network impacts service
- Poor pedestrian connections and intersection crossings provide inadequate access and development is mostly internalized in favor of auto access

Roadway linkage deficiencies contribute to the increased traffic congestion in the area. IH-610W is the only high capacity north-south facility that provides access to the U.S. 59 and IH-10 in the study area. Currently IH-610W is operating above its capacity limits. Volume on IH-610W is continuing to increase each year, causing excessive delays. Capacity constraints on this facility increase the duration of both a.m. and p.m. peak travel and aggravate congestion within the study area arterial network. TxDOT's Environmental Assessment, Interstate Highway 610 West Loop Study, which was conducted in 1991, states that IH-610W was designed for 150,000 ADT. The current ADT for IH-610W is over 275,000. The volume is expected to grow to 350,000 ADT by 2020 as stated by the Texas Transportation Institute in July 1998 and the H-GAC Vision 2020 completed in 1997. The increased traffic volume combined with weaving problems associated with ingress and egress from IH-610W contribute to the increased congestion and poor level of service which adversely impacts transit service in the study area.

1.4.2 Linkage deficiencies

Direct transit service to and from the Uptown-West Loop study area is limited. Transfers, an inadequate street network, mixed-flow traffic conditions and unreliable travel times, impact study area transit service. Currently, there are two transit centers providing service in the vicinity of the study area. The NWTC has three bus lines while the Hillcroft Transit Center has one bus line that serves the study area. Routes 93, 283, 284 and 285 provide service on Post Oak Blvd., however, only the 33, 93 and 285 serve the NWTC. Route 82, Westheimer, provides service from the Hillcroft Transit Center to Post Oak Blvd. via Westheimer. There is no direct connection between the two transit centers. Projected growth in trip volumes from the west and southwestern edge of the service area to the study area suggests a need for an additional transit center on the south side of the Uptown-West Loop study area.

Other than IH-610W, there are limited alternative north/south major thoroughfare routes available in the study area impacting both transit and auto access and circulation. Chimney Rock is the nearest major thoroughfare in the vicinity west of IH-610W that provides a north/south corridor from U.S. 59 to IH-10. However, Chimney Rock is over two miles from IH-610W. A preferable network would include a major north/south corridor, which could serve as an alternative route to IH-610W within one mile.

Sage is within one mile of IH-610W and provides access from U.S. 59 to Woodway Dr., however, it is not feasible to extend Sage to IH-10 due to the unavailability of ROW. The secondary street network and collector system is equally deficient. Due in part to unique topography and development patterns, the secondary system is limited in access and contributes to heavy congestion at intersections with major thoroughfares. It is this linkage deficiency that exacerbates the capacity problems throughout the study area and highlights the need for transit improvements for the Uptown-West Loop area.

1.4.3 Air Quality Concerns

As with other large U.S. metropolitan areas, combined factors of population, economic growth, traffic congestion and meteorological conditions have led to severe air quality problems. For many years, the Houston region has been in the non-attainment category with federal air quality standards for ground-level ozone. This has prompted the adoption of a variety of measures designed to help bring the region into compliance with Clean Air Act Amendments (CAAA) of 1997 air quality standards, including the one-hour ozone standard by 2007, 8-hour ozone standard by 2010, and new fine particulate matter standards.

In the long term, regional growth, congestion and air quality issues are at least partially addressed via the transportation planning process. The long range plan for transportation improvements in the Houston-Galveston region is known as the Metropolitan Transportation Plan (MTP).[8] H-GAC is responsible for coordinating the participation of local governments to ensure the conformance of the MTP with on-road mobile source emissions reductions contained in the SIP. H-GAC has developed five programs to assist the region in attaining compliance with federal air quality standards for ground-level ozone pollution: Clean Air Action, Clean Cities, Commute Solutions, Area Emission Reduction Credit Organization, and Regional Air

[8] Houston-Galveston Area Council, February 25, 2000. The area covered by the 2022 MTP includes eight counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller. This region is designated as the Houston-Galveston Transportation Management Area (TMA).

Quality Planning Committee. Each program aims to comply with the air quality standards by focusing on specific sources of pollution. For instance, the Clean Cities program promotes the early acquisition of clean-fueled vehicles in order to accelerate compliance and stimulate the development of a regional alternative-refueling system. Approved alternative fuels include compressed and liquefied natural gas, methanol or methanol-gasoline blends, ethanol or ethanol-gasoline blends, and electricity.

The currently adopted MTP identifies and addresses the transportation and air quality needs of the region through the year 2022. A 2025 update of the Plan is currently underway. The MTP is a multimodal plan that describes needed improvements for modes as diverse as cars, trucks, public transit, bicycles, and pedestrian. As such, the MTP forms the basis for transportation planning activities within the region and determines the nature of the future transportation system.

1.4.4 Other Issues

The Uptown-West Loop Planning Study presents a challenge in quantifying travel demand within the study area. Due to the large number of office, hotel, retail and entertainment sites that generate trips during off-peak hours, there is a significant travel market that needs to be addressed. These non-home based trips generated could amount to a significant portion of total trips within the study area.

Non-home based trips internal to the study area could be assumed to take place based on a “park-once” philosophy. Once an individual parks their vehicle, subsequent trips made during mid-day hours could be accommodated by the collection/distribution function of prospective alternatives for the Uptown-West Loop Planning Study. The underlying assumptions would be a high-level of transit service during off-peak hours with more frequent service and incentives to use long-term parking.

1.4.5 Specific Problems that Potential Alternatives Would Alleviate

Potential transit improvements for the Uptown-West Loop study area should address the following issues:

- Improve transit access, visual identity, and schedule reliability
- Improve travel time savings relative to other competing modes
- Congestion at key intersections
- Serve distinct travel markets
    - IH-10, IH-610W, Westpark Tollroad and U.S. 59 line-haul services

- Uptown Houston internal collection/distribution needs
- Enhance the pedestrian environment and provide high-quality linkages
- Establish the framework to better serve existing and future development in a transit-supportive manner

1.5 Consistency with Local, State, and Federal Planning Process

1.5.1 Agencies Involved in the Corridor Planning Process

All agencies identified in this section were contacted during the Uptown-West Loop Planning Study process. Many of these agencies participated directly in the scoping process and Interagency Steering Committee. Others agencies were contacted as appropriate during the study process:

Federal Agencies:

- Federal Aviation Administration (FAA)
- Federal Highway Administration (FHWA)
- Federal Transit Administration (FTA)
- US Army Corps of Engineers (COE)
- US Environmental Protection Agency (EPA)
- US Coast Guard
- US Fish and Wildlife Service
- US Geological Survey

State Agencies:

- Texas Department of Transportation (TxDOT)
- Texas General Land Office
- Texas Historical Commission
- Texas Natural Resource Conservation Commission
- Texas Parks and Wildlife

Regional Agencies:

- Houston-Galveston Area Council (H-GAC)

Local Agencies:

- City of Houston (Departments: Planning, Parks, Public Works & Engineering, Air Quality, Airport System, and Police)
- Harris County (Departments: Flood Control District and Public Infrastructure)
- Houston Archeological and Historical Commission
- Houston-Harris County Agency on Aging

Other Public Agencies:

- Harris County Toll Road Authority
- Uptown Houston District / Reinvestment Zone Number 16

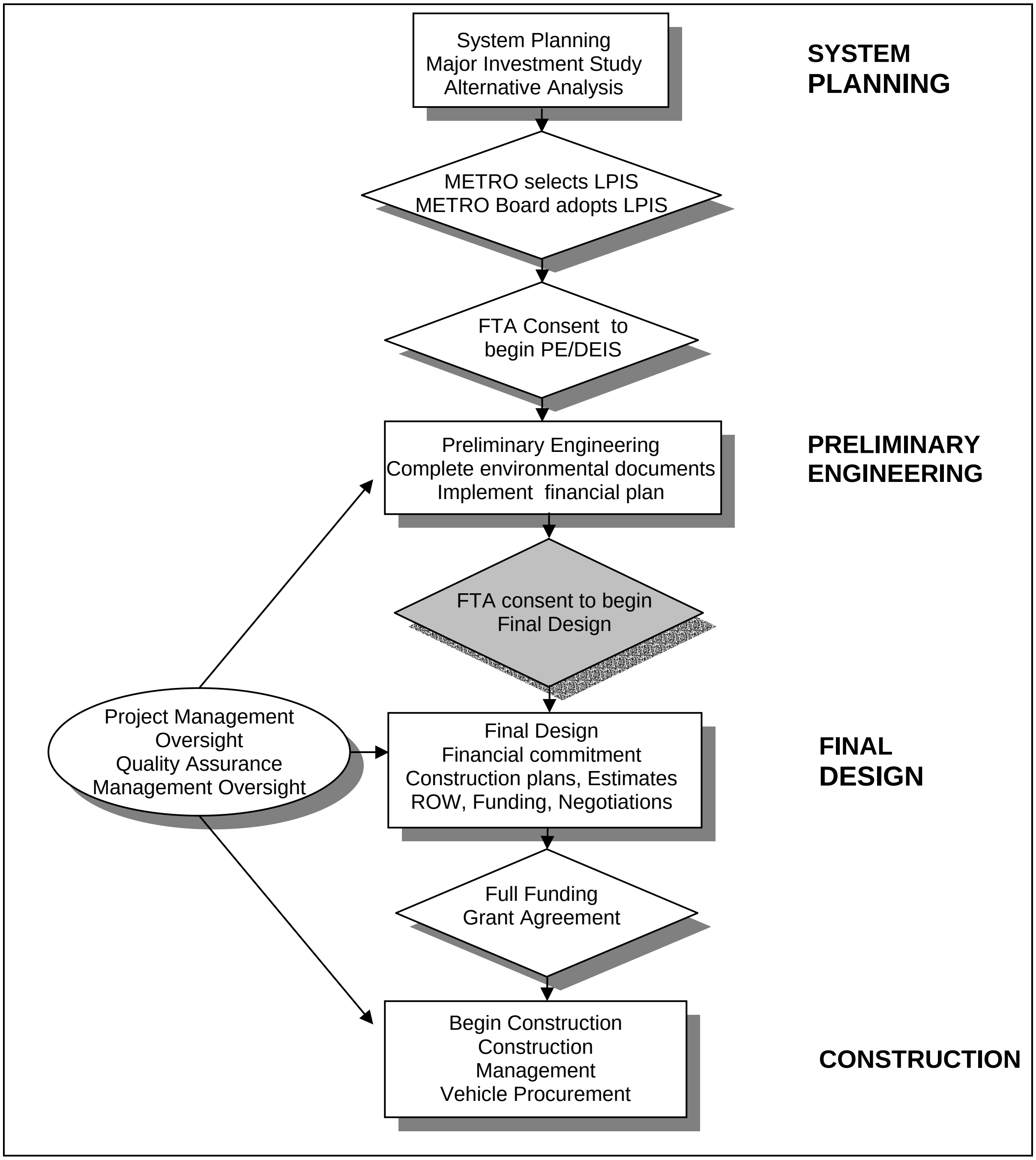
1.5.2 Role of the AA in the Project Development Process

For consideration and eligibility for FTA capital investment funds designed for a New Starts project, the proposed improvements must emerge from local and/or statewide planning processes. This requirement obliges METRO to perform a corridor-level analysis of mode and alignment alternatives. To this end, METRO is preparing an Alternatives Analysis (AA) in accordance with NEPA for the Uptown-West Loop Planning Study. The project scope for the Uptown-West Loop Planning Study, of which the AA is a component, has been prepared and approved by METRO. The planning study includes development, public involvement, initial screening and refinement and evaluation of transportation alternatives appropriate to the corridor through the AA process. This includes the production of detailed information on the potential benefits, costs, and impacts associated with specific alternatives under review and providing a basis for decision making for the eventual production of a Locally Preferred Investment Strategy (LPIS). If the LPIS includes a Build Alternative, it will be moved forward in the process with the preparation of a Draft Environmental Impact Statement (DEIS). Please refer to Figure 1.14 for a graphical description of the project development process.

METRO endeavored to ensure that all issues related to the project were addressed in the Planning Study and that all concerns were identified early in the development and evaluation of alternatives. Public involvement is an extensive activity that is continued throughout the planning process, enabling the public to be involved fully in the development and evaluation of the alternatives. The AA process actively seeks solutions to transportation issues common to the entire study area. The AA process and LPIS recommendation are the synthesis of the exploration and analysis of the issues. The AA process addressed the following isssues:

1) Identification of exclusive transit corridor to improve reliability and travel time;
2) Pervasive congestion at key intersections;
3) The recognition of distinct market connections (i.e. IH-10, IH-610W, Westpark Toll Road, U.S. 59, line-haul services and Uptown-West Loop collection/distribution systems);
4) Pedestrian environment and linkages;
5) Transit impacts on development; and
6) Conservation of Memorial Park and other sensitive land uses.

FIGURE 1.14
PROJECT DEVELOPMENT PROCESS



1.5.3 Documentation of the Consistency with Planning Process

The planning process employed for the preparation of the Uptown-West Loop AA conforms to the uniform approach developed by METRO for all corridor evaluations in the service area. As required by federal project development processes, the planning approach or framework is consistent with TEA-21 relative to major transportation investments requiring federal funds. The planning process conforms to and is consistent with the MTP and the Transportation Improvement Program (TIP), which are developed by H-GAC, the regional MPO. The information analyzed during the planning process will be documented in a final report and presented to METRO's Board of Directors for selection of the LPIS to be included in the MTP. The MTP forms the basis for transportation planning activities within the region and determines the nature of the future transportation system.

Goals and objectives developed in the Uptown-West Loop Planning Study are consistent with the overall goals presented in METRO Solutions and with those identified in the MTP.

1.5.4 Relationship to Other On-going Studies

The Uptown West-Loop Planning Study relates to several ongoing studies and may be affected by the outcomes and decisions resulting from these studies as described below:

METRO Solutions – METRO Solutions is a long-range plan that will recommend multiple transportation alternatives in major corridors throughout the region to provide choices in getting riders to their destinations. The plan will offer more connections and faster, shorter trips. The form or forms of high capacity transit in the corridors have not been determined (mode neutral). Currently, three detailed studies are underway to identify preferred transit improvements including this study. The other two corridors include:

- North-Hardy Corridor Alternatives Analysis (AA) – IH-14 North and Hardy Toll Road
- Southeast-Universities-Hobby Corridor Alternatives Analysis (AA) – Texas Southern University, University of Houston and Hobby Airport

Westheimer Corridor Mobility Study – This study is being conducted jointly by the H-GAC, TxDOT, Uptown Houston District and the Westchase District. The project goals are to address short-term traffic and operational issues affecting the corridor and to develop a long-term vision for the Westheimer corridor.

San Felipe Street reconstruction is underway. This project is a joint effort between the City of Houston and TIRZ # 16. Changes in the configuration of this major thoroughfare will affect any modeling being conducted as part of this study.

Inner Katy Transit Oriented Development Study – This study is being conducted jointly by the City of Houston and METRO. The anticipated outcome of this study is to identify potential economic development opportunities associated with transit development in the corridor and to develop consensus on a preliminary alignment and mode choice. This alignment will directly feed the NWTC which will anchor any potential alignment selected for Uptown-West Loop and offer connectivity to Downtown.

Uptown Master Plan (Vision) – The Uptown Houston District is completing a comprehensive plan aimed at improving overall mobility in the area. The plan consists of five basic components describing a systematic approach to create an efficient street grid and pedestrian network, improving existing streets, extending collector streets, improving intersections and transit routes, and implementing a parking management plan. The plan also includes design components intended to achieve livability and quality pedestrian environments.

Exhibit 1.1
Historic (1970-2000) Census Data

1970			1980			1990			2000		
Tract	Block Group	Pop	Tract	Block Group Pop		Tract	Block Group Pop		Tract	Block Group	Pop
419	all	3,485	419.01	3	3,333	419.01	1	3,975	4319	1	4,264
	1		419.02	1,2		419.02	1,2		4116	1,2	
	2										
	3										
420	2,3,4,5	11,545	420.01	all	9,824	420.01	all	11,213	4317	all	12,787
			420.02	2		420.02	1,2		4113	1,2	
			420.03	all		420.03	all		4318	all	
421	1,2,3	2,894	421	1,2,3	3,268	421	1,2,3	3,231	4301	1,2,3	4,300
422	1	814	422.01	1	877	422.01	1	1,005	4316	1	994
423	1,2	3,847	423.04	1	2,990	423.04	1	2,622	4320	1	2,159
	1		423.05	2*		423.05	1		4327	1	
	2*										
		22,585			20,292			22,046			24,504

Source: US Census Bureau, 1970-2000

Exhibit 1.2
Census 2000 and H-GAC TAZ 2000 Comparison

2000 Census Tract	Census 2000 Population	TAZ	H-GAC Projected 2000 Population	Census / H-GAC Population Difference
4319	2,063	932	7	(815)
		933	748	
		934	271	
		935	1,852	
4116	2,201	936	2,185	16
4317	4,206	944	1,494	152
		945	2,560	
4113	3,972	946	751	232
		947	625	
		948	2,364	
4318	4,609	949	3,013	(372)
		950	424	
		951	753	
		2622	368	
		2623	423	
4301	4,300	952	1,312	318
		953	1,311	
		954	1,324	
		955	35	
4316	994	957	1,000	(6)
4320	708	969	1,114	(406)
4327	1,451	972	1,827	(376)
	25,761		24,504	1,257

Source: US Census Bureau, 1970-2000 and H-GAC, 2000-2025

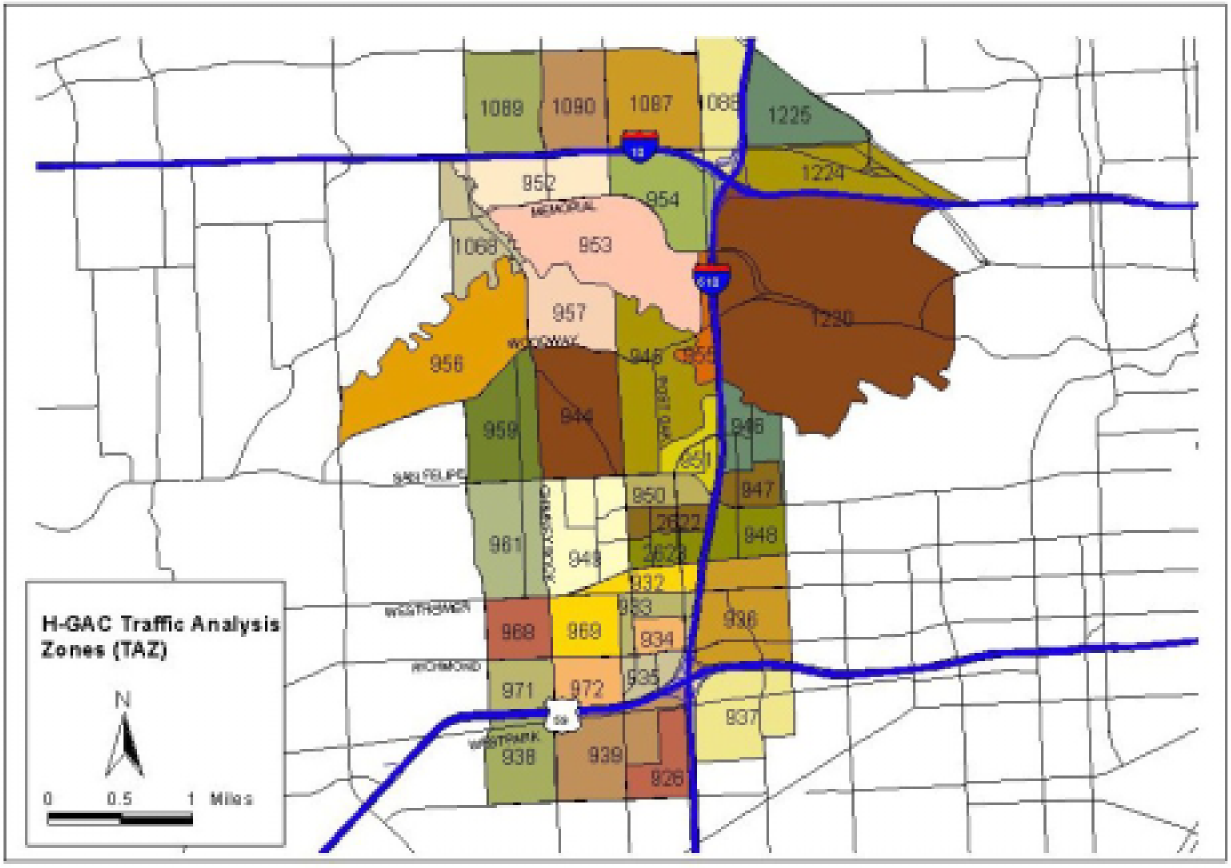
Exhibit 1.3
2025 Baseline Checklist -- Uptown Corridor Routes

This is a checklist of routes in the 2025 Baseline Route Network that cross or otherwise		
travel within some portion of the Uptown-West Loop study area		
Revised 12/1/01		
Route	Name	Branch
17	Gulfton	
17	Tanglewood	
20	Long Point	Memorial City Branch
20	Long Point	Memorial City Brand (via Katy-CBD Ramp)
20	Long Point	Neuens Branch
20	Long Point	Neuens Branch (Via Katy-CBD Ramp)
25	Richmond	Sharpstown
25	Richmond	West Oaks
33	Post Oak Crosstown	Fuqua Branch
33	Post Oak Crosstown	Ridgemont Branch
35	Fairview	
36	Lawndale	Wayside Branch
36	Lawndale	
38	Renwick Crosstown	
40	Pecore	Northwest Mall Branch
43	Pinemont Plaza	
49	Chimney Rock Crosstown	
53	Westheimer Limited	Brair Forest
58	Hammerly	Via Freeway
58	Hammerly	Via Freeway, when Katy-CBD Ramp is Open
58	Hammerly	
65	Bissonnet	Via Freeway
65	Bissonnet	Via Westwood P&R
65	Bissonnet	
70	Memorial	
72	Westview	
73	Bellfort Crosstown	Medical Center Turnback Trips
73	Bellfort Crosstown	
82	Westheimer	Dairy Ashford Branch
82	Westheimer	West Oaks Branch
82	Westheimer	Woodlake Branch
85	Antoine	Via Freeway
85	Antoine	Via Freeway, when Katy-CBD Ramp is Open
85	Antoine	via Washington
131	Memorial Express	Midday
131	Memorial Express	via Gessner (via HOV)
131	Memorial Express	via West Belt (via HOV)
132	Harwin Express	Cook Road Branch (AM)
132	Harwin Express	Mission Bend Branch (AM)

163	Fondren Express	Airport Branch (AM)
163	Fondren Express	Missouri City Branch (AM)
210	West Belt Park & Ride	AM
210	West Belt Park & Ride	AM, when Katy-CBD Ramp is Open
214	Northwest Station Park & Ride	AM
214	Northwest Station Park & Ride	AM, when Katy-CBD Ramp is Open
216	West Little York / Pinemont Park & Ride	AM
216	West Little York / Pinemont Park & Ride	AM, when Katy-CBD Ramp is Open
219	Barker-Cypress Park & Ride	AM
219	Barker-Cypress Park & Ride	AM, when Katy-CBD Ramp is Open
221	Kingsland Park & Ride	AM
221	Kingsland Park & Ride	AM, when Katy-CBD Ramp is Open
228	Addicks Park & Ride	AM
228	Addicks Park & Ride	AM (via Shell / Connoco)
228	Addicks Park & Ride	AM (via Shell / Connoco, when Katy-CBD Ramp is Open)
228	Addicks Park & Ride	AM, when Katy-CBD Ramp is Open
261	West Loop Park & Ride	AM
262	Alief / Westwood Park & Ride	AM
262	Alief / Westwood Park & Ride	AM, via Houston Center
265	West Bellfort Park & Ride	AM
273	Gessner Park & Ride	AM
275	Mission Bend Park & Ride	AM
283	Kuykendahl-Greenway-Uptown Park & Ride	AM
284	Kingwood-Uptown / Greenway Park & Ride	AM
285	Kingsland / Addicks / Uptown-Greenway Park & Ride	AM
285	NWTC-Greenway Plaza Shuttle	AM
292	West Bellfort / Westwood / TMC Park & Ride	AM
298	Addicks / NWTC / TMC Park & Ride	AM
299	Bay Area-Uptown Park & Ride	AM
303	West Garage Shuttle	AM Peak
303	West Garage Shuttle	Midday
401	Newcastle Crosstown	
486	Buffalo Speedway Crosstown	
505	Fairfield Park & Ride	AM
513	Westchase Express	AM
561	Spring-Uptown Park & Ride	AM
562	Stuebner-Uptown Park & Ride	AM
564	Eastex-Uptown / Greenway Park & Ride	AM
570	Northwest Station-Uptown Park & Ride	AM
572	West Bellfort-Uptown Park & Ride	AM
602B	Woodlands Park & Ride	Uptown / Greenway
603B	Conroe Park & Ride	Uptown / Greenway

Source: METRO

Exhibit 1.4
H-GAC Traffic Analysis Zone (TAZ)



Source: METRO- Zonal aggregation based on H-GAC 2022 MTP, 2002

2.0 Alternatives Considered

This chapter describes the process by which the conceptual alternatives developed for the Uptown-West Loop Planning Study evolved since the commencement of the AA process.

An initial set of conceptual alternatives was developed and screened as described in this section. Descriptions of the alternatives and the reasons for either eliminating them or moving them forward for detailed analysis is provided.

2.1 No Build Alternative

The Scoping Results Report stated that the No Build Alternative would be assessed in the AA and subsequent DEIS. The No Build Alternative includes the existing and projected transportation highway and transit network for the METRO service area as identified in the 2025 MTP – which is an update to the 2022 MTP adopted February 2000 and updated in March 2002. This alternative provides the baseline for establishing the future environmental, social, and economic impacts for the Uptown-West Loop Planning Study. The No Build Alternative consists of committed, financially constrained construction projects, as identified in the FY 2002-04 TIP. For planning purposes, TIP projects are assumed to be programmed and in place for the No Build and all Build Alternatives. In addition, major transportation improvements supported by the taxing districts in their approval of the TIRZ within the study area are included in the assessment. Though not traditionally included in the TIP, specific TIRZ improvements may have a significant localized effects. The No Build, or baseline alternative, is fully developed and evaluated in the detailed analysis of alternatives. Please refer to Section 2.4 for a detailed description of the No Build Alternative.

2.2 Developing the Long List of Possible Build Alternatives

To address study area transportation needs, it is necessary to have a framework for comparing and assessing the advantages and disadvantages of each alternative. The FTA has developed guidelines for the AA process which present a methodology for developing a long list of all reasonable alternatives, then evaluating each alternative in a consistent manner to screen the list to those that will be examined in further detail. This screening process is performed so that resources are used in analyzing only those options that show promise in meeting the transportation goals of the study.

The process of evaluating the long list of conceptual alternatives identified at project inception has been a continuous process and will played a pivotal role in reaching the LPIS. The evaluation approach, established early in the process, was organized to allow consistent comparison of the alternatives, yet be flexible enough to discern differences in the various conceptual alternatives' attributes.

2.2.1 Conceptual Alternatives

Conceptual alternatives were developed for the Uptown-West Loop Planning Study through collaboration with interested individuals and organizations, as well as federal, state and local agencies, the determination of the purpose and need for transit improvements, and information from previous studies. The conceptual alternatives were developed and refined to include competing alignments and modes deemed appropriate for consideration.

System Concept for Alternatives

The conceptual alternatives presented in this report are conceived as a link to METRO's HOV system that bypasses freeway and arterial congestion and provides fast, convenient transit service into the Uptown-West Loop Study area. The alternatives proposed in this study would support both line-haul and collection/distribution functions in concert with regional access. The system concept supports the internal circulation needs of the corridor. The following guiding principles were followed in developing the conceptual alternatives:

- Support future connectivity to METRO Mobility 2025 System Plan
- Satisfy project goals and objectives
- Provide cost effective services
- Provide express connections for regional access
- Provide travel time savings
- Provide collection and distribution functions
- Provide for an improved pedestrian environment

2.2.2 Alternative Alignments

The conceptual alternatives developed for the Uptown-West Loop Planning Study include eight (8) alignments. These alignments served as the “long list” of conceptual alternatives. The alignments address a range of possible solutions to study area transportation problems and needs. The alignments also represent significant public interaction and comment received during the scoping phase of the project, collaboration among federal, state and local agencies, results from previous studies and logical routing to project terminus points. The conceptual alternative alignments have been presented to the public and comments have been documented. The following alignment descriptions include a conceptual alignment map and a general description of the routes running from the NWTC on the northern end of the study area to a proposed transit facility south of U.S. 59 and the Westpark Toll Road:

FIGURE 2.1
CONCEPTUAL ALTERNATIVE # 1

Description:

The alignment proceeds west from the present NWTC and along IH-10 ROW to Chimney Rock, then south along Chimney Rock to the Westpark Corridor; east on Westpark and terminating at a potential new transit center.

Variation: south on Chimney Rock to San Felipe; east to Post Oak Blvd. and continuing south on Post Oak Blvd. to U.S. 59; west on U.S. 59 frontage road to Sage Rd./S. Rice accessing Westpark Corridor and terminating at potential new transit center.

FIGURE 2.2
CONCEPTUAL ALTERNATIVE # 2

Description:

The alignment proceeds west from the present NWTC and along IH-10 ROW to Silber/Sage Rd., then south along an alignment extending from IH-10 to Sage Rd.; continue south on Sage Rd. to S. Rice and accessing Westpark Corridor and terminating at potential new transit center.

Variation: south on Sage Rd. to San Felipe; east to Post Oak Blvd. and continuing south on Post Oak Blvd. to U.S. 59; west on U.S. 59 frontage road to Sage Rd./S. Rice and accessing Westpark Corridor and terminating at potential new transit center.

FIGURE 2.3
CONCEPTUAL ALTERNATIVE # 3

Description:

The alignment proceeds south from the present NWTC on elevated structure above IH-10 and joins IH-610W ROW as an elevated facility in the center of IH-610W; south to a portal preserved by METRO at Post Oak Blvd. and emerging at-grade on Post Oak Blvd.; continuing south and accessing Westpark Corridor by sharing TxDOT ramps or separate facility (portal preservation – ROW has been preserved by others for potential future transit) and terminating at potential new transit center.

FIGURE 2.4
CONCEPTUAL ALTERNATIVE # 4

Description:

The alignment proceeds south from the present NWTC, crossing N. Post Oak Rd. bridge over IH-10 on a separate structure, and along N. Post Oak Rd. to Memorial Dr.; continuing south along IH-610W frontage road to Post Oak Blvd. via a split pair beginning at Uptown Park Blvd. – southbound on Uptown Park Blvd; northbound on IH-610W frontage road and re-joining at Post Oak Blvd.; continuing south on Post Oak Blvd. to U.S. 59; west on U.S. 59 frontage road to Sage Rd./S. Rice and accessing Westpark Corridor and terminating at potential new transit center.

FIGURE 2.5
CONCEPTUAL ALTERNATIVE # 5

Description:

The alignment proceeds south from the present NWTC, crossing N. Post Oak Rd. bridge over IH-10 on a separate structure, and along N. Post Oak Road to Memorial Dr. at-grade; alignment elevates to join the IH-610W ROW in the vicinity of Memorial Dr. as an elevated facility in the center of IH-610W; south to a portal preserved by METRO at Post Oak Blvd. and emerging at-grade on Post Oak Blvd.; continue south and accessing Westpark Corridor by sharing TxDOT ramps or separate facility (portal preservation – ROW preserved for potential future transit) and terminating at potential new transit center.

FIGURE 2.6
CONCEPTUAL ALTERNATIVE # 6

Description:

The alignment proceeds south from the present NWTC, crossing N. Post Oak Rd. bridge over IH-10 on a separate structure, and along N. Post Oak Rd. to Woodway Dr. at-grade; west at Woodway Dr.; south at S. Post Oak Ln. and east in the vicinity of San Felipe and continuing south on Post Oak Blvd. to U.S. 59; west on U.S. 59 frontage road to Sage Rd./S. Rice and accessing Westpark Corridor and terminating at potential new transit center.

FIGURE 2.7
CONCEPTUAL ALTERNATIVE # 7

Description:

The alignment proceeds from the present NWTC as a split pair. From NWTC - 1) southbound - south from the NWTC, crossing N. Post Oak Rd. bridge over IH-10 on a separate structure and along N. Post Oak Rd. and IH-610W frontage and rejoining at Post Oak Blvd. 2) northbound - east along Old Katy Rd. and crossing IH-10 to eastern IH-610W frontage road and running along Memorial Park to join at Post Oak Blvd.; Post Oak Blvd. to U.S. 59; west on U.S. 59 frontage road to Sage Rd./Rice and accessing Westpark Corridor and terminating at potential new transit center.

FIGURE 2.8
CONCEPTUAL ALTERNATIVE # 8

Description:

The alignment proceeds east from the present NWTC along Old Katy Ro. Corridor to connect to the Union Pacific Rail Road ROW; south through Memorial Park on Union Pacific Rail Road ROW; west via San Felipe to Post Oak Blvd. alignment to U.S. 59; west on U.S. 59 frontage road to Sage Rd./S. Rice and accessing Westpark Corridor and terminating at potential new transit center.

2.2.3 Alternative Modes/Technologies

The various high capacity transit modes/technologies considered for the Uptown-West Loop Planning Study possess the potential for implementation on any of the conceptual alignments presented in this chapter. While other transit technologies exist, only those considered suitable to the study area and the Houston region were initially screened. The various modes/technologies considered during the conceptual phase included the following:

AGT — Automated Guideway Transit (AGT), including Monorail and people movers, is a grade-separated guideway and medium to high capacity transit service generally used in specialized applications in the U.S. such as airports and theme parks.

BRT — Bus Rapid Transit (BRT) is a flexible, intermediate capacity, rubber-tired form of rapid transit that combines stations, guideway and Intelligent Transportation System (ITS) elements in an integrated system with a unique identity. BRT vehicles are typically powered by diesel or alternative fuels.

LRT — Light Rail Transit (LRT) is an intermediate capacity transit mode operating on steel tracks. LRT, integrating ITS elements, can operate on city streets, medians or on dedicated ROW such as a railroad alignment, elevated structures or tunnels. LRT vehicles are typically electrically powered from overhead.

HOV — High Occupancy Vehicle (HOV) lanes provide improved travel speed for transit buses and carpools. HOV lanes are typically constructed on freeways or as in-street separate facilities.

2.3 Screening the Long List of Conceptual Alternatives

The Screening and Evaluation Plan for the Uptown-West Loop Planning Study was developed early in the planning process. The process was predicated on a cooperative and collaborative effort whereby public agencies and the community assists in the development of a definition, identification of potential alternatives and the criteria to evaluate the alternatives. This process, referred to as scoping, was conducted in cooperation with the FTA, FHWA, TxDOT, and H-GAC. A series of meetings were held to encourage the active participation of the public and agencies early in the planning process, providing an opportunity to communicate issues and concerns to assist in the development of a viable range of conceptual alternatives before considerable resources were expended.

The scoping process defined the alternatives to be examined in the study, identified the impacts to be considered, and established the goals and objectives that would guide the evaluation of alternatives. The process also assisted in identifying the appropriate technical analysis to use for testing the performance of the alternatives. Scoping provided the framework for the screening and evaluation process.

The Screening and Evaluation Plan was developed for implementation in five basic phases. First, goals and objectives were developed for the Uptown-West Loop Planning Study. Next, performance criteria were established that could help distinguish the degree to which each alternative satisfies project goals. Initial screening was then undertaken to narrow the long list of conceptual alternatives into a manageable set of the most viable alternatives. Performance data was collected for the remaining alternatives. Finally, performance outcomes were summarized as findings that articulate discernable characteristics and the trade-offs required by each alternative for minimizing impacts, creating operational efficiencies, and satisfying project goals and objectives.

2.3.1 Transportation Goals and Objectives

Goals and objectives were established for the Uptown-West Loop Planning Study and reflect a wide variety of interests and perspectives that assist in effective screening and evaluation. The goals and objectives developed for this study reflect the objectives of METRO and input received during the initial public outreach efforts. They encompassed such issues as mobility and transit improvements, fostering more livable communities, economic development, and preserving or improving the environment and the quality of life in the study area. They were designed to reflect the transportation needs of the study area as well as provide potential solutions to address the specific needs. It is important to note that the goals encompassed more than transit issues, they also reflect quality of life related needs of the study area. See Section 1.3 of this report for a description of goals and objectives developed for the Uptown-West Loop Planning Study.

Upon establishing the project goals and objectives, criteria were developed to measure the degree to which each alternative meets the set of goals. The four basic categories of evaluation criteria, outlined below, and their measures of effectiveness were developed based on the project goals and objectives, input from local officials in concert with transportation professionals, the general public, and other interested parties. These measures of performance are the basis for the screening and evaluation. The selected criteria help identify commonalties, differences, and trade-offs between each conceptual alternative. Screening and evaluation criteria developed for the Uptown-West Loop Planning Study include:

1. Mobility/Access to Uptown-West Loop Area
   - Service to key origins and destinations
   - Number of transfers
   - Ridership potential
   - Speed/alignment route length
2. Efficient Transit Services
   - Increase transit service speed and reliability
   - Timing/implementation
3. Cost-Effective Improvements
   - Order of magnitude capital costs
4. Environmental and Community Impacts
   - Air quality
   - Neighborhood cohesion
   - Noise impacts
   - Visual impacts
   - Traffic impacts
   - Station area development potential

2.3.2 Screening of Alternatives

Before any in-depth evaluation of the alternatives was undertaken, an initial screening process was initiated to narrow the long list of conceptual alternatives being considered to a short list of conceptual alternatives. Narrowing the alternatives under consideration was achieved through screening out less promising alternatives – those that did not satisfy project goals or possessed major technical flaws. The initial process allows METRO to focus and allocate resources on the most viable alternatives.

While it is important to have a comprehensive set of alternatives at the onset – to address the full range of possible solutions directed at study area transportation problems – all of the alternatives could not be carried forward through the detailed evaluation phase as the amount of time and money spent collecting and analyzing the data would be enormous. Since many of the initial conceptual alternatives would be extremely difficult or expensive to implement, it became possible to eliminate these alternatives from the list before the first level of evaluation and analysis began.

In order to efficiently utilize limited study resources, it is necessary to quickly eliminate any alternatives that;

- have "fatal flaws," making implementation of the alternative difficult;
- are clearly inferior to all or most of the other alternatives, and therefore have little chance of selection;

2.3.3 Screening Matrix

A screening matrix was created to provide a visual representation of alignment performance relative to the established criteria and associated scoring. The matrix also allows easy comparison of each conceptual alignment against the other conceptual alignments. Scoring and ranking was accomplished by assigning a score of low, medium or high to each of the conceptual alignments for each performance criteria. The cumulative score for each conceptual alignment provided the ranking. Table 2.1 provides a description and rationale for the assignment of performance for each of the alternatives.

Matrix Ranking:	¸	Low	= 1
	½	Medium	= 2
	¹	High	= 3

Table 2.1:
Matrix – Initial Screening Results

	Evaluation Measures for Initial Screening	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8
1	**Mobility/Access to U/WL Area**								
	Service to key O/Ds	¸	¸	1	1	1	1	½	½
	Number of transfers	½	½	½	½	½	½	½	½
	Demand potential	¸	¸	½	1	1	1	½	½
	Speed/Alignment route length	¸	¸	1	½	1	¸	¸	¸
2	**Efficient Transit Services**								
	Increased transit service speed and reliability	¸	¸	1	1	1	½	¸	½
	Timing/Implementation	½	½	¸	½	¸	½	½	¸
3	**Cost-Effective Improvements**								
	Order of Magnitude Capital Costs	½	¸	¸	½	¸	½	¸	¸
4	**Environmental and Community Impacts**								
	Air Quality	½	½	½	½	½	½	½	½
	Neighborhood cohesion	½	¸	½	1	1	1	½	½
	Noise impacts	½	¸	½	½	½	½	½	½
	Visual impacts	1	¸	½	1	½	½	½	½
	Number of lanes impacted	¸	¸	½	¸	½	¸	¸	½
	Number of key intersections impacted	¸	¸	1	¸	½	¸	¸	½
	Station area development potential	¸	½	¸	½	¸	½	½	¸
	Score	22	18	29	31	30	28	23	24
	Ranking	**7**	**8**	**3**	**1**	**2**	**4**	**6**	**5**

Matrix Ranking:

¸	Low
½	Medium
1	High

2.3.4 Screening and Evaluation Results Summary

This section summarizes the results of the initial screening phase for the Uptown-West Loop Planning Study. Table 2.2, Results of Initial Screening, provides a summary of those conceptual alternatives were being carried forward for further analysis and identifies the conceptual alternatives that were eliminated from the study during initial screening.

Table 2.2
Results of Initial Screening

	Carried Forward for Further Evaluation	Eliminated in Initial Screening
Modes	ç Bus Rapid Transit (BRT) ç Light Rail Transit (LRT)	ç High Occupancy Vehicle (HOV) ç Automated Guideway Transit (AGT)
Alignments	ç Conceptual Alignment # 3 ç Conceptual Alignment # 4 ç Conceptual Alignment # 5 ç Conceptual Alignment # 6	ç Conceptual Alignment # 1 ç Conceptual Alignment # 2 ç Conceptual Alignment # 7 ç Conceptual Alignment # 8

Alignments

Common trade-offs occur between the effectiveness of an alternative (as determined by such measures as a potential increase in ridership, a decrease in pollutant levels, an increase in development, etc.) and its cost-effectiveness or financial feasibility. For instance, while one alternative might be particularly effective in meeting the transportation and land use goals of the area, the benefits it provides may be small when compared to the costs. At the same time, a different conceptual alternative might be more cost-effective, but may not meet other project goals and objectives as well as another conceptual alternative. Community support also plays a large role when looking at the trade-offs among conceptual alternatives and will become increasingly important when reviewing the short listed conceptual alternatives' performance.

The process of reviewing the performance of each conceptual alternative and assigning a relative score for each of the categories allows METRO to advance the most promising conceptual alternatives as they relate to project priorities and study goals and objectives. Scoring the alignments and identifying priorities was accomplished by reviewing each alignment's ability to effectively satisfy the criterion for each category. For each category, a benchmark was established that identified the low, moderate and high ranking assigned to each alignment. When it was determined that an alignment satisfied that criterion, it was given a rank of high. Generally, effective alignment performance had the following characteristics:

1. Mobility/Access to Uptown-West Loop Area:

   Service performance that achieved project goals by providing service to key activity centers in the study area (origins and destinations); reduced transfer requirements; its relationship and connectivity in context with METRO Mobility 2025; efficient route lengths and alignments between termini and; demand potential.

2. Efficient Transit Services:

   Service performance that achieved project goals by increasing transit service speed and *reliability* – by improving access, travel times savings relative to other competing modes, integration of transit services internal to the study area and with other regional transit services and schedule consistency; comparable timing and implementation of transit service improvements.

3. Cost-Effective Improvements:

   Service performance that achieved project goals by design of transit and facilities that are consistent with expected transit markets relative to cost; transit improvements that had potential to minimize project capital and operating costs by using innovative technologies and implementation and operating strategies.

4. Environmental and Community Impacts:

   Service performance that achieved project goals by minimizing negative impacts on immediate residential, recreational, commercial, shopping and other land uses and had the potential to contribute to regional environmental goals and preserves ecologically sensitive areas; transit service that had the greatest potential for community support and takes into account community preferences including visual and noise impacts; preferred service that provided minimal impact to existing traffic patterns and key intersections; preferred service that provided the highest potential for station area development, complemented and supported current and future corridor development and provided opportunities for joint development; transit service that provided the highest potential for encouraging and supporting transit-friendly, pedestrian-oriented development.

Alignment Analysis

The initial screening analysis for each alignment alternative is detailed below. Please refer to Table 2.1 (Matrix – Initial Screening Results) for specific alignment results.

- Alternative 1 - the alignment minimally met the transportation goals and objectives identified for the project. Mobility and access issues in the Uptown-West Loop area were not satisfied by this alignment. Additionally, demand potential, route speed and length, traffic impacts and economic development potential achieved low marks for this alignment. The alignment was eliminated from further consideration.
- Alternative 2 – the alignment minimally met the transportation goals and objectives identified for the project. The alignment offers negative environmental and community impacts, lower demand potential, and limited general corridor mobility and access to the Uptown-West Loop area. The alignment would have required extensive ROW acquisition. The alignment was eliminated from further consideration.
- Alternative 3 – the alignment is consistent with local improvement plans and previous studies. The alignment performed well relative to mobility and access to key activity centers. The alignment also performed well in terms of speed and environmental and community impacts, however, the alignment may yield little benefit to northern alignment neighborhoods while presenting potential negative impacts. The alignment was evaluated low for economic development potential and high capital costs. The alignment was carried forward for detailed evaluation.
- Alternative 4 – the alignment fulfilled the transportation goals and objectives identified for the project and is consistent with local improvement plans and previous studies. The alignment performed well in terms of improved mobility, access to key activity centers within the study area and efficient transit service. Community impacts were nominal with this alignment. There were potential park impacts along Memorial Park and Uptown Park with this alignment. The alignment, due to its at-grade nature, had the potential for increased economic development opportunities, but may increase traffic impacts compared to aerial

alignments. Lower capital costs were assumed with this alignment. The alignment was carried forward for detailed evaluation.

- Alternative 5 – the alignment fulfilled the transportation goals and objectives identified for the project and was consistent with local improvement plans and previous studies. Relative to other alignments under consideration, this alignment minimized conflict with auto traffic, service speed and reliability, mobility and access, and community needs. The alignment was evaluated low for economic development potential and high capital costs. The alignment was carried forward for detailed evaluation.
- Alternative 6 - the alignment was consistent with local plans and meets the majority of transportation goals and objectives identified for the project. The alignment performed well relative to mobility and access to key activity centers. Lower relative capital costs were associated with this alignment. The alignment would have significant speed and traffic penalties due to limited ROW, constrained turning radii, and potential community issues. The alignment was carried forward for detailed evaluation.
- Alternative 7 - the alignment minimally met the transportation goals and objectives identified for the project. The alignment was characterized by an operationally undesirable split pair service configuration that will significantly increase capital costs. Mobility and access issues in the Uptown-West Loop area were not served by this alignment. The at-grade alignment had the potential for increased economic development opportunities, but may increase traffic impacts. The alignment was eliminated from further consideration.
- Alternative 8 - the alignment minimally met the transportation goals and objectives identified for the project. Mobility and access issues in the Uptown-West Loop area were not served by this alignment and it provides inferior service coverage. Demand potential, route speed and length, traffic impacts and economic development potential received low marks for this alignment. Increased route length significantly impacted capital costs. The alignment was eliminated from further consideration.

Through the screening process, four alignments were selected for advancement into the detailed analysis phase. The alignments were chosen according to the ranking assigned in the initial screening process – see Table 2.1 Matrix – Initial Screening. The conceptual alternatives shown below are ranked in order of their performance after screening. The conceptual alternatives showing the greatest promise are in bold:

Table 2.3
Alignment Scoring

Rank	Score	Alignment
1	**31**	**Conceptual Alignment # 4**
2	**30**	**Conceptual Alignment # 5**
3	**29**	**Conceptual Alignment # 3**
4	**28**	**Conceptual Alignment # 6**
5	24	Conceptual Alignment # 8
6	23	Conceptual Alignment # 7
7	22	Conceptual Alignment # 1
8	18	Conceptual Alignment # 2

Although Alignment 3 performed well initially, several elements compromised the conceptual alignment's capacity for potential implementation. For future regional connectivity in a system plan and planned improvements to IH-10, sufficient preliminary engineering was required to determine the feasibility and constructability of alignments connecting to the NWTC. Alignment 3, as proposed, contained significant potential operational and engineering constraints resulting from planned improvements to IH-10, and design constraints due to the required reconfiguration of the NWTC, thus meriting the alternative's elimination. Access to the NWTC would require an elevated structure with a turning radius and gradient not consistent with planned operations and potential connections to the regional transit network envisioned as part of METRO Mobility 2025. Elevated facilities above the IH-610W profile also received negative community reaction. However, it may be necessary to re-examine a variation to an alternative that uses an aerial entry into the NWTC. This is due to the fact the remaining conceptual alignments moving forward for further analysis all provide service along N. Post Oak Rd.

As the selected conceptual alternatives moved through the detailed analysis phase, the alignments were divided into segments for evaluating their performance in terms of engineering, operations, traffic impacts, relative cost and environmental and community impacts. The plan was to match the best performing segments that minimize impacts, create operational efficiencies, and satisfy project goals and objectives. The segments were divided along major thoroughfares that intersect the alignments at points where major distinctions in the conceptual alternatives occur. The segments are as follows:

- **Segment 1** - NWTC to Memorial Dr.
- **Segment 2** - Memorial Dr. to San Felipe
  - 2A - via S. Post Oak Ln.
  - 2B - via IH-610W elevated facility
  - 2C - via IH-610W frontage road (with variations)
- **Segment 3** - San Felipe to Richmond Ave.
- **Segment 4** – Richmond Ave. to Proposed Transit Center
  - 4A - via TxDOT ramps or separate facility (portal preservation)
  - 4B – via U.S. 59 frontage road to S. Rice/Sage Rd.

Modes/Technologies

The initial screening of the various AHCT modes/technologies considered for the Uptown-West Loop Planning Study presented discernable differences in their ability to satisfy project goals, system requirements and their appropriateness for the Houston market.

HOV lanes, as an AHCT technology, was eliminated from the study for further consideration. HOV transit service did not meet the goals and objectives identified for this project. HOV transit service was examined in the previous West Loop MIS and performed poorly.

AGT, as an AHCT technology, was eliminated from the study for further consideration. AGT minimally met some of the project goals and objectives However, grade-separated technologies are consistent with the Uptown Houston District's vision or neighborhood input. AGT technologies are not as cost-effective as the other technologies being considered due to significantly higher capital costs, reduced ridership potential associated with fewer stations and the lack of evidence supporting economic development with this technology. Further, AGT was incompatible with other forms of transit technology in Houston. Therefore, AGT was assessed as low performing.

Of the AHCT technologies examined, LRT and BRT had superior performance during the initial screening of conceptual alternatives and may be considered cost-effective, high-quality rapid transit technologies that could be implemented in the corridor. Each technology was able to satisfy existing and future system requirements and project goals and objectives. Both modes/technologies could serve the distinct travel markets identified in the study, provide economic development potential, and link the key activity centers via conceptual alignments developed for the corridor. Operationally, they performed similarly. Both modes/technologies were moved forward for further analysis and were considered for each alignment in the detailed analysis of alternatives.

2.3.5 Summary

Alternatives Selected for Detailed Analysis:

- Alternative 4
- Alternative 5
- Alternative 6

The following section defines and describes, in detail, the operational characteristics and requirements of each alternative. It also describes the development of an elevated alternative that was proposed to overcome engineering and operational constraints related to future system connections at the NWTC.

2.4 Alternatives Carried Forward – Short List

2.4.1 No Build Alternative

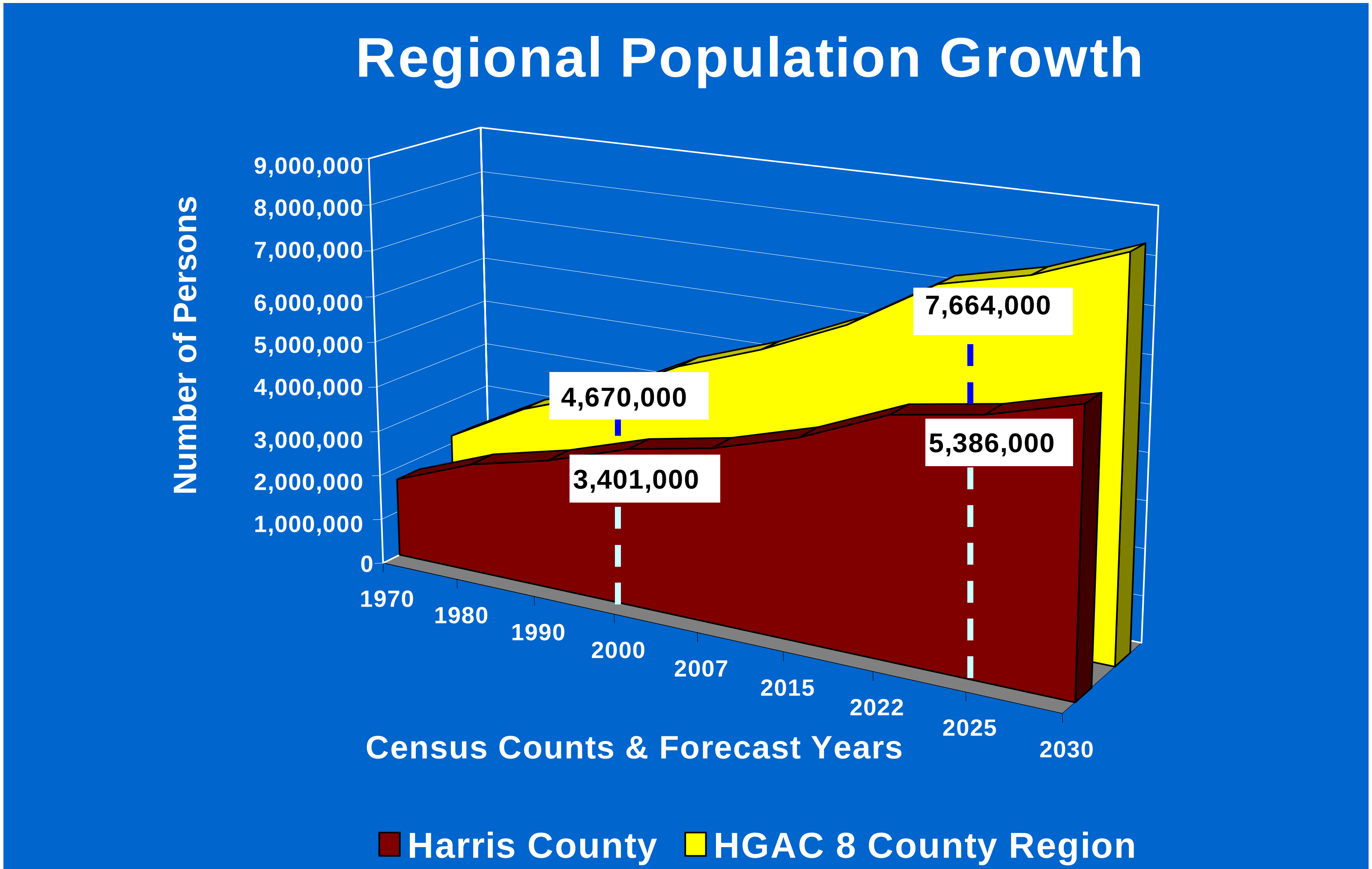
The No Build Alternative includes the METRO transit services and facilities that were programmed to be in operation in FY 2007 and the regional roadway/highway system that was programmed to be in place in 2022. The definition of the No Build Alternative was discussed with the FTA during its development. A subsequent review concluded with a verbal approval of the concept from the FTA (conference calls held with FTA staff in the first quarter of 2002). It includes the implementation of the Downtown to Reliant Park light rail service, starting in January 2004, but incorporates no other new high capacity transit services. In addition to METRO service, the No Build Alternative includes bus service into Houston provided by the Brazos Transit District (Woodlands Service) and TREKEXPRESS (Fort Bend County/U.S. 59 South). These services are listed in Exhibit 2.1 at the end of this chapter. Exhibit 2.2 presents METRO's transit capital facilities. Roadway improvements included in the No Build Alternative, except for IH-45 North where future improvements were removed to test multiple IH-45 highway options, are identified in the H-GAC 2022 MTP (Adopted February 25, 2000). As a result, all highway elements in the IH-45 North and Hardy Toll Road corridors represent a FY 2007 level of investment.

The transit service and roadway improvements included in the No Build Alternative respond to the substantial increase in the region's population and employment (Figures 2.9 and 2.10). In 20 years, the Houston area will have two million more people and add over one million new jobs.[1] In addition, the number of motor vehicles registered in the eight-county region is expected to increase from 3.3 million in 1996 to 10.6 million in 2020.[2] The additional trips generated by the new residents and jobs and the three-fold increase in motor vehicles will aggravate congestion on the regional roadway system that will need to be mitigated by multiple types of transportation projects.

Accommodating this growth will require a team effort, with all transportation agencies aggressively making improvements. METRO intends to accommodate the increased demand for transit by initiating new bus routes, bus route enhancements, constructing new transit facilities, and implementing a network of AHCT. In addition, TxDOT and the Harris County Toll Road Authority (HCTRA) plan to increase regional freeway and tollway lane miles by 35 percent over the next 20 years.

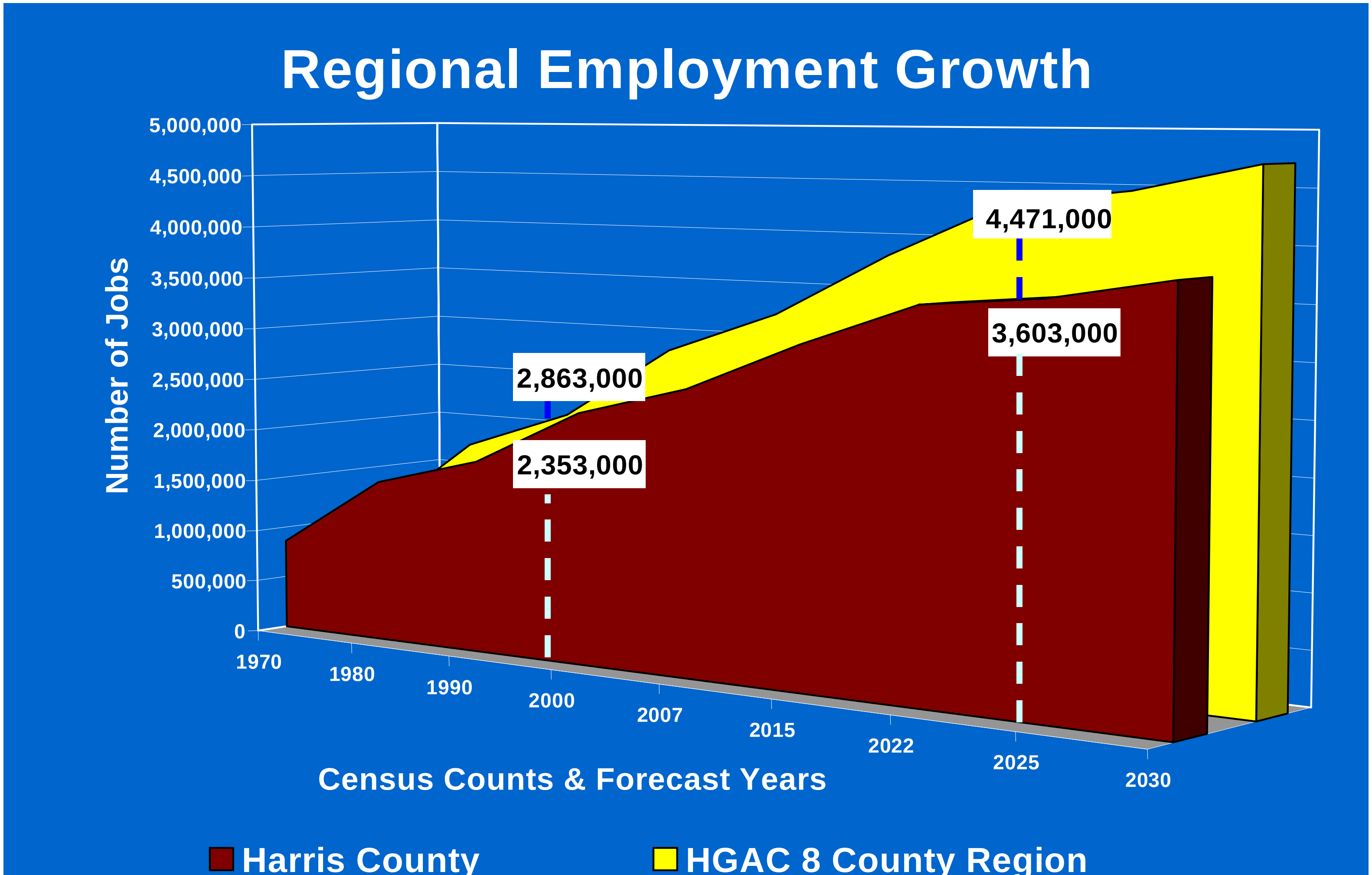
[1] Houston-Galveston Area Council, Transportation Department, January 2003.
[2] 2022 Metropolitan Transportation Plan, Houston-Galveston Area Council, February 25, 2000, Section 7.3, Regional Roadway System, pg. 59. This projected growth assumes an average annual increase of nine percent.

FIGURE 2.9
REGIONAL POPULATION GROWTH (1970 – 2030)



Source: (1970-1990) U.S. Bureau of Census, Profile of General Demographic Characteristics; (2000) U.S. Census Bureau, Census 2000 Summary File 2, current as of January 21, 2003; (2025) H-GAC-endorsed forecasts prepared by REMI Policy Insight, 2007-2030 Forecasts, January 9, 2003.

FIGURE 2.10
REGIONAL EMPLOYMENT GROWTH (1970 – 2030)



Source: (1970-2000) U.S. Bureau of Census, Socioeconomic Characteristics, provided by H-GAC; (2007-2030) H-GAC-endorsed forecasts prepared by REMI Policy Insight, 2007-2030 Forecasts, January 9, 2003.

Existing METRO Service and Programmed Improvements

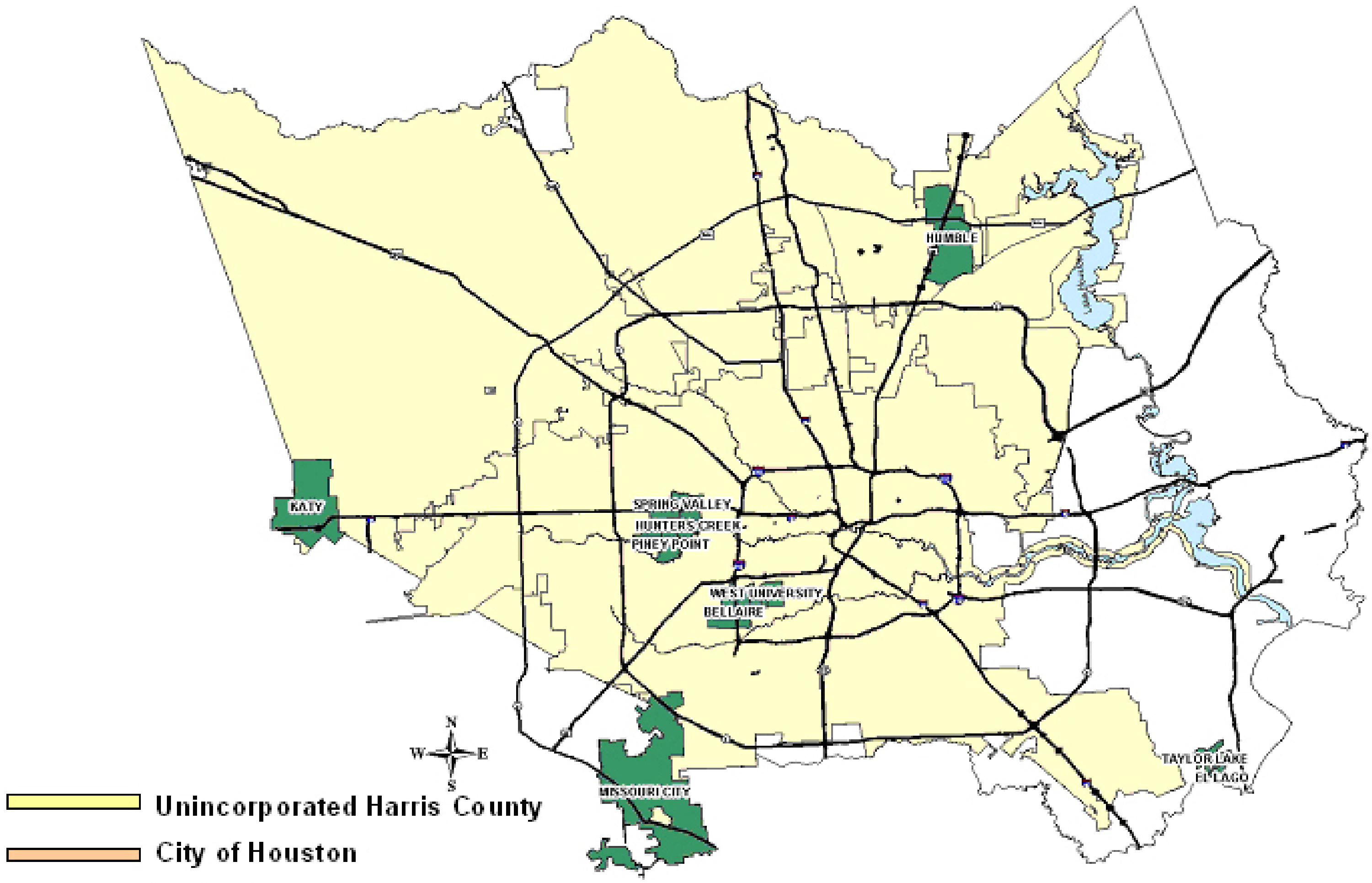
METRO's service area encompasses 1,285 square miles comprising most of Harris County and small portions of Fort Bend, Waller, and Montgomery counties (Figure 2.11). METRO provides approximately 6,700 route miles of service using over 1,450 buses on fixed-routes and special events service (such as sporting and community event shuttles). METRO operates bus service seven days per week, with weekday service operating from 3:47am (first bus in revenue service) to 2:27am (last bus in revenue service), weekdays. The span of service is less on weekends. As part of the fixed route system, METRO operates 36 commuter routes (express and park-and-ride) that serve the Central Business District (CBD) and other major, regional employment centers, primarily weekdays, during peak periods. METRO's fixed route services are listed by route, by type of service, and by peak/off-peak service frequencies in Exhibit 2.1. In addition, METRO offers paratransit services for the senior and disabled communities utilizing 118 vans and 124 sedans. METRO, in conjunction with TxDOT, has funded and constructed over 100 miles of HOV lanes on six freeways that METRO uses for many of its commuter routes.[3]

In FY2002, METRO carried over 97 million annual boardings on all fixed route and special bus services. In addition, over 20 million person trips in carpools and vanpools on METRO's HOV lanes contributed to systemwide annual boardings.[4]

In January 2004, METRO will began operating the Downtown to Reliant Park light rail line with 16 stations, including one new Park & Ride lot, two transit centers and a new light rail maintenance and storage facility (Figure 2.12). Light rail service will operate seven days per week, with weekday service operating from 4:30am and 12:38am. The span of service will be somewhat reduced on weekends. During peak periods, light rail is proposed to operate at six-minute intervals. In addition, METRO plans to provide a shuttle between Smith Lands Station and Hermann Park/Rice Station offering three-minute peak headways to the Texas Medical Center. During midday, light rail service will operate at six-minute intervals, increasing to 12 and 18 minutes during evenings and weekends, respectively.

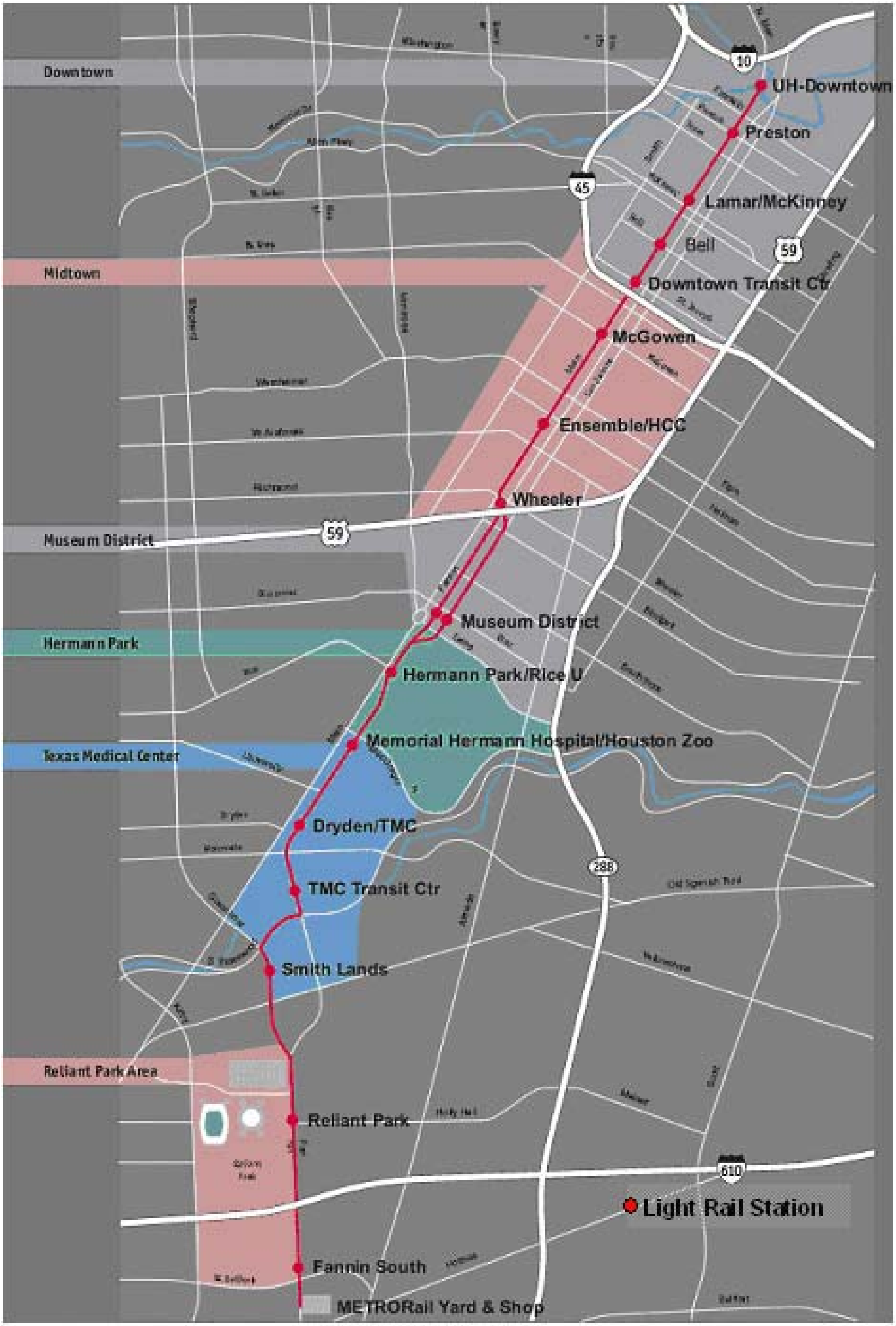
[3] HOV lanes operate between 5:00am and 11:00am and between 2:00pm and 8:00pm weekdays. The HOV lanes on the Katy Freeway are operational on Saturday and Sunday as well.
[4] METRO Office of Management & Budget Department, January 27, 2003.

FIGURE 2.11
METRO SERVICE AREA



Source: METRO Transit System Analysis, 03/18/03
Base Map, METRO GIS & Cartography

FIGURE 2.12
DOWNTOWN TO RELIANT PARK LIGHT RAIL LINE



Source: METRO Marketing & Communications 2003

Concurrent with the operation of light rail, METRO has programmed bus service improvements that include route alignment and service frequency modifications. All of these improvements are included in the No Build Alternative for this study. The No Build bus routes are presented in Figure 2.13. Overall, the service improvements will change the existing system as indicated in Table 2.4.

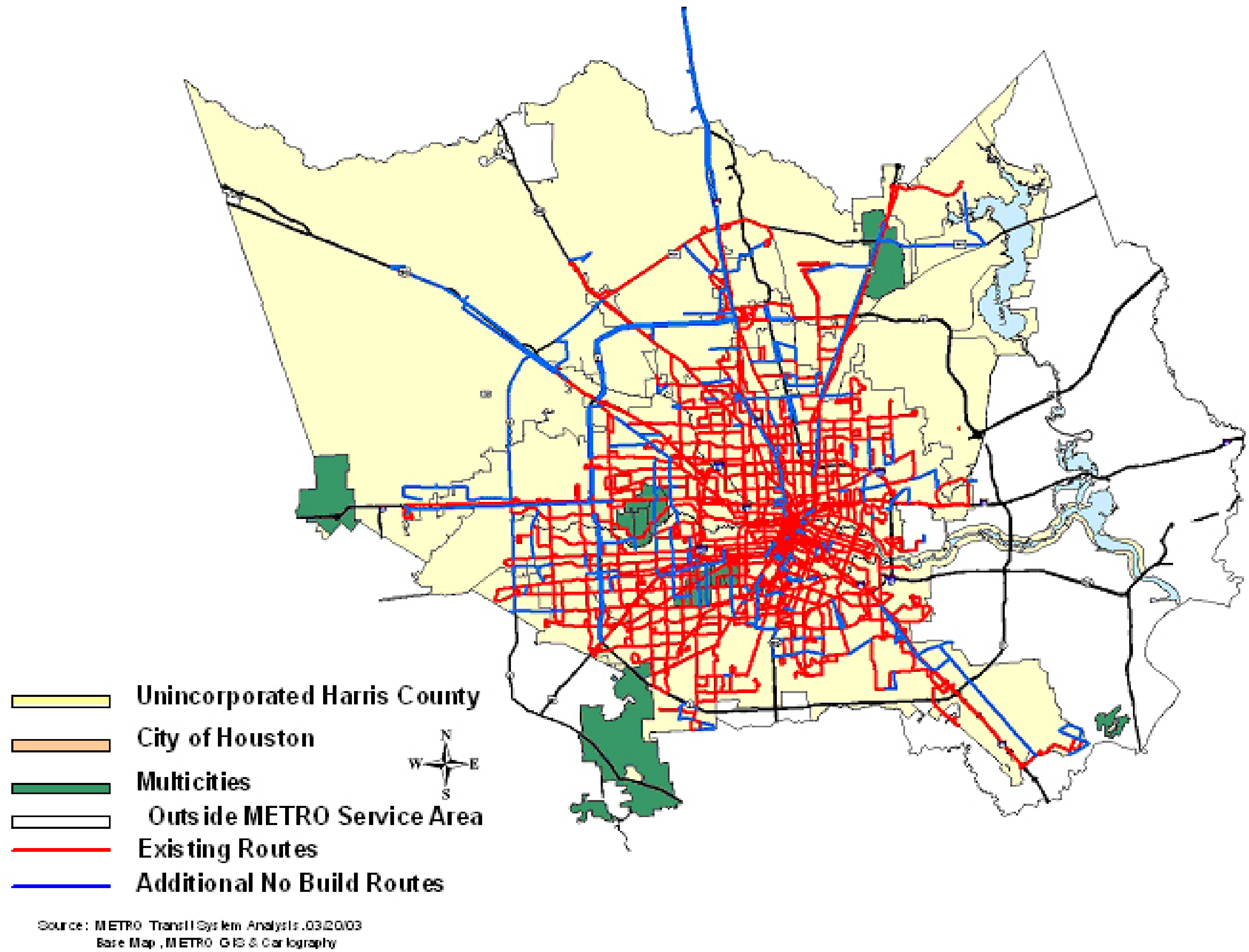
TABLE 2.4
SUMMARY OF NO BUILD METRO SERVICE CHARACTERISTICS

Element	2003	2025 No Build (estimate)
Fixed Routes by Service Type*	74 Local 8 Express 28 Park & Ride	84 Local 10 Express 37 Park & Ride
Bus Fleet Size	1,457 (including spares)	1,600 (including spares)
Annual Revenue Miles of Bus Service**	56.22 million	87.21 million
Annual Revenue Hours of Bus Service**	3.82 million	4.63 million
Light Rail Fleet Size	-	18
Annual Revenue Miles of Light Rail Service	-	836,290
Annual Revenue Hours of Light Rail Service	-	65,346

*Does not include employee shuttles and transit services operated by other entities. Does not count route branches as separate routes. All numbers are based on Year-to-Date figures as of January 2003. No growth was assumed for 2007.
**The 2025 estimates do not assume an increase in Special Bus Services from the 2003 levels and are annualized based on 300 operational days per year.
Source: METRO Scheduling Department, METRO Rail Operations Department, and METRO Capital Planning Department; December 2002; METRO Office of Management & Budget; January 2003.

As a result of No Build service improvements, METRO's total annual transit boardings are expected to increase from 97 million in 2003 to approximately 160 million by 2025.

FIGURE 2.13
NO BUILD TRANSIT ROUTE NETWORK



<u>Existing METRO Capital Facilities and Programmed Improvements</u>

METRO has constructed transit facilities, such as transit centers, Park & Ride lots, and storage and maintenance facilities, to support its current operations. In addition, METRO currently operates 107.4 lane miles of HOV that commuter routes and carpools/vanpools use.

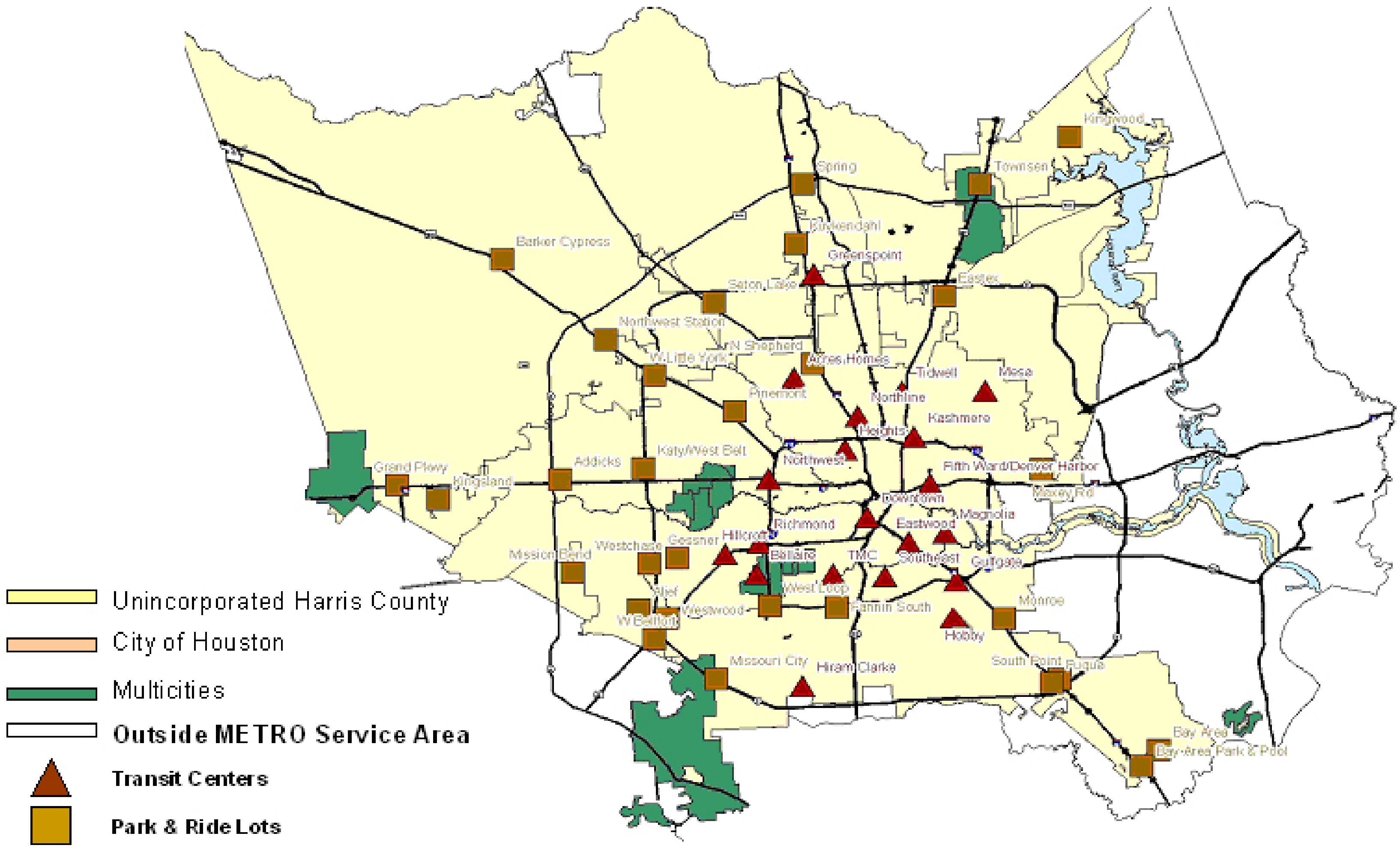
To accommodate the increase in service levels assumed to occur by 2025, METRO will expand or increase the number of transit facilities as indicated in Table 2.5. Figure 2.14 identifies existing and programmed locations for METRO's Park & Ride lots and transit centers that are included in the No Build Alternative. Similarly, Figures 2.15 and 2.16 indicate METRO's HOV system and the locations for METRO's maintenance and storage facility sites that are in the No Build Alternative, respectively. The site for METRO's planned sixth bus maintenance and storage facility has yet to be determined. A complete list of METRO's transit capital facilities that are included in the No Build Alternative is presented in Exhibit 2.2 at the end of this chapter.

TABLE 2.5
NO BUILD METRO CAPITAL FACILITIES

Transit Facility	2003	2025 No Build
Bus Park & Ride Lots	25	29
Bus-only Transit Centers	15	19
HOV Lanes Used By METRO (Centerline Miles	97.7 miles*	187 miles**
Light Rail Park & Ride Lots	0	1
Light Rail-Bus Transit Centers	0	2
Bus and Light Rail Storage and Maintenance Facilities	5 bus facilities	6 bus facilities 1 light rail facility
Other METRO Storage and Maintenance Facilities	1 non-revenue vehicle facility 1 central supply	1 non-revenue vehicle facility 1 central supply

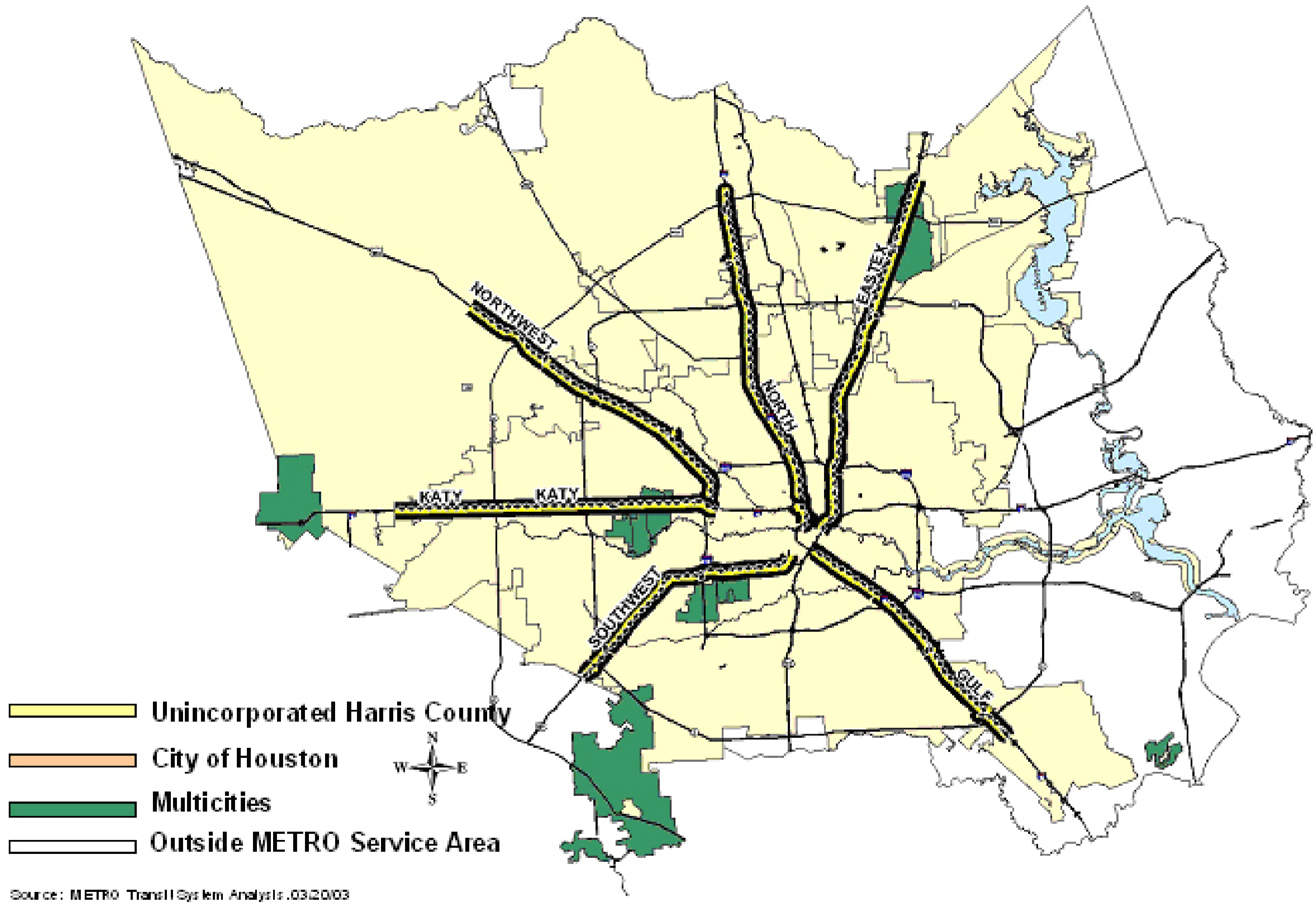
Source: METRO Service Planning, December 17, 2002; 2025 No Build Transit Facilities, METRO Capital Planning.
*Source: METRO Planning, Engineering & Construction, HOV Lane Program Status Report, 04/09/03.
**Generated from Houston METRO EMME/2 Travel Demand Model for No Build Scenario January 2003

FIGURE 2.14
NO BUILD METRO TRANSIT CENTER AND PARK & RIDE FACILITIES



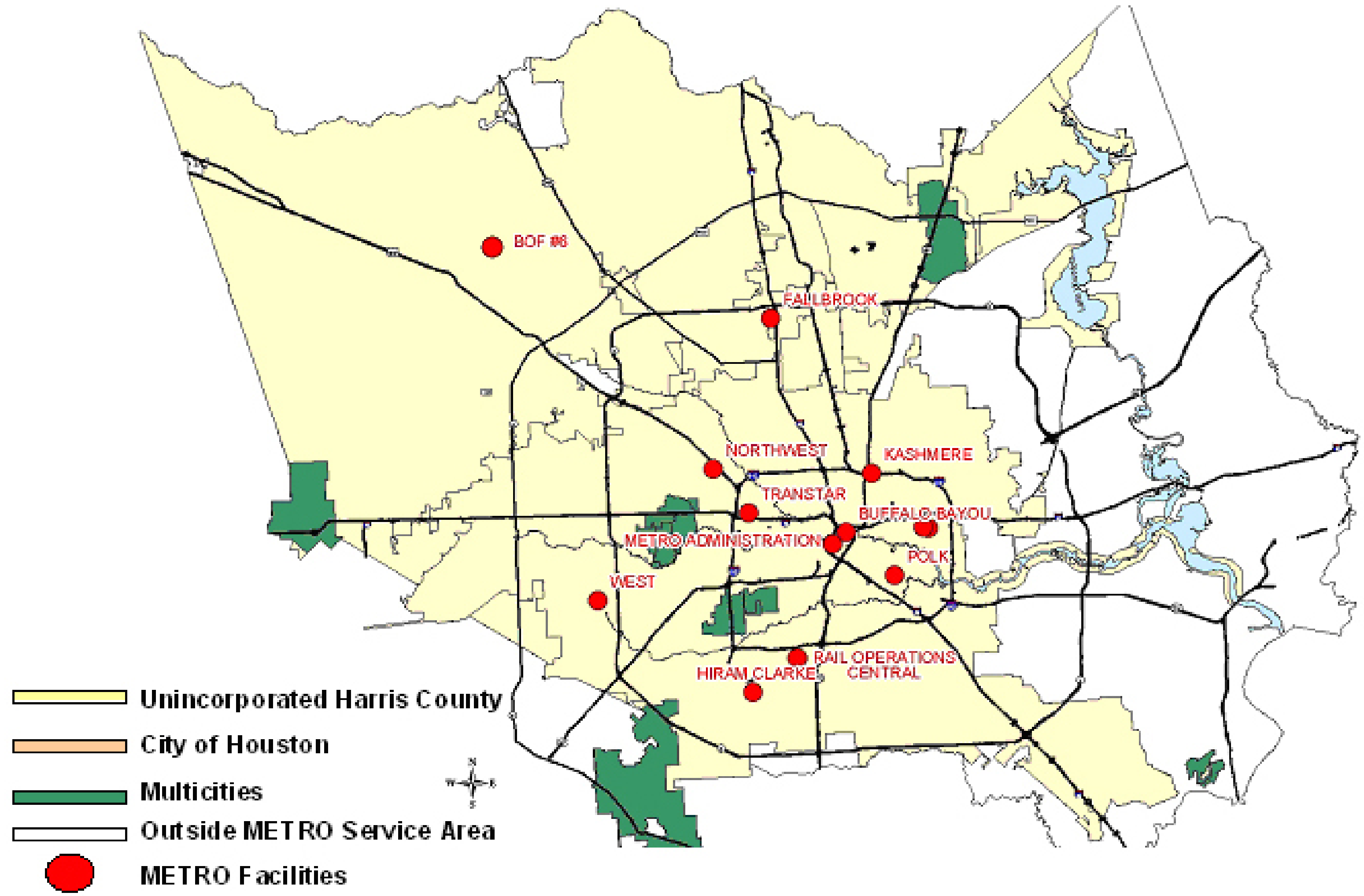
Source: METRO Transit System Analysis, 03/21/03
Base Map, METRO GIS & Cartography

FIGURE 2.15
NO BUILD METRO SERVICE AREA HOV SYSTEM



Source: METRO Transit System Analysis .03/20/03
Base Map, METRO GIS & Cartography

FIGURE 2.16
NO BUILD METRO MAINTENANCE AND STORAGE FACILITY SITES



Source: METRO Transit System Analysis, 03/20/03
Base Map, METRO GIS & Cartography

BOF #6 Location not determined as of 1-2004. Presently located in area forecasting need

Highway and Roadway Improvements

The regional highway and roadway system is comprised of interstate and other federal highways, state highways, county roads, toll roads, and arterial roadways in the eight-county metropolitan area. In 2000, the regional roadway system totaled over 20,000 lane miles of major highways and roads. In addition, the regional highway network incorporates a system of freeway HOV lanes, most of which have been constructed and are used by METRO.

The Level of Mobility (LOM) or the degree of congestion measure for roadways within the Houston-Galveston Transportation Management Area (TMA) is similar to the standard engineering LOS criteria which ranges from LOS-A representing free-flow operating conditions to LOS-F representing gridlock. The LOM measure incorporates an evaluation capacity, which is usually higher than the design capacity to account for higher than average traffic volumes. H-GAC's Transportation Department has developed criteria for determining the LOM as shown in Table 2.6.

TABLE 2.6
CRITERIA FOR LEVELS OF MOBILITY

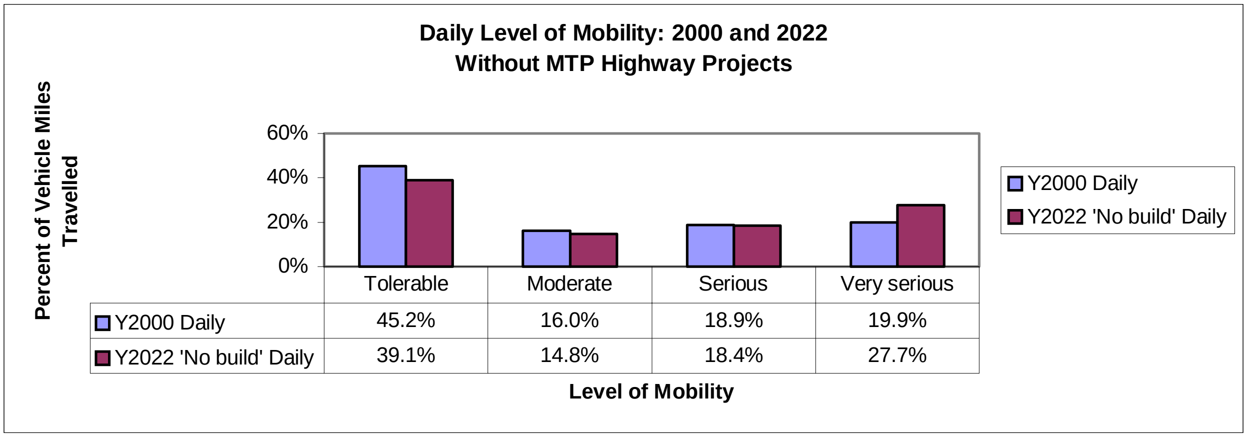
Level of Mobility	V/C Ratio*
Tolerable	V/C less than 0.85
Moderate	V/C between 0.85 and 1.00
Serious	V/C between 1.00 and 1.25
Severe	V/C greater than 1.25

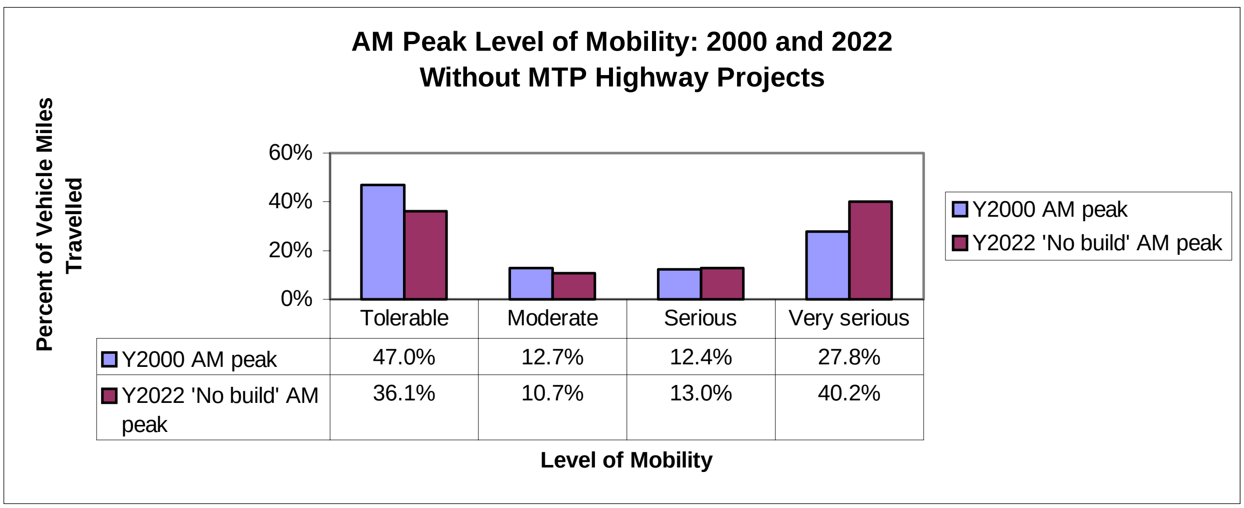
*The V/C ratio is the measure of roadway volume divided by roadway capacity. The dividend indicates the level of congestion. The closer the ratio is to 1.0, the more congested the roadway. At 1.0 or above, traffic is operating in stop-and-go conditions.
Source: H-GAC Transportation Department, 2/19/2003.

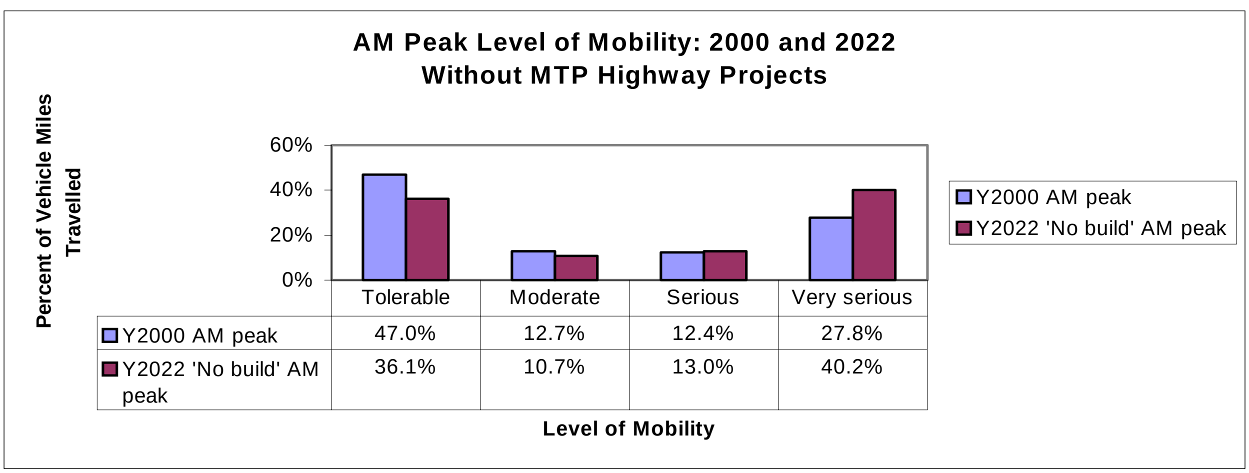
The following graphs (Figure 2.17) illustrate the daily and peak period LOM summaries by category for the current and future systems. The comparison is made between the LOM for 2000 and for 2022, with and without planned MTP projects. The graphs show mobility levels deteriorating unless planned transportation improvements are implemented. (More detailed information pertaining to regional traffic congestion is presented in Exhibit 2.3.)

The planned roadway improvements include expansion of the regional roadway and HOV system. As indicated in Table 2.7, between 2000 and 2022, freeway lane miles will increase by 1,269 miles, but centerline miles (construction of new freeway segments) will increase by only 122 miles. The smaller growth in centerline miles is indicative of more freeway widening projects than construction of new freeways. The

FIGURE 2.17
LEVEL OF MOBILITY







Source: H-GAC, Transportation Department, 2/19/03 regional HOV system is also benefiting from the freeway widening projects. METRO will be operating 112 miles of HOV lanes in 2007, up from 89 miles available in 2000. The 2022 MTP, which includes 8 counties, envisions this expansion of the HOV system to continue over the next twenty years which will include diamond lanes and managed lanes. According to the 2022 MTP, the region will have 187 centerline miles of HOV completed by 2022, much of it in two-way operation (indicated by 316 lane miles in Table 2.7). Some of these proposed two-way HOV lanes were placeholder projects in METRO's 2022 long-range plan.

TABLE 2.7
NO BUILD REGIONAL ROADWAY IMPROVEMENTS THROUGH 2022

Roadway Facility	2002		2022	
	Centerline Miles	Lane Miles	Centerline Miles	Lane Miles
Freeway	510	3,199	714	4,591
Tollway	87	443	139	744
Principal Arterial	1,149	4,485	1,371	5,873
Other Arterial	3,018	8,903	3,219	10,824
Collector	1,502	3,227	1,577	3,791
HOV Lanes	89*	90**	187	316

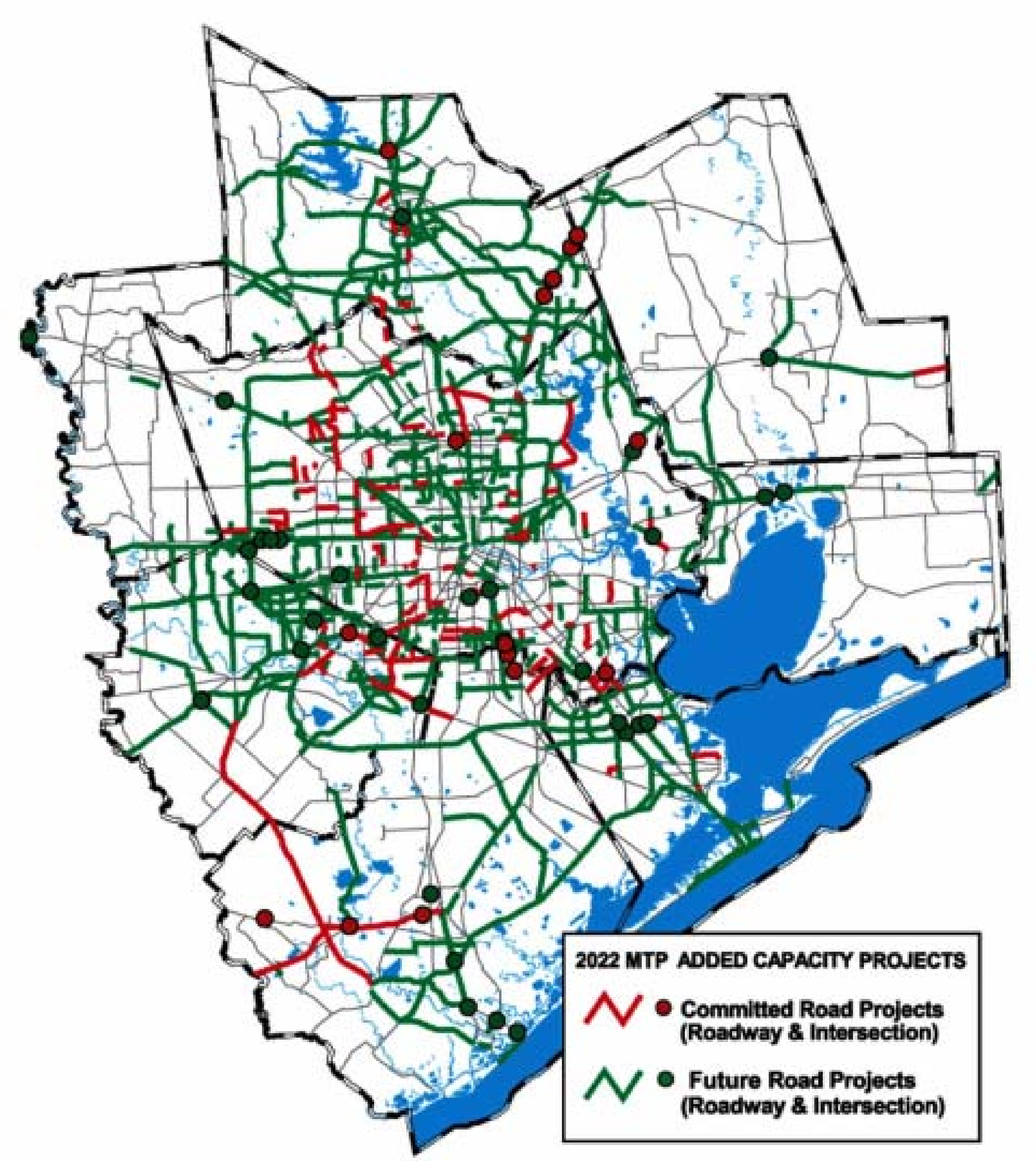
* Miles of HOV facilities
** Miles of HOV lanes, counting each lane separately, even if an HOV lane parallels another on the same roadway segment
Source: H-GAC 2022 Metropolitan Transportation Plan, 2000; H-GAC, 2/17/2003. (Includes 8 county region)

In addition, the arterial street system will undergo extensive improvements. Inside Beltway 8, where the road network is well established, the roadway improvements will focus on widening projects and projects to close the gaps in the existing roadway network. Outside Beltway 8, several new thoroughfares have been identified to accommodate growth primarily in the northern and western sections of Harris County. In addition, TxDOT is planning to improve access to/from the regional freeway network. Supplementing the regional roadway network are toll roads and new toll lanes being constructed by the Harris County Toll Road Authority (HCTRA). Currently, HCTRA operates 87 centerline miles of toll roads and is constructing or planning to construct approximately 139 centerline miles of toll facilities, as indicated in Exhibit 2.4 at the end of this chapter. The regional roadway improvements planned through 2022 are presented in Figure 2.18. Roadway improvements included in the No Build Alternative are identified in the H-GAC MTP (Adopted February 25, 2000).

Other Transportation Improvements

Within the Houston-Galveston region, combined bicycle and pedestrian trips account for approximately 2.6 percent of total work trips. There is a potential for bicycle and pedestrian travel to increase with adequate infrastructure. Currently there are approximately 160 miles of bicycle and pedestrian facilities (not including sidewalks), a significant amount found in "master planned communities." Existing plans call for construction of 391 miles of on- and off-road facilities. Once completed, this would provide over 500 miles of bicycle and pedestrian facilities (not including sidewalks) interlinked in a comprehensive, cohesive network. The Regional Bicycle and Pedestrian Plan identifies ways to implement and expand the planned 500+ mile network.

FIGURE 2.18
NO BUILD REGIONAL ROADWAY IMPROVEMENTS THROUGH 2022



Source: HGAC Transportation Department, 2003

2.4.2 Build Alternatives

As a result of the initial screening and evaluation described in the previous sections and the public input process, the project team recommended a set of conceptual alternatives to be carried forward for detailed analysis. During this period, extensive community outreach, public and stakeholder meetings, project interagency steering committee meetings, as well as informational presentations to the METRO Board of Directors, was undertaken. Input from these meetings was considered during the refinement of the alternatives under consideration. Conformance with other planning and design activities deemed certain modifications necessary.

System Concept for Build Alternatives

The Short List Build Alternatives were further developed from the initial Conceptual Alternatives. They are conceived as a link to METRO's HOV system that bypasses freeway and arterial congestion that would provide fast, convenient transit service into the Uptown-West Loop Study area. The alternatives proposed in this study would support both line-haul and collection/distribution functions in concert with regional access. The system concept supports the internal circulation needs of the corridor. The following guiding principles were followed in defining the alternatives and supporting operating concepts:

- Support future connectivity to METRO Mobility 2025
- Satisfying project goals and objectives
- Providing cost effective services
- Providing express connections for regional access
- Providing travel time savings
- Providing collection and distribution functions
- Providing for an improved pedestrian environment

Transit Service and Facilities

The No Build and Build Alternatives also consist of service and facility changes planned by METRO. The service changes relevant to the Uptown-West Loop Planning Study were identified in the METRO Mobility 2025 Baseline Alternative. Each description of the Build Alternatives characteristics, outlined in the following sections, include recommended service modifications and facilities.

Bus Operations – Conceptual Framework

Common to all Build Alternatives presented in this report, a conceptual framework necessary to integrate and augment the alternatives under consideration was developed to review and make recommendations on existing and proposed METRO services. It was important to establish this framework based on METRO's commuter bus program, which has been highly successful in attracting loyal ridership while maintaining a consistent and positive image. Principles within this framework were followed in recommending system changes and expansions necessary for the successful integration of each alternative.

It is anticipated that a variety of service patterns would be offered to support these alternatives. There would be local service provided by existing bus routes, augmented and integrated with circulator system routes that connect alignments with the major activity and residential centers. Peak period service would be enhanced with frequent circulator service. Recommendations have also been made for expanding existing peak express operations at selected park & ride facilities with significant demand for Uptown-West Loop destinations. The recommendation, documented under Service Modifications, conforms to the definition of BRT and suggests the integration of BRT vehicles within the HOV guideway and accessing a proposed Uptown-West Loop alignment via Transit Centers at the northern and southern ends of the corridor. This option allows for enhanced/improved service as an interim improvement prior to full build out. The recommendations for expanded and augmented service were not reflected as a component in the capital cost analysis. Changes in operations and maintenance costs associated with modifications to existing bus service or augmented service are not included. This information will be documented once the demand for service is determined.

The following set of guidelines/principles, produced by METRO's General Planning Consultant (GPC) and provided to the corridor consultants, was modified to address the specific needs of the Uptown-West Loop Planning Study:

- Avoiding competition between modes/removing duplicative service
- Improving cross-corridor access
- Improving local area and regional access to each alternative's stop/station location
- Improving north/south access through the corridor
- Providing circulator service that complements the proposed alternatives by providing an overlay service with unique route identities

- o Circulator routes that enhance north/south access through the corridor
- o Circulator service that provide a comprehensive transit network overlay within the corridor
- o Circulator service that enhances each alternative's performance

2.4.3 Build Alternative 1 (Formerly Conceptual Alternative #4)

2.4.3.1 Description

Alternative 1 consists of approximately 4.4 miles of exclusive LRT or BRT two-directional service between the NWTC at the IH-10 and IH-610W interchange, and a proposed transit center facility south of U.S. 59 and Westpark. The proposed alignment is an at-grade, barrier separated facility with priority treatment at key intersections. See Figure 2.19.

Alignment: The alignment proceeds south at-grade from the present NWTC, crossing over IH-10 on a separate structure parallel to the N. Post Oak Rd. bridge. The alignment passes several commercial structures before transitioning into the median of N. Post Oak Rd. North of Memorial Dr. the alignment shifts from the median to the west side of N. Post Oak Rd. and proceeds through the intersection. The alignment continues alongside the IH-610W southbound frontage road to Post Oak Blvd. where it turns west and into the median of Post Oak Blvd. The alignment proceeds in the median of Post Oak Blvd. to south of Richmond Ave. where it then enters the preserved 33' transit corridor that passes under U.S. 59, linking IH-610W frontage roads with Westpark Dr. The line turns west and terminates in the reserved Westpark ROW at a proposed new transit center. Figure 2.19 also indicates proposed transit stops.

Initially, the alternative accessed the Westpark Corridor via Sage Rd./S. Rice. This variation has been eliminated because it requires extensive ROW. It would also require rebuilding and reconfiguring the U.S. 59 overpass at Sage Rd./S. Rice. to incorporate the proper turning radius for the transit option. The short turning radius would slow the transit vehicles significantly, creating noise, affecting headways and operation of the facility. The modified alternative under consideration accesses the Westpark Corridor through a preserved 33' transit corridor that resides in the median of the southbound frontage road lane and Westpark exit lane, which are an extension of Post Oak Blvd. The IH-610 southbound frontage road and Westpark exit lane to Post Oak Blvd. are currently under construction as part of the Westpark Tollway project. This alignment provides the best alternative to access the Westpark Corridor since it requires no ROW acquisition and conforms to the design criteria.

The alignment also included a split pair configuration at the Uptown Park retail center with the southbound alignment turning from the IH-610 frontage road west into the median of Uptown Park Blvd. The northbound alignment would have continued along the IH-610 frontage road. The split pair would re-join at the intersection of Post Oak Blvd. and Uptown Park Blvd., continuing south in the center median of Post Oak Blvd. (see Figure 2.19). The alternative was modified to reflect a single alignment for the following reasons:

- Limited ROW to accommodate transit and traffic operations along Uptown Park Blvd.
- Significant traffic impacts
- Limited operating speeds due to a tight turning radii
- Potential noise impact and higher operating costs due to tight turns
- Negative community response

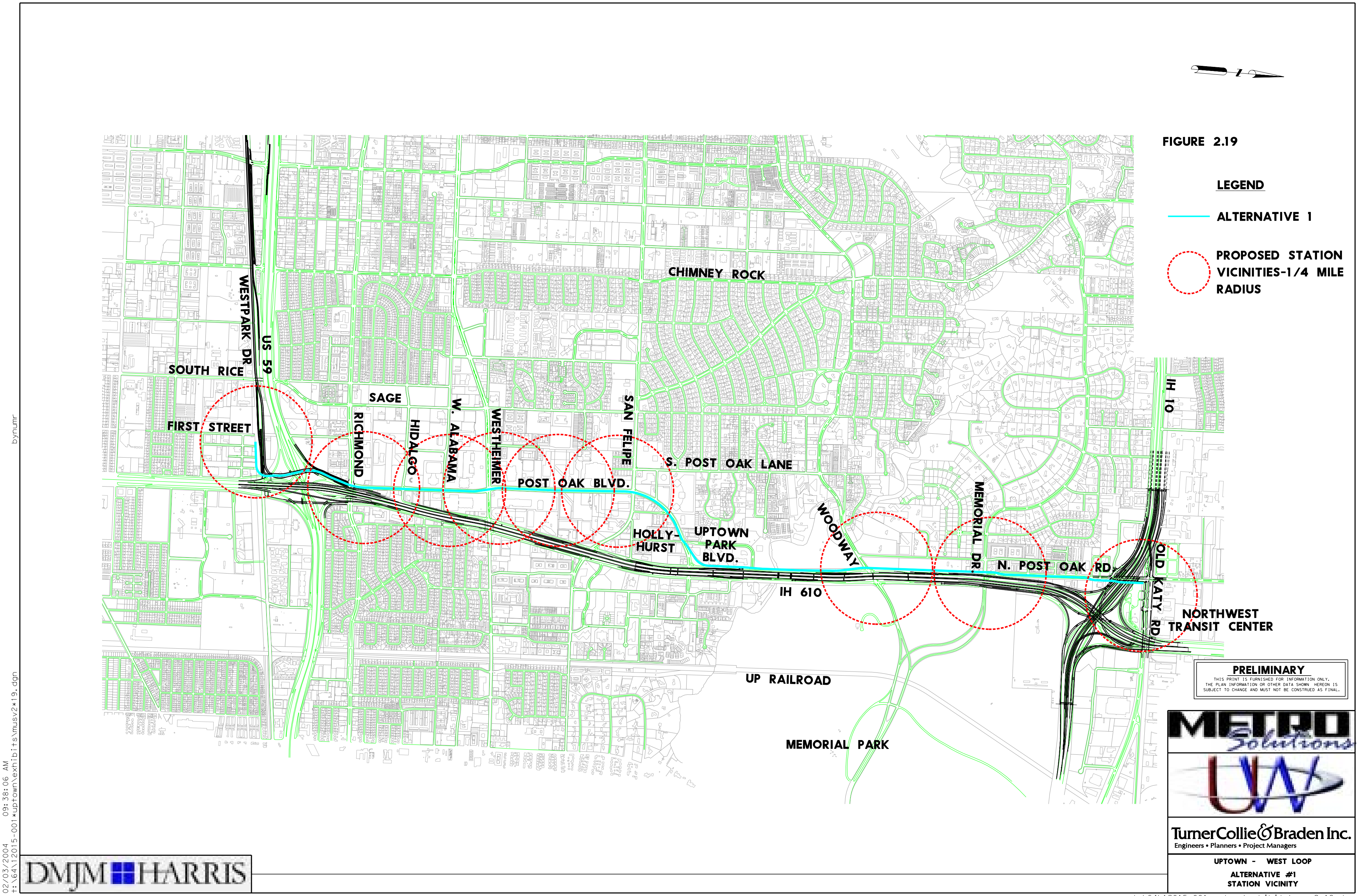


FIGURE 2.19
LEGEND
ALTERNATIVE 1
PROPOSED STATION VICINITIES-1/4 MILE RADIUS
CHIMNEY ROCK
WESTPARK DR
US 59
SOUTH RICE
FIRST STREET
SAGE
RICHMOND
HIDALGO
W. ALABAMA
WESTHEIMER
POST OAK BLVD.
SAN FELIPE
S. POST OAK LANE
HOLLY-HURST
UPTOWN PARK BLVD.
WOODWAY
IH 610
MEMORIAL DR.
N. POST OAK RD.
IH 10
OLD KATY RD
NORTHWEST TRANSIT CENTER
UP RAILROAD
MEMORIAL PARK
PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.
METRO Solutions
Turner Collie & Braden Inc.
Engineers • Planners • Project Managers
UPTOWN - WEST LOOP
ALTERNATIVE #1
STATION VICINITY
DMJM HARRIS
02/03/2004 09:38:06 AM
t:\64\12015-001*uptown\exhibits\musv2*19.dgn
bynumr

2.4.3.2 Operating Characteristics

Conceptual Alternative 1 was designed to accommodate exclusive LRT or BRT operations. LRT and BRT technologies would operate similarly through the corridor relative to the alignments and system design. Major differences in the two transit technologies relative to system operating characteristics should not be significant. It is anticipated that a variety of service patterns would be offered along this alternative. There would be local service provided by existing bus routes, and new circulator routes that connect this alignment with other major activity and residential centers. Peak period service will be enhanced with frequent circulator service. The operating characteristics include the following:

- Headway: 5 min. peak/15 min. off-peak
- Average Operating Speed: 19 mph
- Dwell time: 20 seconds
- Terminus time recovery: 2 minutes

Signal Optimization and Crossings. Currently, traffic signals in the Uptown-West Loop study area are programmed to maximize traffic circulation during peak and off-peak hours. The program varies by the time of day and for special events. Modifications can be made to the program to improve traffic flow in the study area and accommodate transit service priority treatment allowing faster and more predictable service.

LRT or BRT vehicles passing through intersections would most likely utilize signal progression phasing or preemption, though further studies in the Preliminary Engineering phase would determine the need for this. In Alternative 1, there would be several traffic lane crossings and gate crossing may be needed in the following locations:

- N. Post Oak Rd./Old Katy Rd. intersection
- N. Post Oak Rd. northbound lanes south of IH-10
- North of Memorial Dr. crossing the southbound lanes
- Uptown Park Blvd./southbound IH-610W frontage road
- Post Oak Blvd./Uptown Park Blvd. intersection

Stations. Stations would be located in areas of population or employment concentration, approximately every half-mile. Unlike bus services for the No Build, this alternative would have fewer stops, thus increasing speed and providing travel time savings for riders. Station locations would occur in the vicinity of the following intersections: (see Figure 2.19)

- NWTC
- Memorial and N. Post Oak Rd.
- Woodway Dr. and N. Post Oak Rd.
- San Felipe and Post Oak Blvd.
- Between San Felipe and Westheimer on Post Oak Blvd.
- Westheimer and Post Oak Blvd.
- Richmond and Post Oak Blvd.
- Proposed transit center

  Note: Intersection station assignment is used for initial spacing purposes and segment coding for trip generation; not physical location description. The minimum potential station assignments are shown based on population and employment concentration, stakeholder input and sufficient tangent.

Station platforms are positioned on a 220-foot tangent and require a 50-foot tangent beyond both ends of the platform with grades not to exceed 1.5 percent as outlined in the METRORail design criteria manual. Analysis at the NWTC shows that a station with future platform extension must be positioned on a 1.5 percent grade to allow for sufficient vertical clearance over IH-10. All other stations are at-grade along the alignment and comply with METRO's geometric design parameters. A station in the vicinity of Post Oak Blvd. and Uptown Park Blvd. could be possible, based on current information and geometric parameters. The station location for Alternative 1 would be alongside the IH-610W southbound frontage road close to the Uptown Park retail center or along the tangent just south of the Post Oak Blvd./Uptown Park Blvd. intersection in the center of Post Oak Blvd. Additional ROW is required for either option. The engineering is feasible, but future expansion of the station is not possible due to the inadequate tangent length.

Fare Collection. An off-board fare collection system would be implemented to facilitate faster boardings and reduce running and dwell times.

Vehicles. LRT or BRT technologies would use low-floor vehicles with multiple doors to facilitate boarding and provide faster service. Vehicles should be distinctively identified as a marketing and customer service initiative. For planning purposes, two LRT vehicles (two-car trains) were assumed for each trip. Vehicles in the off-peak hours of operation will be stored in the yard and shop that is proposed at the south end of the alignment. The area north of Old Katy Rd. could also accommodate vehicle storage prior to peak hour operations.

Service Modifications. Service modifications will be necessary to integrate this alternative within the transit network. Adjustments to existing METRO route service include the following. (please see Technical Report A for complete route descriptions and graphics):

- New route 1 – Local circulator service – Service to Greenway Plaza from Buffalo Speedway and Richmond (service around block); service along Richmond to S. Rice/Sage Rd. split pair to Hidalgo; service along Hidalgo and continuing on Yorktown; west on St. James Place to San Felipe; east on San Felipe and south on Yorktown. Return. (Headway: peak 10, midday 10, off-peak 20)
- New route 2 – Local circulator service – Service from Post Oak Blvd. and Westheimer to Richmond Ave; from Richmond and Post Oak Blvd. to northbound IH-610W feeder and continuing to Westheimer; service along Westheimer to Sage Rd.; service along Sage Rd. to Woodway Dr.; Woodway Dr. to S. Post Oak Ln. and continuing to San Felipe; service along San Felipe to Post Oak Park east of IH-610W; north on Post Oak Park to Post Oak Blvd. and completing loop to return service along San Felipe. (Headway: peak 10, midday 10, off-peak 20)
- New route 3 – Local circulator service – Service from Memorial Loop Drive and along Memorial Dr. and transitioning to Woodway Dr.; service along Woodway Dr. to Chimney Rock; Chimney Rock to Memorial Dr. and continuing on Memorial to N. Post Oak Ln.; service along N. Post Oak Ln. to Oakford and completing return loop on N. Post Oak Rd. to Memorial. (Headway: peak 10, midday 10, off-peak 20)
- Route 33 – Truncate local route - northbound service should terminate at the proposed transit center south of the Westpark Corridor. Existing service north of the proposed Transit Center would be largely duplicative for this build alternative.

- Route 49 – Realign route – local service should provide a transfer at the proposed transit center south of the Westpark Corridor and continue from the transit center to S. Rice; north on S. Rice west on U.S. 59 feeder to service along Chimney Rock. Realigning this route would provide north/south access while eliminating service that would be duplicative for this build alternative.
- Route 210, 221, and 228 – (BRT option) - Provide expanded service - Routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop Study area via BRT runningway. BRT vehicles enter the Build Alternative at the NWTC. (15 minute headway peak) - ** Proposed frequencies will be evaluated once an initial model run is conducted
- Route 210, 221, and 228 - (LRT option) – Provide expanded service - Routes from these park & rides should offer express/limited service to the Uptown-West Loop Study area via the Build Alternative at the NWTC. (15 minute headway peak) - ** Proposed frequencies will be evaluated once an initial model run is conducted
- Route 283 – Realign and truncate route – Westbound service from Greenway Plaza should realign with Westpark and terminate at the proposed transit center.
- Route 284 – Realign and truncate route – Westbound service from Greenway Plaza should realign with Westpark and terminate at the proposed transit center.
- Route 285 –Realign or eliminate – Express service from Kingsland and Addicks Park & Rides should be eliminated or realigned to provide express service to the Greenway Plaza activity center. Superior service (peak) to the NWTC and uptown will be provided by Routes 210, 221 and 228.
- Route 214, 216 and 219 – (BRT option) - Provide expanded service - Routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop Study area via BRT runningway. BRT vehicles enter the Build Alternative at the NWTC. (15 minute headway peak**) 2025 Baseline service for the LRT alternative provides a transfer opportunity. ** Proposed frequencies will be evaluated once an initial model run is conducted
- Routes 262, 265 (292*) – (BRT option) - Provide expanded service - Express routes from these park & rides should offer express/limited

service via dedicated BRT vehicles to provide service to the Uptown-West Loop study area via BRT runningway. BRT vehicles enter the Build Alternative at the proposed transit center. (15 minute headway peak**) Modification may require new facilities to provide access to transit center. *Route 292 is essentially the same route in western segment. **Proposed frequencies will be evaluated once an initial model run is conducted.

∉ Routes 262, 265 (292*) – (LRT option) – Provide Transfer – Express routes on U.S. 59 should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to TC. *Route 292 is essentially the same route in western segment.

∉ Routes 132, 163, and 273 – Provide transfer – Express routes traveling eastbound should remain on Westpark and provide stop and transfer opportunity at the proposed transit center before entering U.S. 59 Corridor. Westbound service should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to transit center.

∉ Route 65 – Provide transfer – local service should provide a transfer at the proposed transit center south of the Westpark Corridor. Modification may require new facilities to provide access to transit center.

∉ Route 261 – Provide transfer – Express route should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to transit center.

2.4.3.3 Capital Facilities

A regional transit center is proposed for the area south of the Westpark Toll Road and in the vicinity of S. Rice. The transit center would consist of parking, advanced information kiosks, and off-board fair collection. Specific improvements will be necessary to provide access to the transit center facility.

In addition, approximately 13 acres will be required to provide inspection, cleaning services, light maintenance and storage for the vehicle fleet.

2.4.4 Build Alternative 2 (Formerly Conceptual Alternative #5)

2.4.4.1 Description

This alternative consists of approximately 4.4 miles of exclusive LRT or BRT two-directional service between the NWTC at the IH-10 and IH-610W intersection and a proposed transit center facility south of U.S. 59 and Westpark. The proposed alignment is an at-grade, barrier separated facility with priority treatment at key intersections. A segment of the alignment is on elevated structure using IH-610W ROW. See Figure 2.20.

Alignment: The alignment proceeds south at-grade from the present NWTC, crossing over IH-10 on a separate structure parallel to the N. Post Oak Rd. bridge. The alignment passes several commercial structures before transitioning into the median of N. Post Oak Rd. North of Memorial Dr. the alignment shifts from the median to the west side of N. Post Oak Rd. and proceeds through the intersection. This alignment continues at-grade on alongside IH-610W southbound frontage road. Between Memorial Dr. and Woodway Dr., the alignment transitions via an elevated structure into the center of the IH-610W profile. It remains elevated for several hundred feet until entering a proposed underground portal that travels below the IH-610W mainlanes, turning west toward Post Oak Blvd. It returns to grade in the median of Post Oak Blvd. in the vicinity of Uptown Park Blvd. The alignment continues in the median of Post Oak Blvd. to south of Richmond Ave. It then enters the preserved 33’ transit corridor that passes under U.S. 59, linking IH-610W frontage roads with Westpark Dr. The alignment turns west and terminates in the reserved Westpark ROW at a proposed new transit center. Figure 2.20 also indicates proposed transit stops.

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE #2
STATION VICINITY

DMJM HARRIS

02/03/2004 09:39:54 AM
t:\64\12015-001*uptown\exhibits\musv2*20.dgn
bynumr

2.4.4.2 Operating Characteristics

Conceptual Alternative 2 was designed to accommodate exclusive LRT or BRT operations. LRT and BRT technologies would operate similarly through the corridor relative to the alignments and system design. Major differences in the two transit technologies relative to system operating characteristics should not be significant. It is anticipated that a variety of service patterns would be offered along this alternative. There would be local service provided by existing bus routes and new circulator routes that connect this alignment with the other activity and residential centers. Peak period service will be enhanced with frequent circulator service. The operating characteristics include the following:

- Headway: 5 min. peak/15 min. off-peak
- Average Operating Speed: 20 mph
- Dwell time: 20 seconds
- Terminus time recovery: 2 minutes

Signal Optimization and Crossings. Currently, traffic signals in the Uptown-West Loop study area are programmed to maximize traffic circulation during peak and off-peak hours. The program varies by the time of day and for special events. Modifications can be made to the program to improve traffic flow in the study area and accommodate transit service priority treatment allowing faster and more predictable service.

LRT or BRT vehicles passing through intersections would most likely integrate progression phasing or preemption, though further studies in the Preliminary Engineering phase would determine the need for this. In Alternative 2, there are several auto traffic lane crossings and gate crossings are needed in the following locations:

- N. Post Oak Rd./Old Katy Rd. intersection
- N. Post Oak Rd. northbound lanes south of IH-10
- North of Memorial Dr. crossing the southbound lanes

Stations. Stations would be located in areas of population or employment concentration, approximately every half-mile. Unlike bus services for the No Build, this alternative would have fewer stops, thus increasing speed and providing travel time savings for riders. Station locations would occur in the vicinity of the following intersections: (see Figure 2.20)

- NWTC
- Memorial and N. Post Oak Rd.
- San Felipe and Post Oak Blvd.
- Between San Felipe and Westheimer on Post Oak Blvd.
- Westheimer and Post Oak Blvd.
- Richmond and Post Oak Blvd.
- Proposed transit center

Note: Intersection station assignment is used for initial spacing purposes and segment coding for trip generation; not physical location description. The minimum potential station assignments are shown based on population and employment concentration, stakeholder input and sufficient tangent.

Station platforms are positioned on a 220-foot tangent and require a 50-foot tangent beyond both ends of the platform with grades not to exceed 1.5 percent as outlined in the METRORail design criteria manual. Analysis at the NWTC shows that a station with future platform extension must be positioned on a 1.5 percent grade to allow for sufficient vertical clearance over IH-10. All other stations are at-grade along the alignment and comply with METRO's geometric design parameters for light rail. The at-grade alignment allows for a station at Memorial Dr., but the shift into the median of IH-610 just south of Memorial Dr. does not allow for a station located at Woodway Dr. A station in the vicinity of Post Oak Blvd. and Uptown Park Blvd. could be possible if the transit mode can resurface from the portal with sufficient horizontal tangent before the Post Oak Blvd./Uptown Park Blvd. intersection and if Post Oak Blvd. is reconstructed to provide the necessary tangent length for the station.

Fare Collection. An off-board fare collection system would be implemented to facilitate faster boardings and reduce running and dwell times.

Vehicles. LRT or BRT technologies would use low-floor vehicles with multiple doors to facilitate boarding and provide faster service. Vehicles should be distinctively identified as a marketing and customer service initiative. For planning purposes, two LRT vehicles (two-car trains) were assumed for each trip. Vehicles in the off-peak hours of operation will be stored in the yard and shop that is proposed at the south end of the alignment. The area north of Old Katy Rd. could also accommodate vehicle storage prior to peak hour operations.

Service Modifications. Service modifications will be necessary to integrate this alternative within the transit network. Adjustments to existing METRO route service include the following (please see Technical Report A for complete route descriptions and graphics):

- New route 1 – Local circulator service – Service to Greenway Plaza from Buffalo Speedway and Richmond (service around block); service along Richmond to S. Rice/Sage Rd. split pair to Hidalgo; service along Hidalgo and continuing on Yorktown; west on St. James Place to San Felipe; east on San Felipe and south on Yorktown. Return. (Headway: peak 10, midday 10, off-peak 20)
- New route 2 – Local circulator service – Service from Post Oak Blvd. and Westheimer to Richmond; from Richmond and Post Oak Blvd. to northbound IH-610W feeder and continuing to Westheimer; service along Westheimer to Sage Rd.; service along Sage Rd. to Woodway Dr.; Woodway Dr. to S. Post Oak Ln. and continuing to San Felipe; service along San Felipe to Post Oak Park east of IH-610; north on Post Oak Park to Post Oak Blvd. and completing loop to return service along San Felipe. (Headway: peak 10, midday 10, off-peak 20)
- New route 3 – Local circulator service – Service from Memorial Loop Drive and along Memorial and transitioning to Woodway Dr.; service along Woodway Dr. to Chimney Rock; Chimney Rock to Memorial Dr. and continuing on Memorial to N. Post Oak Ln.; service along N. Post Oak Ln. to Oakford and completing return loop on N. Post Oak Rd. to Memorial. (Headway: peak 10, midday 10, off-peak 20)
- Route 33 – Truncate local route - northbound service should terminate at the proposed transit center south of the Westpark Corridor. Existing service north of the proposed TC would be largely duplicative for this build alternative.
- Route 49 – Realign route – local service should provide a transfer at the proposed transit center south of the Westpark Corridor and continue from the transit center to S. Rice; north on S. Rice west on U.S. 59 feeder to service along Chimney Rock. Realigning this route would provide

north/south access while eliminating service that would be duplicative for this build alternative.

- Route 210, 221, and 228 – (BRT option) - Provide expanded service - Routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop Study area via BRT runningway. BRT vehicles enter the Build Alternative at the NWTC. (15 minute headway peak) - ** Proposed frequencies will be evaluated once an initial model run is conducted
- Route 210, 221, and 228 - (LRT option) – Provide expanded service - Routes from these park & rides should offer express/limited service to the Uptown-West Loop study area via the Build Alternative at the NWTC. (15 minute headway peak) - ** Proposed frequencies will be evaluated once an initial model run is conducted
- Route 283 – Realign and truncate route – Westbound service from Greenway Plaza should realign with Westpark and terminate at the proposed transit center.
- Route 284 – Realign and truncate route – Westbound service from Greenway Plaza should realign with Westpark and terminate at the proposed transit center.
- Route 285 –Realign or eliminate – Express service from Kingsland and Addicks Park & Rides should be eliminated or realigned to provide express service to the Greenway Plaza activity center. Superior service (peak) to the NWTC and uptown will be provided by Routes 210, 221 and 228.
- Route 214, 216 and 219 – (BRT option) - Provide expanded service - Routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop Study area via BRT runningway. BRT vehicles enter the Build Alternative at the NWTC. (15 minute headway peak**) 2025 Baseline service for the LRT alternative provides a transfer opportunity. ** Proposed frequencies will be evaluated once an initial model run is conducted
- Routes 262, 265 (292*) – (BRT option) - Provide expanded service - Express routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop study area via BRT runningway. BRT vehicles enter the Build Alternative at the proposed transit center. (15 minute headway peak**) Modification may require new facilities to provide access to transit center.

*Route 292 is essentially the same route in western segment. **Proposed frequencies will be evaluated once an initial model run is conducted.

- Routes 262, 265 (292*) – (LRT option) – Provide Transfer – Express routes on U.S. 59 should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to TC. *Route 292 is essentially the same route in western segment.
- Routes 132, 163, and 273 – Provide transfer – Express routes traveling eastbound should remain on Westpark and provide stop and transfer opportunity at the proposed transit center before entering U.S. 59 Corridor. Westbound service should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to transit center.
- Route 65 – Provide transfer – local service should provide a transfer at the proposed transit center south of the Westpark Corridor. Modification may require new facilities to provide access to transit center.
- Route 261 – Provide transfer – Express route should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to transit center.

2.4.4.3 Capital Facilities

A regional transit center is proposed for the area south of the Westpark Toll Road and in the vicinity of S. Rice. The transit center would consist of parking, advanced information kiosks, and off-board fair collection. Specific improvements will be necessary to provide access to the transit center facility.

In addition, approximately 13 acres will be required to provide inspection, cleaning services, light maintenance and storage for the vehicle fleet.

2.4.5 Build Alternative 2A (Variation)

2.4.5.1 Description

As described in section 2.3.4, a variation to an alternative segment using IH-610W ROW as an aerial entry into the NWTC may be required. Though Alignment 3, an initial aerial alignment, had been eliminated from further consideration, a hybrid alignment with design similarities to Alternative 2 was developed in the event significant issues or engineering constraints limit the viability of an at-grade advanced high capacity transit conceptual alternative along N. Post Oak Road to serve the NWTC.

Alternative 2A consists of approximately 4.4 miles of exclusive LRT or BRT two-directional service between the NWTC at the IH-10 and IH-610W intersection, and a proposed transit center facility south of U.S. 59 and Westpark. The proposed alignment is barrier separated or separate facility with priority treatment at key intersections when at-grade. Approximately half of the alternative is on elevated structure using IH-610W. See Figure 2.21.

Alignment: Alternative 2A would be on dedicated aerial structure two levels above the existing ground contour (+2 cross-platform station configuration) at the NWTC. The alignment crosses over IH-10 and travels adjacent to the eastbound highway ramp from IH-10 to the southbound highway ramp of IH-610W. The alignment would then proceed between the proposed Woodway Dr. exit ramp and two commercial structures, remaining parallel to the Woodway Dr. exit ramp. The alignment would elevate and transition over the Woodway Dr. ramp as the ramp descends south of Memorial Dr. The alignment proceeds as an elevated structure above the mainlanes in the center of the IH-610W profile. It remains elevated in the center of IH-610W until entering a proposed underground portal that travels below the IH-610W mainlanes, turning west toward Post Oak Blvd. It returns to grade in the median of Post Oak Blvd. in the vicinity of Uptown Park Blvd. The alignment continues in the median of Post Oak Blvd. to south of Richmond Ave. It then enters the preserved 33' transit corridor that passes under U.S. 59, linking IH-610W frontage roads with Westpark Dr. The line turns west and terminates in the reserved Westpark ROW at a proposed new transit center. Figure 2.21 also indicates proposed transit stops.

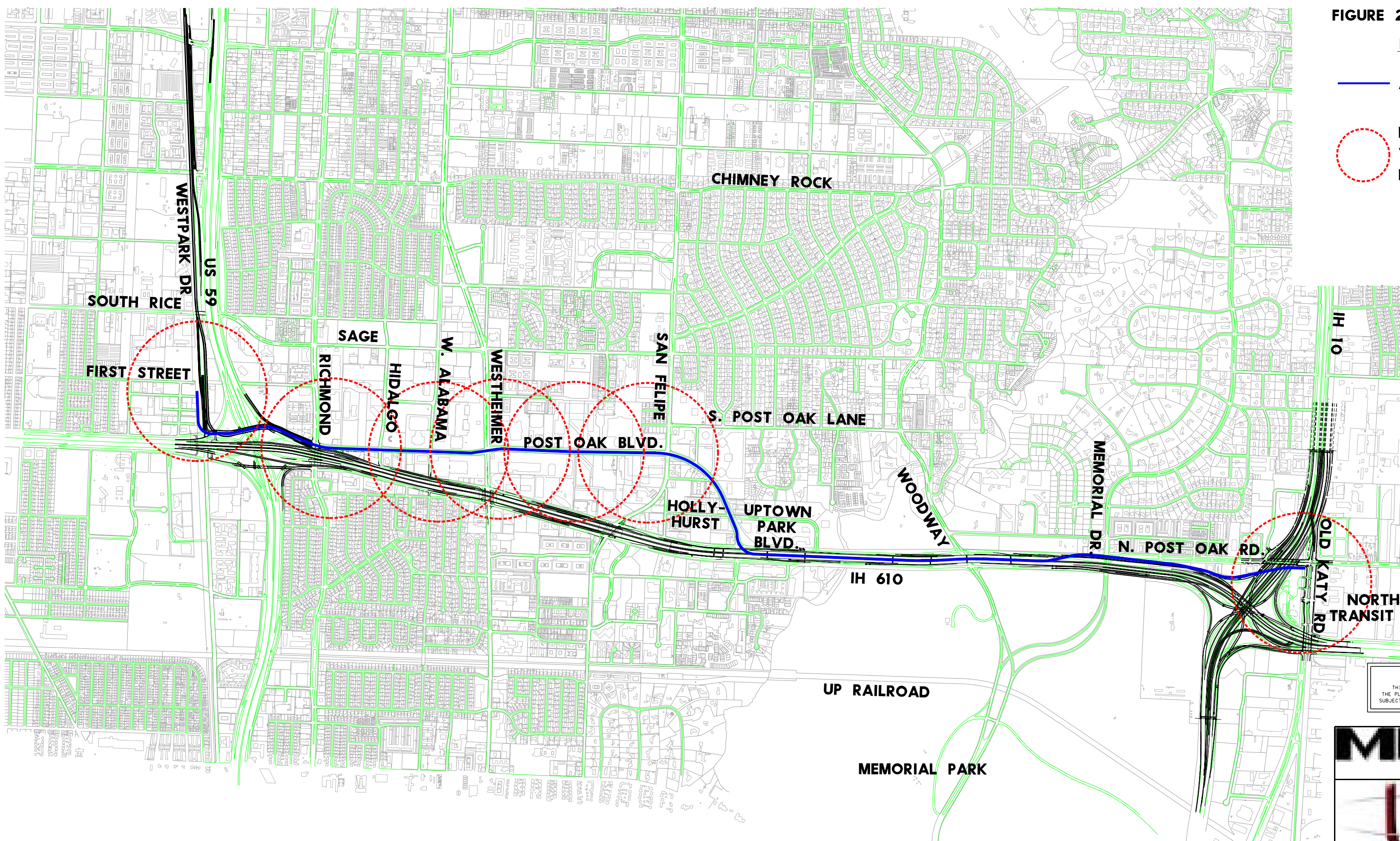


FIGURE 2.21

LEGEND

ALTERNATIVE 2A

PROPOSED STATION VICINITIES-1/4 MILE RADIUS

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE #2A
STATION VICINITY

DMJM HARRIS

02/03/2004 09:40:53 AM
t:\64\12015-001*uptown\exhibits\musv2*21.dgn
bynumr

t:\64\12015-001*uptown\exhibits\musv2*21.dgn

2.4.5.2 Operating Characteristics

Conceptual Alternative 2A was designed to accommodate exclusive LRT or BRT operations. LRT and BRT technologies would operate similarly through the corridor relative to the alignments and system design. Major differences in the two transit technologies relative to system operating characteristics should not be significant. It is anticipated that a variety of service patterns would be offered along this alternative. There would be local service provided by existing bus routes, and new circulator routes that connect this alignment with other major activity and residential centers. Peak period service would be enhanced with frequent circulator service. The operating characteristics include the following:

- Headway: 5 min. peak/15 min. off-peak
- Average Operating Speed: 21 mph
- Dwell time: 20 seconds
- Terminus time recovery: 2 minutes

Signal Optimization and Crossings. Currently, traffic signals in the Uptown-West Loop study area are programmed to maximize traffic circulation during peak and off-peak hours. The program varies by the time of day and for special events. Modifications can be made to the program to improve traffic flow in the study area and accommodate transit service priority treatment allowing faster and more predictable service. LRT or BRT vehicles passing through intersections would most likely integrate progression phasing or preemption, though further studies in the Preliminary Engineering phase would determine the need for this.

Stations. Stations would be located in areas of population or employment concentration, approximately every half-mile. Unlike bus services for the No Build, this alternative would have fewer stops, thus increasing speed and providing travel time savings for riders. Also, due to the elevated nature of this alignment, no stations are included between San Felipe and the NWTC. Station locations would occur in the vicinity of the following intersections: (see Figure 2.21)

- NWTC
- San Felipe and Post Oak Blvd.

- Between San Felipe and Westheimer on Post Oak Blvd.
- Westheimer and Post Oak Blvd.
- Richmond and Post Oak Blvd.
- Proposed transit center

  Note: Intersection station assignment is used for initial spacing purposes and segment coding for trip generation; not physical location description. The minimum potential station assignments are shown based on population and employment concentration, stakeholder input and sufficient tangent.

Station platforms are positioned on a 220-foot tangent and require a 50-foot tangent beyond both ends of the platform with grades not to exceed 1.5 percent as outlined in the METRORail design criteria manual for light rail. The station at the NWTC is a +2 cross platform configuration with a future platform extension. All other stations are at-grade along the alignment and comply with METRO's geometric design parameters for light rail. A station in the vicinity of Post Oak Blvd. and Uptown Park Blvd. could be possible if the transit mode can resurface from the portal with sufficient horizontal tangent before the Post Oak Blvd./Uptown Park Blvd. intersection and if Post Oak Blvd. is reconstructed to provide the necessary tangent length for the station.

Fare Collection. An off-board fare collection system would be implemented to facilitate faster boardings and reduce running and dwell times.

Vehicles. LRT or BRT technologies would use low-floor vehicles with multiple doors to facilitate boarding and provide faster service. Vehicles should be distinctively identified as a marketing and customer service initiative. For planning purposes, two LRT vehicles (two-car trains) were assumed for each trip. Vehicles in the off-peak hours of operation will be stored in the yard and shop that is proposed at the south end of the alignment. The area north of Old Katy Rd. could also accommodate vehicle storage prior to peak hour operations.

Service Modifications. Service modifications will be necessary to integrate this alternative within the transit network. Adjustments to existing METRO route service include the following (please see Technical Report A for complete route descriptions and graphics):

- New route 1 – Local circulator service – Service to Greenway Plaza from Buffalo Speedway and Richmond (service around block); service along Richmond to S. Rice/Sage Rd. split pair to Hidalgo; service along Hidalgo and continuing on Yorktown; west on St. James Place to San Felipe; east on San Felipe and south on Yorktown. Return. (Headway: peak 10, midday 10, off-peak 20)
- New route 2 – Local circulator service – Service from Post Oak Blvd. and Westheimer to Richmond; from Richmond and Post Oak Blvd. to northbound IH-610W feeder and continuing to Westheimer; service along Westheimer to Sage Rd.; service along Sage Rd. to Woodway Dr.; Woodway Dr. to S. Post Oak Ln. and continuing to San Felipe; service along San Felipe to Post Oak Park east of IH-610; north on Post Oak Park to Post Oak Blvd. and completing loop to return service along San Felipe. (Headway: peak 10, midday 10, off-peak 20)
- New route 3 – Local circulator service – Service from Memorial Loop Drive and along Memorial and transitioning to Woodway Dr.; service along Woodway Dr. to Chimney Rock; Chimney Rock to Memorial Dr. and continuing on Memorial to N. Post Oak Ln.; service along N. Post Oak Ln. to Oakford and completing return loop on N. Post Oak Rd. to Memorial. (Headway: peak 10, midday 10, off-peak 20)
- Route 33 – Truncate local route - northbound service should terminate at the proposed transit center south of the Westpark Corridor. Existing service north of the proposed TC would be largely duplicative for this build alternative.
- Route 49 – Realign route – local service should provide a transfer at the proposed transit center south of the Westpark Corridor and continue from the transit center to Rice; north on S. Rice west on U.S. 59 feeder to service along Chimney Rock. Realigning this route would provide north/south access while eliminating service that would be duplicative for this build alternative.
- Route 210, 221, and 228 – (BRT option) - Provide expanded service - Routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop study area via BRT runningway. BRT vehicles enter the Build Alternative at the NWTC. (15 minute headway peak) - ** Proposed frequencies will be evaluated once an initial model run is conducted

- Route 210, 221, and 228 - (LRT option) – Provide expanded service - Routes from these park & rides should offer express/limited service to the Uptown-West Loop study area via the Build Alternative at the NWTC. (15 minute headway peak) - ** Proposed frequencies will be evaluated once an initial model run is conducted
- Route 283 – Realign and truncate route – Westbound service from Greenway Plaza should realign with Westpark and terminate at the proposed transit center.
- Route 284 – Realign and truncate route – Westbound service from Greenway Plaza should realign with Westpark and terminate at the proposed transit center.
- Route 285 –Realign or eliminate – Express service from Kingsland and Addicks Park & Rides should be eliminated or realigned to provide express service to the Greenway Plaza activity center. Superior service (peak) to the NWTC and uptown will be provided by Routes 210, 221 and 228.
- Route 214, 216 and 219 – (BRT option) - Provide expanded service - Routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop study area via BRT runningway. BRT vehicles enter the Build Alternative at the NWTC. (15 minute headway peak**) 2025 Baseline service for the LRT alternative provides a transfer opportunity. ** Proposed frequencies will be evaluated once an initial model run is conducted
- Routes 262, 265 (292*) – (BRT option) - Provide expanded service - Express routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop study area via BRT runningway. BRT vehicles enter the Build Alternative at the proposed transit center. (15 minute headway peak**) Modification may require new facilities to provide access to transit center. *Route 292 is essentially the same route in western segment. **Proposed frequencies will be evaluated once an initial model run is conducted.
- Routes 262, 265 (292*) – (LRT option) – Provide Transfer – Express routes on U.S. 59 should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to TC. *Route 292 is essentially the same route in western segment.

- Routes 132, 163, and 273 – Provide transfer – Express routes traveling eastbound should remain on Westpark and provide stop and transfer opportunity at the proposed transit center before entering U.S. 59 Corridor. Westbound service should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to transit center.
- Route 65 – Provide transfer – local service should provide a transfer at the proposed transit center south of the Westpark Corridor. Modification may require new facilities to provide access to transit center.
- Route 261 – Provide transfer – Express route should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to transit center.

2.4.5.3 Capital Facilities

A regional transit center is proposed for the area south of the Westpark Toll Road and in the vicinity of S. Rice. The transit center would consist of parking, advanced information kiosks, and off-board fair collection. Specific improvements will be necessary to provide access to the transit center facility.

In addition, approximately 13 acres will be required to provide inspection, cleaning services, light maintenance and storage for the vehicle fleet.

2.4.6 Build Alternative 3 (Formerly Conceptual Alternative #6)

2.4.6.1 Description

Alternative 3 consists of approximately 4.6 miles of exclusive LRT or BRT two-directional service between the NWTC and a proposed transit center facility south of U.S. 59 and Westpark. The proposed alignment is an at-grade, barrier separated or separate facility with priority treatment at key intersections. See Figure 2.22:

Alignment: The alignment proceeds south at-grade from the west side of the NWTC, crossing over IH-10 on a separate structure parallel to the east side of the N. Post Oak Rd. bridge. The alignment extends past several commercial structures before transitioning into the median of N. Post Oak Rd. North of Memorial Dr. the alignment shifts from the median to the west side of N. Post Oak Rd. and proceeds through the intersection. This alignment continues at-grade on this route alongside IH-610W southbound frontage road and turns west into the center of Woodway Dr. A traffic lane must be taken in each direction due to a narrow median and ROW constraints in the area. The alignment then turns south into the center of S. Post Oak Ln. where a traffic lane must be taken in each direction due to ROW constraints. The alignment follows S. Post Oak Ln. to San Felipe where it turns east into the median. The alignment then takes an immediate turn south into the median of Post Oak Blvd. The alignment then proceeds along the median of Post Oak Blvd. to just south of Richmond Ave. and enters the preserved 33' transit corridor in the proposed IH-610W frontage roads under U.S. 59. The line turns west and terminates along the alignment reserved for the future Westpark line at potential new transit center.

Initially, the alternative accessed the Westpark Corridor via Sage Rd./S. Rice. This variation has been eliminated because it requires extensive ROW. It would also require rebuilding and reconfiguring the U.S. 59 overpass at Sage Rd./S. Rice Blvd. to incorporate the proper turning radius for the transit option. The short turning radius would slow the transit vehicles significantly, creating noise, affecting headways and operation of the facility. The modified alternative under consideration accesses the Westpark Corridor through a preserved 33' transit corridor that resides in the median of the southbound frontage road lane and Westpark exit lane, which are an extension of Post Oak Blvd. The IH-610 southbound frontage road and Westpark exit lane to Post Oak Blvd. are currently under construction as part of the Westpark Toll Road project. This alignment provides the best alternative to access the Westpark Corridor since it requires no ROW acquisition and conforms to the design criteria.

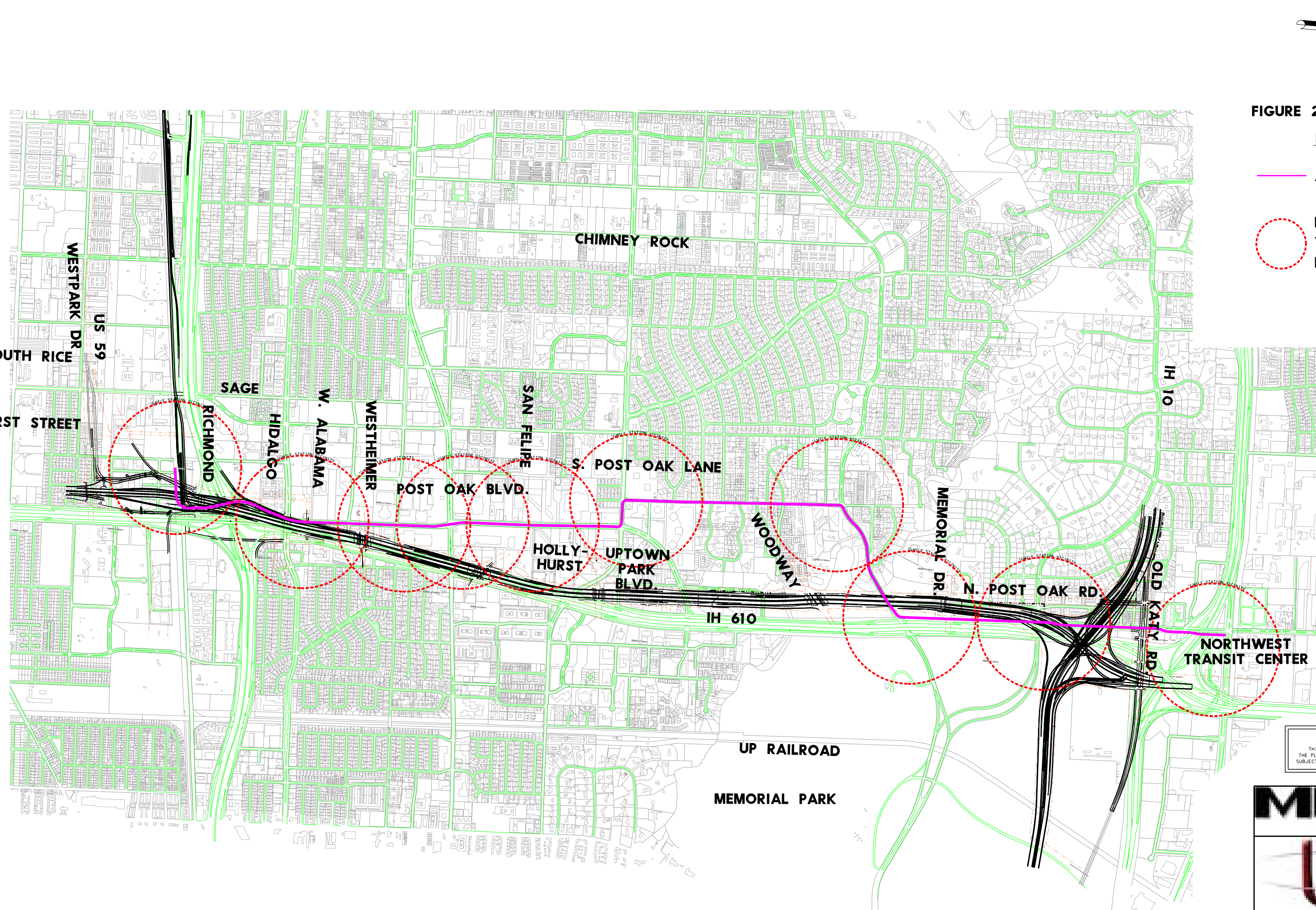


FIGURE 2.22

LEGEND

ALTERNATIVE 3

PROPOSED STATION VICINITIES-1/4 MILE RADIUS

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE #3
STATION VICINITY

DMJM HARRIS

02/03/2004 10:26:35 AM
t:\64\12015-001*uptown\exhibits\musv2*22.dgn

bynumr

2.4.6.2 Operational Characteristics

Conceptual Alternative 3 was designed to accommodate exclusive LRT or BRT operations. LRT and BRT technologies would operate similarly through the corridor relative to the alignments and system design. Major differences in the two transit technologies relative to system operating characteristics should not be significant. It is anticipated that a variety of service patterns would be offered along this alternative. There would be local service provided by existing bus routes, and new circulator routes that connect this alignment with other major activity and residential centers. Peak period service would be enhanced with frequent circulator service. The operating characteristics include the following:

- Headway: 5 min. peak/15 min. off-peak
- Average Operating Speed: 19 mph
- Dwell time: 20 seconds
- Terminus time recovery: 2 minutes

Signal Optimization and Crossings. Currently, traffic signals in the Uptown-West Loop study area are programmed to maximize traffic circulation during peak and off-peak hours. The program varies by the time of day and for special events. Modifications can be made to the program to improve traffic flow in the study area and accommodate transit service priority treatment allowing faster and more predictable service.

LRT or BRT vehicles passing through intersections would most likely integrate progression phasing or preemption, though further studies in the Preliminary Engineering phase would determine the need for this. In Alternative 3, there are several traffic lane crossings, and gate crossings may be needed in the following locations:

- N. Post Oak Rd./Old Katy Rd. intersection
- N. Post Oak Rd. northbound lanes south of IH-10
- North of Memorial Dr. crossing the southbound lanes

Stations. Stations would be located in areas of population or employment concentration, approximately every half-mile. Unlike bus services for the No Build this alternative would have fewer stops, thus increasing speed and providing travel time savings for riders. Station locations would occur in the vicinity of the following intersections: (see Figure 2.22)

- NWTC
- Memorial and N. Post Oak Rd.
- Woodway Dr. and S. Post Oak Lane
- San Felipe and Post Oak Blvd.
- Between San Felipe and Westheimer on Post Oak Blvd.
- Westheimer and Post Oak Blvd.
- Richmond and Post Oak Blvd.
- Proposed transit center

Note: Intersection station assignment is used for initial spacing purposes and segment coding for trip generation; not physical location description. The minimum potential station assignments are shown based on population and employment concentration, stakeholder input and sufficient tangent.

Station platforms are positioned on a 220-foot tangent and require a 50-foot tangent beyond both ends of the platform with grades not to exceed 1.5 percent as outlined in the METRORail design criteria manual for light rail. Analysis at the NWTC shows that a station with future platform extension must be positioned on a 1.5 percent grade to allow for sufficient vertical clearance over IH-10. All other stations are at-grade along the corridor and comply with METRO's geometric design parameters.

Fare Collection. An off-board fare collection system would be implemented to facilitate faster boardings and reduce running and dwell times.

Vehicles. LRT or BRT technologies would use low-floor vehicles with multiple doors to facilitate boarding and provide faster service. Vehicles should be distinctively identified as a marketing and customer service initiative. For planning purposes, two LRT vehicles (two-car trains) were assumed for each trip. Vehicles in the off-peak hours of operation will be stored in the yard and shop that is proposed at the south end of the alignment. The area north of Old Katy Rd. could also accommodate vehicle storage prior to peak hour operations.

Service Modifications. Service modifications will be necessary to integrate this alternative within the transit network. Adjustments to existing METRO route service include the following (please see Technical Report A for complete route descriptions and graphics):

- New route 1 – Local circulator service – Service to Greenway Plaza from Buffalo Speedway and Richmond (service around block); service along Richmond to S. Rice/Sage Rd. split pair to Hidalgo; service along Hidalgo and continuing on Yorktown; west on St. James Place to San Felipe; east on San Felipe and south on Yorktown. Return. (Headway: peak 10, midday 10, off-peak 20)
- New route 2(A) – Local circulator service – Service from Post Oak Blvd. and Westheimer to Richmond; from Richmond and Post Oak Blvd. to northbound IH-610W feeder and continuing to Westheimer; service along Westheimer to Sage Rd.; service along Sage Rd. to Woodway Dr.; Woodway Dr. to IH-610 southbound feeder and continuing to San Felipe; service along San Felipe to Post Oak Park east of IH-610; north on Post Oak Park to Post Oak Blvd and continuing along IH-610 northbound feeder to complete return loop with service along Woodway Dr. (Headway: peak 10, midday 10, off-peak 20)
- New route 3 – Local circulator service – Service from Memorial Loop Drive and along Memorial and transitioning to Woodway Dr.; service along Woodway Dr. to Chimney Rock; Chimney Rock to Memorial Dr. and continuing on Memorial to N. Post Oak Ln.; service along N. Post Oak Ln. to Oakford and completing return loop on N. Post Oak Rd. to Memorial. (Headway: peak 10, midday 10, off-peak 20)
- Route 33 – Truncate local route - northbound service should terminate at the proposed transit center south of the Westpark Corridor. Existing service north of the proposed TC would be largely duplicative for this build alternative.
- Route 49 – Realign route – local service should provide a transfer at the proposed transit center south of the Westpark Corridor and continue from the transit center to S. Rice; north on S. Rice west on U.S. 59 feeder to service along Chimney Rock. Realigning this route would provide north/south access while eliminating service that would be duplicative for this build alternative.
- Route 210, 221, and 228 – (BRT option) - Provide expanded service - Routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop

Study area via BRT runningway. BRT vehicles enter the Build Alternative at the NWTC. (15 minute headway peak) - ** Proposed frequencies will be evaluated once an initial model run is conducted

- Route 210, 221, and 228 - (LRT option) – Provide expanded service - Routes from these park & rides should offer express/limited service to the Uptown-West Loop study area via the Build Alternative at the NWTC. (15 minute headway peak) - ** Proposed frequencies will be evaluated once an initial model run is conducted
- Route 283 – Realign and truncate route – Westbound service from Greenway Plaza should realign with Westpark and terminate at the proposed transit center.
- Route 284 – Realign and truncate route – Westbound service from Greenway Plaza should realign with Westpark and terminate at the proposed transit center.
- Route 285 –Realign or eliminate – Express service from Kingsland and Addicks Park & Rides should be eliminated or realigned to provide express service to the Greenway Plaza activity center. Superior service (peak) to the NWTC and uptown will be provided by Routes 210, 221 and 228.
- Route 214, 216 and 219 – (BRT option) - Provide expanded service - Routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop study area via BRT runningway. BRT vehicles enter the Build Alternative at the NWTC. (15 minute headway peak**) 2025 Baseline service for the LRT alternative provides a transfer opportunity. ** Proposed frequencies will be evaluated once an initial model run is conducted
- Routes 262, 265 (292*) – (BRT option) - Provide expanded service - Express routes from these park & rides should offer express/limited service via dedicated BRT vehicles to provide service to the Uptown-West Loop study area via BRT runningway. BRT vehicles enter the Build Alternative at the proposed transit center. (15 minute headway peak**) Modification may require new facilities to provide access to transit center. *Route 292 is essentially the same route in western segment. **Proposed frequencies will be evaluated once an initial model run is conducted.
- Routes 262, 265 (292*) – (LRT option) – Provide Transfer – Express routes on U.S. 59 should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide

access to TC. *Route 292 is essentially the same route in western segment.

- Routes 132, 163, and 273 – Provide transfer – Express routes traveling eastbound should remain on Westpark and provide stop and transfer opportunity at the proposed transit center before entering U.S. 59 Corridor. Westbound service should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to transit center.
- Route 65 – Provide transfer – local service should provide a transfer at the proposed transit center south of the Westpark Corridor. Modification may require new facilities to provide access to transit center.
- Route 261 – Provide transfer – Express route should provide stop and transfer opportunity at the proposed transit center. Modification may require new facilities to provide access to transit center.

2.4.6.3 Capital Facilities

A regional transit center is proposed for the area south of the Westpark Toll Road and in the vicinity of S. Rice. The transit center would consist of parking, advanced information kiosks, and off-board fair collection. Specific improvements will be necessary to provide access to the transit center facility.

In addition, approximately 13 acres will be required to provide inspection, cleaning services, light maintenance and storage for the vehicle fleet.

2.4.7 Technology Options

The two technology options analyzed were LRT and BRT. The alternative alignments were conceptually designed to meet the minimum design criteria for LRT, as its specifications required the more stringent design parameters. The design components of the LRT system comply with BRT's design criteria so each alternative was designed for LRT's minimum design criteria.

LRT, like the system currently running in downtown Houston, is an electric railway system characterized by its ability to operate single- or multiple-car trains along exclusive ROW at ground level, on aerial structures, in subways or in streets. LRT is able to board and discharge passengers at station platforms or at street, track, or car-floor level. LRT is typically powered by overhead electrical wires. Maximum speeds for LRT are normally 65 miles per hour, however, since the distance between stations is shorter than within typical commuter rail systems the average speed is usually significantly lower. LRT systems combine intelligent transportation systems technology with traffic signal preemption priority or priority. LRT systems integrate convenient and rapid fare collection. The Siemens S70 is the Light Rail Vehicle used by METRO for its LRT transit system. The passenger capacity of the Siemens LRV is 200 passengers per vehicle.

BRT combines the quality of rail transit and the flexibility of buses. It can operate on exclusive guideways, HOV lanes, expressways, or streets. A BRT system combines intelligent transportation systems technology, traffic signal preemption priority for transit, cleaner and quieter vehicles than a typical bus, and rapid and convenient fare collection. Considering the length of the Uptown-Westloop Corridor, BRT vehicles (buses) must be capable of operating at speeds comparable to LRT. Among the most promising vehicles for BRT operations are diesel buses, but diesel bus acceleration tends to be slower than electrically powered vehicles. Hybrid vehicles tend to mirror the performance of trolleybuses, meeting or exceeding rail vehicle acceleration rates. The DE60LF hybrid, manufactured by New Flyer, appeared to offer the performance desired for METRO's BRT operations and has been recommended as the preferred technology by the General Planning Consultant (GPC). The maximum standing and seating capacity of the DE60LF is approximately 110 passengers per vehicle. (Please see Technical Report B: Definition of BRT)

2.4.8 Vehicle Requirements

Station spacing, acceleration and deceleration rates, attained speeds, and recovery time at the beginning and end of each alignment were used to determine the number of vehicles for each alternative. The number of LRT and BRT vehicles differs for each alternative as shown in Table 2.8. This is due to the greater carrying capacity of the LRT Siemens S70 vehicle compared with the BRT DE60LF vehicle. The basis for comparison was an assumption of operating two LRT vehicles (two-car trains) for each trip – with all other operational characteristics held constant; as contained in the METRO project definition of BRT – thus deriving the number of BRT vehicles for comparable service levels.

Table 2.8
Vehicle Fleet Size

REQUIRED NUMBER OF VEHICLES				
Transit Mode	**Alternative 1**	**Alternative 2**	**Alternative 2A**	**Alternative 3**
LRT	13	13	11	14
BRT	21	21	18	23

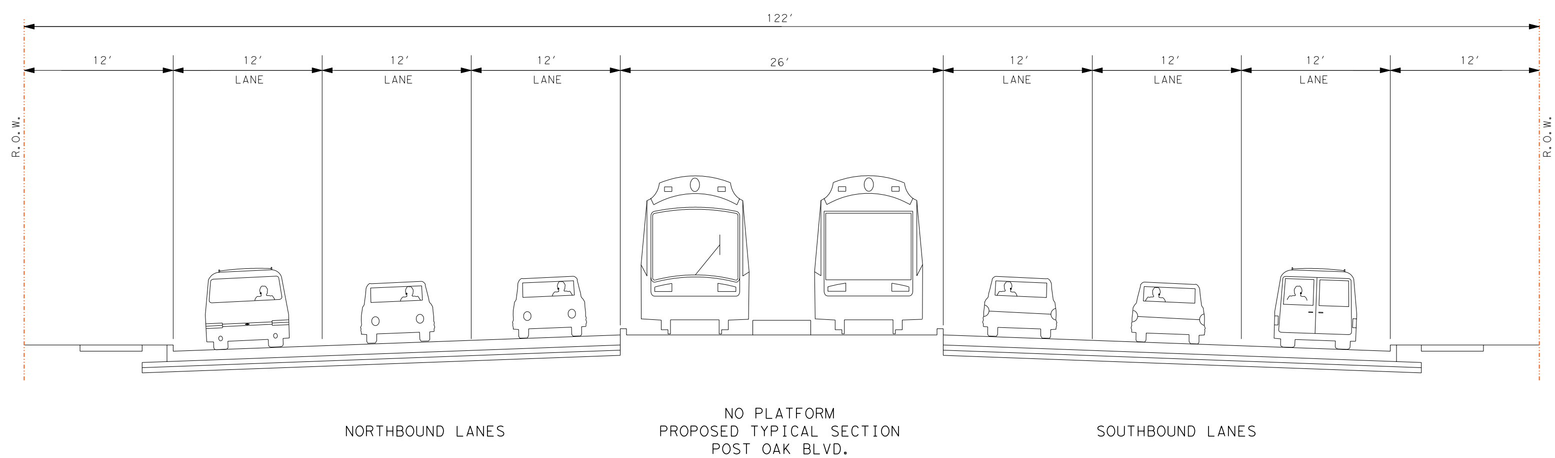
LRT FLEET REQUIREMENTS;

Alternative 1: 13 vehicles (12 coupled+1 spare)
Alternative 2: 13 vehicles (12 coupled+1 spare)
Alternative 2A: 11 vehicles (10 coupled+1 spare)
Alternative 3: 14 vehicles (12 coupled+2 spare)

2.4.9 Facility Requirements

The guideway for each conceptual alignment requires a minimum width of 26' to accommodate the vehicle dynamic envelope on the at-grade segments. The aerial configurations require approximately 27' for elevated structures. The underground section through the portal at Post Oak Blvd and IH-610W requires an absolute minimum of 33'. METRO has come to an agreement with TxDOT to allow for this ROW during the reconstruction of IH-610W. The portal width dictates special construction methods and requires a subway structure without center support for the roof. The excavation support for the subway box will have to be provided by slurry wall, tangent piles, secan piles or some other method. Constructability of the excavation support system under IH-610W bridge has not been verified at this time. Side-platform station configurations for an at-grade station require approximately 48' between the inside edges of adjacent travel ways. The typical cross section dimensions for at-grade, aerial, underground, and side-platform scenarios can be seen in Figures 2.23-2.26.

FIGURE 2.23



PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

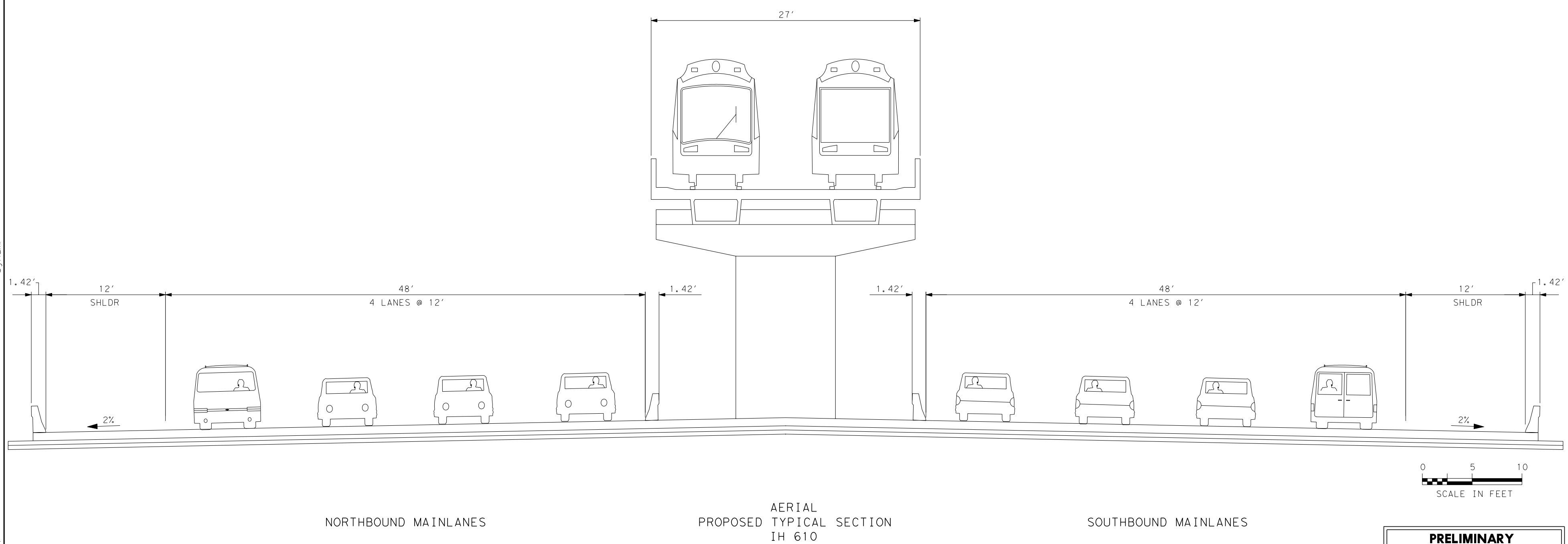
Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
AT-GRADE
PROPOSED TYPICAL SECTION

DMJM HARRIS

02/03/2004 10:39:04 AM
t:\64\12015-001*uptown\exhibits\mutyp223.dgn
bynumr

FIGURE 2.24



PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

DMJM HARRIS

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

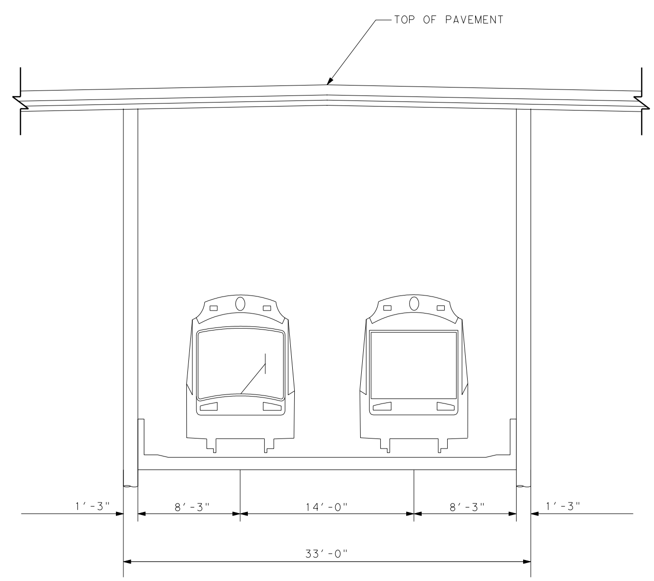
AERIAL
PROPOSED TYPICAL SECTION

t:\64\12015-001*uptown\exhibits\mutyp224.dgn

bynumr

02/03/2004 10:38:38 AM
t:\64\12015-001*uptown\exhibits\mutyp224.dgn

FIGURE 2.25



UNDERGROUND
PROPOSED TYPICAL SECTION
POST OAK BLVD AT IH 610

0 5 10
SCALE IN FEET

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY.
THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS
SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

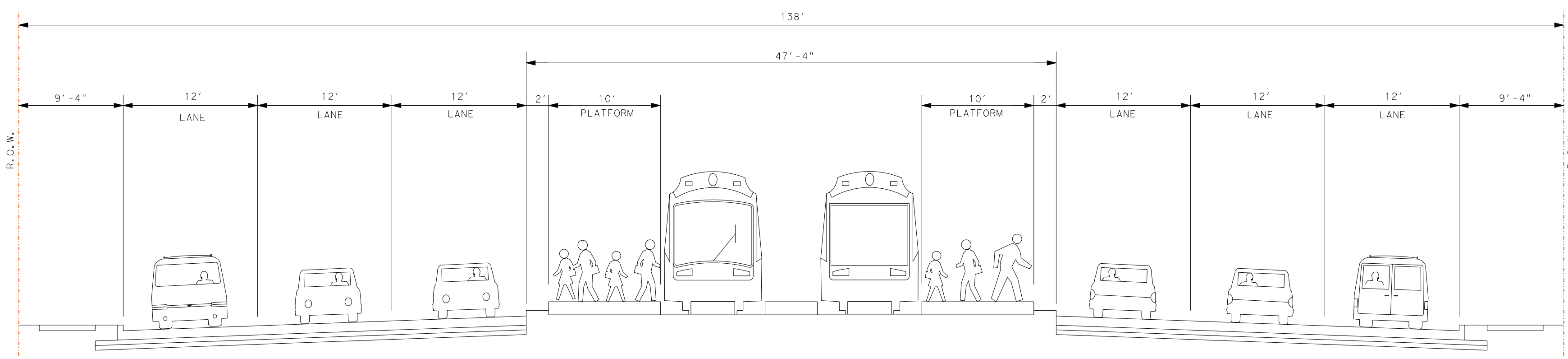
Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
UNDERGROUND
PROPOSED TYPICAL SECTION

DMJM HARRIS

02/03/2004 10:39:33 AM
t:\64\12015-001*uptown\exhibits\mutyp225.dgn
bynumr
t:\64\12015-001*uptown\exhibits\mutyp225.dgn

FIGURE 2.26



SIDE PLATFORM
PROPOSED TYPICAL SECTION
POST OAK BLVD.

0 5 10
SCALE IN FEET

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
SIDE PLATFORM
PROPOSED TYPICAL SECTION

DMJM HARRIS

bynumr
02/03/2004 10:40:02 AM
t:\64\12015-001*uptown\exhibits\mutyp226.dgn

To maintain the number of automobile traffic lanes and provide space for the conceptual alignment in the median of Post Oak Blvd., additional ROW is required. The additional ROW needed is the same for both LRT and BRT. Proposed ROW along Post Oak Blvd. is typically 138'. The proposed ROW is based on six 12-foot lanes, a transit way in the median, and a 9'4" clearance from the edge of pavement to the ROW line. City of Houston typically requires a 10' clearance from the edge of pavement to the ROW line, thus a design exception may be required. The proposed ROW along Post Oak Blvd. exceeds 138' at Westheimer and San Felipe to accommodate two left turn movements. However, if the left turn lanes are reduced to one lane, then the 138' ROW footprint can be maintained. See Section 4.2 Roadway Impacts for more information on the left turn lane reduction. Proposed ROW differs for each alternative to the north of Post Oak Blvd. due to varying alignments. ROW calculations are approximate and need detailed survey along the corridor to increase accuracy; this will be done in the preliminary engineering phase. The ROW exhibits (Figures 2.27 - 2.30 at the end of this section) show the additional ROW needed along the corridor for each alternative in greater detail. Segment 1 is designated from the NWTC to Memorial Dr. Segment 2 is from Memorial Dr. to San Felipe. Segment 3 is from San Felipe to Richmond Ave. Segment 4 is from Richmond Ave. to a proposed transit center. A summary of the ROW by segment is shown in Table 2.9 below.

Table 2.9
Transit Way ROW Summary

TRANSIT WAY ROW				
Segment	**Alternative 1 (Acres)**	**Alternative 2 (Acres)**	**Alternative 2A (Acres)**	**Alternative 3 (Acres)**
Segment 1	0	0	0	0
Segment 2	2.22	1.31	.68	1.01
Segment 3	3.82	3.82	3.82	3.82
Segment 4	0	0	0	0
TOTALS	**6.04**	**5.13**	**4.50**	**4.83**

**See section 6.1.1 Methodology: Alternative 2A for further information*
Summary does not include Maintenance facility or proposed Transit Center ROW

Table 2.10 gives a summary of the approximate additional ROW needed for each alternative. The ROW refers to the ROW needed along the corridor to accommodate transit. The ROW for the maintenance facility was calculated based on number of vehicles and necessary items essential for light to medium service to the vehicles.

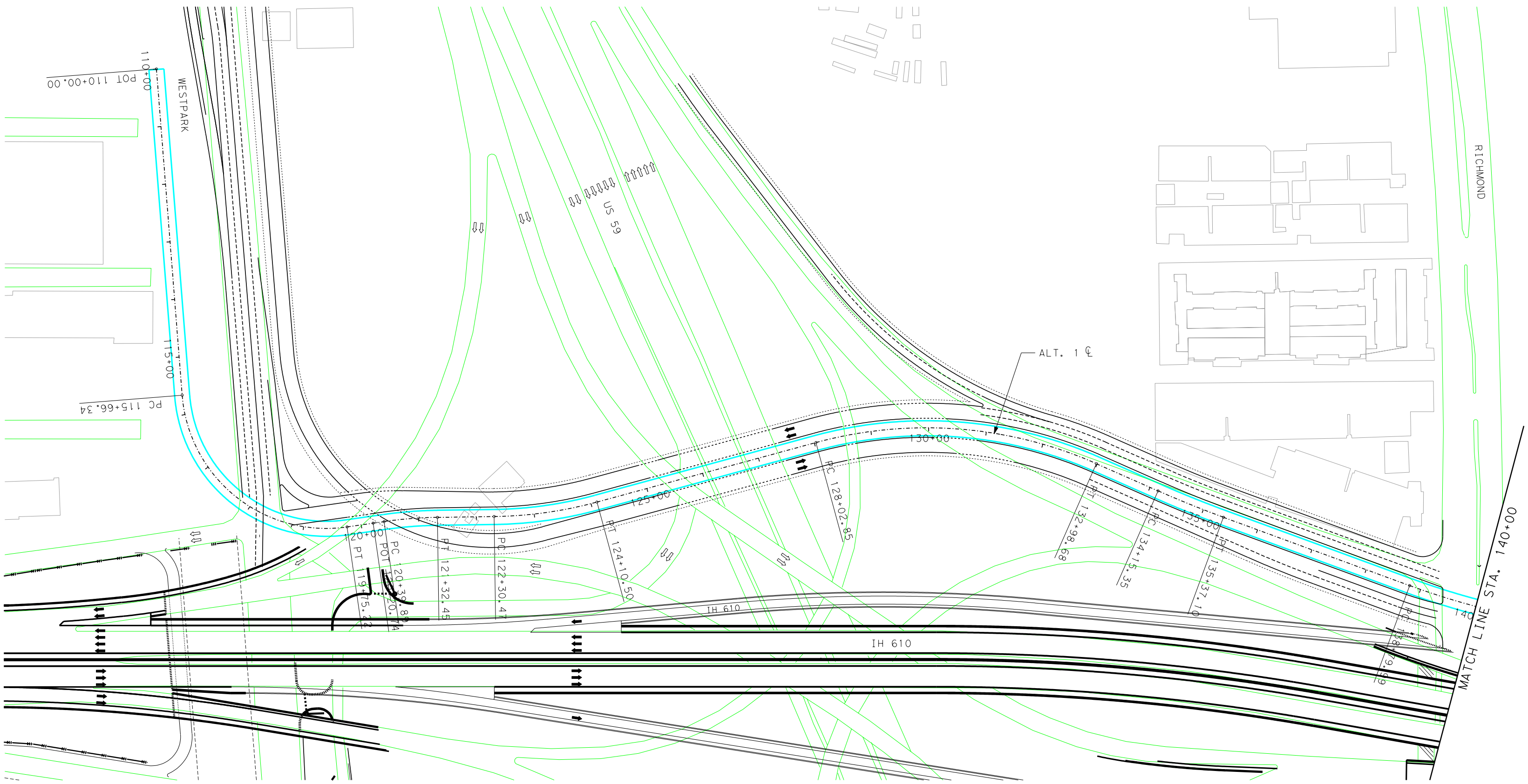
Table 2.10
Required ROW

ADDITIONAL ROW FOR LRT AND BRT				
	Alternative 1 (Acres)	Alternative 2 (Acres)	Alternative 2A (Acres)	Alternative 3 (Acres)
ROW (Transit) (acres)	6.04	5.13	4.5	4.83
ROW (Maintenance Facility) (acres)	13	13	13	13
ROW (Transit Center) (acres)	9.9	9.9	9.9	9.9
Total ROW (acres)	28.94	28.03	27.4	27.73

The necessary ROW and facility requirements for a maintenance facility were calculated based on the number of vehicles. Approximately 13 acres will be required to provide offices, inspection, cleaning services, light maintenance, parking and a detention pond(s). The 13 acres includes an allowance for a less than efficient shape of available land. ROW cost estimates for the proposed southern transit center and maintenance/inspection facilities was based on average costs provided for the Westpark Corridor Sub-area Study.

The proposed transit center to be located at the southern terminus of the project alternatives was estimated to be the same size and parking capacity as the Northwest Transit Center. Facilities and amenities common to METRO transit centers including bus bays, canopies, seating and layover area are included in the cost estimate.

FIGURE 2.27
ALTERNATIVE 1



LEGEND

PROP TRANSIT ROW

EXIST TXDOT ROW

PROP TXDOT ROW

ROW TAKING

TRANSIT ENVELOPE

EXISTING LANE

PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE 1
PROPOSED TRANSIT ROW

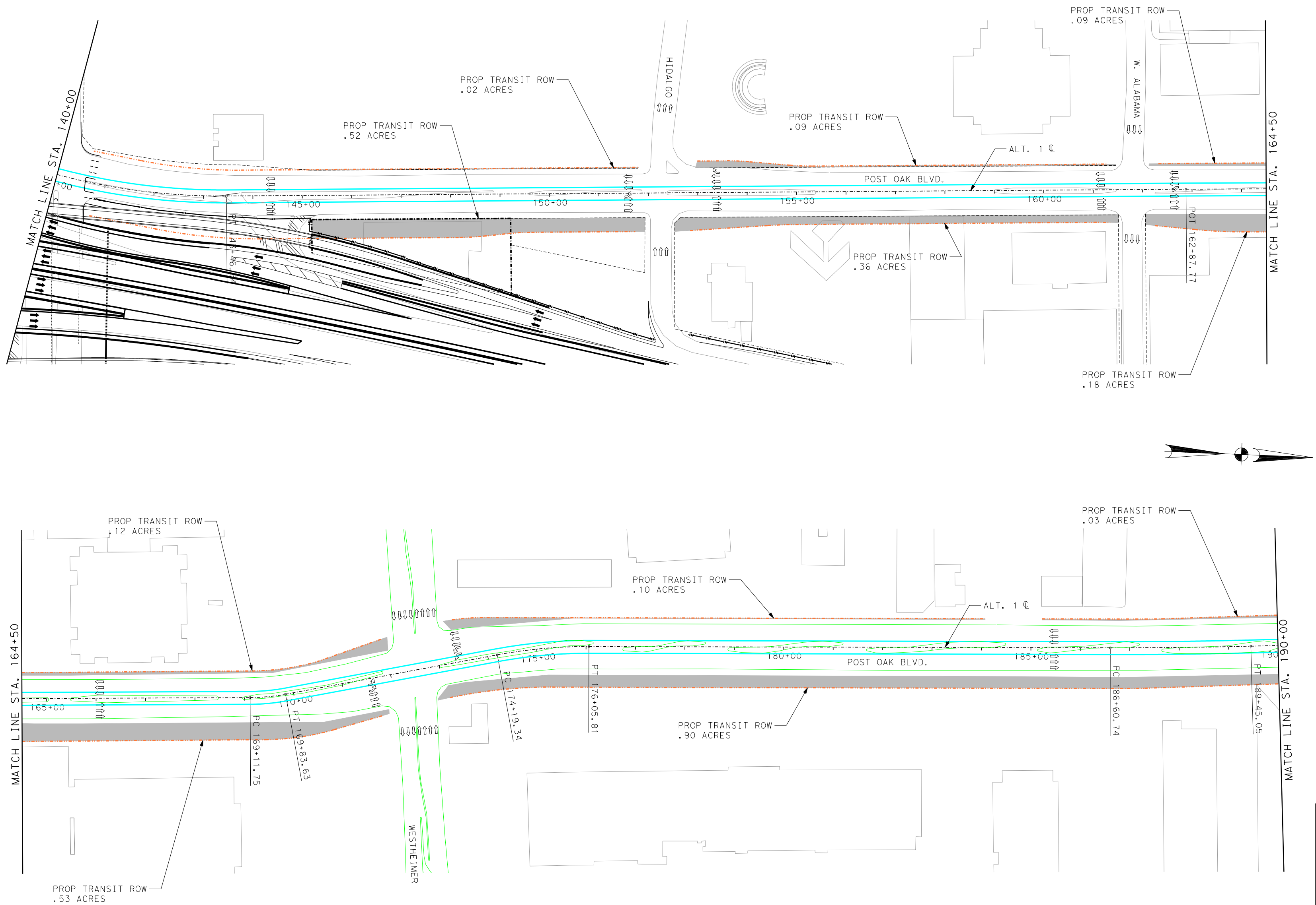
DMJM HARRIS

bynumr

02/03/2004 10:41:28 AM
t:\64\12015-001*uptown\exhibits\alrow227.dgn

t:\64\12015-001*uptown\exhibits\alrow227.dgn

FIGURE 2.27.1
ALTERNATIVE 1



LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

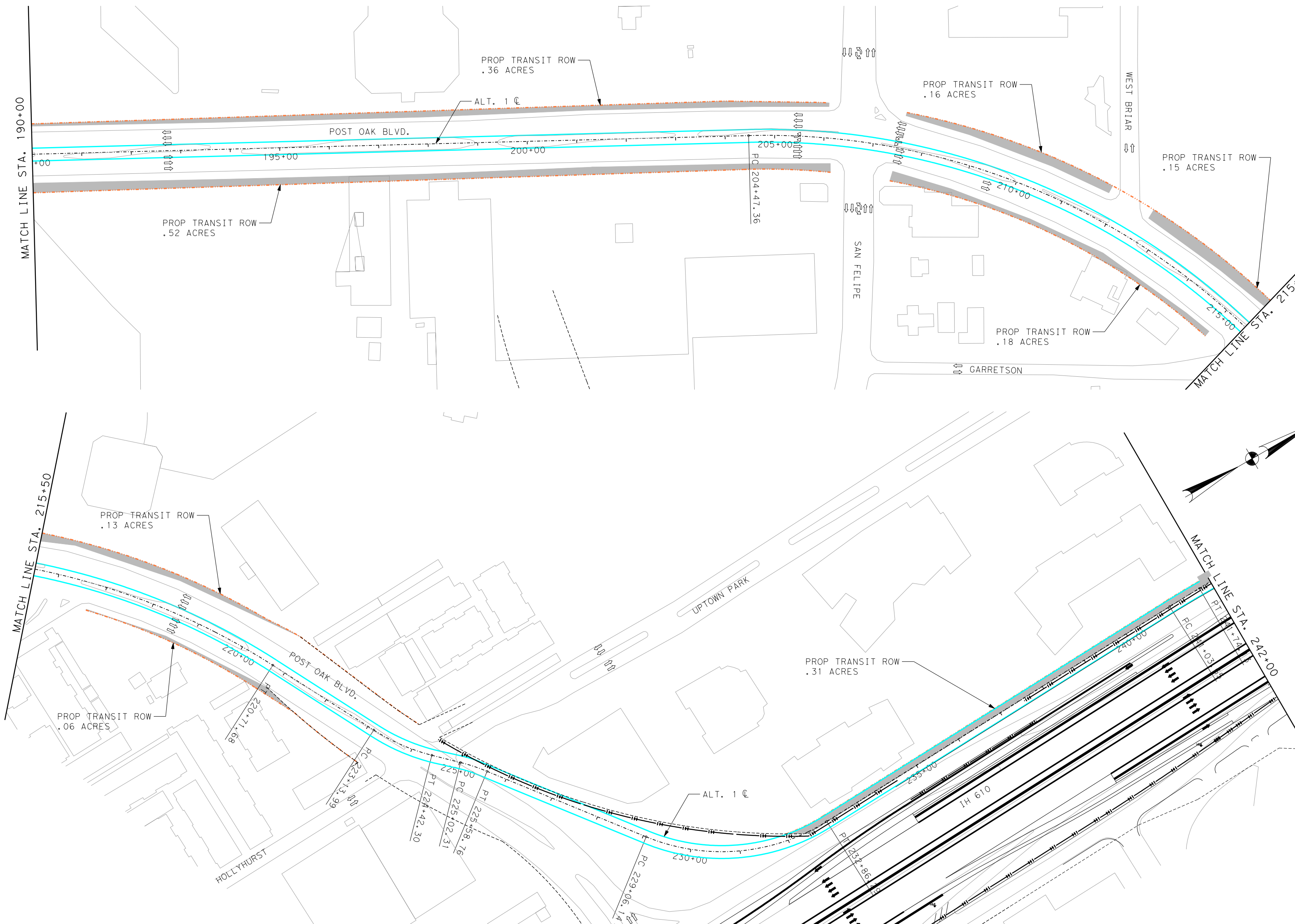
TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE 1
PROPOSED TRANSIT ROW

DMJM HARRIS

bynumr
02/03/2004 10:42:34 AM
t:\64\12015-001*uptown\exhibits\a1row2271.dgn

FIGURE 2.27.2
ALTERNATIVE 1



LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

ALTERNATIVE 1
PROPOSED TRANSIT ROW

DMJM HARRIS

02/03/2004 10:43:17 AM
t:\64\12015-001*uptown\exhibits\alrow2272.dgn
bynumr

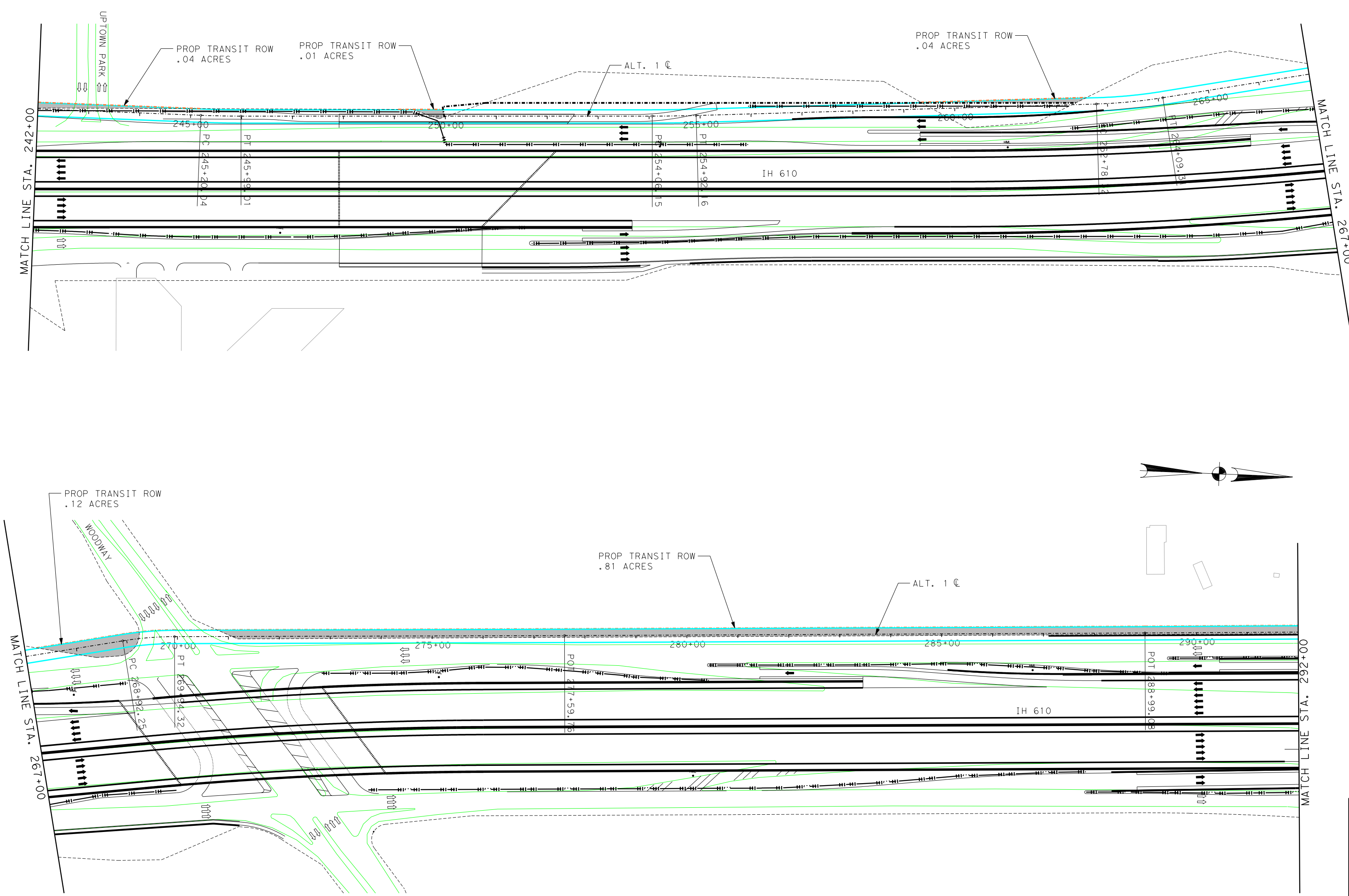


FIGURE 2.27.3
ALTERNATIVE 1

LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

ALTERNATIVE 1
PROPOSED TRANSIT ROW

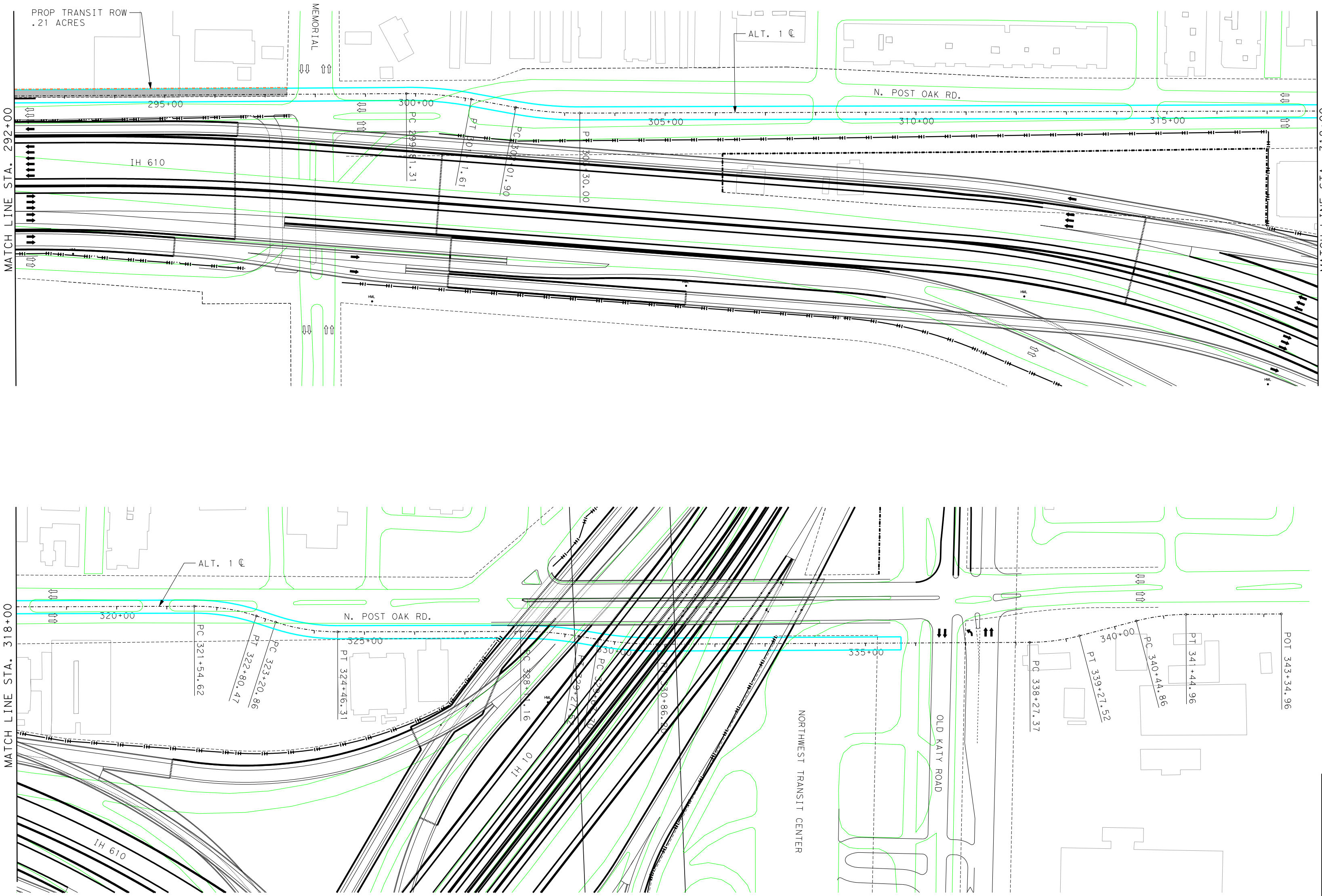
DMJM HARRIS

bynumr

02/03/2004 10:43:51 AM
t:\64\12015-001*uptown\exhibits\a1row2273.dgn

t:\64\12015-001*uptown\exhibits\a1row2273.dgn

FIGURE 2.27.4
ALTERNATIVE 1



LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

ALTERNATIVE 1
PROPOSED TRANSIT ROW

DMJM HARRIS

02/03/2004 10:45:09 AM
t:\64\12015-001*uptown\exhibits\a1row2274.dgn
bynumr

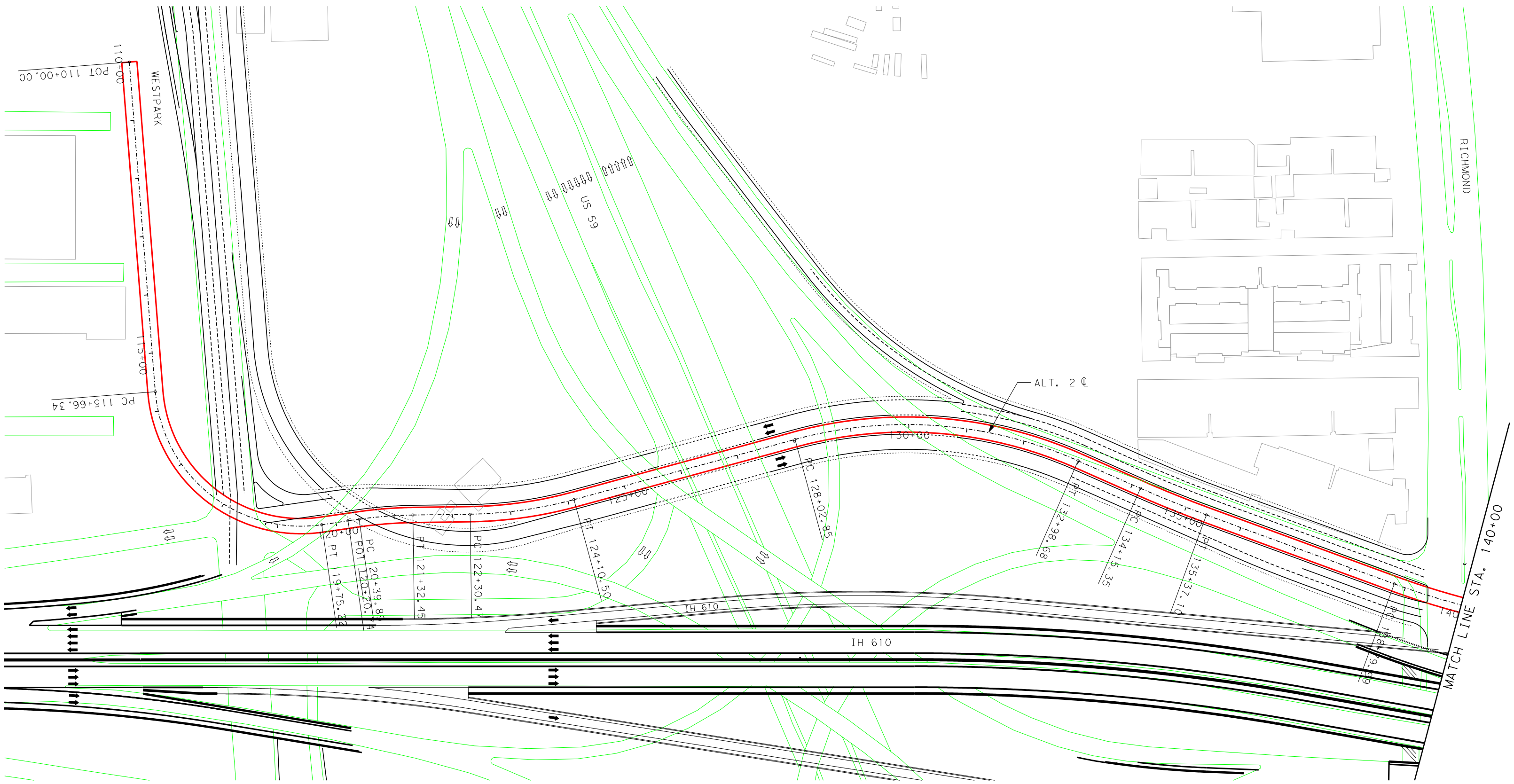


FIGURE 2.28
ALTERNATIVE 2

LEGEND

PROP TRANSIT ROW
EXIST TXDOT ROW
PROP TXDOT ROW
ROW TAKING
TRANSIT ENVELOPE
EXISTING LANE
PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

ALTERNATIVE 2
PROPOSED TRANSIT ROW

DMJM HARRIS

t:\64\12015-001*uptown\exhibits\a2row228.dgn

02/03/2004 10:49:29 AM
t:\64\12015-001*uptown\exhibits\a2row228.dgn
bynumr

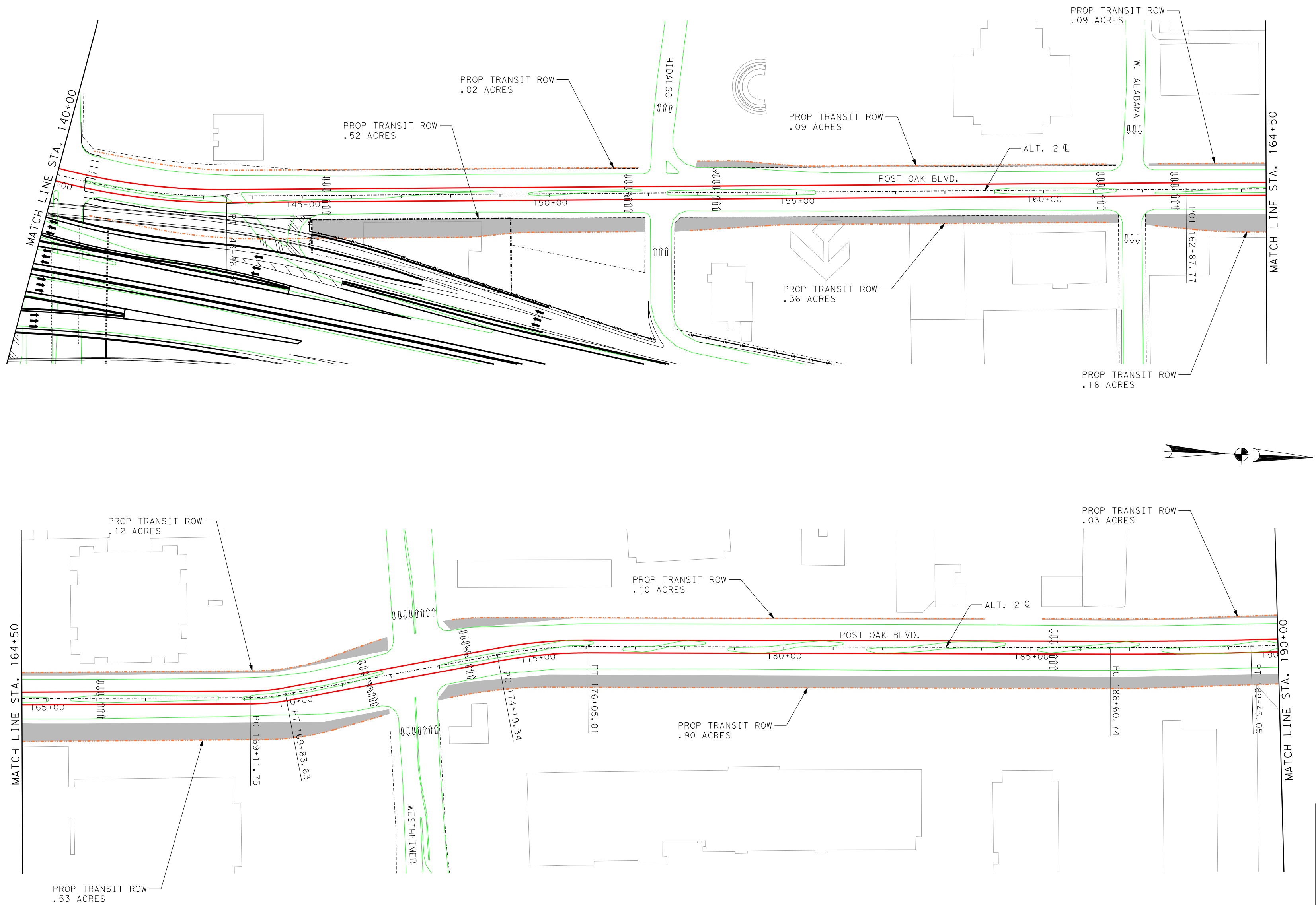


FIGURE 2.28.1
ALTERNATIVE 2

LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

DMJM HARRIS

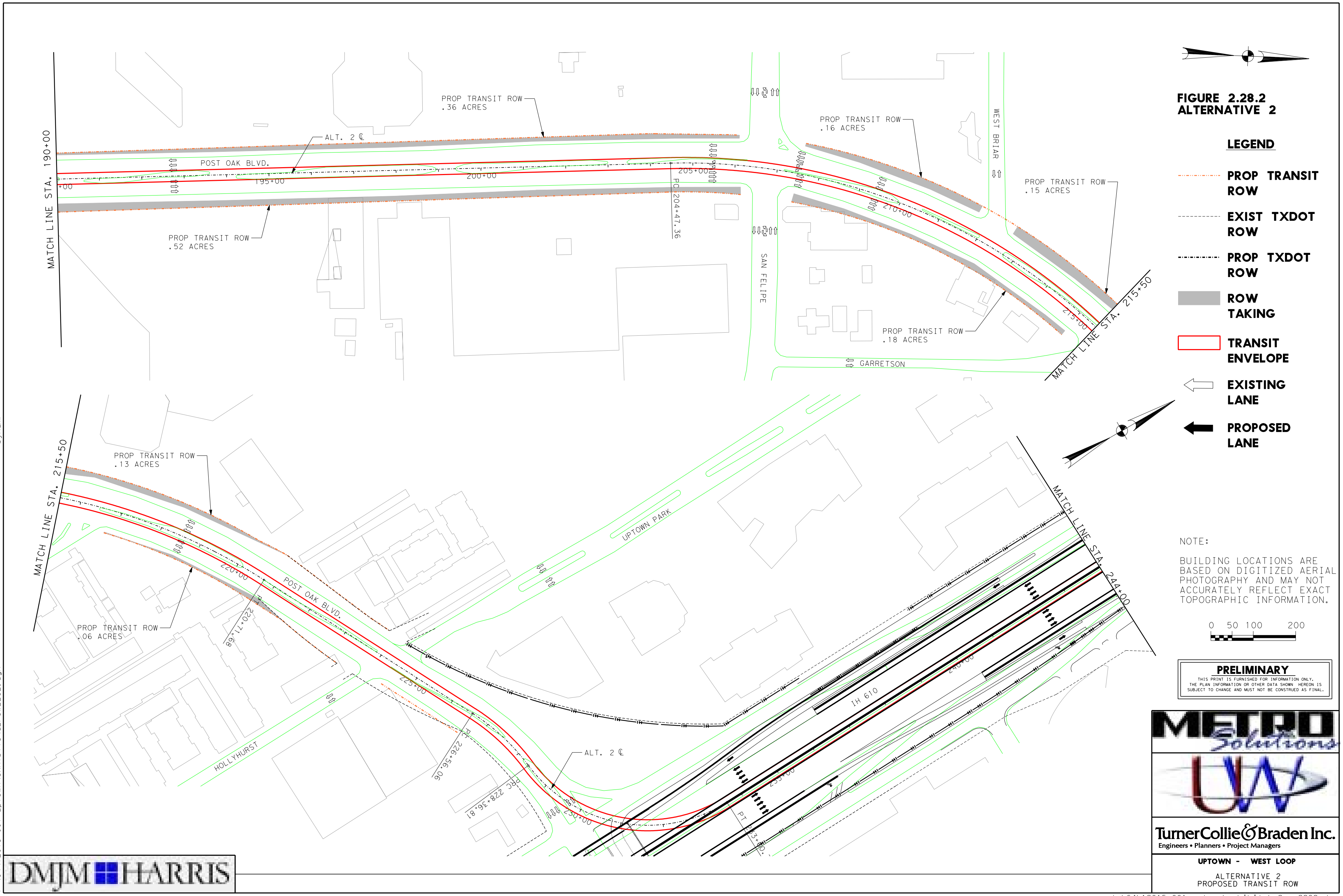
UPTOWN - WEST LOOP

ALTERNATIVE 2
PROPOSED TRANSIT ROW

t:\64\12015-001*uptown\exhibits\a2row2281.dgn

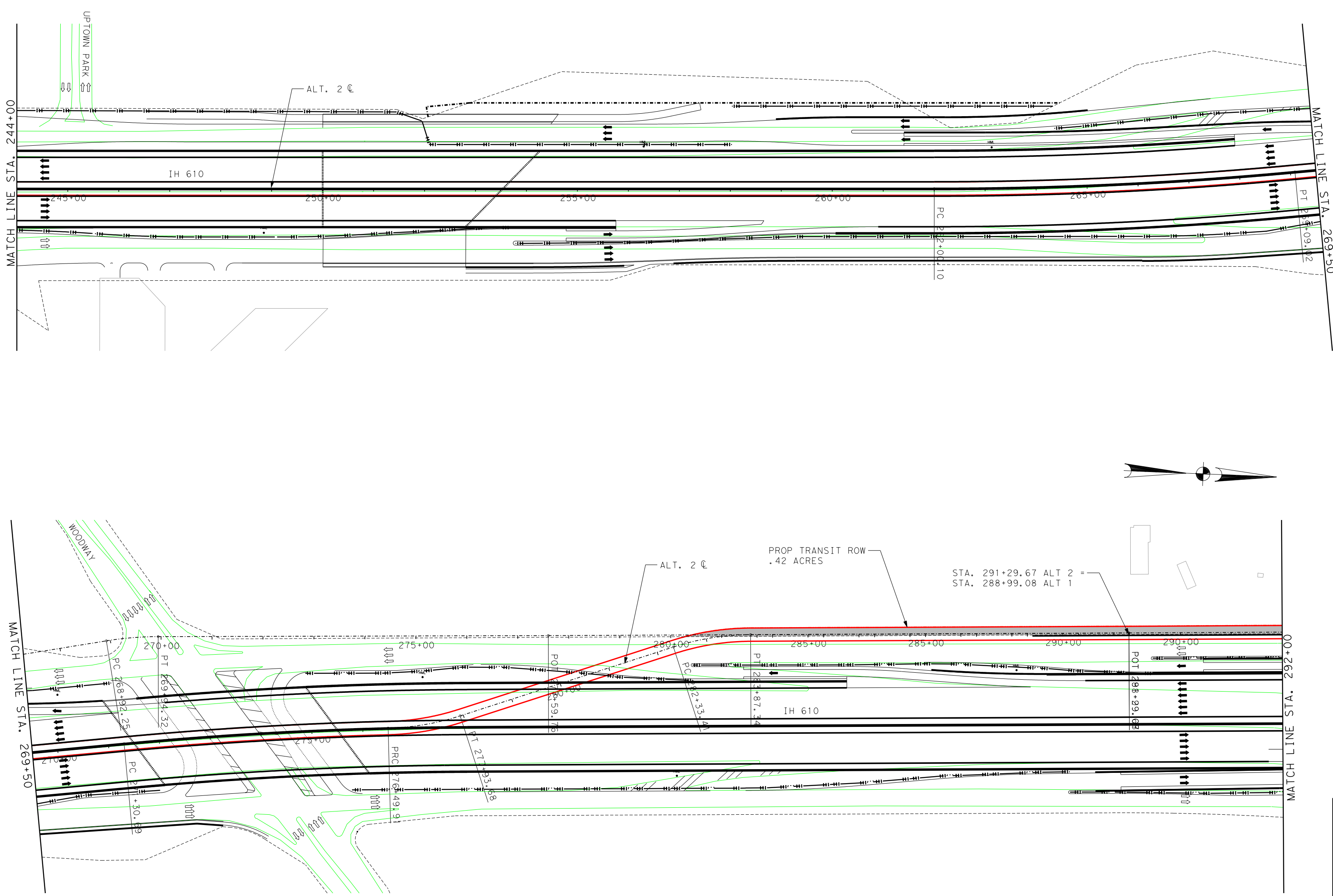
02/03/2004 10:50:12 AM
t:\64\12015-001*uptown\exhibits\a2row2281.dgn

bynumr



02/03/2004 10:51:01 AM bynumr
t:\64\12015-001*uptown\exhibits\a2row2282.dgn

FIGURE 2.28.3
ALTERNATIVE 2



LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

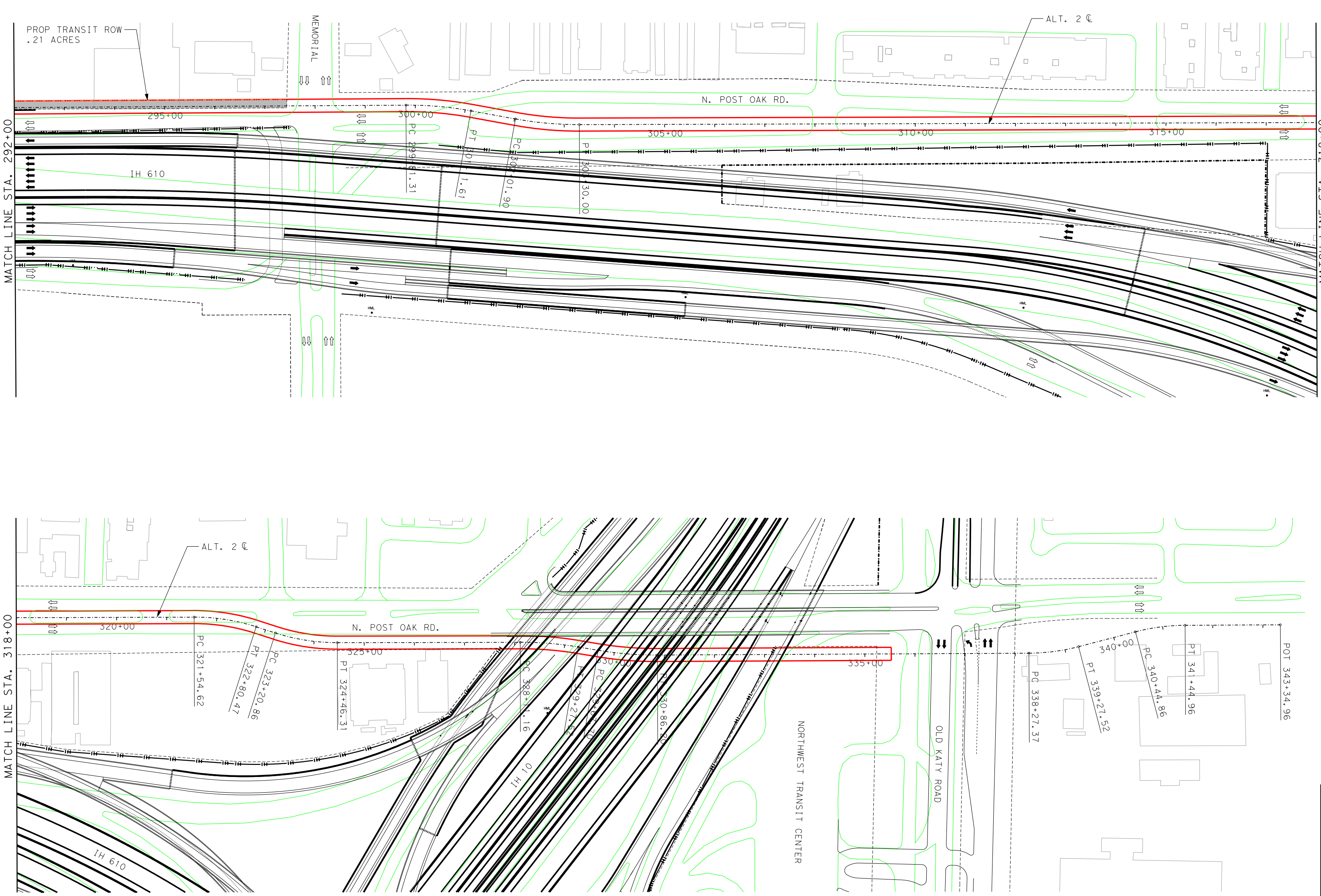
ALTERNATIVE 2
PROPOSED TRANSIT ROW

DMJM HARRIS

bynumr

02/03/2004 10:51:33 AM
t:\64\12015-001*uptown\exhibits\a2row2283.dgn

FIGURE 2.28.4
ALTERNATIVE 2



LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE 2
PROPOSED TRANSIT ROW

DMJM HARRIS

02/03/2004 10:52:27 AM
t:\64\12015-001*uptown\exhibits\a2row2284.dgn
bynumr

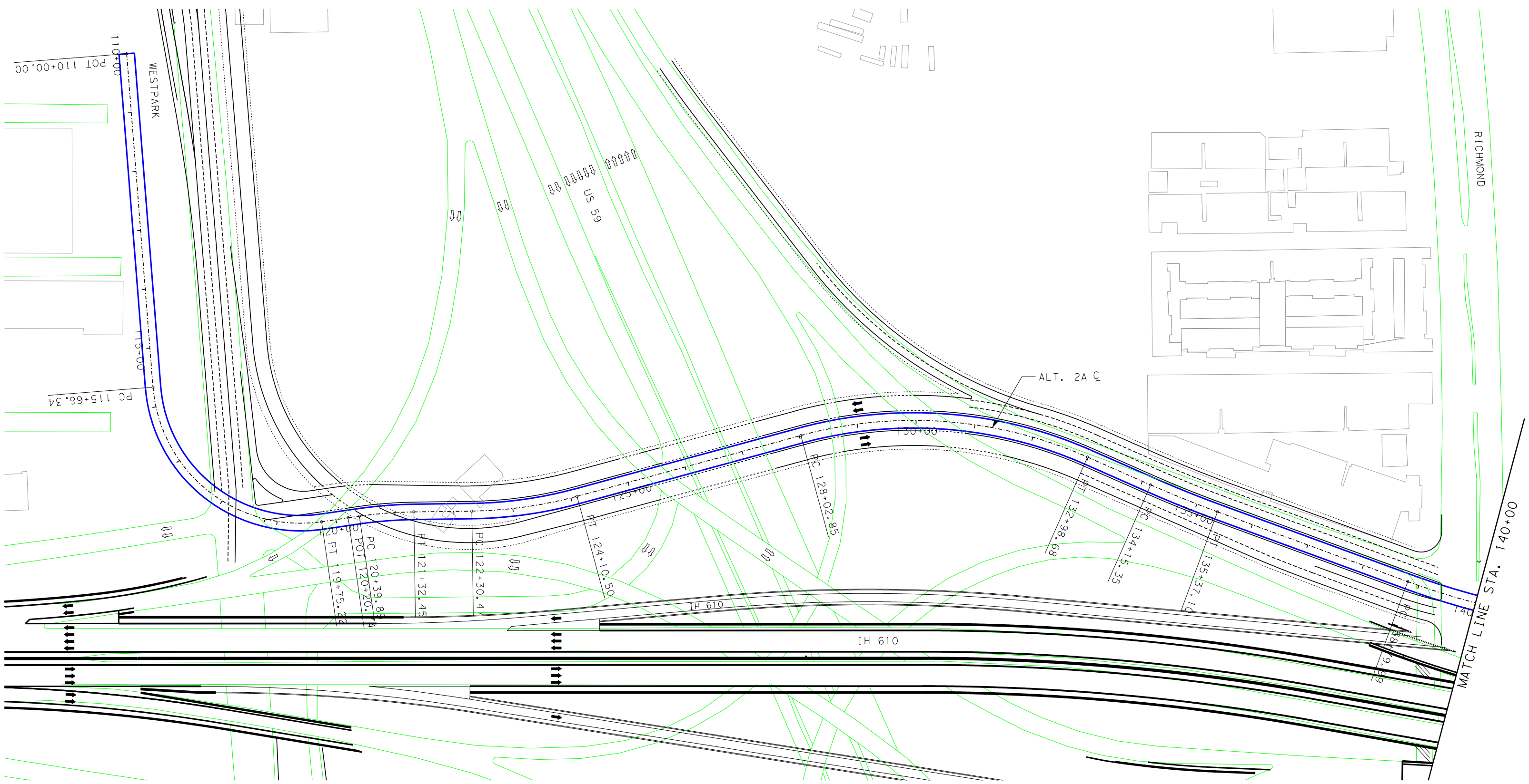


FIGURE 2.29
ALTERNATIVE 2A

LEGEND

PROP TRANSIT ROW

EXIST TXDOT ROW

PROP TXDOT ROW

ROW TAKING

TRANSIT ENVELOPE

EXISTING LANE

PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

ALTERNATIVE 2A
PROPOSED TRANSIT ROW

DMJM HARRIS

02/03/2004 10:45:44 AM
t:\64\12015-001*uptown\exhibits\a2arow229.dgn

bynumr

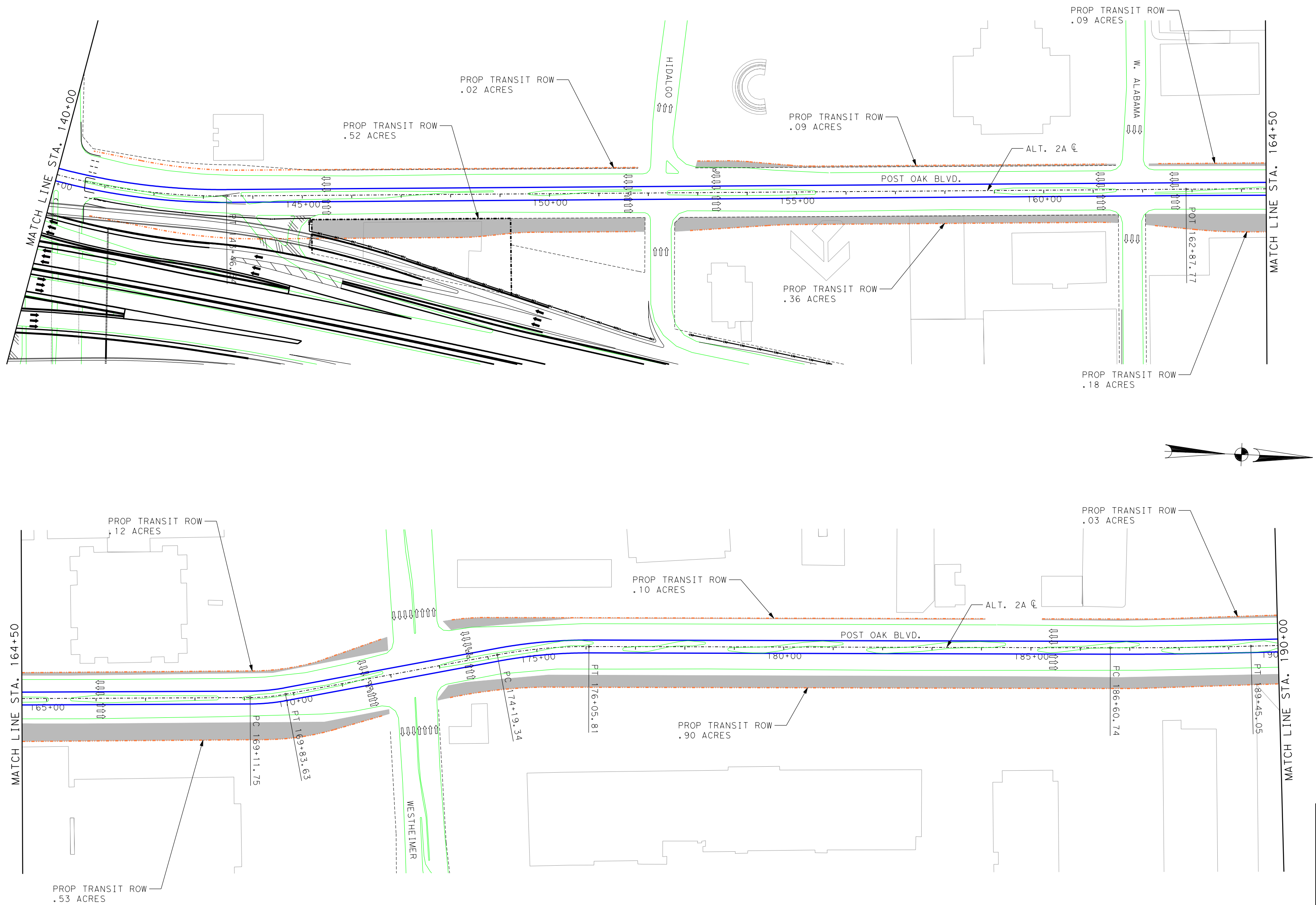


FIGURE 2.29.1
ALTERNATIVE 2A

LEGEND

- **PROP TRANSIT ROW**
- **EXIST TXDOT ROW**
- **PROP TXDOT ROW**
- **ROW TAKING**
- **TRANSIT ENVELOPE**
- **EXISTING LANE**
- **PROPOSED LANE**

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

UW

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

ALTERNATIVE 2A
PROPOSED TRANSIT ROW

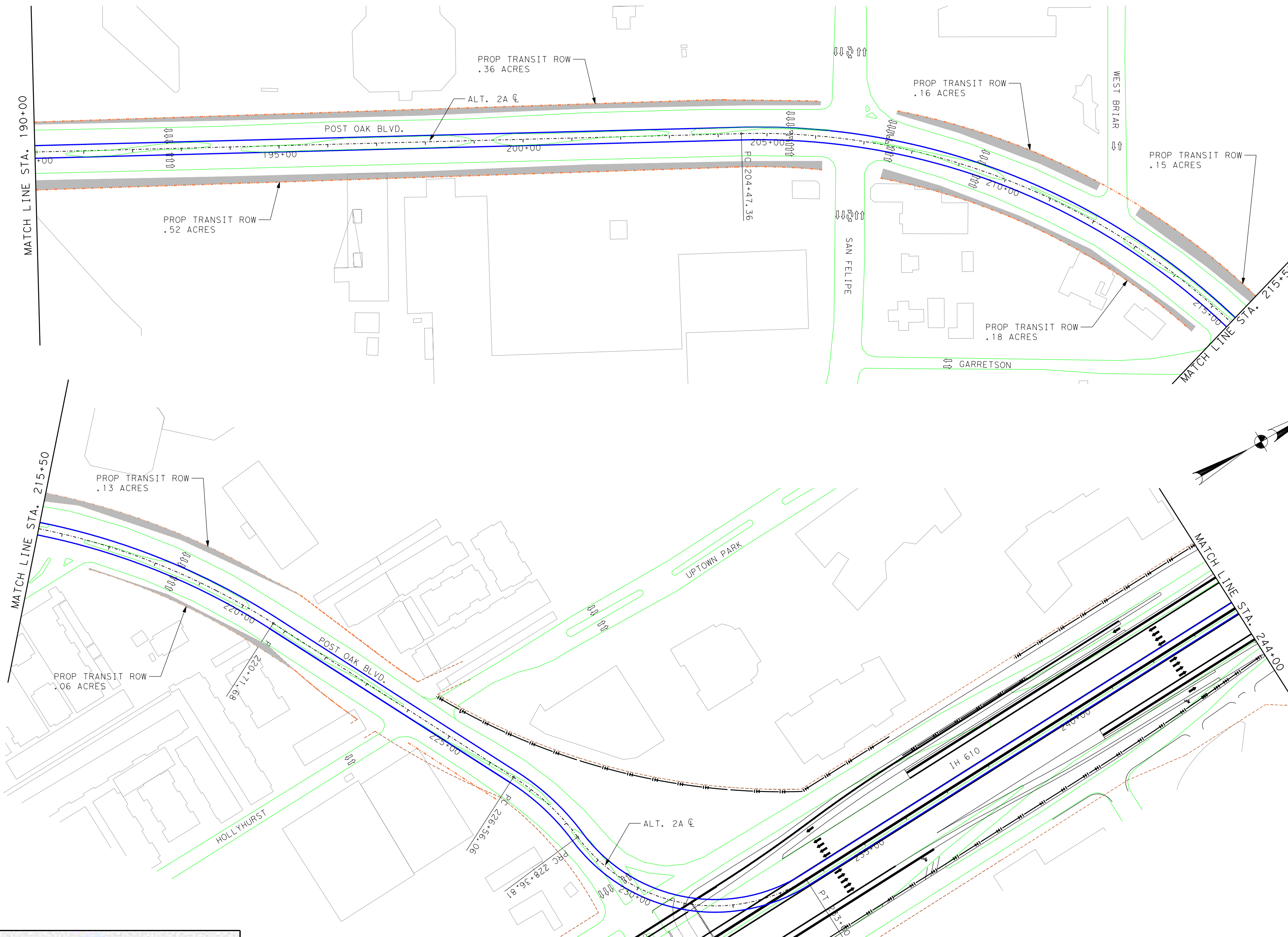
DMJM HARRIS

bynumr

02/03/2004 10:46:31 AM
t:\64\12015-001*uptown\exhibits\a2arow2291.dgn

t:\64\12015-001*uptown\exhibits\a2arow2291.dgn

FIGURE 2.29.2
ALTERNATIVE 2A



LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

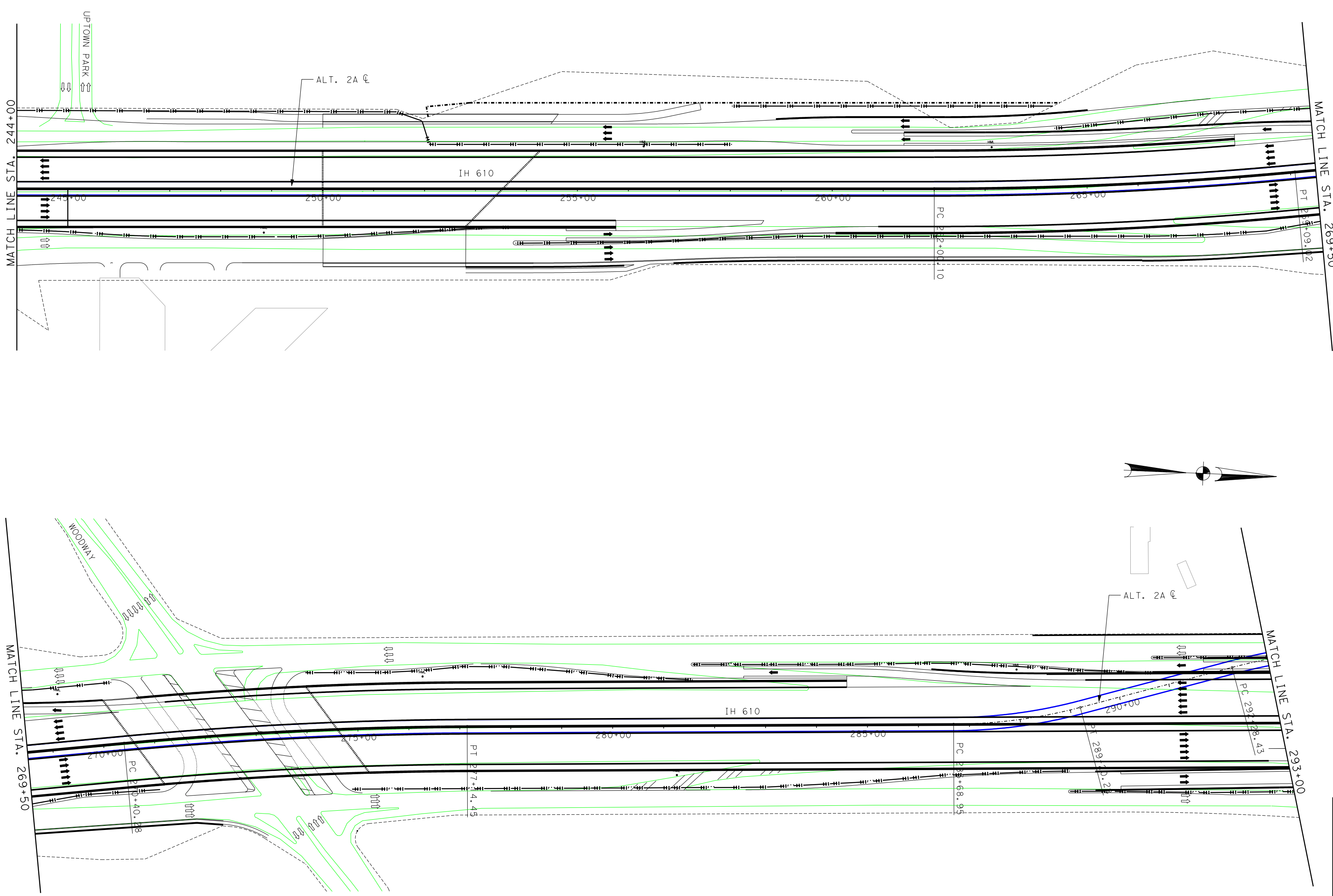
ALTERNATIVE 2A
PROPOSED TRANSIT ROW

DMJM HARRIS

02/03/2004 10:47:07 AM
t:\64\12015-001*uptown\exhibits\a2arow2292.dgn

bynumr

FIGURE 2.29.3
ALTERNATIVE 2A



LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

ALTERNATIVE 2A
PROPOSED TRANSIT ROW

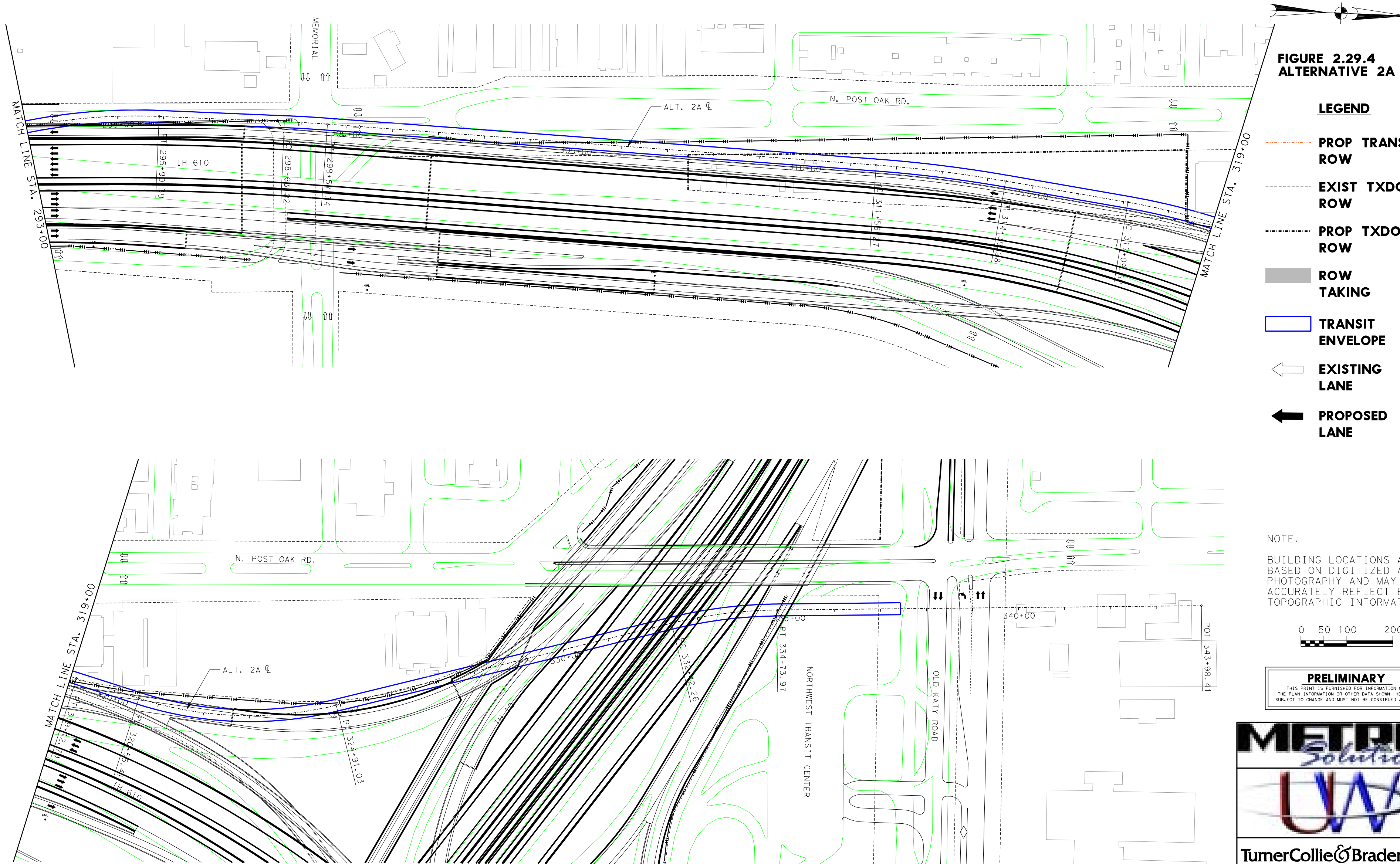
DMJM HARRIS

bynumr

02/03/2004 10:47:55 AM
t:\64\12015-001*uptown\exhibits\a2arow2293.dgn

t:\64\12015-001*uptown\exhibits\a2arow2293.dgn

FIGURE 2.29.4
ALTERNATIVE 2A



NOTE:
BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

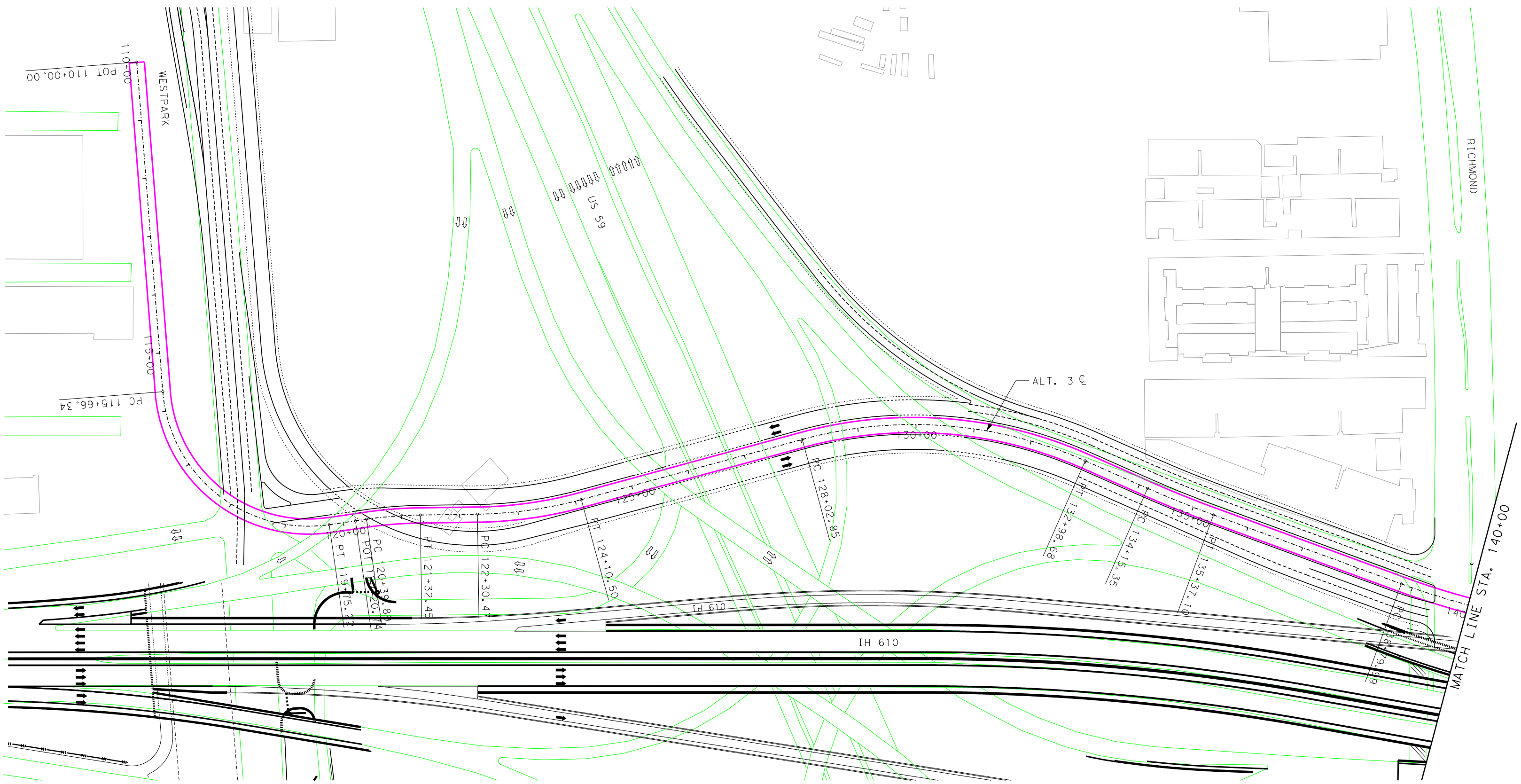
TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE 2A
PROPOSED TRANSIT ROW

DMJM HARRIS

02/03/2004 10:48:34 AM bynumr
t:\64\12015-001*uptown\exhibits\a2arow2294.dgn

FIGURE 2.30
ALTERNATIVE 3



LEGEND

PROP TRANSIT ROW

EXIST TXDOT ROW

PROP TXDOT ROW

ROW TAKING

TRANSIT ENVELOPE

EXISTING LANE

PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

ALTERNATIVE 3
PROPOSED TRANSIT ROW

DMJM HARRIS

bynumr

02/03/2004 10:53:10 AM
t:\64\12015-001*uptown\exhibits\a3row230.dgn

t:\64\12015-001*uptown\exhibits\a3row230.dgn

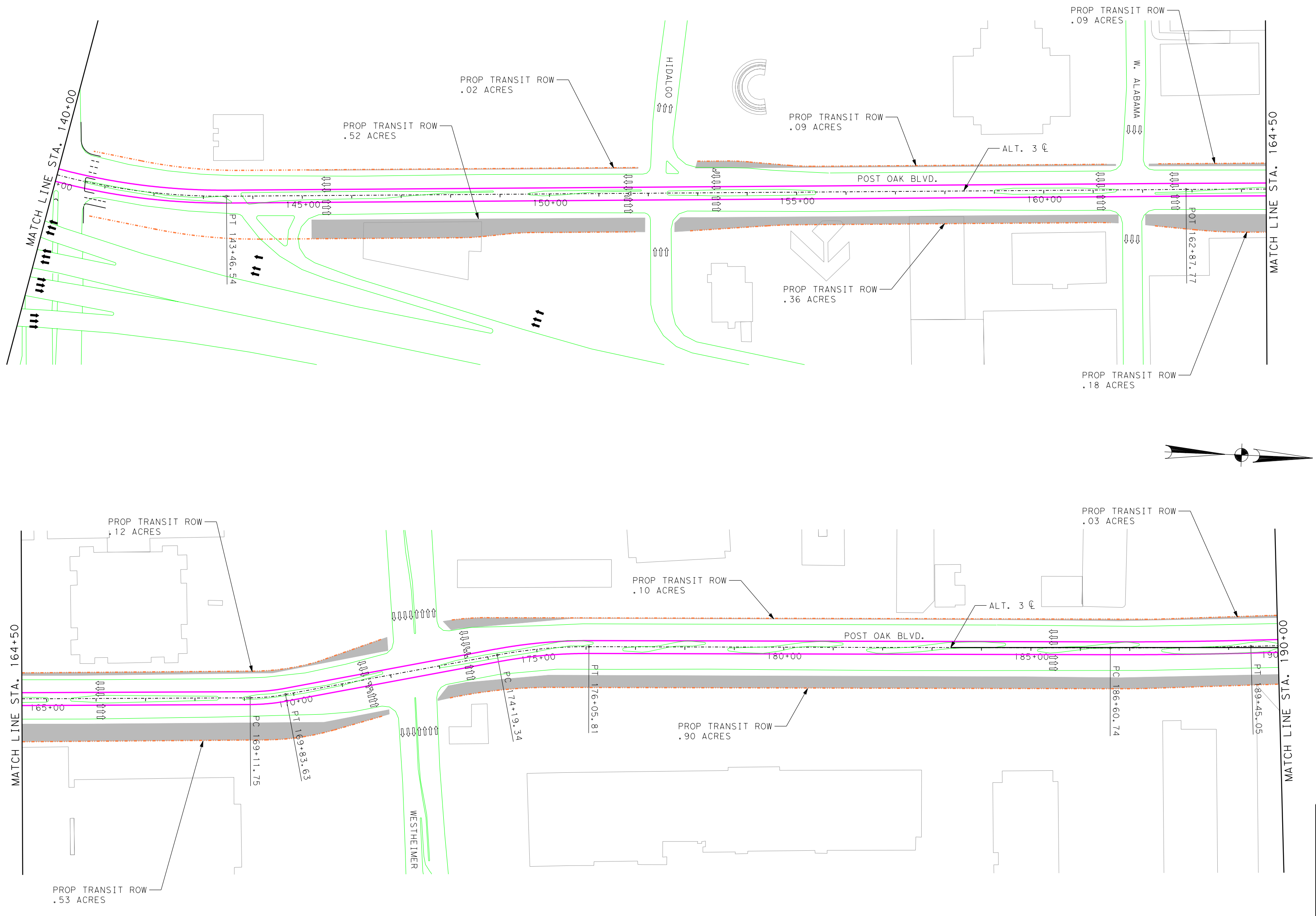


FIGURE 2.30.1
ALTERNATIVE 3

LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:
BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

UW

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE 3
PROPOSED TRANSIT ROW

DMJM HARRIS

bynumr
02/03/2004 10:53:45 AM
t:\64\12015-001*uptown\exhibits\a3row2301.dgn

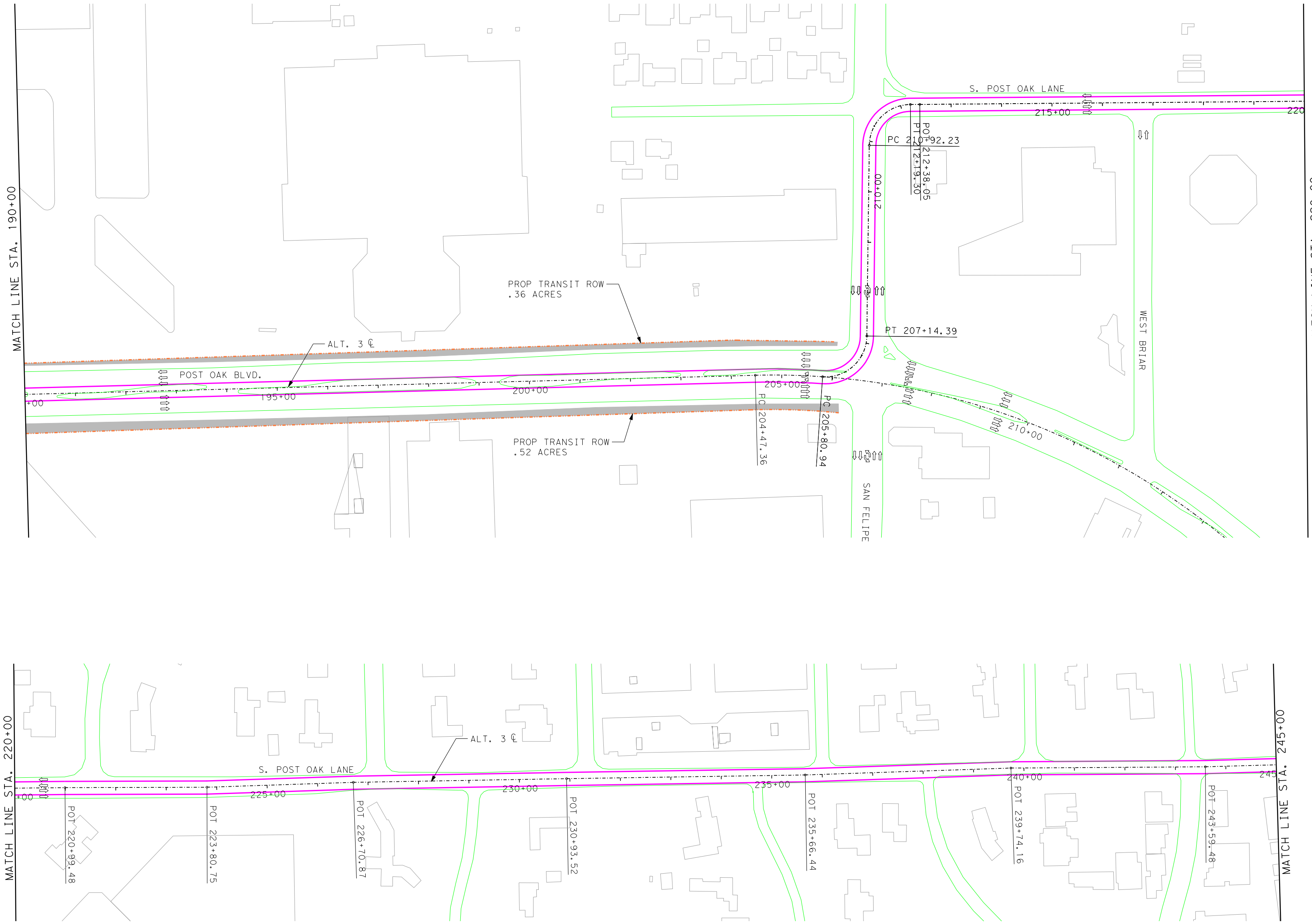


FIGURE 2.30.2
ALTERNATIVE 3

LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE 3
PROPOSED TRANSIT ROW

DMJM HARRIS

bynumr
02/03/2004 10:54:43 AM
t:\64\12015-001*uptown\exhibits\a3row2302.dgn

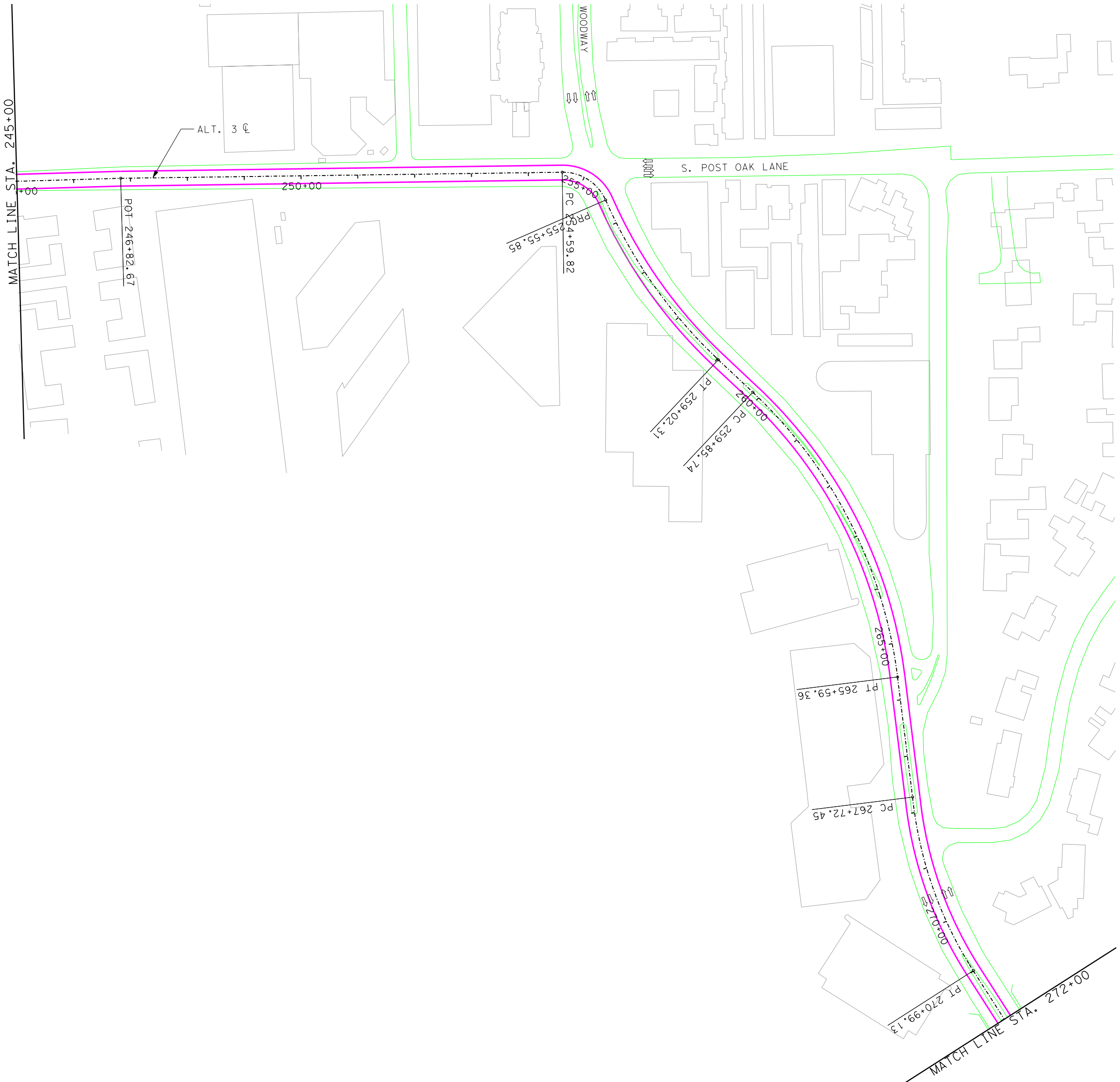


FIGURE 2.30.3
ALTERNATIVE 3

LEGEND

- **PROP TRANSIT ROW**
- **EXIST TXDOT ROW**
- **PROP TXDOT ROW**
- **ROW TAKING**
- **TRANSIT ENVELOPE**
- **EXISTING LANE**
- **PROPOSED LANE**

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE 3
PROPOSED TRANSIT ROW

DMJM HARRIS

bynumr
02/03/2004 10:55:52 AM
t:\64\12015-001*uptown\exhibits\a3row2303.dgn

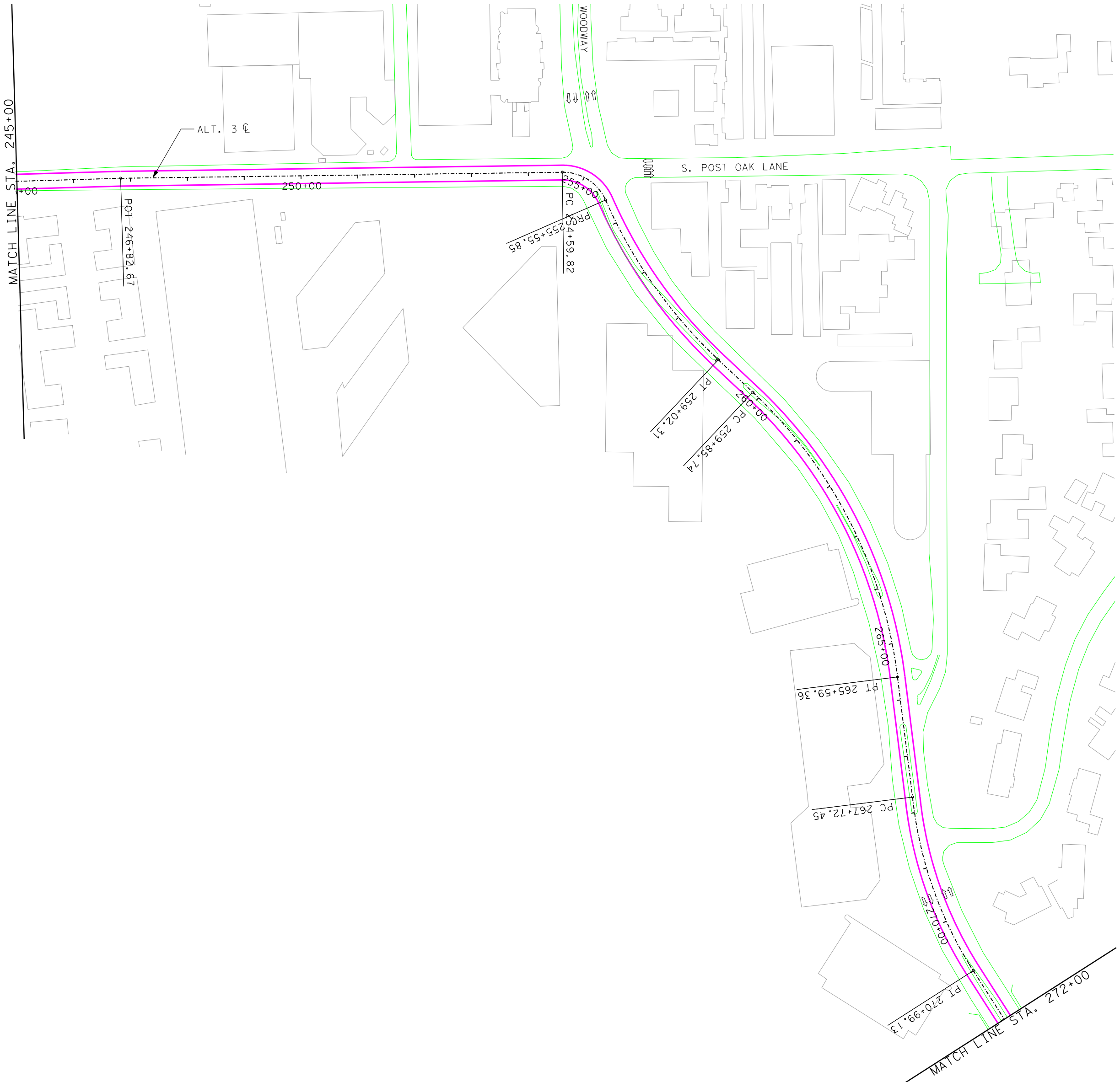


FIGURE 2.30.3
ALTERNATIVE 3

LEGEND

- **PROP TRANSIT ROW**
- **EXIST TXDOT ROW**
- **PROP TXDOT ROW**
- **ROW TAKING**
- **TRANSIT ENVELOPE**
- **EXISTING LANE**
- **PROPOSED LANE**

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE 3
PROPOSED TRANSIT ROW

DMJM HARRIS

02/03/2004 10:55:52 AM
t:\64\12015-001*uptown\exhibits\a3row2303.dgn
bynumr

t:\64\12015-001*uptown\exhibits\a3row2303.dgn

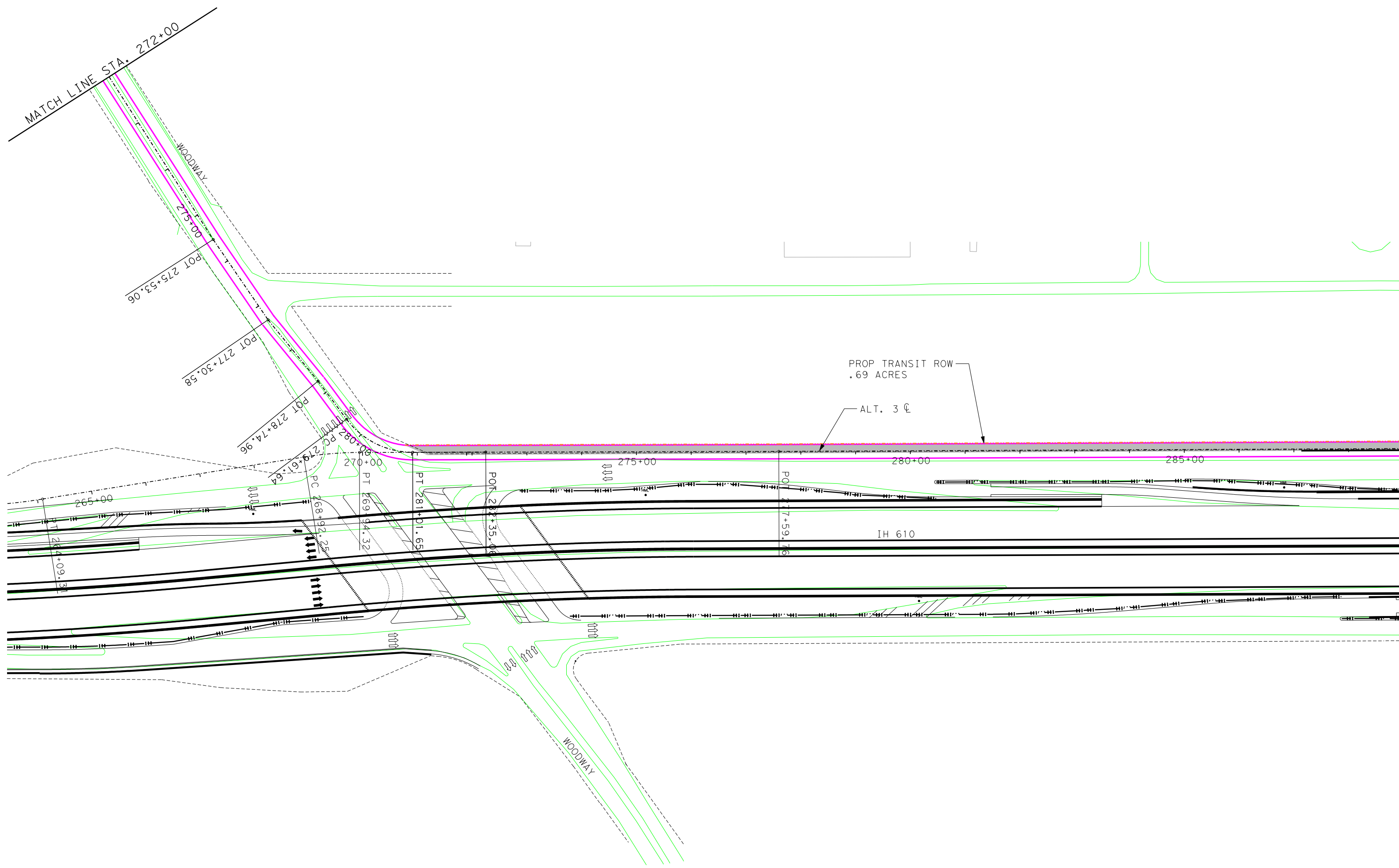


FIGURE 2.30.4
ALTERNATIVE 3

LEGEND

PROP TRANSIT ROW

EXIST TXDOT ROW

PROP TXDOT ROW

ROW TAKING

TRANSIT ENVELOPE

EXISTING LANE

PROPOSED LANE

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

ALTERNATIVE 3
PROPOSED TRANSIT ROW

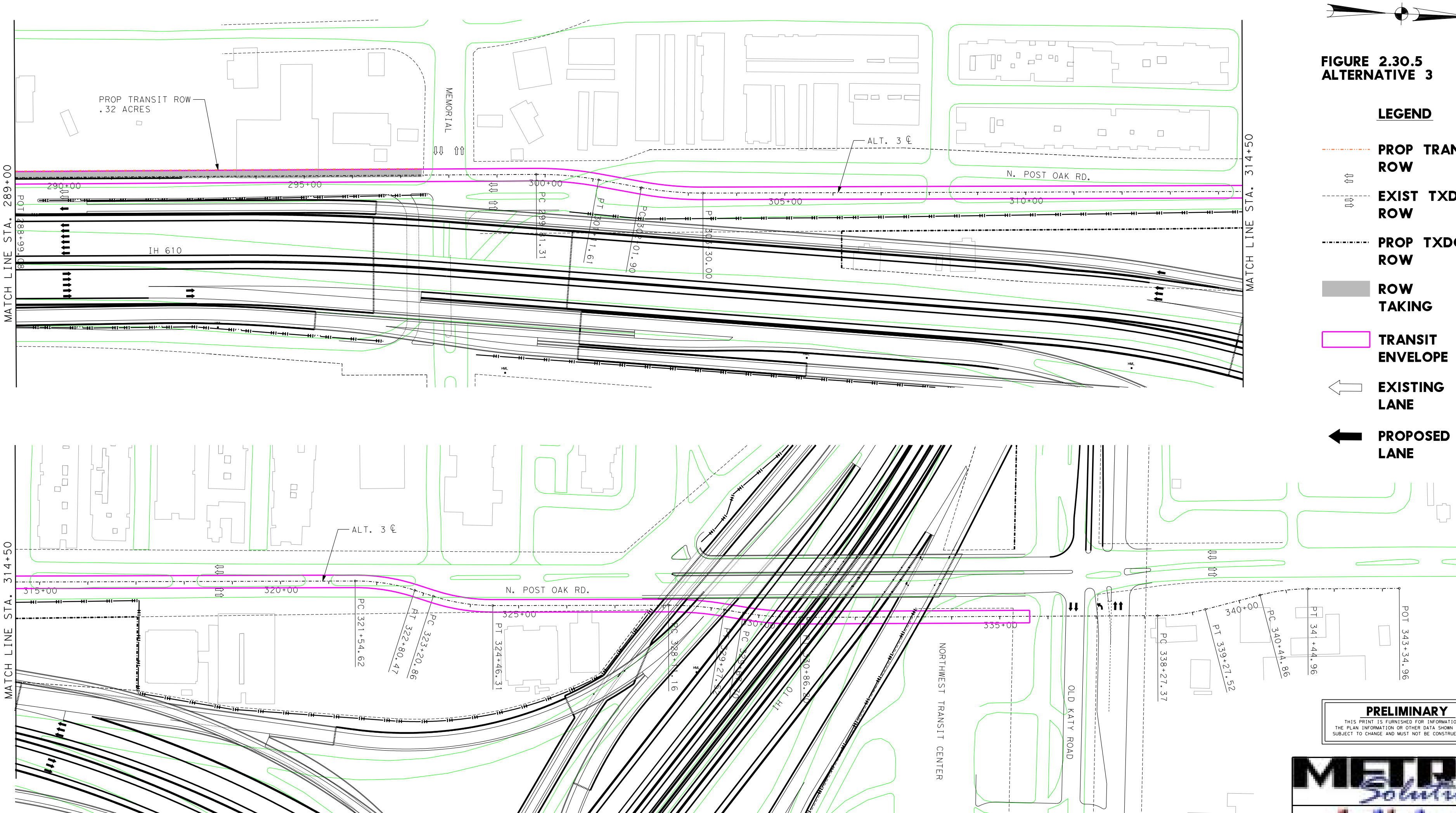
DMJM HARRIS

bynumr

02/03/2004 10:56:27 AM
t:\64\12015-001*uptown\exhibits\a3row2304.dgn

t:\64\12015-001*uptown\exhibits\a3row2304.dgn

FIGURE 2.30.5
ALTERNATIVE 3



LEGEND

- PROP TRANSIT ROW
- EXIST TXDOT ROW
- PROP TXDOT ROW
- ROW TAKING
- TRANSIT ENVELOPE
- EXISTING LANE
- PROPOSED LANE

PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

NOTE:

BUILDING LOCATIONS ARE BASED ON DIGITIZED AERIAL PHOTOGRAPHY AND MAY NOT ACCURATELY REFLECT EXACT TOPOGRAPHIC INFORMATION.

0 50 100 200

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP

ALTERNATIVE 3
PROPOSED TRANSIT ROW

DMJM HARRIS

bynumr

02/03/2004 10:57:09 AM
t:\64\12015-001*uptown\exhibits\a3row2305.dgn

Exhibit 2.1
No Build Alternative
* Includes transit service operated by METRO, the Brazos Transit District (Woodlands Service), and TREKEXPRESS (Fort Bend County/ US 59 South)

Route Number	Description	Service Type	Headway	
			Peak	Off-Peak
001ar	Hospital Crosstown	local	15	15
002ar	Bellaire-7600trnbk	local	30	60
002br	Bellaire-Alief	local	10	30
002cr	Bellaire-Westchase	local	30	30
003ar	Langley/Southmore-Bellfort-Hk	local	30	40
003br	Langley/Southmore-Gulf-HK	local	30	40
004ar	Beechnut	local	7	20
004br	Jensen	local	7	20
005ar	Kashmere	local	15	26
008ar	N/S.Main-Bell HK	local	30	30
008br	N/S.Main-Willowbend HK	local	30	30
008cr	S.Main-Bellfort TB	local	60	60
008dr	S.Main-Willowbend TB	local	60	60
009ar	West Gray	local	15	30
011ar	Nance/Almeda-HK	local	25	35
015ar	Fulton	local	10	15
015br	HC-Southmont	local	20	30
015cr	H.C. - Orem/TMC	local	20	30
017ar	Tanglewood/Gulfton-HK	local	20	25
018ar	Kirby Limited	local	27	35
019ar	Wilcrest Crosstown	local	15	40
020ar	Canal-Long Pt-MeC-HK	local	25	40
020br	Canal-Long Pt-Mem/___-HK	local	60	60
020cr	Canal-Long Pt-NeC-HK	local	15	40
020dr	Canal-Long Point-Neu/-HK	local	60	60
023ar	Crosstimbers Crosstown	local	27	30
025ar	Northline Rich-W Oaks-HK	local	12	30
025br	Northline Rich-Sharps-HK	local	12	30
026ar	Outer Loop Crosstown	local	15	30
026br	Outer Loop Crosstown TMCTB	local	40	40
027ar	Inner Loop Crosstown	local	15	30
027br	Inner Loop Crosstown TMCTB	local	40	40
029ar	TSU/UH Hirsch Xtown	local	18	20
030ar	Cullen/Clinton Pk-HK	local	40	60
030br	Clinton/Galena Pk. -HK	local	40	60
030cr	Clinton/Denver Har - HK	local	40	50
030dr	Cullen/Clinton Pk FWY-HK	local	60	60
030er	Clinton/Galena Pk FWY-HK	local	60	60
030fr	Clinton/Denver Har FWY-HK	local	60	60
033ar	Post Oak - Fuqua	local	25	40
033br	Post Oak - Ridgemont	local	25	40

034ar	Montrose Crosstown	local	25	45
035ar	Leeland/Fairview -HK	local	30	45
036ar	Lawndale-Wayside	local	30	60
036br	Lawndale-Wayside DTT	local	60	60
036cr	Lawndale	local	40	60
037ar	El Sol Crosstown	local	35	35
040ar	Pecore-NWM/Tel Richey-HK	local	30	60
040br	Pecore-Ella/Tel Richey-HK	local	30	60
040cr	Pecore-NWM/Richey GHC-HK	local	60	60
040dr	Pecore-Ela/Richey GHC-HK	local	60	60
040er	Pecore-Ella-Dtwn Tb	local	60	60
041ar	Gulf Medows Circ	local	40	40
042ar	Holmes Crosstown Magnolia	local	30	30
042br	Holmes Crosstown 5th Ward/De	local	30	30
043ar	Pinemont Plaza	local	30	55
044ar	Acres Homes	local	20	30
044br	Acres Home via Stall	local	40	60
045ar	Tidwell Crosstown	local	20	40
046ar	Gessner Crosstown	local	10	30
047ar	Hillcroft/Voss Crosstown	local	20	25
048ar	Nav-Mag/W. Dallas-HK	local	60	60
048br	Nav-Plv/W. Dallas-HK	local	30	60
048cr	Nav-Pv(Lab)/W Dal-HK	local	60	60
049ar	Chimney Rock Crosstown	local	40	50
050ar	Harrisburg-Airport/Ht HK	local	30	40
050br	Harrisburg-Pk Pl/Ht HK	local	30	40
050cr	Harrisburg-LaPrt/Ht HK	local	40	60
050dr	Harrisburg-Airp/Ht FWY HK	local	60	60
050er	Harrisburg-PkPl/Ht FWY HK	local	60	60
050fr	Harrisburg-LaPt/Ht FWY HK	local	60	60
052ar	Scott-Sunysd/Hrsch-HK	local	20	35
052br	Scott Frwy/Hirsch-HK	local	40	40
052cr	Scott-Suny/Hrsh-FWY HK	local	40	60
052dr	Scott-fwy/Hrsch-FWY HK	local	60	60
052er	Scott-Downtown TB	local	60	60
052fr	Scott-8000 TB	local	60	60
053ar	Westheimer LTD Briar	local	13	23
054ar	Aldine/Hollyvale	local	30	50
056ar	Airline	local	10	15
058ar	Hammerly	local	20	60
058br	Hammerly via Fwy/Kty	local	60	60
060ar	South MacGregor	local	30	60
064ar	Lincoln City	local	30	60
065ar	Bissonnet	local	15	20
065br	Bissonnet via Fwy	local	60	60
065cr	Bissonnet via Westwood P&R	local	60	60
067ar	Dairy Ashford Crosstown	local	30	60
068ar	Braes Bayou-West Belt	local	24	40
068br	Braes Bayou-L610 West Belt	local	60	60

068cr	Braes Bayou-FonMeadw	local	24	40
068dr	Braes Bayou-Med. Ctr TB	local	60	60
070ar	University/Memorial-HK	local	25	60
072ar	Westview	local	20	30
073ar	Bellfort Crosstown	local	30	40
073br	Bellfort Crosstown TMC TB	local	8	20
077ar	Liberty/MLK-Trswy HK	local	24	60
077br	Liberty FWY/MLK-Twy HK	local	24	60
077cr	Liberty/MLK-no Trswy H	local	60	60
077dr	Liberty FW/MLK-no Twy H	local	60	60
078ar	Irvington/Alabama-HK	local	60	60
078br	Irvington Berry/Alabama-HK	local	60	60
078cr	Irvington Downtown TB	local	60	60
078dr	Irvington 9800/ Berry D-TB	local	60	60
079ar	W. Little York Xtown	local	35	35
080ar	Lyons-Kelley/Dowling-HK	local	40	60
080br	Lyons-Waco/Dowling-HK	local	60	80
080cr	Lyons-Calvacade/Dowling-HK	local	40	60
082ar	Westheimer-West Oaks	local	30	60
082br	Westheimer-Dairy Ash	local	30	60
082cr	Westheimer-Woodlake	local	10	20
083ar	Lee Road Circulator	local	30	40
085ar	Antoine-via Freeway	local	8	30
085br	Antoine-Washington	local	40	60
085cr	Antoine-via Frwy/Kty	local	40	60
086ar	FM 1960 Circ	local	15	30
087ar	Yellowstone Circulator	local	15	25
089ar	South Park Circulator	local	35	60
090ar	Yale	local	15	40
090br	Yale(8200 TB)	local	40	40
093ar	NWTC – Greenway Shuttle	Local	20	No service
097ar	Settegast	local	40	60
098ar	Briargate&Via N/Thum	local	70	70
098br	Briargate	local	35	35
101ar	Airport	local	20	40
102ar	IAH Express AM Route	express	60	60
102br	IAH Express-Non Hov	express	20	40
108ar	Veterans Highway	express	20	40
1098ar	Smith Lands-TMC Shuttle	Rail	6	No service
131ar	Memorial Exp Ges/HOV	express	29	60
131br	Memorial Exp WB /HOV	express	10	60
132ar	Harwin Exp-Cook Rd.	express	30	60
132br	Harwin-Exp/Mis-Bend	express	10	40
137ar	Northshore Exp	express	15	40
163ar	Fondren Exp-M/City	express	20	40
163br	Fondren Exp-Airport	express	20	40
170ar	Missouri City Exp	express	15	60
201ar	N. Shepherd P&R	commuter	10	No service
202ar	Kuykendahl P&R Center	commuter	8	No service

202br	Kuykendahl P&R Houston Ctr	commuter	30	No service
204ar	Spring P&R	commuter	8	No service
204br	Spring-Kuykendahl P&R	Commuter	No service	30
2051ar	CBD to Astrodome	rail	6	6
205ar	Kingwood P&R	commuter	10	30
205br	Kingwood-Houston Center	commuter	30	No service
206ar	Eastex-P & R	commuter	10	No service
210ar	West Belt P&R via Katy/CBD	commuter	15	No service
212ar	Seton Lake P&R	commuter	10	No service
212br	Seton Lake Hou Ctr P&R	commuter	30	No service
214ar	NW Station via Katy/CBD P&R	commuter	7	No service
216ar	WLY/Pmnt-Katy/CBD P&R	commuter	6	No service
221ar	Kingsland P&R Katy/CBD	commuter	5	30
228ar	Addicks P&R Katy CBD	commuter	3	No service
228br	Addicks P&R/Sh/Co Katy	commuter	60	No service
236ar	Maxey Rd P&R	commuter	12	No service
244ar	Monroe P&R	commuter	15	No service
244br	Monroe P&R via EWTC	commuter	60	No service
246ar	Bay Area P&R	commuter	10	No service
246br	Bay Area P&R-EWTC	commuter	45	No service
246cr	Bay Area via NASA	commuter	60	No service
246dr	Bay Area NASA & EWTC	commuter	60	30
247ar	Fuqua P&R	commuter	10	No service
247br	Fuqua P&R - EWTC	commuter	20	No service
257ar	Townsen P&R	commuter	15	No service
261ar	West Loop P&R	commuter	15	No service
262ar	Alief/Westwood P&R	commuter	10	No service
262br	Alief/Westwood P&R-Hou Ctr	commuter	30	30
265ar	West Bellfort P&R	commuter	6	30
273ar	Gessner P&R	commuter	12	No service
283ar	Kuykendahl/Uptown P&R	commuter	15	30
284ar	Kingwood/Uptown P&R	commuter	20	30
285ar	Kingsland/Addicks/Uptown	commuter	20	No service
285br	NWTC/Greenway Plaza	commuter	20	No service
291ar	N.Shepherd-TMC P&R	commuter	15	No service
292ar	W.Bel/W.Wood-TMC P&R	commuter	15	30
297ar	S. Point/Mon/TMC P&R	commuter	15	No service
298ar	Addicks/NWTC/TMC P&R	commuter	10	No service
313ar	Allen Parkway Special	local	6	15
320ar	TMC Circulator White	local	4	15
321ar	TMC Circulator Blue	local	4	No service
443ar	T.C. Jester Ltd.	local	20	40
451ar	Trolley Route A	local	7	7
452ar	Trolley Route B	local	10	10
453ar	Trolley Route C	local	7	7
454ar	Trolley Route D	local	8	8
455ar	Trolley Route E	local	8	8
601ar	Sawdust P&R/CBD	Commuter	10	No service
601br	Sawdust P&R-Uptown/Greenway	Commuter	10	No service

601cr	Sawdust P&R-TMC	Commuter	10	No service
602ar	Woodlands P&R / CBD	commuter	10	No service
602br	Woodlands P&R-Upt/Grnwy	commuter	10	No service
602cr	Woodlands P&R-TMC	commuter	10	No service

Note: Shaded lines identify routes that are to be implemented as part of the No Build Alternative
Source: Houston METRO Scheduling Department, 2003

Exhibit 2.2
No Build Alternative – METRO Transit Capital Facilities

CORRIDOR/PROJECT	LIMITS/LOCATION	2007 No Build	STATUS/COMMENTS
Downtown to Reliant Park Corridor			
Yard & Shop		LRT	existing
Stations (16 stations)		LRT	existing
Fannin South	On Fannin, south of Loop 610 at Astroworld	P&R/TS	existing
Reliant Park	On Fannin, east of Astrodome	TS	existing
Smith Lands	On Greenbriar, between Braeswood and OST	TS	existing
Texas Medical Center Transit Center	On Fannin, north of Galen intersection	TC/TS	existing
Dryden/TMC	On Fannin, south of Dryden	TS	existing
Memorial Hermann Hospital/Zoo	On Fannin, south of N. MacGregor	TS	existing
Hermann Park/Rice University	On Fannin, south of Sunset Blvd.	TS	existing
Museum District	Split track – on Fannin & San Jacinto, between Binz and Ewing (side platforms)	TS	existing
Wheeler	Split track – on Fannin & San Jacinto, between Wheeler and Blodgett	TC/TS	existing
Ensemble/Houston Community College	On Main, at Berry	TS	existing
McGowen	On Main, at McGowen	TS	existing
Downtown Transit Center	On Main, between St. Joseph Prkway and Pierce	TC/TS	existing
Bell	On Main, at Bell	TS	existing
Main Street Square	On Main, between Dallas, McKinney and Lamar	TS	existing
Preston	On Main, at Preston	TS	existing
U of H Downtown	On Main Street Bridge @ U of H	TS	existing
Downtown Superstop	Travis/Lamar/Main/McKinney	TC	existing
South Main/TMC Transit Street Recons	Major arterials in the TMC area (Fannin, Main)	TSM	existing
Downtown/Midtown Streets	Selected Downtown and Midtown transit streets	TSM	existing

South Main			
Missouri City Park & Ride	Beltway 8 @ Fondren	P&R	existing
Gulf			
Gulf HOV Lane	Pierce/Dowling to Dixie Farm Road	HOV-3+/1/1	existing
Bay Area Park & Ride	Bay Area Blvd. @ Feathercraft	P&R	existing
Bay Area Park & Pool	I-45 and Bay Area Blvd.	P&P	existing
Fuqua Park & Ride	Fuqua and Sabo	P&R	existing
South Point Park & Ride	Across from the Fuqua Park & Ride	P&R	existing, previously called Fuqua East
Monroe Park & Ride	At Gulf Freeway and Canniff	P&R	existing
Eastwood Transit Center	Gulf Freeway @ Calhoun	TC	existing
Southeast			
Southeast Transit Center	Located at OST and Scottcrest	TC	existing
Gulfgate Transit Center	On Evergreen, just south of I-610 and Gulf Freeway	TC	Programmed
Hobby Transit Center	Airport Blvd. @ Broadway		Proposed; also includes relocation of facility to accommodate light rail operations
Eastex			
Eastex HOV Lane	Quitman to Will Clayton Parkway	HOV-3+/1/1	existing
Eastex HOV Lane*	Will Clayton Parkway to Kingwood	HOV-3+/1/1	under construction
Eastex HOV Lane	Jackson/Chenevert to Quitman	HOV-3+/1/1	under construction
Eastex Park & Ride w/HOV ramp	Aldine Bender and Old Humble Road	P&R	existing
Kingwood Park & Ride	Just north of Kingwood Dr. on Lake Houston Parkway	P&R	existing
Tidwell Transit Center	US 59 (Eastex) @ Tidwell	TC	existing
Townsen Park & Ride	West of Eastex Frwy @ Townsen Blvd.	P&R	existing
Kashmere Transit Center	Kelley Rd. @ Hirsch	TC	existing
I-10 East			
Maxey Road Park & Ride	Maxey Road and Federal Road	P&R	existing
Fifth Ward/Denver Harbor Transit Center	Lockwood between Lyons Ave and Farmers St	TC	existing

Katy			
Katy HOV	SH6 to Inner Katy Connector	HOV-3+/1/1	existing
Katy Diamond Lanes*	Between Barker-Cypress/Hwy. 6 to Grand Parkway	HOV-3+/2/2	existing
Katy/CBD HOV Ramp to Downtown	Direct ramp to north side of CBD at Franklin	HOV-3+/3/2	existing
Kingsland Park & Ride	On Kingsland Blvd., just east of Town & Country	P&R	existing
Addicks Park & Ride	Just north of 1-10, between SH 6 and Eldridge	P&R	existing
Katy/West Belt Park & Ride	On West Belt, north of I-10	P&R	existing
Northwest Transit Center	Old Katy Rd. @ I-10 West	TC w/park	existing
North/Hardy HOV			
North HOV Lane	Smith/Louisiana to north of FM 1960	HOV-3+/1/1	existing
North HOV Lane Crosstimbers Ramp	direct access ramp from Northline TC	HOV/ramp	existing
North HOV Lane Connection “L”	direct ramp connection	HOV-3+/1/1	existing
Kuykendahl Park & Ride	I-45 @ Kuykendahl and DeMontrond	P&R	existing
North Shepherd Park & Ride	North Shepherd @ Little York	P&R	existing
Spring Park & Ride	FM 1960 @ Carlsway	P&R	existing
Northline Mall Transit Center	Northline Mall	TC	existing
Greenspoint Dr./Greenspoint Mall Transit Center	Greenspoint Dr./Greenspoint Mall	TC	existing
Northwest			
Northwest HOV Lane	Northwest Transit Center to FM 1960	HOV-3+/1/1	existing
Northwest Transit Center	I-10 (Katy Frwy) @ I-610 (West Loop)	TC w/park	existing
Pinemont Park & Ride	Pinemont @ Bingle	P&R	existing
West Little York Park & Ride	West Little York, between West Belt & US 290	P&R	existing
Northwest Station P&R	Northwest Frwy (US 290) @ West Rd.	P&R	existing
Barker Cypress Park & Ride	US 290 @ Skinner	P&R	Programmed

Uptown-West Loop			
Richmond Transit Center	In the median on Richmond, between Post Oak & Rice; relocate to S. Rice with LRT	TC	Programmed
West Loop Improvements	Portals at Westpark/US 59 and Post Oak Blvd.	TSM	Programmed
SH 249/Tomball Corridor			
Seton Lake Park & Ride	Seton Lake @ Bammel North Houston	P&R	existing
Acres Home Transit Center	West Little York, just west of SH 249	TC	existing

South Loop			
West Loop Park & Ride	Intersection of West Loop 610/South Loop 610	P&R	existing
Southwest			
Southwest HOV Lane	Shepherd to County Line	HOV-3+/1/1	existing
Southwest HOV Lane*	South of Elgin to Shepherd	HOV-3+/1/1	under construction
Hillcroft Transit Center	On Westpark between US59 and Hillcroft	TC	existing
Westwood Park & Ride	Southwest Freeway @ Bissonnet	P&R	existing
Alief Park & Ride	Boone Rd. and Bissonnet	P&R	existing
West Bellfort Park & Ride	Southwest Freeway @ West Bellfort	P&R	existing
Westpark			
Mission Bend Park & Ride	Alief-Clodine and Eldridge Pkwy	P&R	existing
Westchase Park & Ride	Northwest corner of Rogersdale and Harwin	P&R	under construction
Westpark Toll Lanes*	IH-610 to Beltway 8	HOV-3+/2/2	under construction
Gessner Park & Ride	Westpark and Gessner	P&R	existing
Harrisburg/SH 225 Corridor			
Magnolia Transit Center	East of M. Garcia between Harrisburg and Capitol	TC	existing
Non-Corridor Facilities			
Bellaire Transit Center	On Bellaire between Bissonnet and S. Rice Ave.	TC	existing

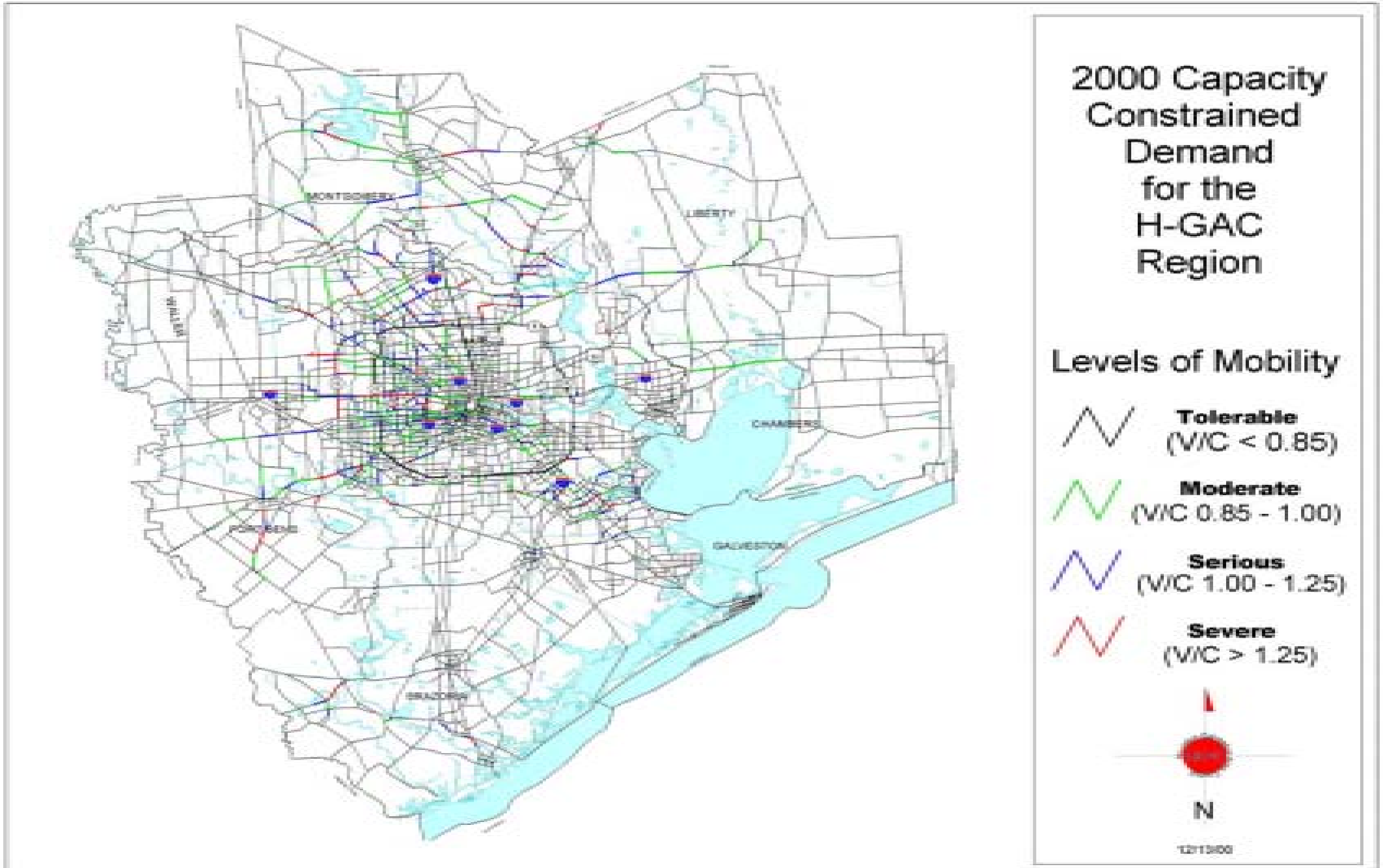
Heights Transit Center	N. Main/W. 20th, and Studewood	TC	existing
Hiram Clarke Transit Center	Buffalo Speedway @ Fuqua	TC	existing
Mesa Transit Center	Mesa @ Tidwell	TC	existing
Facilities Operated By Other Entities*			
Brazos Transit District - The Woodlands Express			
Research Forest Park & Ride	3900 Marisco Place in The Woodlands	P&R	existing
Sawdust Park & Ride	701 West Ridge in Spring, Tx	P&R	existing
TREKEXPRESS			
University of Houston Park & Ride	University Blvd. & US 59 South, Sugar Land, Tx	P&R	existing
First Colony AMC Theatre Park & Ride	AMC Theatre lot, Sweetwater Blvd. @ US 59 South, Sugarland, Tx	P&R	existing

NOTE:
(1) a grouping of low cost project improvements;
(2) AHCT = Advanced High Capacity Transit;
(3) HOV designations = # people in carpool/ # of lanes/ # of directions of HOV operation;
(4) LRT = Light Rail Transit;
(5) SIP = Service Improvements Package
(6) CRT = Commuter Rail Transit

LRT **Light Rail Transit**
TS **Transit Station**
TC **Transit Center**
TSM **Transportation System Management**
P&R **Park & Ride**
HOV **High Occupancy Vehicle**

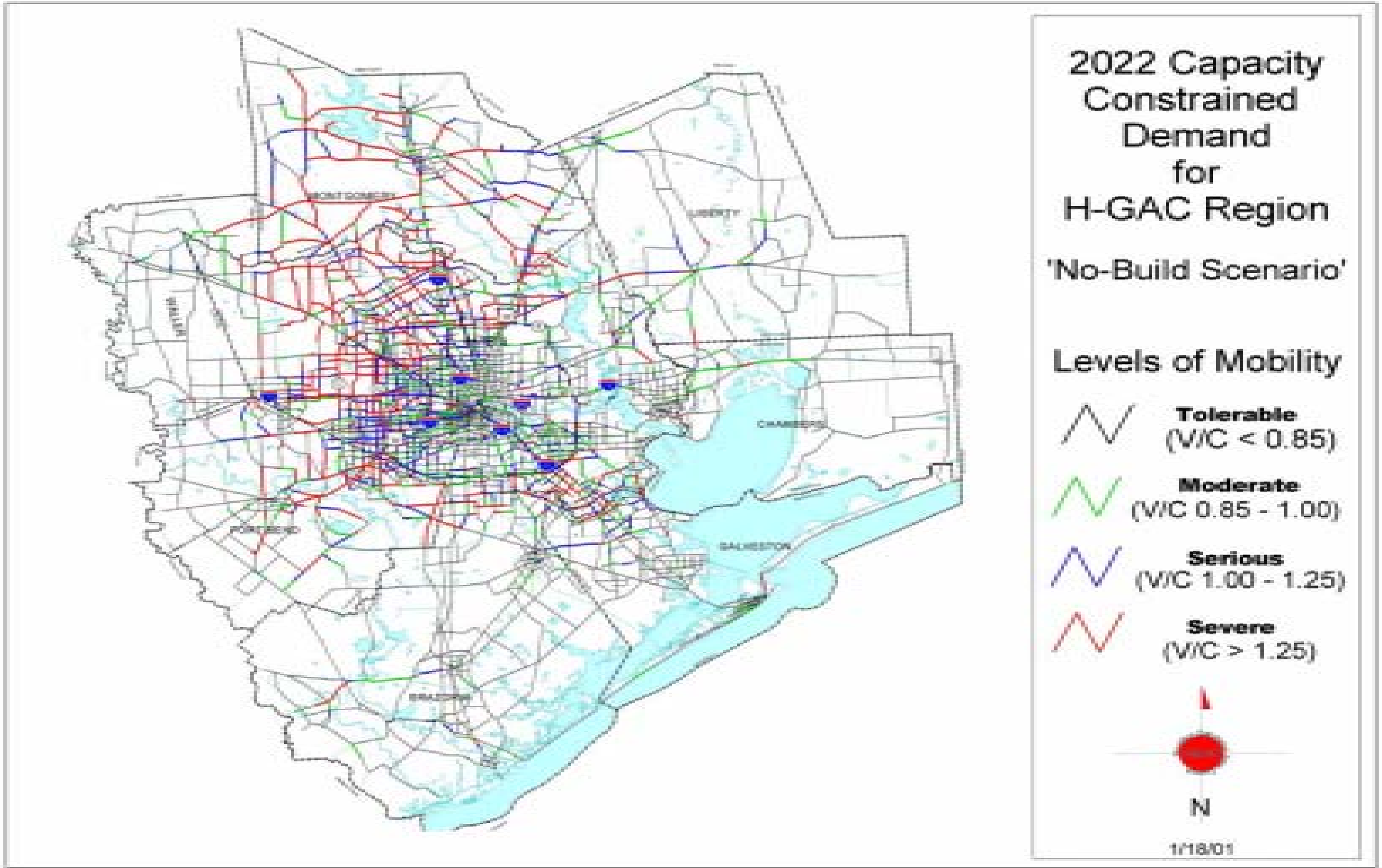
Source: Houston METRO Capital Planning, 2003

Exhibit 2.3.1
Current Levels of Mobility (2000)



Source: HGAC Transportation Department 12-13-00

Exhibit 2.3.2
2022 No Build Scenario (Future Demand on Current Roadways)



Source: HGAC Transportation Department 1-18-01

Exhibit 2.4
Future Harris County Toll Road Projects

Project	Limits		Distance	Est. Cost in $ millions	Facility
	From	To	in miles		
Ft. Bend Parkway	Beltway 8 W @ Hillcroft	Grand Parkway South of SH 6	18.7	Phase 1 49.	4 lanes
Ft. Bend Westpark	FM 1464	Grand Parkway	6	41.5	4 lanes
Westpark Toll Road	I-610 W	FM 1464	16	391	4 lanes
Post Oak Rd Extension	I-610 S	Beltway 8 S @ Hillcroft	5	55	4 lanes
I-10 W Toll Lanes	I-610 W	City of Katy	20	266	4 high occupancy toll lanes
Northwest Tollway	I-610 N	Grand Parkway	20	-	4 lanes using railroad ROW
Grand Parkway Tollway NW	I-10 W	US 59 N	53	487	4 lanes
Grand Parkway Tollway East	I-10 E	US 59 N			
Grand Parkway Tollway S	US 59 S	Fred Hartman Bridge SH 146			
SH 87 Toll Bridge	Galveston	Bolivar Peninsula		211	
Kingsland Blvd	SH 6	Barker Cypress	3.5		4 lanes
Barker Cypress	Westpark Tollway	I-10 W	5		4 lanes
Briar Forest	SH 6	W of Barker Reservoir	5		4 lanes
Beltway 8 East Tollway	US 59 N	US 90 E			
US 290 Toll Lanes	I-610	Grand Parkway			
SPRR Corridor	I-610 N	I-610 S			
SH 35 S	Old Spanish Trail	Grand Parkway			
Fairmont Pkwy E	Beltway 8 E	Grand Parkway			
SH 288 S	US 59 S	Grand Parkway			

Source: Compiled by West Houston Association from material supplied by the Harris County Toll Road Authority.

3.0 Environmental Screening of Detailed Alternatives

This chapter documents the environmental analysis conducted for the detailed alternatives in the Uptown-West Loop Planning Study.

3.1 Urban Elements

Since the Uptown-West Loop Corridor is heavily urbanized, most of the social, economic and environmental considerations fall within the category of "urban elements." This section provides a preliminary assessment of several areas of concern, including:

- the degree to which project alternatives are consistent with area growth plans and policies;
- the potential for noise and visual impacts;
- potential effects on business access;
- potential land use displacements; and
- the potential for encountering known hazardous materials sites.

At the conceptual design stage, the assessment is preliminary for the Build Alternatives. Design details will be refined as the project moves from conceptual design to preliminary design and ultimately into final engineering. The final analysis of project impacts will reflect these engineering details.

3.1.1 Consistency with Area Growth Plans and Policies

Several organizations have adopted plans and policies with respect to economic and transportation infrastructure development within the Uptown-West Loop Corridor. These include a study area TIRZ, the Uptown Houston District, and various neighborhood organizations and civic clubs.

3.1.1.1 No Build Alternative

The No Build Alternative includes the METRO transit services and facilities that were programmed to be in operation in FY 2007 and the regional roadway/highway system that was programmed to be in place in 2022.

The No Build Alternative would be incompatible with the plans and policies of local organizations and TIRZs within the Uptown-West Loop area. At least four suborganizations that comprise the Uptown Houston Organization within the corridor support the implementation of AHCT to improve accessibility in the area. Although the No Build Alternative would not preclude future development in and around Uptown-West Loop area, the lack of an AHCT system could significantly alter planned land uses within the area.

3.1.1.2 Build Alternatives

The Build Alternatives would alter the visual quality of the corridor. New elevated structures along IH-610W would be required in the northern segments of Alternatives 2 and 2A. All Build Alternatives introduce new at-grade facilities (possibly including, but not limited to, catenary poles, overhead trolley wire or catenary systems, open-ballast track, electric sub-stations, new transit stations, and vehicle storage areas). All Build Alternatives also involve the removal of the landscaped median along Post Oak Blvd. However, Post Oak Blvd. has been dedicated to transportation uses and the addition of the proposed facility in the median would not constitute a major visual change in this area. These aspects of the Build Alternatives could negatively affect visual quality, with the overall effect heavily dependent on project design details, aesthetic treatments and landscaping.

The primary difference among the alternatives is the introduction of elevated segments. Alternatives 1 and 3 would be constructed completely at-grade. Alternative 2 would elevate just north of Woodway to an aerial structure in the center of the IH-610W ROW. The transitway would remain elevated south to the intersection of Post Oak Blvd. and Uptown Park Blvd. for a total distance of approximately one mile. Alternative 2A would be elevated for a total length of 1.9 miles, beginning at the NWTC and continuing parallel to an existing connector ramp from IH-10 to IH-610W. It would remain elevated along the western portion of the IH-610W ROW across Memorial Dr. From there, it curves east to the center of the IH-610W ROW approximately halfway between Memorial Dr. and Woodway. It remains elevated south to the intersection of Post Oak Blvd. and Uptown Park Blvd.

3.1.2 Noise and Vibration Impacts

In conducting the analysis for vibration and noise impacts for the Uptown-West Loop Planning Study, methods prescribed by the FTA Transit Noise and Vibration Impact Assessment guidance manual screening procedures were applied to both the BRT and LRT options.

3.1.2.1 No Build Alternative

The No Build Alternative will not produce noise and vibration impacts within the Uptown-West Loop Corridor.

3.1.2.2 Build Alternatives

The noise screening procedure used the general screening distance found in the FTA Transit Noise and Vibration Impact Assessment Guidance Manual. It was then refined to include light rail and bus source reference levels, vehicle headways, and speeds. The LRT source level came from the specifications of the vehicle currently being used in Houston. The bus noise source level was assumed to be that of a diesel powered articulated bus, as data for a hybrid bus was not available. This assumption is representative of the existing technology and represents a worst-case scenario. Adjustments to the source levels were made to account for operations on the aerial and at-grade sections. The Post Oak Blvd. portal was analyzed as an at-grade section. All buildings were assumed to have unobstructed propagation conditions. The existing noise levels were estimated using the table of typical levels given in the FTA guidance manual (Table 5-7) and with a 5-dBA factor of safety. FTA criteria for noise impacts were used to develop a noise impact contour for each alternative. The noise contours were then superimposed onto a base map.

The vibration contours were developed using the distances given in the FTA guidance manual’s screening procedure. No detailed data of the soil conditions or the road and guideway surfaces was available and therefore the distances were not refined to reflect that information. The vibration contours were then superimposed onto a base map.

Table 3.1 lists the distances used for the noise and vibration screening. These are the distances at which the contours have been drawn.

Table 3.1
Screening Distances (feet)

	Noise	Vibration
LRT		
At-Grade	[1]	150
1.0 Aerial	55	150
BRT		
At-Grade	100	50
Aerial	155	50
[1] LRT at-grade segments are not projected to cause noise impact; therefore no contour was drawn for this option.		

Land use Category 2 (residential) buildings that fell within the contours were counted and the resulting numbers of potential impacts from BRT and LRT alternatives are listed in Tables 3.2 and 3.3. The corridor was split into six segments to make the comparison of impacts associated with the LRT and BRT options and the type of structure (aerial, at-grade) more straightforward. Graphics of the assigned contours for both LRT and BRT are shown in Figures 3.1 through 3.3.

The impacted buildings include single and multi-family residences in addition to park areas. If potential impact was shown at a park, it was counted as one receiver and is shown in both tables below.

It should be noted that at the time the noise and vibration analysis was conducted, Alternative 3 had already been eliminated from further consideration. However, other environmental impact analysis was performed prior to the noise and vibration analysis for Alternative 3 and has been documented in other sections of this chapter.

Table 3.2
Potential Noise and Vibration Impacts for Category 2 Receivers - LRT

LRT	**1**		**2**		**2A**	
Segment	**Noise**	**Vibration**	**Noise**	**Vibration**	**Noise**	**Vibration**
IH-10 to Memorial	0	30	0	30	0	3
Memorial to Woodway	0	park	0	park	0	park
Woodway to Uptown Park	0	park	0	0	0	0
Uptown Park to San Felipe	0	5	0	5	0	5
Woodway to San Felipe	--	--	--	--	--	--
San Felipe to Transit Center	0	1	0	1	0	1
Total	0	38	0	37	0	10

The light rail option for the Uptown-West Loop Planning Study was considered for all Build Alternatives. Projections indicated that no noise impacts would occur for any of the three alternatives still under consideration. 38 vibration impacts are projected for Alternative 1. This can be broken down into 36 residential buildings and two parks. Alternative 2 is projected to have 37 impacts, 36 at residential buildings and one at a park. Nine residential buildings and one park are projected to experience vibration impacts from alternative 2A.

Table 3.3
Potential Noise and Vibration Impacts for Category 2 Receivers - BRT

BRT	**1**		**2**		**2A**	
Segment	**Noise**	**Vibration**	**Noise**	**Vibration**	**Noise**	**Vibration**
IH-10 to Memorial	19	0	19	0	3	0
Memorial to Woodway	park	0	park	0	0	0
Woodway to Uptown Park	park	0	0	0	0	0
Uptown Park to San Felipe	7	0	7	0	7	0
Woodway to San Felipe	--	--	--	--	--	--
San Felipe to Transit Center	1	0	1	0	1	0
Total	29	0	28	0	11	0

The bus rapid transit option creates mostly noise impacts. For Alternative 1, 29 noise impacts are projected with 27 at residential buildings and two at parks. 28 noise impacts are projected for Alternative 2, one of which is at a park with the other 27 at residential buildings. Alternative 2A has the least projected noise impacts with 11, all of which are at residential buildings.

FIGURE 3.1
ALTERNATIVE #1 NOISE AND VIBRATION CONTOURS

FIGURE 3.2
ALTERNATIVE #2 NOISE AND VIBRATION CONTOURS

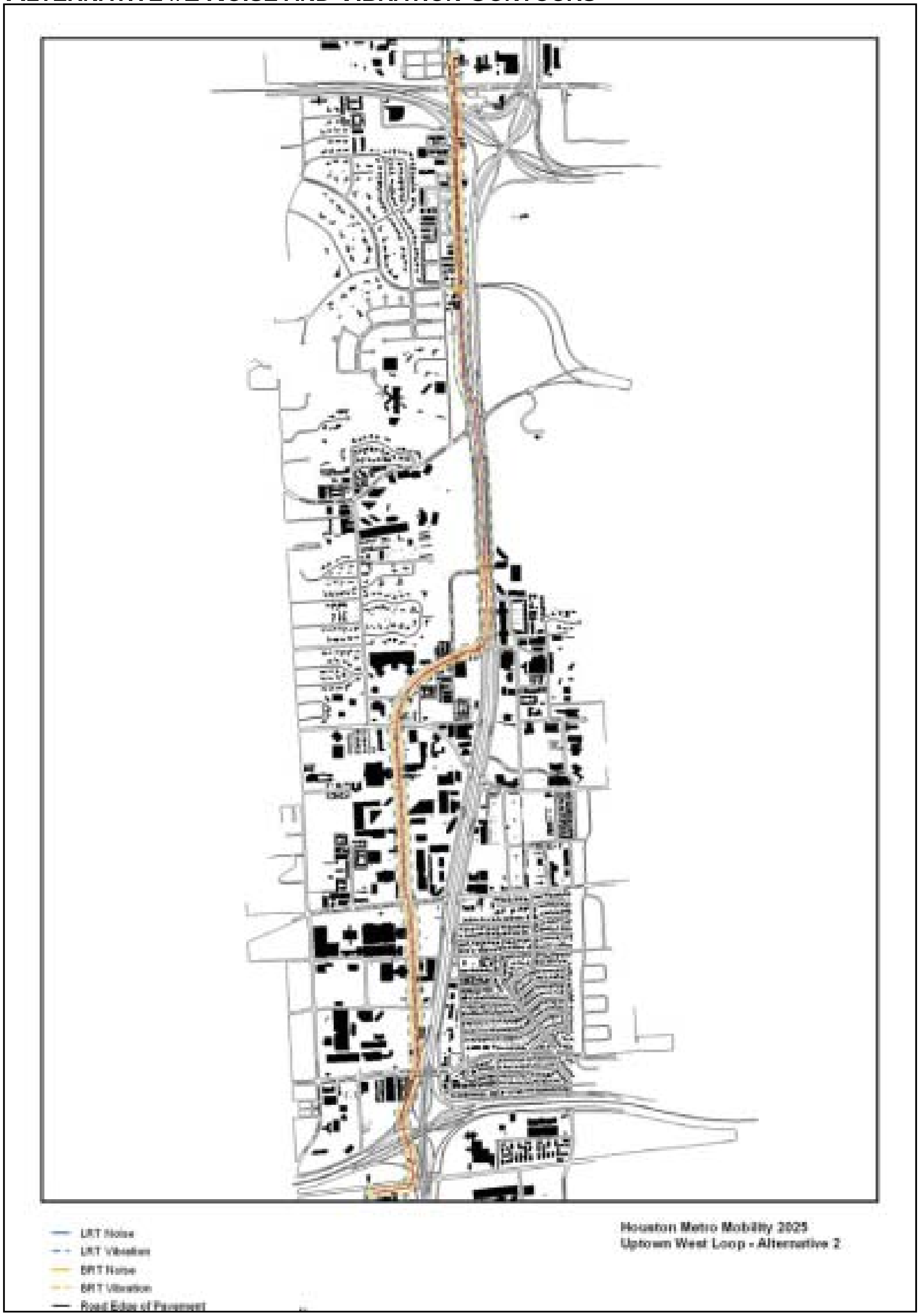


FIGURE 3.3
ALTERNATIVE #2A NOISE AND VIBRATION CONTOURS

3.1.3 Visual Impacts

Project alternatives may affect existing visual resources at several levels. The alternatives may add to, alter, or remove some of the visible features that comprise the basic visual resources of the landscape. These features include landforms, bodies of water, vegetation, open space, and urban structures (including existing transportation facilities). The alternatives change viewpoints and views to natural areas (such as Memorial Park) or the Downtown Houston skyline. During the preliminary assessment stage, discussion of visual impacts was concerned with the introduction of new elevated structures by each of the proposed Build Alternatives. Subsequent analysis will focus on identifying the viewers who will see the proposed transit improvements and determining what specific visual elements they believe are most likely to be affected.

3.1.3.1 No Build Alternative

Under the No Build scenario, no elevated structures would be added to the current and planned configuration of IH-610W. Therefore neighborhoods and businesses adjacent to the existing roadway would not experience additional visual intrusions from the construction of an elevated section in the IH-610W median or at-grade structures for transit purposes. Memorial Park would not experience visual intrusions from the proposed project. However, the visual quality of the corridor could potentially diminish over time as traffic congestion worsens and more of the landscape becomes devoted to automobile parking.

3.1.3.2 Build Alternatives

The visual impact of the Build Alternatives is generally considered to be "low," except for the northern segments of Alternatives 2 and 2A which both include new elevated structures along IH-610W. All Build Alternatives introduce new at-grade facilities (possibly including, but not limited to, catenary poles, overhead trolley wire or catenary systems, open-ballast track, electric sub-stations, new transit stations, and vehicle storage areas). All Build Alternatives also involve the removal of the landscaped median along Post Oak Blvd. However, Post Oak Blvd. has been dedicated to transportation uses and the addition of the proposed facility in the median would not constitute a major visual change in this area. These aspects of the Build Alternatives could negatively affect visual quality, with the overall effect heavily dependent on project design details, aesthetic treatments and landscaping.

The primary difference among the alternatives is the introduction of elevated segments. Alternatives 1 and 3 would be constructed completely at-grade. Alternative 2 would elevate to an aerial structure in the center of the IH-610W ROW. The transitway would remain elevated south to the intersection of Post Oak Blvd. and Uptown Park Blvd. Alternative 2 would be elevated for approximately one mile. Alternative 2A would be elevated from the NWTC, parallel to an existing connector ramp from IH-10 to IH-610W. It continues on an elevated structure along the western portion of the IH-610W ROW across Memorial Dr. From there, it curves east to the center of the IH-610W ROW approximately halfway between Memorial Dr. and Woodway Dr. It remains elevated south to the intersection of Post Oak Blvd. and Uptown Park Blvd. The total elevated length of Alternative 2A is 1.9 miles.

The elevated section of Alternative 2 would constitute a visual intrusion for residents located just north of Woodway Dr. and just north of Uptown Park Blvd. The businesses located in the Uptown Park shopping area west of IH-610W, along with retail and office land uses east of IH-610W, would see the elevated section of the transitway nearby, until it returns to grade at Post Oak Blvd.

Alternative 2A would have the same visual impact as Alternative 2 described above, with additional visual impacts north of Woodway Dr. Between Woodway Dr. and Memorial Dr., the alignment would be elevated and visible to users of Memorial Park. North of Memorial Dr., land on the west side of N. post oak Rd. features residential and some office uses. Residents along N. Post Oak Rd. in particular have expressed concern about elevated sections of IH-610W itself, and would most likely discourage selection of Alternative 2A for its extensive elevated length.

Federal regulations require an assessment of the visual and aesthetic impacts of federally funded projects. During the DEIS phase a more detailed analysis of visual impacts would be conducted, with particular focus on the concerns of affected neighborhoods.

3.1.4 Access to Local Businesses

The Uptown-West Loop Corridor is home to hundreds of commercial and retail businesses, both large and small. Access to these businesses is predominantly via private automobile. Bus service is available, and sidewalks and crosswalks are present throughout the corridor for pedestrians. The potential for project alternatives to affect local business access falls into two categories: construction impacts (which are mostly temporary), and operating impacts (which would be permanent). This section primarily addresses the potential for permanent effects. Construction impacts are addressed in more detail in Section 3.4.

3.1.4.1 No Build Alternative

The No Build Alternative would result in only minor changes to the vehicle access and circulation patterns currently found along the corridor. For the most part, vehicles are permitted to make mid-block right and left turns for ingress and egress to adjacent commercial and retail parking facilities. As the corridor continues to develop with increasing density over the next 25 years, traffic congestion will likely become more severe, triggering the need for additional traffic control measures, intersection improvements, and possibly turning movement restrictions.

Without the Build Alternatives, local business access will remain oriented primarily to automobiles, and the demand for parking will require an ever-increasing supply of off-street surface and garage parking facilities. Land that could otherwise be developed to a higher and better use would continue to serve the parking needs of the motoring public.

3.1.4.2 Build Alternatives

Access to local businesses may be affected both during and after the construction of transit improvements, regardless of which Build Alternative is implemented. Construction impacts will be short-term but potentially disruptive, as existing travel lanes and intersections undergo temporary closure. Even with the implementation of programs and measures to maintain local business access during construction activities, construction may negatively hamper automobile and pedestrian access. Diminished access could result in a negative impact in sales for some businesses along the affected streets.

Operational characteristics of the proposed transit improvements could also present access issues for local businesses. Automobile turning movements on streets that feature dedicated transitways may need to be restricted for safety purposes, particularly in mid-block areas. Automobile access to driveways may need to be restricted to eliminate mid-block left turns. Although access and circulation could be maintained by other means, motorists may perceive a diminished ease of access.

Over the long-term, local business access would be enhanced through the improved transit services implemented by the proposed Build Alternatives. As automobile congestion worsens, transit alternatives will become more appealing to customers and employees of local area businesses. As part of a broader, regional network of linked transit facilities, local businesses in the Uptown-West Loop area would enjoy a much wider market area. Access to the area would be improved from numerous corridors throughout Harris County, and transit passengers coming to the Uptown-West Loop for shopping, dining or employment purposes would be able to do so without the delay and expense (parking, etc.) of traveling by automobile. Access would be greatly enhanced by the Build Alternatives by inclusion of appropriate pedestrian facility improvements, including sidewalks, landscape and aesthetic treatments. Given the Houston climate, landscape improvements that feature greater shade and in some cases covered or enclosed walkways would make the walking experience between transit stops and businesses more comfortable and enjoyable.

3.1.5 Land Use Displacement

At this conceptual engineering stage, generalized assumptions were made about the amount of ROW required for each of the Build Alternatives. Much of the ROW would be made available within existing, publicly-owned roadways, such as N. Post Oak Rd., IH-610W, Woodway Dr., Post Oak Blvd., and others. In some areas, additional ROW would be obtained from privately-owned property, some of which is currently developed. This section identifies the potential amount of land use that would be converted to transit use as a result of the proposed project alternatives.

3.1.5.1 No Build Alternative

The No Build Alternative will not displace any existing land uses within the Uptown-West Loop Corridor.

3.1.5.2 Build Alternatives

All of the Build Alternatives will require ROW acquisition of publicly- and privately-owned property or the conversion of non-transportation public property to transportation uses. Additional land will be needed for transit improvements proposed within the existing publicly-owned transportation ROW. Table 3.4 lists the additional ROW that would be required along the corridor for each segment and alignment. For comparison between alignments, only the transitway requirements are shown by segment in Table 3.4. Publicly-owned transportation ROW is not included in this total. For comparison between alignments, the analysis segments were divided along major thoroughfares that intersect the alignments at points where major distinctions in the conceptual alternatives occur. The segments are as follows:

- Segment 1 - NWTC to Memorial Dr.
- Segment 2 - Memorial Dr. to San Felipe
    - via S. Post Oak Ln.

- via IH-610W elevated facility
- via IH-610W frontage road (with variations)

∉ Segment 3 - San Felipe to Richmond Ave.

∉ Segment 4 - Richmond Ave. to Proposed Transit Center

Table 3.4
Segment ROW Requirements Summary – Transitway

	Segment 1	Segment 2	Segment 3	Segment 4	Total Acres Impacted
Alternative 1	0	2.22	3.82	0	**6.04**
Alternative 2	0	1.31	3.82	0	**5.13**
Alternative 2A	0	0.68	3.82	0	**4.5**
Alternative 3	0	1.01	3.82	0	**4.83**

Table 3.5 summarizes the total ROW that would be necessary for the implementation of each Build Alternative. The ROW estimate includes the transitway (shown above), maintenance facility and a proposed transit center at the southern terminus of the project that would operate at the same size and parking capacity as the NWTC. Other required facilities and amenities common for efficient operation of METRO transit centers including bus bays, canopies, seating and transfer areas are included in the ROW estimate.

Table 3.5
Total ROW

Facility	Alternative 1	Alternative 2	Alternative 2A	Alternative 3
ROW (Transitway) (acres)	6.04	5.13	4.5	4.83
ROW (Maintenance Facility) (acres)	13	13	13	13
ROW (Transit Center) (acres)	9.9	9.9	9.9	9.9
Total ROW (acres)	**28.94**	**28.03**	**27.40**	**27.73**

Both tables reveal that Alternative 1 requires the most acreage. All alternatives would require some construction at the NWTC. Alternatives 1 and 2 have the potential to affect parkland in segment 2. In segment 3, all alternatives primarily affect surface parking and some commercial and undeveloped land uses. In segment 4, there are no impacts to transportation/utilities and park land uses. All Build Alternatives will impact land use on the southern end of the corridor equally, requiring sufficient ROW for a light maintenance and cleaning facility and the proposed southern transit center.

3.1.6 Hazardous Materials

Depending on ROW acquisition and construction methods, each of the Build Alternatives may encounter existing hazardous materials sites. Since most construction is anticipated to take place in existing public ROW, impacts related to hazardous material sites may be reduced. GeoSearch Environmental Data Services conducted a database search in July 2002 to identify recorded hazardous materials sites in the Uptown-West Loop study area. GeoSearch mapped these sites, and a subset of sites closest to the proposed alternatives is shown in Table 3.6 and Figure 3.4 Potential Hazardous Materials Sites.

3.1.6.1 No Build Alternative

The No Build Alternative would not pose conflicts with existing hazardous materials sites in the project area.

3.1.6.2 Build Alternatives

Known hazardous materials sites within the project area include petroleum storage tanks (PSTs), leaking petroleum storage tanks (LPSTs), Resource Conservation and Recovery Act sites (RCRA), SPILLS sites (a database maintained by TCEQ that provides information on releases of hazardous or potentially hazardous chemicals and materials into the environment), and voluntary cleanup program sites (VCP). PST sites are those that are either safely in use or have been filled or removed from the ground. Typically, LPSTs are the greatest concern for a construction project since they may result in groundwater contamination or other impacts that are difficult to isolate. RCRA sites are usually legal generators, storage facilities, or transporters of hazardous materials operating under a permit system, and are not a concern unless violations are reported. SPILLS sites have typically been resolved and may have occurred many years ago. VCP sites are those where the owner wishes to obtain certification that a hazardous materials issue has been resolved. Many sites are listed in more than one database. Note that this database review does not constitute a Phase I Environmental Site Assessment. No windshield or ground survey has been conducted.

Direct impacts cannot be determined until the ROW requirements have been identified and ROW acquisition and construction are initiated. Several of the sites listed may be relatively close to the roadway (i.e. gas stations) while other sites could actually sit farther back on their lots (i.e. Doubletree or Westin hotels). Additional analysis would be required during the design phase. Based on the available information, Alternative 2A would result in the fewest impacts to potential hazardous materials in the project area, primarily due to the use of IH-610W in the northern segment.

Alternative 1 could encounter 14 sites. Alternative 2 could encounter 15 sites, 2A could encounter 11 sites, and Alternative 3 could encounter 17 sites. All of the alternatives utilize the same route south of San Felipe Road along Post Oak Blvd., so all alternatives could have the same potential to encounter Sites 9-18.

Sites 9 - 18 include three LPSTs, six PSTs, four RCRAs, two VCPs, and two SPILLS sites. Site 9 and 11 include an LPST for which final concurrence was issued and the case was closed. The status of the LPST at Site 17 is in final concurrence pending documentation of well plugging. The spills at Sites 13 and 14 were relatively small (five gallons of gasoline, two gallons of mineral oil respectively). No violations are recorded for the RCRA sites, most of which are conditionally exempt small quantity generators. The other sites were PSTs, in use or removed from the ground or VCPs with final or in-process certificates of completion.

In addition to Sites 9-18, Alternative 1 could encounter Sites 1-4 for a total of 14 sites. Site 1 has an active aboveground storage tank. Site 2 is a hazardous materials generator with no recorded violations. Site 3 has multiple PSTs in use, and one LPST in site assessment status with no apparent threats or impacts to sensitive receptors. Site 4 has a conditionally exempt small quantity generator and multiple PSTs in use. In summary, Alternative 1 could potentially affect three sites in Segment 1 (#1-3), one site in Segment 2 (#4), six sites in Segment 3 (#9-14), and four sites in Segment 4 (#15-18).

Alternative 2 could encounter Sites 1-3 as described above, in addition to Sites 9-18 for a total of 15 sites. This alternative could also encounter site 5, where 1,000 gallons of phosphoric acid were spilled on IH-610W in 1983. No waterways were reported as being affected. In summary, Alternative 2 could potentially affect three sites in Segment 1 (#1-3), two sites in Segment 2 (#4-5), six sites in Segment 3 (#9-14), and four sites in Segment 4 (#15-18).

Alternative 2A could encounter Sites 9-18, and Site 5, described above. This alternative would potentially affect 11 sites. Alternative 2A would potentially affect zero sites in Segment 1, one site in Segment 2 (#5), six sites in Segment 3 (#9-14), and four sites in Segment 4 (#15-18).

Alternative 3 could affect 17 sites--more than each of the other alternatives. This is due to its routing along S. Post Oak Rd. rather than along existing IH-610W between Woodway Dr. and San Felipe. This alternative could potentially affect sites 1-4 and sites 9-18 described above. Additionally, this alternative could encounter sites 6-8. Site 6 had one underground storage tank removed from the ground. Site 7 had one LPST with a status of "plan B/risk assessment". The groundwater was impacted but there were no apparent threats or impacts to receptors. Site 8 was listed in the LPST and VCP databases. The LPST site assessment was incomplete according to the record, but no apparent receptors were impacted. A VCP agreement was reached in 1998, presumably related to the LPST, but no certificate of completion was issued as of the record date. Little to no ROW could be required in this area for Alternative 3, so these sites would not be likely to pose constraints to project development. In summary, Alternative 3 would potentially affect three sites in Segment 1 (#1-3), four sites in Segment 2 (#4, 6-8), six sites in Segment 3 (#9-14), and four sites in Segment 4 (#15-18).

Table 3.6
Hazardous Materials Sites Near Proposed Uptown-West Loop Alternatives

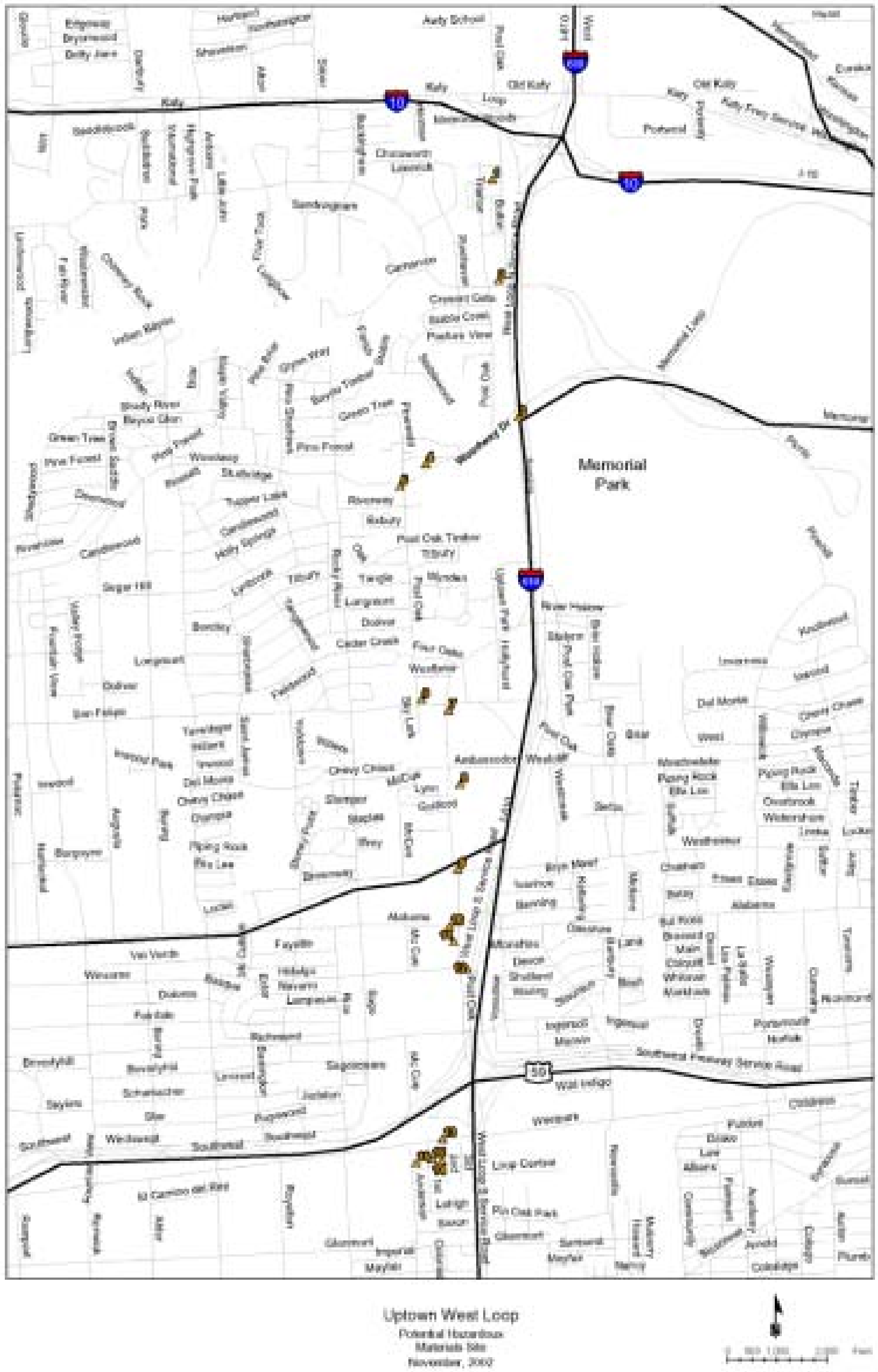
	Site No.	Data-base	Name	Address/ Location	Status	Alt. 1	Alt. 2	Alt. 2A	Alt. 3
Segment 1 – NWTC to Memorial Dr.	1	PST	Memorial Woods	777 N. Post Oak Rd.	1 AST in use	x	x		x
	2	RCRA	Separation Dynamics International	701 N. Post Oak Rd. Ste. 100	generator	x	x		x
	3	PST, LPST	Shell Oil Products Co. (Retail)	8602 Memorial Dr.	PST = multiple tanks in use; LPST = groundwater impacts, no apparent threats or impacts to receptors; status = site assessment	x	x		x
Segment 2 - Memorial Dr. to San Felipe	4	RCRA, PST	Memorial Car Care Center, Exxon 64656	8605 Memorial Dr.	RCRA = conditionally exempt small quantity generator; PST = multiple tanks in use	x	x		x
	5	SPILLS	Mart Agricultural Supply	Houston - W. Loop IH-610 at Woodway	1,000 gal phosphoric acid spilled (1983); no affected waterways		x	x	
	6	PST	Galveston-Houston Co.	4900 Woodway	1 UST removed from ground				x
	7	LPST	Former Mobil 12 WDY	5010 Woodway	groundwater impacted, no apparent threats or impacts to receptors; status: Plan B/ risk assessment				x

	Site No.	Data-base	Name	Address/ Location	Status	Alt. 1	Alt. 2	Alt. 2A	Alt. 3
	8	LPST, VCP	Bank United-Galleria Branch	5020 San Felipe @ S. Post Oak Ln.	LPST = assessment incomplete, no apparent receptors impacted, preassessment /release determination; VCP = agreement in 1998 but no certificate of completion date.				x
Segment 3 - San Felipe to Richmond	9	LPST	California Pizza Kitchen	1703 Post Oak Blvd.	final concurrence issued, case closed	x	x	x	x
	10	RCRA, VCP	Double Tree Hotel	2001 Post Oak Blvd.	RCRA = conditionally exempt small quantity generator; VCP = agreement in 1997 but no certificate of completion date.	x	x	x	x
	11	RCRA, PST, LPST	Exxon Co.	252 S. Post Oak Ln.	RCRA = conditionally exempt small quantity generator; PST = 4 USTs removed from ground; LPST = final concurrence issued, case closed	x	x	x	x
	12	RCRA, VCP	The Westin Galleria Hotel Laundry Room	5060 W. Alabama	RCRA = conditionally exempt small quantity generator; VCP = certificate completed 9/01	x	x	x	x

	Site No.	Data-base	Name	Address/ Location	Status	Alt. 1	Alt. 2	Alt. 2A	Alt. 3
	13	SPILLS, PST; RCRA	Transco; Ocean Specialty Tankers Corp	2800 Post Oak Blvd.; 2800 Post Oak Blvd. Ste. #5400	SPILLS (Transco) = 5 gallons of gasoline (1994), PST = 2 USTs in use, 1 filled in place; RCRA (Ocean Specialty Tankers Corp) = unverified, not TSD, not transporter	x	x	x	x
	14	SPILLS	Houston Lighting and Power	3009 South Post Oak Blvd.	2 gallons mineral oil	x	x	x	x
Seg. 4	15	PST	Granite Construction Co.	4970 Westpark Dr.	1 UST not in use	x	x	x	x
	16	PST	JD Abrams Inc. 9001	5150 A Terminal St.	2 USTs not in use	x	x	x	x
Segment 4 - Richmond to SW Transit Center	17	PST, LPST	Gilbert Plumbing	5010 Terminal St.	PST = 1 UST removed from ground, LPST = final concurrence pending documentation of well plugging	x	x	x	x
	18	PST	So. Copy Industries/Copy Pak Inc.	4970/4950 Terminal St.	1 UST removed from ground	x	x	x	x
	Total					14	15	11	17

Source: GeoSearch database search, July 2002.

FIGURE 3.4
POTENTIAL HAZARDOUS MATERIALS SITES



3.2 Natural Environment

As previously mentioned, the Uptown-West Loop Corridor has a pronounced urban character. It is not without natural resources however, due largely to the presence of Memorial Park and Buffalo Bayou. All Build Alternatives have the potential to adversely affect vegetation, wildlife and water bodies.

3.2.1 Vegetation

Aerial photography and field observations were used to identify and verify areas of native vegetation within the project area. Memorial Park consists of a large, contiguous area containing a substantial amount of native vegetation. Alternatives 1 and 3 would require some ROW from Memorial Park.

3.2.2 Wildlife/Threatened and Endangered Species

The Texas Parks & Wildlife Department (TPWD) maintains maps, county special species lists, and a database of endangered, threatened, or rare plant and animal species. A survey of these data resources revealed no known threatened or endangered species occurrences near the project area.

3.2.3 Water Resources

Portions of the project area drain into Segment 1014 of the San Jacinto River Basin, which is named Buffalo Bayou. The designated water uses for this segment include contact recreation and limited aquatic life (TCEQ, 1996). The project area crosses the 100-year flood plain as indicated on the Flood Insurance Rate Map (FIRM) Community Panel #48201C0665 K. Buffalo Bayou is listed in the Draft 303(d) list prepared by the TCEQ on October 1, 2002 as not meeting water quality standards because of elevated bacteria levels.

3.2.4 Wetlands/Waters of the U.S.

National Wetland Inventory (NWI) maps indicate no locations of wetlands within the project area. However, each of the alternatives would have to cross Buffalo Bayou, a linear water feature that falls under the jurisdiction of the U.S. Army Corps of Engineers (USACE). No permanent impacts to the bayou would occur unless bridge piers or fill material are placed within the channel, in which case construction impacts at Buffalo Bayou could require a permit from the USACE.

3.3 Cultural Resources

An identification of potential impacts of the alternatives on cultural resources in the project area is required and must comply with four major pieces of Federal and State legislation that apply to cultural resources.

Major Legislation:

- National Historic Preservation Act of 1966 (16 U.S.C. 470)
- Department of Transportation Act of 1966 (49 U.S.C. 303)
- Texas Parks and Wildlife Code
- Antiquities Code of Texas

An archival search and field survey of the corridor area revealed a handful of buildings on potential alignments that were both 50 years old or older and/or that appeared to be architecturally and/or historically significant, and where an adverse effect might occur to the setting of the resource. “Adverse effect” is defined as demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the physical characteristics that justify the classification as an historic resource are materially impaired. The introduction of new permanent visual elements that further diminish the ability of the setting to convey the time period to which the resource belongs, or its physical association to that setting, is considered a significant effect. No formal determination of effects per the Criteria of Effect (the measures specified for assessing impacts for federally-assisted projects) has been made to this point, nor should a property being included in this section be considered as a determination. It is important to identify situations that could cause an “adverse effect” to historic resources, so that planning and design considerations to avoid such situations can occur as alternatives and alignments are developed.

In several other instances there were documented historic resources within one-quarter mile of alignments but due to the distance from the roadways and intervening development that serves to buffer the buildings, no adverse effect on those resources or their settings would be anticipated.

Potential impacts by the alternatives on significant publicly-owned parks and recreational land as cultural resources must also be identified. Both Section 4(f) of the DOT Act of 1966 and the Texas Parks and Wildlife Codes apply to publicly owned parks and recreational space.

A more detailed analysis and discussion of the resources, project impacts and mitigation will be conducted during the DEIS phase of the of the project.

The results of the preliminary investigation are summarized as follows:

3.3.1 Potentially Affected Resources

901 N. Post Oak Rd. (Keeling Law offices) is a substantial two-story Queen Anne/Eastlake style residence dating from circa 1890 and may have historical associations that would merit focused research. In the event research confirms historical significance, the design of the transit corridor should avoid adverse changes to the setting.

Congregation Beth El Cemetery is located within a few hundred feet of the NWTC, at Old Katy Rd. on the west side of N. Post Oak Rd. This property appears eligible for the National Register primarily because of its historical associations with Houston's Jewish community, as well as its design features. All proposed improvements to the NWTC, and the design of the transit corridor, should respect the setting of the cemetery and avoid adverse changes to it.

500 - 530 N. Post Oak Rd. is a complex consisting of three buildings of similar design, and of one to one-and-a-half-story frame/drop siding construction. The business names include "Danna's," "Shug's," and the "Post Oak Animal Clinic." Although altered, these buildings appear to be approximately 50 years old or older--possibly dating from the 1920s-1930s period--and may have historical associations that would merit focused research. In the event research confirms their historical significance, the design of the transit corridor should avoid adverse changes to the buildings and/or their setting.

The Stables— SW corner of N. Post Oak Ln. and Memorial Dr. stretching between Carnarvon Dr. and N. Post Oak Ln. between Memorial Dr. and Buffalo Bayou is a 100-acre estate established by Harry C. and Olga Wiess. This property is perhaps the sole surviving intact large estate from among the dozens of country estates developed in the Tanglewood neighborhood during the late 1920s and 1930s. Mr. & Mrs. Wiess commissioned a noteworthy Belgian Revival style entertainment house/stable for the property. Designed by the accomplished Houston architect John Staub (1931) it is one of the most significant examples of the architect's work, and appears clearly to be eligible for the National Register of Historic Places.

The Police Stables on N. Post Oak Ln. (near Memorial Dr.) adjoin the Weiss property. It is possible that one or two of the older structures at the Police Stables were originally part of the Wiess property. Among them is an approximately 10-foot wide, wood-sided gable-front shed. Focused research will be undertaken to determine whether any of the structures at this location are associated with the Wiess family—Harry Wiess having been significant in Houston history. In the event research confirms this association, said structure(s) might be historically significant. Accordingly, the design of the transit corridor should avoid adverse changes to the structure(s).

Memorial Park is an approximate 1,500-acre regional park, owned by the City of Houston, situated on the east and west sides of the frontage roads that parallel IH-610W between IH-10 and Buffalo Bayou. It is the largest urban park in Texas and can be accessed from IH-610W by Memorial Dr. and Woodway Dr. The park provides a multitude of uses such as the Houston Arboretum and Nature Center, golf course, ball fields, tennis courts, playgrounds, jogging trails and picnic areas. Many of these uses are located more than 500 feet from the project alignments. Alternative 1 has the potential to impact this 4(f) resource due to ROW requirements.

Weiss Park stretching from Woodway Dr. north toward Memorial Dr. on the west side of the IH-610W Frontage Road, was dedicated in 1965 to the City of Houston for “public park and recreation purposes”. The dedication formally makes the Wiess Park subject to Section 4(f) clauses. The dedication also calls out the 2.15 acres leased to the Sheriff’s Mounted Posse and is not dedicated parkland as long as the lease remains in effect. Presumably, voiding the lease would likely void the exception to the dedication. Due to ROW requirements, Alternatives 1 and 3 have the highest potential to impact this 4(f) resource. Preliminary investigations indicate that Alternative 2 does not infringe upon or impact Weiss Park. However, further analysis in during the EIS is necessary for a final determination.

Post Oak Park is a .05-acre open space facility serving as passive open space and containing a rest area for the adjacent West Loop Hike and Bide trail that extends north along the western frontage road on the west side of IH-610W. This facility is currently listed on City of Houston Park inventory. Preliminary investigations suggest that this facility is maintained under an agreement with the City of Houston but TxDOT retains ownership. Due to ROW requirements, Alternative 1 could potentially impact this resource.

3.3.2 Resources Not Affected (i.e., Resources Outside the Areas of Potential Effect)

Station at south end of IH-610W (vicinity of Westpark Dr. and Sage Rd.) No buildings approximately 50 years old or older and deemed architecturally noteworthy were found. Presumably, therefore, the project would have no effect on historic resources in this case.

111 N. Post Oak Ln. (The Houstonian Club "Manor House") Although less than 50 years of age, the Manor House at the Houstonian is a masterful brick, two-story Georgian Revival design that is potentially eligible for the National Register of Historic Places, based on its architect, architectural design merit and its historical associations with the Reed family. Known originally as the Lawrence S. Reed House, it is the work of John Staub (1959)--one of Houston's most accomplished architects during the second and third quarter of the twentieth century. Due to its location several hundred feet west of the N Post Oak Ln. roadway as well as the erosion of its historic setting that has resulted from construction of newer buildings on the east, south and west, the project would presumably have no effect on this historic resource.

105 N. Post Oak Ln. (The Fay School "Office Building") Preserved on the campus of the Fay School is the Ernest Bel Fay House (1937), another significant design authored by architect John Staub. Based on its architect, architectural design, and associations with the Fay family, the building appears to be eligible for the National Register of Historic Places. The house is now part of a complex of newer school buildings, and is separated from N. Post Oak Ln. by additional, intervening newer development not associated with the school effectively screens it from the street. Given its separation from the N. Post Oak Ln. roadway due to new intervening, encroaching development, and the resultant erosion of its historic setting, the project would presumably have no effect on this historic resource.

Other Historic/Architectural Resources Within One-Quarter Mile of Proposed Alignments:

- The Bayou Club, 8550 Memorial Dr.; John Staub, architect (1930)
- 275 Pine Hollow Ln.; Harwood Taylor, architect (1956)
- Barthelme House, 11 N. Wynden Dr.; Donald Barthelme, archt. (1941)
- 54 Briar Hollow Ln.; Bolton & Barnstone, Architects (1960)
- 63 Briar Hollow Ln.; Ford, Colley & Tamminga, Architects (1955)
- 695 Rocky River Rd.; Wilson, Morris, Crain & Anderson, Archts. (1955)

3.4 Construction Impacts

This section discusses potential impacts that are the direct result of construction activities and that would typically end when construction is complete. Final project design, construction techniques and construction phasing would determine construction impacts. Careful planning and design would mitigate construction impacts to minimize the construction effects on the surrounding neighborhoods, businesses, infrastructure, and natural environment. Though relatively short, construction impacts may have the potential to be disruptive to normal, daily activities. Measures to minimize or mitigate construction impacts will be assessed during the preparation of the DEIS. The current analysis was based on conceptual design and assumptions regarding the construction approach.

Construction of the potential project could cause intermittent impacts to the surrounding environment. It was anticipated that equipment will be able to be accommodated on-site during construction. METRO's construction of the potential project would not interfere with any scheduled infrastructure projects of the City of Houston or TxDOT.

Coordination: Any short-term construction-related impacts of the potential project would be mitigated to the extent possible. Measures would be put in place to control dust, noise and vibration and to maintain traffic flow and access. The construction of the potential project would be coordinated with relevant agencies and other construction projects. METRO would take a proactive role in outreach and communication efforts to those potentially affected by construction of this potential project. Early and interactive communications would be proposed with staff assigned to the project during the construction stage to facilitate understanding and communications.

The major construction activities that could cause environmental impacts include the following:

- Demolition (buildings, pavement)
- Fill and Excavation
- Utilities (major relocations or disruption)
- Drainage changes
- Vegetation removal (temporary)
- Construction easements
- Construction activity in or near sensitive areas (bayou, park)
- Tunneling
- Elevated structure construction
- Retaining wall construction
- Pile driving or drilling
- Blasting
- Temporary partial road or lane closures and traffic rerouting
- Building temporary, new detour routes

Since the proposed routes for Alternatives 1, 2, 2A and 3 use similar types and quantities of ROW, construction-related effects are expected to be roughly equivalent for all Build Alternatives. The construction activities would potentially impact transportation, land use and economics, neighborhoods, air quality, noise and vibration levels, hazardous materials sites, utilities, and cultural resources. These potential impacts are discussed below in greater detail.

Transportation: Construction of the Build Alternatives would result in temporary impacts to local and regional automobile and truck traffic. Linear projects such as the proposed transit improvements for the Uptown-West Loop Corridor are typically divided into various segments or line sections for construction of the transitway (track or busway), structures, tunnels, park & ride facilities, station platforms, transit centers, maintenance yards, sub-station and signal control facilities, and other related improvements. For light rail transit, open track segments of the route, consisting of at-grade tracks, would require clearing and grading. Where new ROW would be required, some existing buildings and other structures could be demolished. Both activities would produce debris and truck traffic for debris removal. Where in-street track is proposed within existing or expanded street ROW, grading would be minimal but extensive reconstruction of streets, sidewalks, and other existing facilities may occur. The project would partially close streets and reroute traffic via detours to ensure that construction proceeds in an efficient and timely manner.

Constructing an elevated transitway within existing street ROW, depending on the size and location of foundations, may temporarily close some traffic lanes and detour traffic until a sufficient portion of the elevated structure is complete and the street can be safely reopened.

Land Use and Economics: Construction-related land use impacts may effect the quality and character of existing land uses. These include impacts from noise, dust, access and parking restrictions. Small businesses, especially those retail businesses depending on walk-up or Dr.-up customers, could be most vulnerable to prolonged periods of construction activity. If construction impacts are sufficiently severe, such businesses could fail or be forced to relocate. Other businesses could experience a short-term decline in revenues due to reduced business activity. Construction activity would also result in increased output, income, and jobs for the local economy, to the extent that labor and materials are captured locally.

Neighborhoods: Noise, vibration, visual, aesthetic, and traffic impacts could temporarily affect neighborhood quality of life. Fire, emergency medical, and police response times could be affected due to blocking problems on at-grade and elevated sections and around cut-and-cover station construction areas. This would be a particular concern on major roads and at major intersections. The safety of neighborhood residents, visitors, and employees would be a concern around construction sites. During construction of the Uptown-West Loop transit improvements, construction equipment, materials, signage, and staging areas would also reduce the visual quality in the immediate area.

Air Quality: Construction activities primarily generate particulate matter (PM_{10} and $PM_{2.5}$) as well as small amounts of carbon monoxide and nitrogen oxides from construction machinery exhaust and vehicular traffic delayed in construction zones. Specific sources of particulate would be dust from earth moving-excavation activities (known as fugitive dust) and diesel smoke.

Noise and Vibration: Noise and vibration would be generated by heavy equipment used during major construction periods and could impact residential or other noise-sensitive land uses.

Hazardous Materials: Potential hazardous materials impacts would be largely beneficial because existing contaminated sites would be cleaned up during project construction if such sites fall within needed ROW. However, adverse impacts can occur if cleanup activities create opportunities for public contact with contaminated soil and groundwater, and if dewatering during construction causes contamination within groundwater to migrate.

Utilities: Utility pipes, lines, conduits, cables, and other infrastructure would need to be relocated or otherwise avoided during construction.

Cultural Resources: Noise, vibration, visual, aesthetic, and traffic impacts could impact local cultural resources. Access may be reduced with detours used during construction. During construction of the Uptown-West Loop transit improvements, construction equipment, materials, signage, and staging areas would also reduce the visual quality in the immediate area.

3.5 Cumulative Effects

Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR, Sec. 1508.7). Potential cumulative effects are discussed in the following sections for a variety of resources, including transportation, land use and economics, visual and aesthetic, air quality, noise and vibration, ecosystems, water quality and hydrology, and cultural resources.

Transportation: The analysis of traffic and transit impacts was based on the results of regional traffic modeling and ridership modeling that incorporated past and future projects and growth that would result from development in the region.

Land Use and Economics: The population and employment projections used for travel demand modeling were based on regional demographic and land use assumptions approved by H-GAC that are expected to result from future growth and development.

Visual and Aesthetics: In general, other reasonably foreseeable transportation and land use development projects within the Uptown-West Loop Corridor would be consistent with the area's trends and policies to concentrate and intensify urban development. In most cases, the visual impacts of such future projects would include redevelopment with larger buildings, greater visual scale and higher pedestrian orientation. These buildings would generate more pedestrian traffic, streetscape improvements, and visible improvements in site maintenance. In locations such as Post Oak Blvd., proposed transit improvements would be more visually compatible with these future developments than with the existing, automobile-dominated conditions, and the cumulative visual impacts would be less than those of the project alternatives considered alone.

Air Quality: The regional air quality analysis will be based on regional modeling, which incorporates projected changes to land use, employment, population and travel behavior.

Noise and Vibration: The traffic noise impact analysis was based on projected future traffic volumes within the project area, forecasted background growth, and programmed transportation improvements. Noise and vibration impacts from the project alternatives could be intensified in locations where future sensitive receptors would be built near the transitway, and/or where future noise-producing uses would be developed near sensitive receptors that would be impacted by the Build Alternatives' noise and vibration.

Ecosystems, Water Quality and Hydrology: Future development in the Uptown-West Loop study area would occur in developed urban areas with limited natural resources. However, as more land is converted to buildings and parking lots, additional impacts on local water quality, hydrology, and ecosystems could occur.

Cultural Resources: The analysis process used in assessing the indirect impacts and cumulative effects of the alternatives was based on information obtained from public and agency scoping meetings and meetings with responsible agencies, field investigations, and review of available information listing potentially affected resources. Information was collected on past, present and future actions having known or reasonably foreseeable cumulative effects with regard to cultural resources.

3.6 Environmental Justice

This section addresses the potential impacts of Uptown-West Loop Alternatives on minority, low income, and elderly and disabled populations. All three alternatives are consistent with Executive Order 12898, Environmental Justice because they do not create any disproportionately high and adverse effects on minority and/or low-income populations. Potential impacts associated with the project fall mainly on moderate and high income communities that lie within the corridor. As a result, no environmental justice impacts have been identified.

Table 3.7 shows the ethnicity and poverty data for the study area Block Groups that fall within the vicinities of the proposed station locations for the three Build Alternatives. Figure 3.5 depicts proposed station locations; station vicinities 2 and 5 are potential future station locations that could be incorporated at such a time that development and engineering constraints warrant. The Block Groups within the station vicinities are comprised primarily of non-Hispanic White persons (ranging from 53 percent to 90 percent). The area around Station 13 (Alternative 3 only), which includes Block Groups 1, 2 and 3 in Census Tract 4317 is particularly homogenous, having a white population of 90 percent. The areas around Stations 3 (Alternatives 1, 2 and 3), 4 (Alternatives 1, 2 and 3) and 12 (Alternative 3 only) are also homogenous, having white populations ranging from 81 to 86 percent. The remaining station vicinities, except for the area around Station 1, are also predominately white, with African-American populations ranging between one and seven percent and Hispanic populations ranging between 12 and 27 percent.

The Block Groups in the vicinities of Stations 1, 7 and 11 are generally less homogenous than the rest of the project area. For instance, the population around Station 1, which is located at the existing NWTC, is 53 percent white and 43 percent Hispanic. The percentages of minority persons are relatively high given that two of the four Block Groups that are in the vicinity of the station are comprised primarily of Hispanic persons (54 to 91 percent). These Block Groups are located north of IH-10 and the NWTC. Similarly, of the three Block Groups near Station 11, two are predominately white, whereas one Block Group (located south of U.S. 59) is predominately Hispanic. See Technical Report C for ethnicity and poverty data for the individual Block Groups that comprise the vicinities of the proposed station locations.

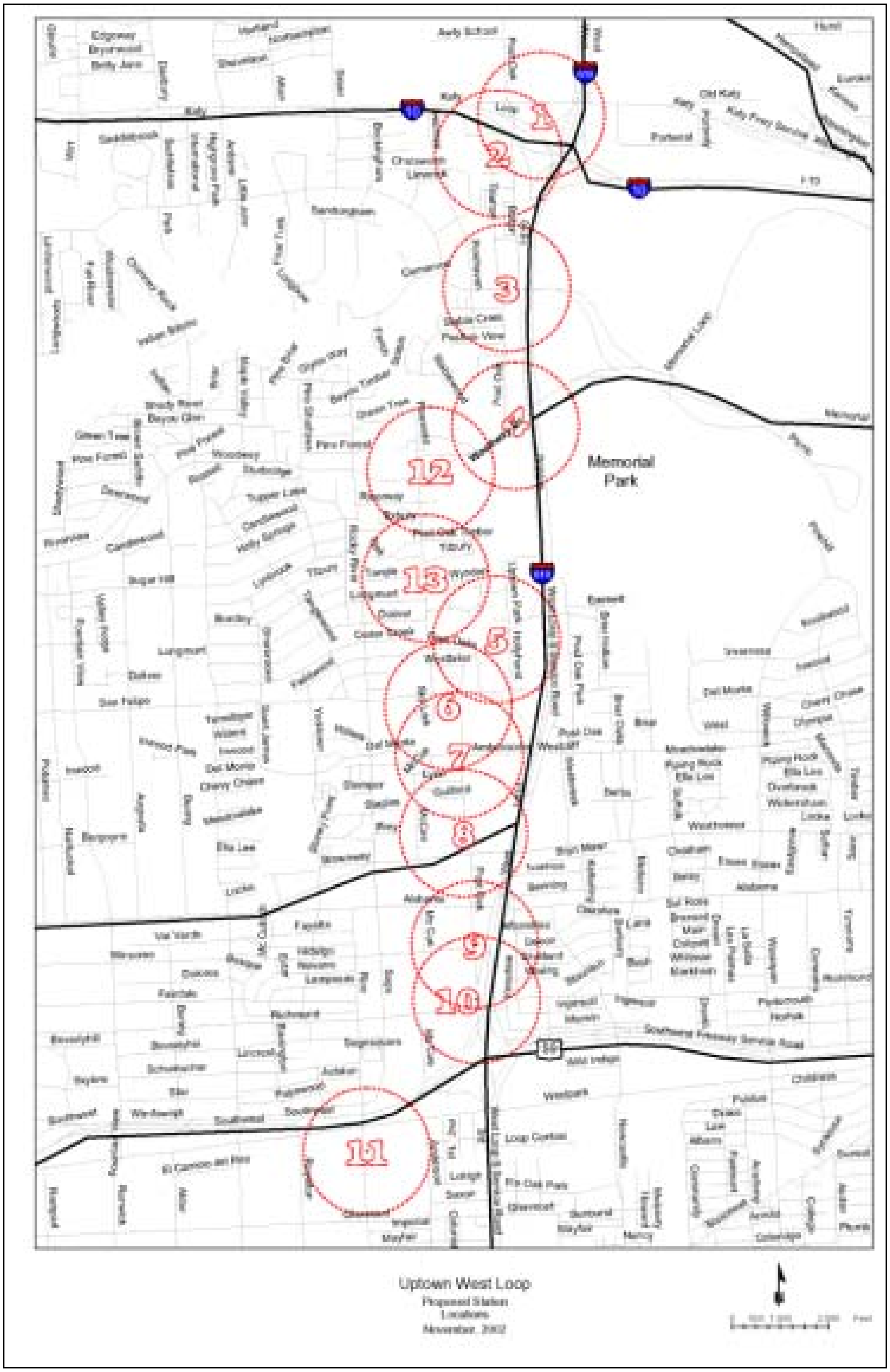
Overall, the populations of the Block Groups located within the station locations are more homogenous than the City of Houston as a whole, which had a white population of approximately 31 percent, an African-American population of 25 percent and an Hispanic population of approximately 37 percent in 2000. In addition, the populations within the vicinity of all station locations except Station 11, which had a poverty rate of 20 percent, had lower poverty rates than the City of Houston (19 percent) in 1999. The poverty rates of the Block Groups within the affected Block Groups ranged from 1 percent to 20 percent in 1999.

Table 3.7
Ethnicity and Poverty for Block Groups within Station Vicinities, 2000

Area	Population Total:	Percent Hispanic	Percent White	Percent Black	Percent Other	Poverty Rate	Associated Alternatives
Station 1	5,751	43%	53%	2%	2%	17%	1,2,3
Station 2*	5,608	20%	72%	2%	5%	8%	1,2,3
Station 3	4,008	7%	85%	1%	7%	6%	1,2,3
Station 4	3,294	9%	81%	0%	10%	4%	1
Station 5*	4,525	12%	79%	2%	7%	7%	1,2
Station 6	3,683	14%	79%	2%	6%	5%	1,2,3
Station 7	1,342	21%	63%	3%	12%	12%	1,2,3
Station 8	7,045	17%	74%	3%	6%	12%	1,2,3
Station 9	3,101	15%	79%	1%	4%	14%	1,2,3
Station 10	3,101	15%	79%	1%	4%	14%	1,2,3
Station 11	5,803	27%	60%	7%	6%	20%	1,2,3
Station 12	3,921	7%	86%	0%	7%	3%	3
Station 13	4,183	8%	90%	0%	3%	1%	3

Source: US Census Bureau, 2000.
** Potential station location*

FIGURE 3.5
POTENTIAL STATION LOCATIONS



4.0 Transportation Impacts

This chapter documents the potential transportation impacts associated with the Uptown-West Loop Planning Study conceptual alignments.

4.1 Transit Impacts

This section describes the potential transit impacts associated with the Uptown-West Loop Planning Study conceptual alignments.

4.1.1 Demand Potential Methodology and Results

This section contains the output from the METRO Service Estimator for the conceptual alignments. Table 4.1 provides a summary description of the service estimator results and the accompanying scaled demand potential index (DPI) for the alternatives under review. The scaled DPI represents each alignment's potential to capture travel demand in comparison to the other alignments being reviewed for this corridor. The estimated performance of each alignment is based solely and exclusively on the isolated characteristics of each individual corridor. The METRO Service Estimator results are not reflective of an alignment’s potential performance when evaluated as part of a regional transit system with transit improvements in numerous corridors. For purposes of this analysis, Alternatives 2 and 2A have been grouped together since the service estimator does not yield significant differences between the two alternatives. The full Travel Demand Modeling Methodology and Evaluation Criteria is available in Technical Report D.

METRO Service Estimator

The METRO Service Estimator is a sketch-planning tool developed to perform corridor level analysis of new and/or modified transit service in both short and long-term applications. The METRO Service Estimator integrates Geographic Information Systems (GIS) and Excel to provide order of magnitude demand forecasts based on population, employment, available capacity on the proposed transit alignment, fare, and frequency. It also evaluated the impact of the new service based on a given background transit network. The Service Estimator has been validated using current METRO data by service type. This demand projection tool made the integration of the GIS information seamless, though it should be noted that if proposed alignments are not significantly different, as with the Uptown-West Loop Corridor, demand projections will show minimal differences.

Houston Long-Range Patronage Forecasting Model

The Houston Long-Range Patronage Forecasting Model is a series of equations and functions designed to estimate systemwide transit ridership, highway traffic, and other impacts associated with alternative transit improvements. This model was used during the regional transit system development. It commenced with person-trip tables converted from the H-GAC trip generation and trip distribution modeling process. The Long-Range Patronage Forecasting Model computes the transportation mode split impacts associated with different highway and transit improvements and assigns the resulting trip tables to the appropriate networks. The geographic area defined for the model represents the Houston Modeling Region, as designated by H-GAC. This modeling region includes all of Harris County and seven surrounding counties: Galveston, Brazoria, Fort Bend, Waller, Montgomery, Liberty, and Chambers. While a large portion of this region is outside of the METRO service area, the entire eight county region was used for travel demand modeling purposes. The sketch-planning tool and the long-range model have different uses, inputs, investments of time, and products. The phased approach for analyzing and evaluating corridor alternatives uses both tools in their appropriate application to complement each other and facilitate the decision making process.

Population and employment data relative to alignment and station location provided the basis for determining an alignment's potential to capture travel demand. Tables 4.2, 4.3 and 4.4 provide detailed population and employment in relation to station assignment. A five-mile catchment area was drawn around transit stations with parking to reflect the catchment area for demand potential for parking spaces (please see Technical Report E for catchment areas). METRO's 1995 origin/destination data indicates that current patrons drive an average of 4.42 miles to access a transit facility with parking.

Population

The proximity of population around transit stations has a large influence on the use of transit service. A one-quarter mile and a one-half mile catchment area were drawn around each approximate station location for the corridor-specific alignments. The number of persons living within these catchment areas was identified using a geographic information system (GIS). The extracted population was based on 2000 census data for the existing condition and year 2025 projections provided by H-GAC. The one-quarter mile catchment area was intended to reflect population within a reasonable walk distance to the facility. The one-half mile catchment area provided additional information on population density in areas with documented extended pedestrian activity. The extended walk distances may be enhanced by aesthetics of the area and additional pedestrian accommodations (i.e. lighting, trees, and good sidewalks). These criteria may also reflect the increased opportunity for transfer point trips at station locations. While not all transit station locations would support extended pedestrian activity, the one-half mile catchment area population provided information on the forecasted density surrounding the potential site.

Employment

Similar to the population criteria, employment data was gathered for the each transit station within one-quarter and one-half mile catchment areas around each station. The number of jobs within these catchment areas was also identified using GIS. The extracted employment was based on 2000 census data for the existing condition and year 2025 projections provided by HGAC. This reflected each station's propensity to serve as an attractor of work trips. In addition, the catchment areas indicated the concentration of employment that is within a reasonable walk distance of the proposed station location.

Tables 4.1 – 4.4 are listed below. The following definitions have been provided for reference.

Definitions

- *Scaled Demand Potential Index* - The alignment(s) demonstrating the greatest potential to capture travel demand in the corridor is set at 100. All remaining alignments are scaled as a percentage of the top producing alignment's performance.
- *Route Service Area* - The total square mileage of all traffic analysis zones (TAZs) within 1/10th of a mile of each alignment.
- *Service Area Population* - Total household population of all TAZs within 1/10th of a mile of each alignment.
- *Service Area Employment* - Total employment of all TAZs within 1/10th of a mile of each alignment.
- *Income Quintile One* - All households with a mean household income from $0 to $13,434.
- *Income Quintile Two* - All households with a mean household income from $13,434 to $25,321.
- *Income Quintile Three* - All households with a mean household income from $25,321 to $38,700.
- *Income Quintile Four* - All households with a mean household income from $38,700 to $58,856.
- *Income Quintile Five* - All households with a mean household income from $58,856 and above.

Table 4.1
Uptown-West Loop Service Estimator Results - Alignment Specific Data

	Conceptual Alignment 1	Conceptual Alignment 2 & 2A	Conceptual Alignment 3
Scaled DPI	100	94	97
Route Service Area	7.83	6.87	7.51
Service Area Population	22,888	19,313	28,033
Service Area Employment	95,360	85,290	88,966
# of Households in Income Quintile 1	1,432	1,156	1,545
# of Households in Income Quintile 3	2,225	2,225	2,225
# of Households in Income Quintile 4	1,510	1,510	1,510
# of Households in Income Quintile 5	1,287	1,287	1,287
Phase One - 2025 Evaluation Data			
Population within .25 miles of transit stations	33,396	29,996	35,214
Population within .50 miles of transit stations	49,189	47,888	50,034
Population within 5 miles of transit stations with parking	324,983	324,983	324,983
Employment within .25 miles of transit stations	112,176	106,028	108,245
Employment within .50 miles of transit stations	152,621	148,909	151,346
The METRO Service Estimator results are not reflective of an alignment's potential performance when evaluated as part of a regional transit system with transit improvements in numerous corridors.			

Table 4.2
Alternative 1 - Station Level Demographics

Uptown-West Loop Phase One - Evaluation Data					
	Population within .25 miles of transit stations	**Population within .50 miles of transit stations**	**Population within 5 miles of transit stations with parking**	**Employment within .25 miles of transit stations**	**Employment within .50 miles of transit stations**
Alternative 1					
NWTC					
Year 2000	1,759	1,759	95,872	17,655	17,655
Year 2007	1,779	1,779	96,860	18,279	18,279
Year 2025	2,828	2,828	129,165	20,503	20,503
I-10 / N. Post Oak Rd.					
Year 2000	1,372	3,174	x	13,755	19,481
Year 2007	1,355	3,171	x	14,217	20,228
Year 2025	2,330	4,926	x	15,901	22,939
Memorial Dr.					
Year 2000	2,779	2,779	x	5,638	5,638
Year 2007	2,737	2,737	x	5,923	5,923
Year 2025	4,390	4,390	x	6,904	6,904
Woodway Dr.					
Year 2000	3,139	4,440	x	9,089	15,704
Year 2007	3,158	4,488	x	9,626	16,790
Year 2025	4,727	6,921	x	11,759	20,976
Uptown Park Blvd.					
Year 2000	2,199	5,541	x	14,453	31,253
Year 2007	2,242	5,623	x	15,690	34,185
Year 2025	3,979	9,962	x	20,227	44,665
San Felipe St. / Post Oak Blvd					
Year 2000	3,160	9,977	x	21,784	44,602
Year 2007	3,241	10,147	x	23,794	48,751
Year 2025	5,616	17,397	x	30,678	63,775
Westheimer Rd. / Post Oak Blvd					
Year 2000	3,566	8,385	x	20,987	53,079
Year 2007	3,592	8,446	x	22,554	57,372
Year 2025	6,019	13,778	x	28,515	72,833
Richmond Ave. / Post Oak Blvd					
Year 2000	8,120	12,401	x	18,890	35,644
Year 2007	8,379	12,568	x	19,987	37,690
Year 2025	13,623	18,755	x	24,187	45,541
Rice / Westpark(Proposed TC)					
Year 2000	4,311	13,460	166,775	3,819	19,082

Uptown-West Loop Phase One - Evaluation Data					
	Population within .25 miles of transit stations	**Population within .50 miles of transit stations**	**Population within 5 miles of transit stations with parking**	**Employment within .25 miles of transit stations**	**Employment within .50 miles of transit stations**
Year 2007	4,319	13,508	167,917	3,964	20,283
Year 2025	6,922	15,430	195,818	4,524	24,655
The METRO Service Estimator results are not reflective of an alignment's potential performance when evaluated as part of a regional transit system with transit improvements in numerous corridors.					

Table 4.3
Alternative 2 & 2A - Station Level Demographics

Uptown-West Loop Phase One - Evaluation Data					
	Population within .25 miles of transit stations	Population within .50 miles of transit stations	Population within 5 miles of transit stations with parking	Employment within .25 miles of transit stations	Employment within .50 miles of transit stations
Alternatives 2 & 2A					
NWTC					
Year 2000	1,759	1,759	95,872	17,655	17,655
Year 2007	1,779	1,779	96,860	18,279	18,279
Year 2025	2,828	2,828	129,165	20,503	20,503
I-10 / N. Post Oak Rd.					
Year 2000	1,372	3,174	x	13,755	19,481
Year 2007	1,355	3,171	x	14,217	20,228
Year 2025	2,329	4,926	x	15,901	22,939
Uptown Park Blvd.					
Year 2000	2,199	5,542	x	14,453	31,253
Year 2007	2,242	5,623	x	15,690	34,185
Year 2025	3,979	9,962	x	20,227	44,665
San Felipe St. / Post Oak Blvd					
Year 2000	3,160	9,977	x	21,784	44,602
Year 2007	3,241	10,146	x	23,794	48,751
Year 2025	5,616	17,397	x	30,678	63,775
Westheimer Rd. / Post Oak Blvd					
Year 2000	3,566	8,385	x	20,987	53,080
Year 2007	3,592	8,446	x	22,554	57,372
Year 2025	6,019	13,778	x	28,515	72,833
Richmond Ave. / Post Oak Blvd					
Year 2000	8,120	12,401	x	18,890	35,644
Year 2007	8,379	12,568	x	19,987	37,690
Year 2025	13,623	18,755	x	24,187	45,541
Rice / Westpark(Proposed TC)					
Year 2000	4,311	13,460	16,6775	3,819	19,082
Year 2007	4,319	13,508	167,917	3,964	20,284
Year 2025	6,922	15,430	19,5818	4,524	24,655
The METRO Service Estimator results are not reflective of an alignment's potential performance when evaluated as part of a regional transit system with transit improvements in numerous corridors.					

Table 4.4
Alternative 3 - Station Level Demographics

Uptown-West Loop Phase One - Evaluation Data					
	Population within .25 miles of transit stations	Population within .50 miles of transit stations	Population within 5 miles of transit stations with parking	Employment within .25 miles of transit stations	Employment within .50 miles of transit stations
Alternative 3					
NWTC					
Year 2000	1,759	1,759	95,872	17,655	17,655
Year 2007	1,779	1,779	96,860	18,279	18279
Year 2025	2,828	2,828	129,165	20,503	20,503
I-10 / N. Post Oak Rd.					
Year 2000	1,372	3,174	x	13,755	19,481
Year 2007	1,355	3,171	x	14,217	20,228
Year 2025	2,329	4,926	x	15,901	22,939
Memorial Dr.					
Year 2000	2,779	2,779	x	5,638	5,638
Year 2007	2,737	2,737	x	5,923	5,923
Year 2025	4,389	4,389	x	6,904	6,904
Woodway Dr. 3					
Year 2000	5,089	6,747	x	8,521	14,944
Year 2007	5,167	6,810	x	9,320	16,005
Year 2025	6,806	9,411	x	12,428	20,111
Longmont					
Year 2000	3,461	6,274	x	8,423	26,594
Year 2007	3,547	6,420	x	9,125	29,138
Year 2025	4,805	9866	x	11,806	38,156
San Felipe St./Post Oak Blvd					
Year 2000	3,160	9,977	x	21,784	44,602
Year 2007	3,241	10,147	x	23,794	48,751
Year 2025	5,616	17,397	x	30,678	63,775
Westheimer Rd./Post Oak Blvd					
Year 2000	3,566	8,385	x	20,987	53,079
Year 2007	3,592	8,446	x	22,554	57,372
Year 2025	6,019	13,778	x	28,515	72,833
Richmond Ave./Post Oak Blvd					
Year 2000	8,120	12,401	x	18,890	35,644
Year 2007	8,379	12,568	x	19,987	37,690
Year 2025	13,623	18,755	x	24,187	45,541

Uptown-West Loop Phase One - Evaluation Data					
	Population within .25 miles of transit stations	Population within .50 miles of transit stations	Population within 5 miles of transit stations with parking	Employment within .25 miles of transit stations	Employment within .50 miles of transit stations
Rice/ Westpark (Proposed TC)					
Year 2000	4,311	13,460	166,775	3,819	19,082
Year 2007	4,319	13,508	167,917	3,964	20,284
Year 2025	6,922	15,430	195,818	4,524	24,655
The METRO Service Estimator results do not reflect an alignment's potential performance if evaluated as part of a regional transit system that includes transit improvements in numerous corridors.					

4.1.2 Travel Markets

Travel forecasting models were used to project future traffic and were the basis for the determination of the need for new road capacity, transit service changes and changes in policy. Travel models followed a sequence of steps to answer specific questions relative to travel choice. Choices that travelers make in response to a given system of highways and transit were simulated. Travel demand data sets generated for the 2022 MTP and adjusted for the 2025 horizon of the METRO Mobility 2025 plan provided the basis for preliminary analysis for origins and destinations of persons traveling to and from the Uptown-West Loop study area.

The distribution of all trips (total person trips), with Uptown-West Loop study area as the destination (aggregated to Traffic Analysis Zones, TAZ), is dispersed throughout the corridor with heavy concentrations at major activity centers. Please see Section 1.1.9 of this report for detailed description of internal trip distribution.

Figures 4.1 and 4.2 focused on demand potential for trips originating outside the study area with Uptown-West Loop as the primary destination. In the preliminary investigation of trip origination, only home based work (HBW) trips were examined. During system plan assembly, modeling distributed transit trips by purpose. HBW trips with destinations to the Uptown-West Loop study area were concentrated in the southwest, west, and northwest along the U.S. 59, the Westpark Toll Road, IH-10, and the U.S. 290 corridors in 2007. HBW trips in the baseline year 2007 and assigned to a TAZ were aggregated into regional groups to reflect travel patterns to the corridor. Figure 4.1 shows significant travel to the study area. Projections for the year 2025 indicate the growth in HBW trips to the Uptown-West Loop study area. The highest concentration of trips originated in the southwest quadrant. Figure 4.2 demonstrates the significant increase in travel demand for trips to the study area in 2025. Figure 4.2 also presents a picture of the likely assignment of future trips by corridor. It appears that U.S. 59, the Westpark Toll Road, and Westheimer Rd. would capture significant trip growth. Figure 4.3 aggregates HBW trips into larger zones to express an overall desire for trips to the study area from the southwest. The TAZ aggregation for the west to southwestern edge of the H-GAC zones comprise the majority of trips destined for the Uptown-West Loop study area in year 2025. Significant increases in population for the outlying areas of Ft. Bend County and Brazoria County sharply affected the transportation model projections, thus generating the growth in trip volumes.

Proposed transit improvements for the study area incorporated the NWTC as the northern terminus. It was recommended that the southern terminus of all alternatives under consideration should include a new transit center facility with operations equal to the capacity of the existing NWTC. The Uptown-West Loop Planning Study considered where the logical terminus of the southern end for any AHCT and recommended a location south of U.S. 59 and the Westpark Toll Road. The trip destination trends demonstrated in Figures 4.1, 4.2 and 4.3 emphasized the importance of creating transit connections and integrated facilities that would create a complete network that would attract riders traveling along the IH-10, U.S. 59 and Westpark corridors. Sufficient growth in trips from the southwest support the addition of a new transit facility in the southern end of the Uptown-West Loop study area.

FIGURE 4.1
2007 HBW DESIRE LINES DESTINED TO UPTOWN-WEST LOOP

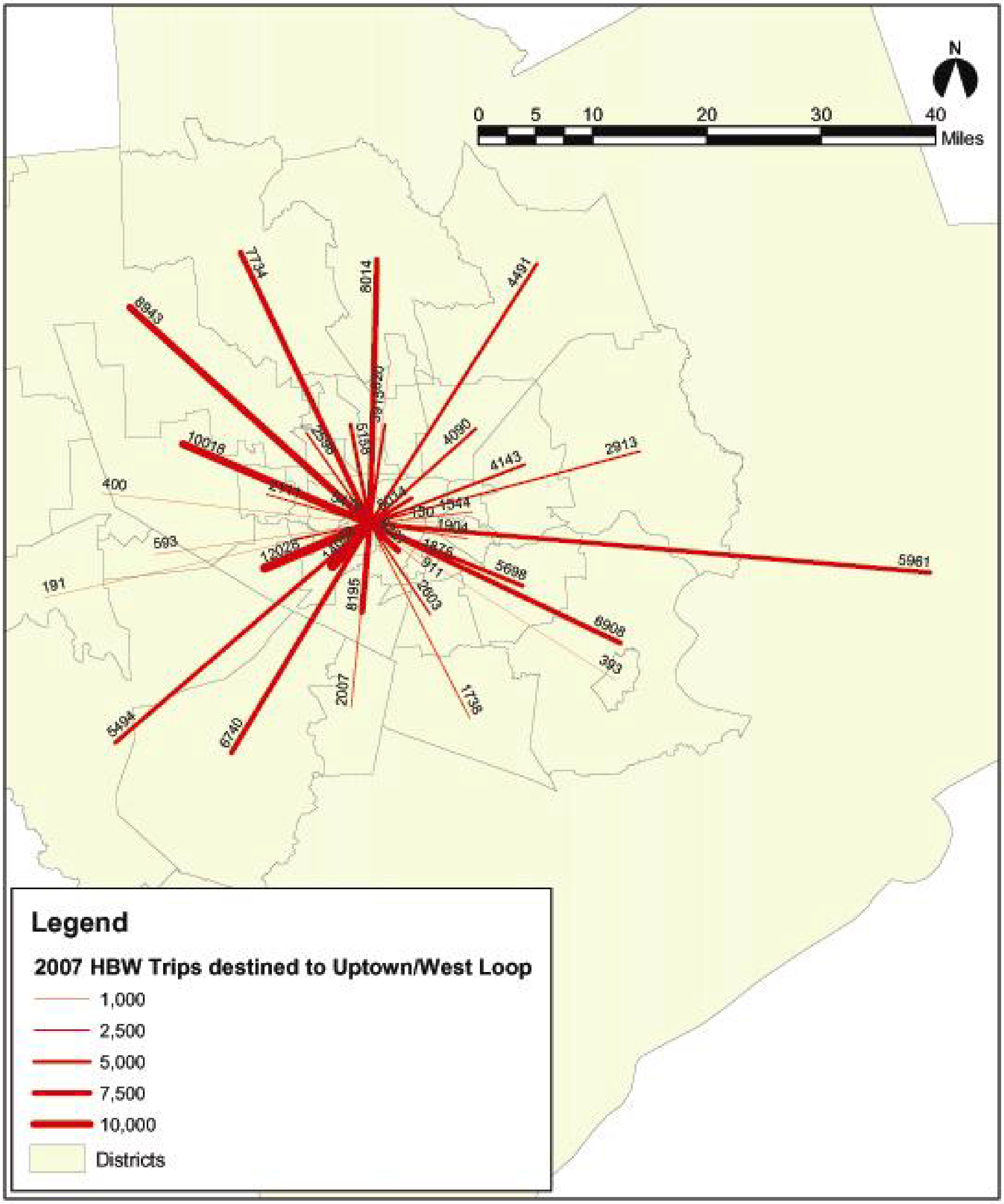


FIGURE 4.2
2025 HBW DESIRE LINES DESTINED TO UPTOWN-WEST LOOP

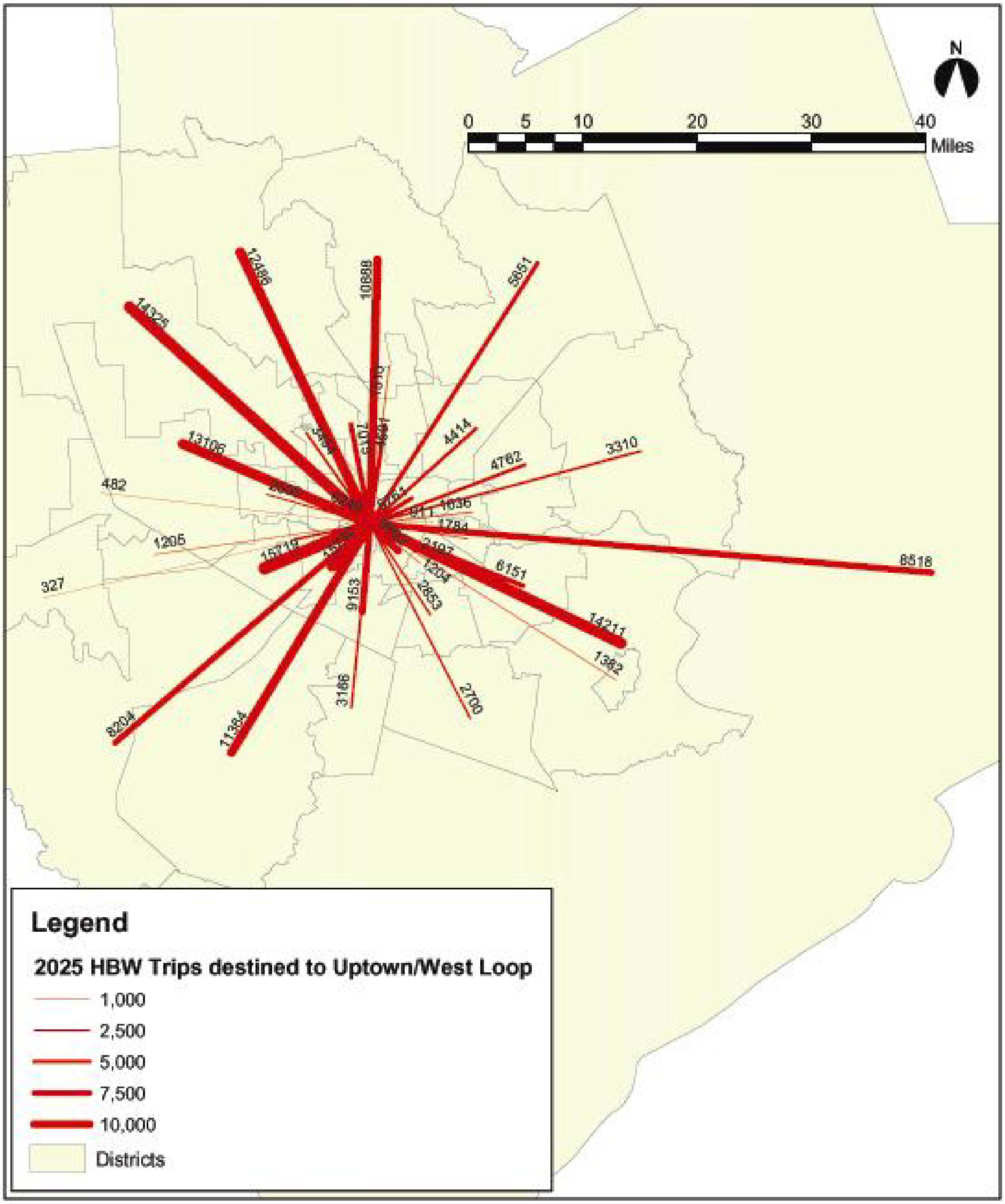
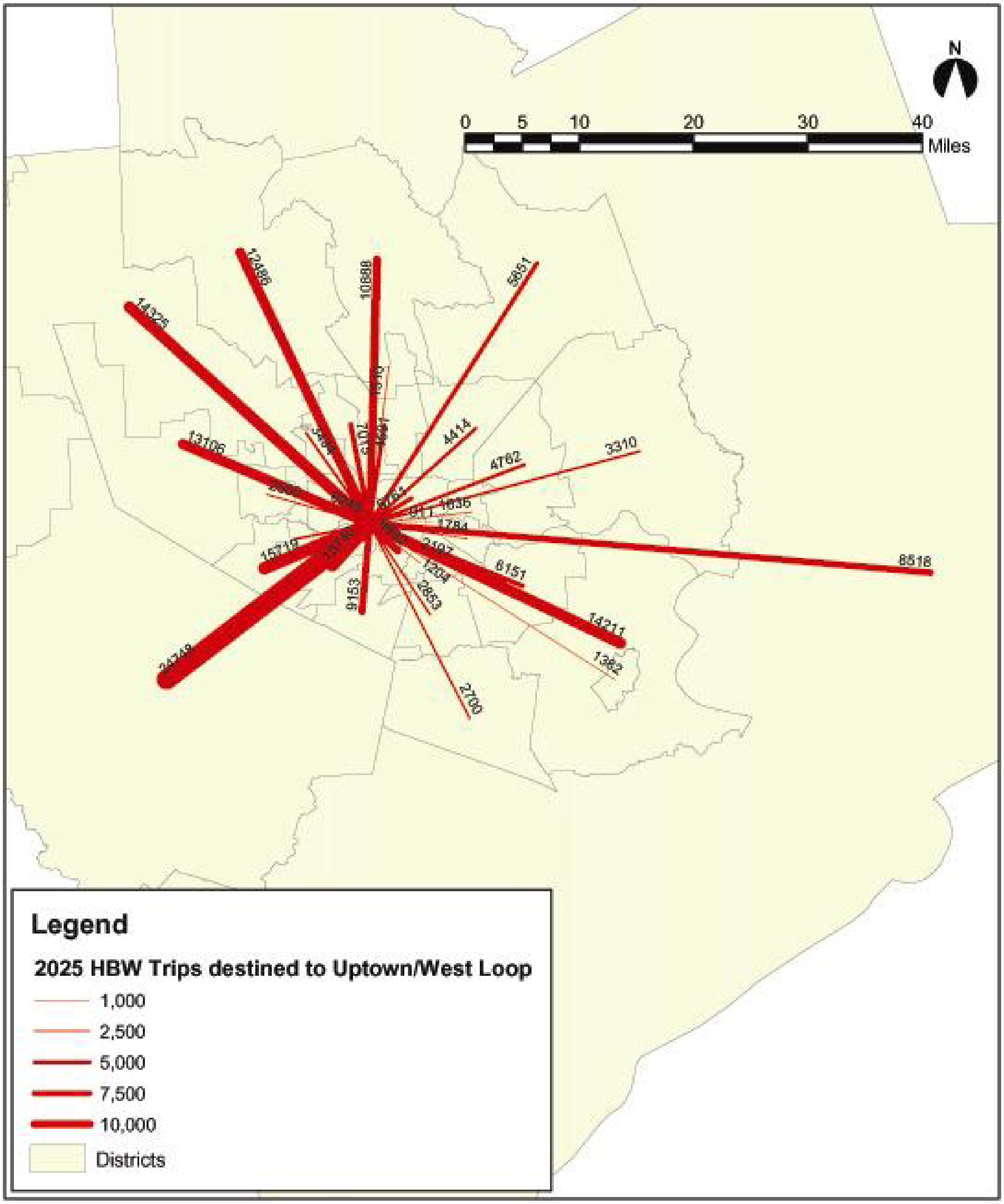


FIGURE 4.3
2025 HBW DESIRE LINES DESTINED TO UPTOWN-WEST LOOP – AGGREGATION



4.1.3 Transit Operations

Transit Operating Characteristics

The conceptual alternatives were designed to accommodate exclusive BRT or LRT operations. BRT and LRT technologies would operate equally through the corridor relative to the alignments and system design. Major differences in the two transit technologies relative to system operating characteristics should not be significant. There would be local service provided by existing bus routes. These services would be augmented and integrated with circulator system routes that connect with major activity and residential centers. The operating characteristics include (see Chapter 2 of this report for detailed alternative characteristics):

Headway: 5 min. peak/ 15 min. off-peak
Average Operating Speed: 19 mph – 21 mph
Dwell time: 20 seconds
Terminus time recovery: 2 minutes

Average Speed

Average operating speeds and attained speed between stations for each alignment are show in Table 4.5, 4.6, 4.7, and 4.8. As discussed in the methodology above, each table represents operating speed for both BRT and LRT.

Table 4.5
Alternative #1 – Running Time Estimation

Alternative 1 -- NWTC to Proposed Transit Center													
		Station	Attained	Start - to Stop:		Cruising:		Total	Average	Dwell	Fraction of	Fraction of	Travel
Beginning	Ending	Spacing	Speed	Distance	Time	Distance	Time	Run Time	Speed	Time	a mile	an Hour	Time
Station	Station	(feet)	(mph)	(feet)	(sec.)	(feet)	(sec.)	(sec.)	(mph)	(sec.)	(miles)	(hour)	(seconds)
Main Line to SH 242 -													
NWTC	**Memorial Dr.**	3,600	30	485.28	22	3,114.72	70.79	92.79	21.76		0.68	0.03	165.42
										20			
Memorial Dr.	**Woodway Dr.**	2,682	45	1,168.41	34	1,513.59	22.93	56.93	23.77		0.51	0.02	112.84
										20			
Woodway Dr.	**San Felipe 1**	6,851	30	485.28	22	6,365.72	144.68	166.68	25.02		1.30	0.05	273.79
										20			
San Felipe 1	**San Felipe 2**	1,400	35	684.76	26	715.24	13.93	39.93	15.93		0.27	0.02	87.90
										20			
San Felipe 2	**Westheimer**	1,400	35	684.76	26	715.24	13.93	39.93	15.93		0.27	0.02	87.90
										20			
Westheimer	**W. Alabama**	1,167	35	684.76	26	482.24	9.39	35.39	14.36		0.22	0.02	81.24
										20			
W. Alabama	**Richmond Ave**	2,029	35	684.76	26	1,344.24	26.19	52.19	19.16		0.38	0.02	105.87
										20			
Richmond Ave	**Proposed Transit Center**	3,239	25	319.33	18	2,919.67	79.63	97.63	18.77		0.61	0.03	172.52
										20			
								Average	19.34	Total	4.24	0.21	

Table 4.6
Alternative #2 – Running Time Estimation

Alternative 2 -- NWTC to Proposed Transit Center													
		Station	Attained	Start - to Stop:		Cruising:		Total	Average	Dwell	Fraction of	Fraction of	Travel
Beginning	Ending	Spacing	Speed	Distance	Time	Distance	Time	Run Time	Speed	Time	a mile	an Hour	Time
Station	Station	(feet)	(mph)	(feet)	(sec.)	(feet)	(sec.)	(sec.)	(mph)	(sec.)	(miles)	(hour)	(seconds)
Main Line to SH 242 -													
NWTC	**Memorial**	3,600	30	485.28	22	3,114.72	70.79	92.79	21.76		0.68	0.03	165.42
										20			
Memorial	**San Felipe 1**	9,835	40	853.61	29	8,981.39	153.09	182.09	33.18		1.86	0.06	296.40
										20			
San Felipe 1	**San Felipe 2**	1,400	35	684.76	26	715.24	13.93	39.93	15.93		0.27	0.02	87.90
										20			
San Felipe 2	**Westheimer**	1,400	35	684.76	26	715.24	13.93	39.93	15.93		0.27	0.02	87.90
										20			
Westheimer	**W. Alabama**	1,167	35	684.76	26	482.24	9.39	35.39	14.36		0.22	0.02	81.24
										20			
W. Alabama	**Richmond**	2,029	35	684.76	26	1,344.24	26.19	52.19	19.16		0.38	0.02	105.87
										20			
Richmond	**Proposed Transit Center**	3,239	25	319.33	18	2,919.67	79.63	97.63	18.77		0.61	0.03	172.52
										20			
								Average	19.87	Total	4.29	0.19	

Table 4.7
Alternative #2A – Running Time Estimation

Alternative 2A -- NWTC to Proposed Transit Center													
		Station	Attained	Start - to Stop:		Cruising:		Total	Average	Dwell	Fraction of	Fraction of	Travel
Beginning	Ending	Spacing	Speed	Distance	Time	Distance	Time	Run Time	Speed	Time	a mile	an Hour	Time
Station	Station	(feet)	(mph)	(feet)	(sec.)	(feet)	(sec.)	(sec.)	(mph)	(sec.)	(miles)	(hour)	(seconds)
Main Line to SH 242 -													
NWTC	**San Felipe 1**	13,452	50	1,590.81	40	11,861.19	161.74	201.74	41.36		2.55	0.06	325.22
										20			
San Felipe 1	**San Felipe 2**	1,400	35	684.76	26	715.24	13.93	39.93	15.93		0.27	0.02	87.90
										20			
San Felipe 2	**Westheimer**	1,400	35	684.76	26	715.24	13.93	39.93	15.93		0.27	0.02	87.90
										20			
Westheimer	**W. Alabama**	1,167	35	684.76	26	482.24	9.39	35.39	14.36		0.22	0.02	81.24
										20			
W. Alabama	**Richmond**	2,029	35	684.76	26	1,344.24	26.19	52.19	19.16		0.38	0.02	105.87
										20			
Richmond	**Proposed Transit Center**	3,239	25	319.33	18	2,919.67	79.63	97.63	18.77		0.61	0.03	172.52
										20			
								Average	20.92	Total	4.30	0.16	

Table 4.8
Alternative #3 – Running Time Estimation

Alternative 3 -- NWTC to Proposed Transit Center													
		Station	Attained	Start - to Stop:		Cruising:		Total	Average	Dwell	Fraction of	Fraction of	Travel
Beginning	Ending	Spacing	Speed	Distance	Time	Distance	Time	Run Time	Speed	Time	a mile	an Hour	Time
Station	Station	(feet)	(mph)	(feet)	(sec.)	(feet)	(sec.)	(sec.)	(mph)	(sec.)	(miles)	(hour)	(seconds)
Main Line to SH 242 -													
NWTC	**Memorial**	3,600	30	485.28	22	3,114.72	70.79	92.79	21.76		0.68	0.03	165.42
										20			
Memorial	**Woodway**	2,682	45	1,168.41	34	1,513.59	22.93	56.93	23.77		0.51	0.02	112.84
										20			
Woodway	**S. Post Oak Lane**	2,664	25	319.33	18	2,344.67	63.95	81.95	17.82		0.50	0.03	149.52
										20			
S. Post Oak Lane	**San Felipe 1**	4,000	25	319.33	18	3,680.67	100.38	118.38	19.71		0.76	0.04	202.96
										20			
San Felipe 1	**San Felipe 2**	2,325	35	684.76	26	1,640.24	31.95	57.95	20.34		0.44	0.02	114.33
										20			
San Felipe 2	**Westheimer**	1,400	35	684.76	26	715.24	13.93	39.93	15.93		0.27	0.02	87.90
										20			
Westheimer	**W. Alabama**	1,167	35	684.76	26	482.24	9.39	35.39	14.36		0.22	0.02	81.24
										20			
W. Alabama	**Richmond**	2,029	35	684.76	26	1,344.24	26.19	52.19	19.16		0.38	0.02	105.87
										20			
Richmond	**Proposed Transit Center**	3,239	25	319.33	18	2,919.67	79.63	97.63	18.77		0.61	0.03	172.52
										20			
								Average	19.07	Total	4.38	0.23	

Fleet Characteristics

For capital costing and operations planning purposes, it was assumed that two LRT vehicles (two-car trains) would be used for each trip. Station spacing, acceleration and deceleration rates, dwell times, attained speeds, and recovery time at the beginning and end of each alignment were used to determine the number of LRT vehicles required for each alternative to maintain headways. Twice as many BRT vehicles are required for an equivalent level of service based on the relative capacity of LRT. (Please see Chapter 2 – Vehicle Requirements of this report). During subsequent phases of analysis, as demand data becomes available, the number of vehicles will be assessed. Table 4.9 below lists vehicle fleet requirements:

Table 4.9
Fleet Size

Required Number of Vehicles				
Transit Mode	**Alternative 1**	**Alternative 2**	**Alternative 2A**	**Alternative 3**
LRT	13	13	11	14
BRT	26	26	22	28

Vehicles in the off-peak hours of operation would be stored in the yard and shop that is proposed at the south end of the alignment. The area north of Old Katy Rd. could also accommodate vehicle storage prior to peak hour operations.

Transit Stations

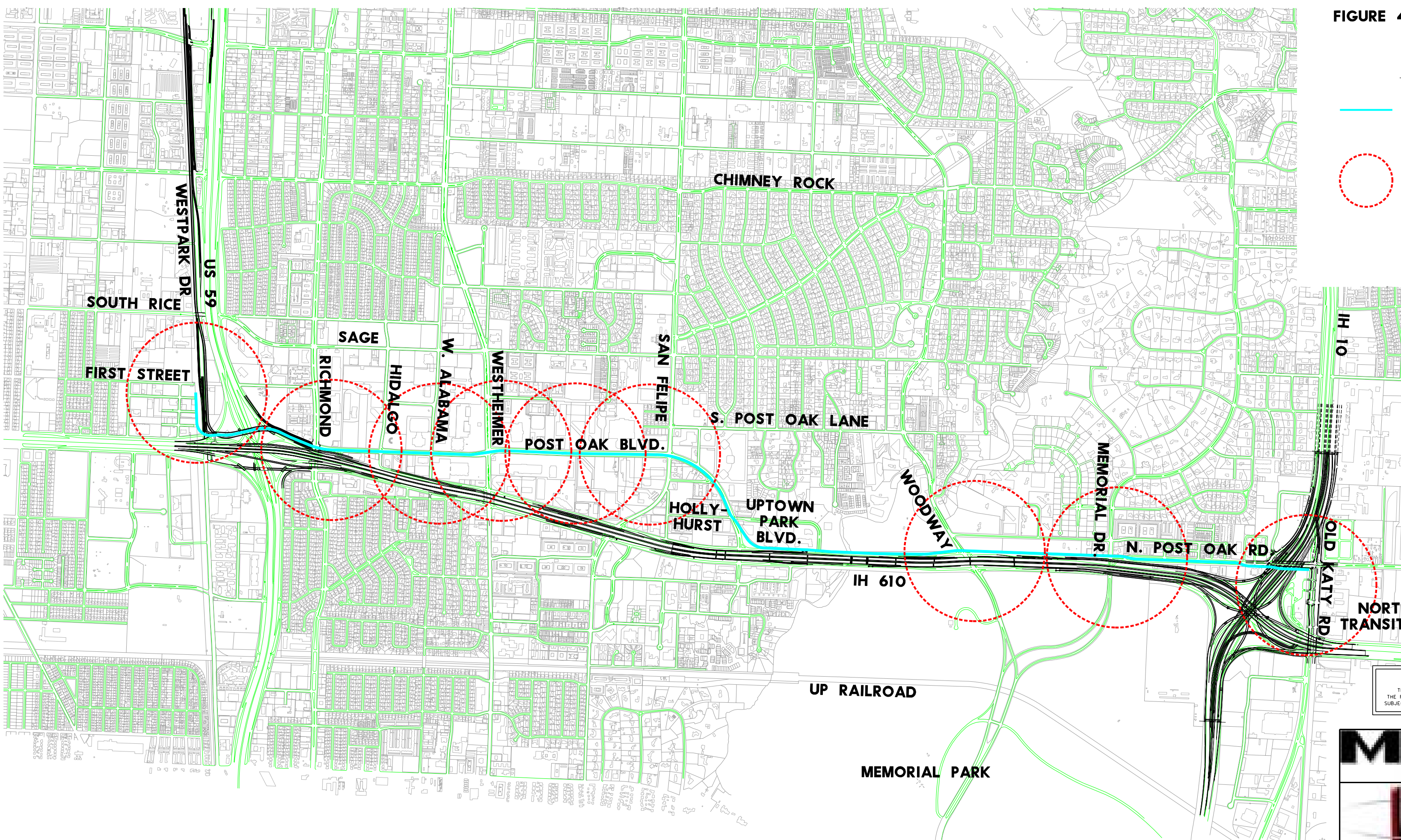
Potential stations were positioned in areas of population or employment concentration, approximately every half-mile. All three alternatives share the number and location of stations in the southern segment. Differences in station placement occurred in the northern segments where differences in alignment characteristics occur. Station platforms were positioned on a 220-foot tangent and require a 50-foot tangent beyond both ends of the platform with grades not to exceed 1.5 percent as outlined in the METRO design criteria manual. Potential station locations for each alternative are shown in Figures 4.4 through 4.7. Analysis at the NWTC shows that a station with future platform extension must be positioned on a 1.5 percent grade to allow for sufficient vertical clearance over IH-10. All other stations are at-grade along the corridor and comply with METRO's geometric design parameters.

FIGURE 4.4

LEGEND

ALTERNATIVE 1

PROPOSED STATION VICINITIES-1/4 MILE RADIUS



PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE #1
STATION VICINITY

DMJM HARRIS

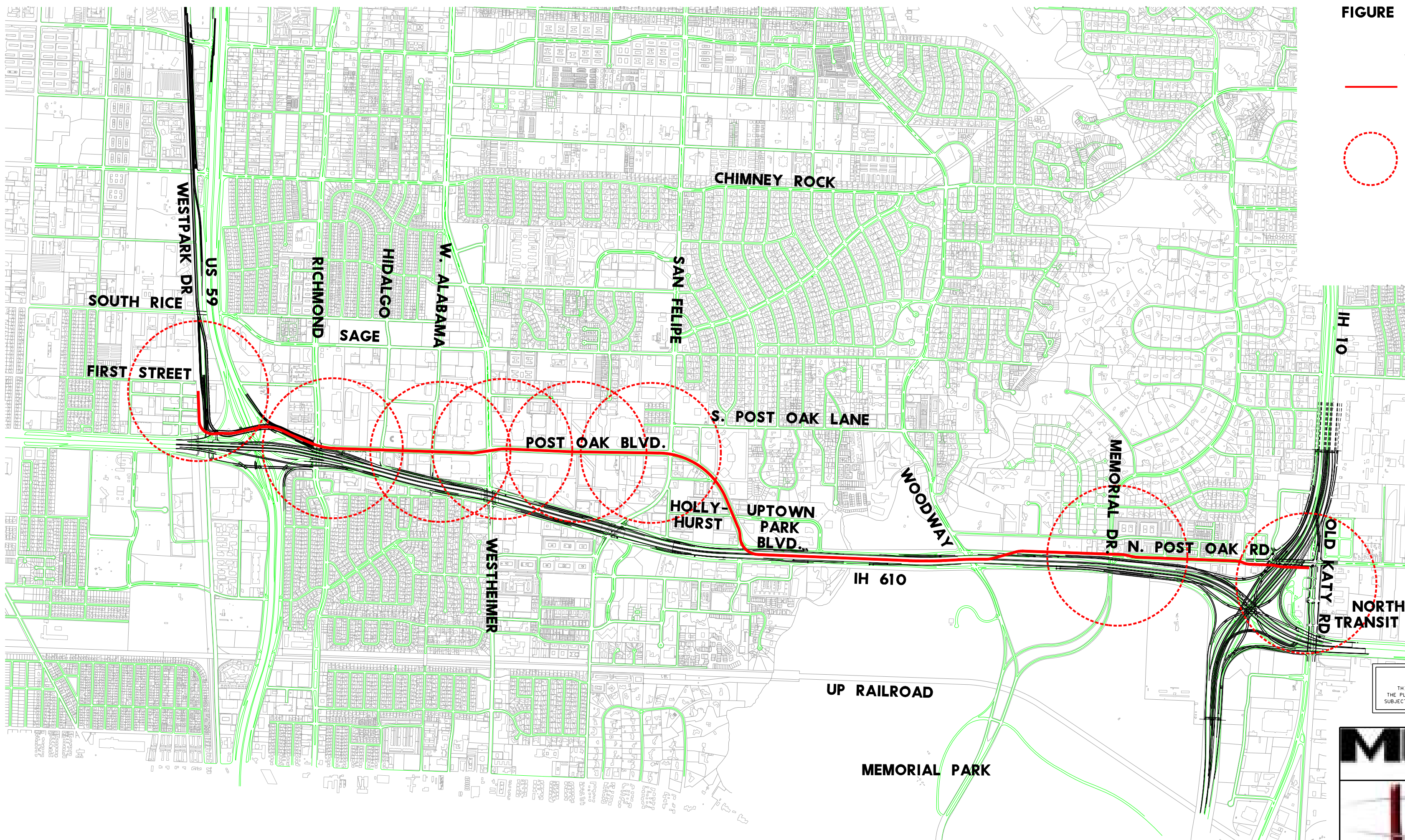


FIGURE 4.5

LEGEND

ALTERNATIVE 2

PROPOSED STATION VICINITIES-1/4 MILE RADIUS

PRELIMINARY

THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE #2
STATION VICINITY

DMJM HARRIS

02/03/2004 10:30:37 AM
t:\64\12015-001*uptown\exhibits\musv4*5.dgn

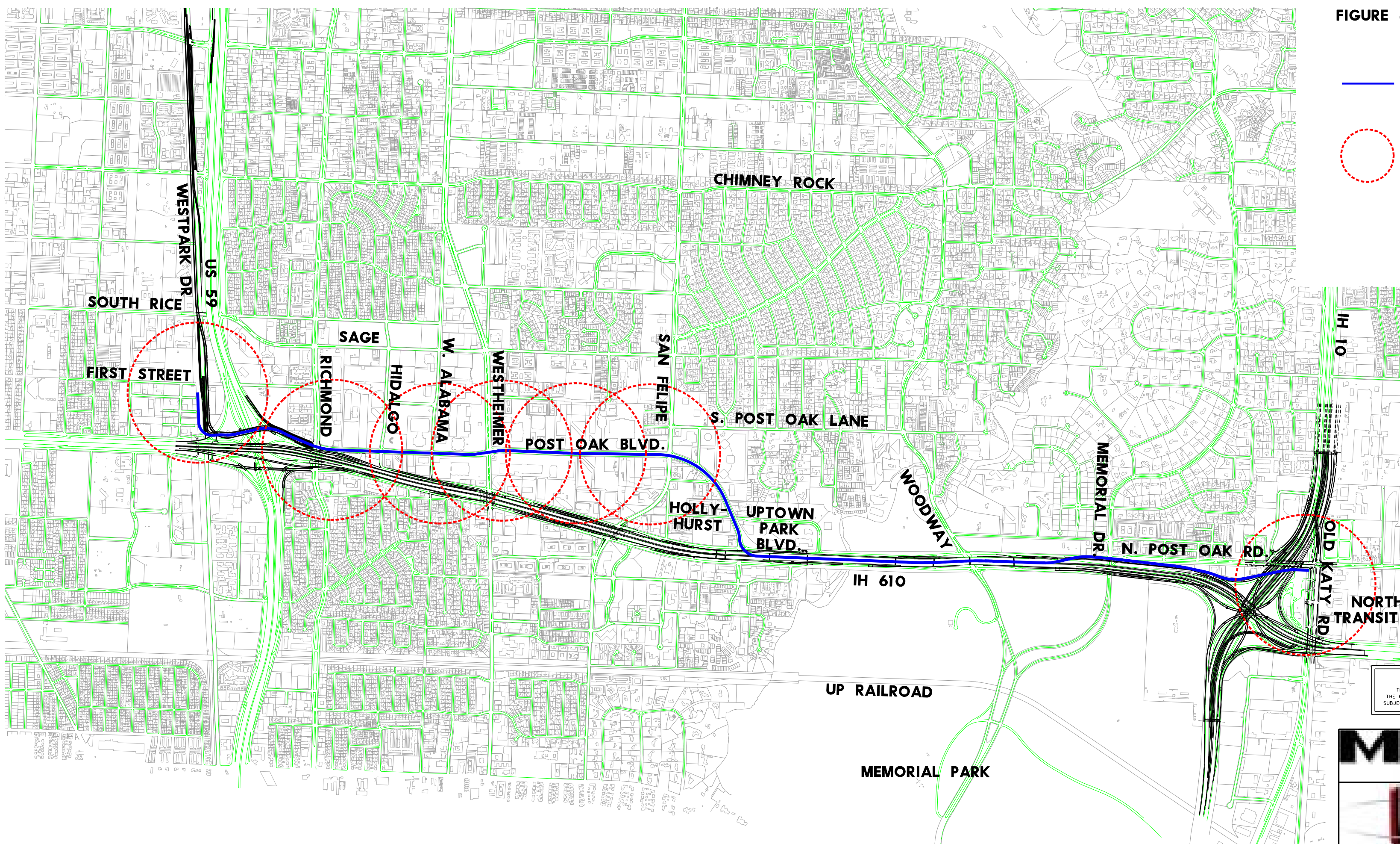
bynumr

FIGURE 4.6

LEGEND

ALTERNATIVE 2A

PROPOSED STATION VICINITIES-1/4 MILE RADIUS



PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.

METRO Solutions

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

UPTOWN - WEST LOOP
ALTERNATIVE #2A
STATION VICINITY

DMJM HARRIS

02/03/2004 10:33:18 AM
t:\64\12015-001*uptown\exhibits\musv4*6.dgn

bynumr

t:\64\12015-001*uptown\exhibits\musv4*6.dgn

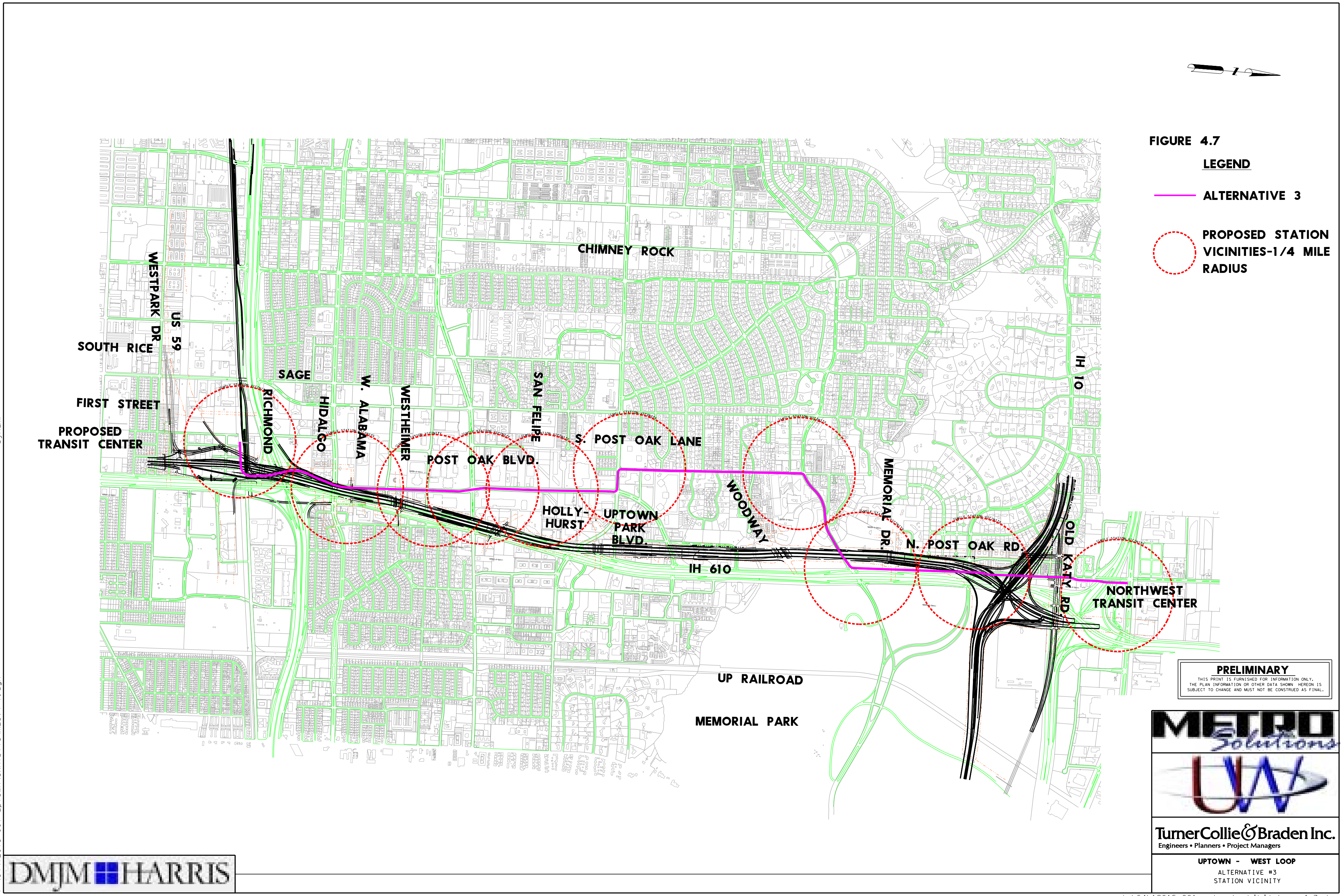


FIGURE 4.7
LEGEND
ALTERNATIVE 3
PROPOSED STATION VICINITIES-1/4 MILE RADIUS
CHIMNEY ROCK
WESTPARK DR
US 59
SOUTH RICE
SAGE
FIRST STREET
PROPOSED TRANSIT CENTER
RICHMOND
HIDALGO
W. ALABAMA
WESTHEIMER
POST OAK BLVD.
SAN FELIPE
S. POST OAK LANE
HOLLY-HURST
UPTOWN PARK BLVD.
WOODWAY
MEMORIAL DR.
N. POST OAK RD
IH 10
OLD KATY RD
NORTHWEST TRANSIT CENTER
IH 610
UP RAILROAD
MEMORIAL PARK
PRELIMINARY
THIS PRINT IS FURNISHED FOR INFORMATION ONLY. THE PLAN INFORMATION OR OTHER DATA SHOWN HEREON IS SUBJECT TO CHANGE AND MUST NOT BE CONSTRUED AS FINAL.
METRO Solutions
TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers
UPTOWN - WEST LOOP
ALTERNATIVE #3
STATION VICINITY
DMJM HARRIS
02/03/2004 10:35:49 AM
t:\64\12015-001*uptown\exhibits\musv4*7.dgn
bynumr

A station in the vicinity of Post Oak Blvd. and Uptown Park could be possible for each alternative based on current information and geometric parameters. The station location for Alternative 1 would be alongside the IH-610W southbound frontage road close to the shopping center as it approaches Post Oak Blvd. Alternative 2 and 2A could potentially accommodate the additional stop along tangent just south of the Post Oak Blvd./Uptown Park intersection in the center of Post Oak Blvd., as they emerge from the preserved portal in the TxDOT reconstruction of IH-610W. Additional ROW is required for both options and the engineering appears feasible, but future extension of the station is not possible due to the inadequate tangent length.

Fare Collection

An off-board fare collection system would be implemented to facilitate boarding and reduce running and dwell times.

Facility Requirements

A maintenance facility was included as part of each conceptual alignment. However, as the subsequent study phases continue, the inclusion of such a facility will be reexamined due to the construction and timing of other proposed corridors and required maintenance facilities. The maintenance facility could be temporary until the Uptown-West Loop is connected to other lines at which time a permanent facility could be built elsewhere or the facility at the south end of the Downtown to Dome line could be used.

The ROW and facility requirements for a maintenance facility were calculated based on the number of vehicles. Approximately 13 acres would be required to provide inspection, cleaning services and light maintenance to the vehicle fleet. This would include a vehicle storage yard, car wash, a maintenance building with an overhead crane, maintenance equipment, parts area, car jacks, and possibly a turntable for the LRT vehicles. The size of the maintenance building would be approximately 100' x 200'. Other on-site facilities would include offices, locker rooms, parking, outdoor storage areas and detention pond(s). The 13 acres included allowance for a less than efficient shape of available land.

A proposed transit center was recommended at the southern terminus of the project alternatives and should operate at the same size and parking capacity as the NWTC. Appropriate facilities and amenities common for efficient operation of METRO transit centers including bus bays, canopies, and transfer were assumed to be part of the transit center.

Traffic Coordination and Signal Priority

The BRT/LRT system would be integrated with intersection signal controls for a fully coordinated operation. This would minimize the impact to intersection traffic by using the traffic signal progression system and operating the transit vehicle within the designed traffic signal green band. The transit vehicle would proceed through the intersection with the vehicular traffic during the through-green phase, thus maintaining a coordinated traffic signal operation. Furthermore, the signal systems will maintain their full integration into the Regional Computerized Traffic Signal System (RCTSS). The proposed method for controlling the traffic signals and providing priority to transit vehicles for the existing LRT line along Fannin and Main is called predictive priority. Predictive priority uses the existing RCTSS system to allow communication between the transit vehicle and approaching intersections. The traffic signal then accounts for the approaching vehicle while still maintaining the existing vehicular progression, thus avoiding additional delay as a result of the transit vehicle. A similar system could be used in the Uptown-West Loop Corridor to avoid additional delays in this area.

Bus Operations – Conceptual Framework

Common to all Build Alternatives presented in this report, a conceptual operations framework necessary to support and augment the alternatives under consideration was developed. It was important to establish this framework within the confines of METRO’s commuter bus program, which has been highly successful in attracting loyal ridership while maintaining a consistent and positive image. Principles within this framework were followed in recommending system changes and expansions necessary for the successful integration of each alternative.

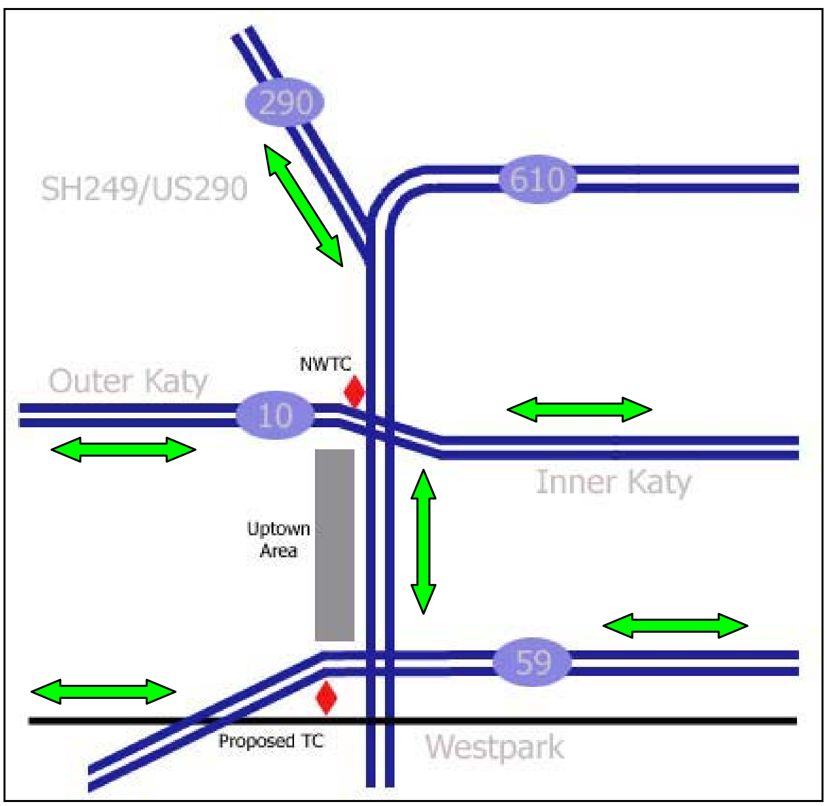
It was anticipated that a variety of service patterns would be offered (see Chapter 2 of this report for detailed descriptions of Build Alternatives and corresponding bus and circulator service recommendations - route graphics are provided in Technical Report A). Local service would be provided by existing bus routes. These services would be augmented and integrated with potential circulator system routes that would connect the Build Alternative major activity and residential centers.

As part of this framework, recommendations were made for expanding existing peak express operations at selected park & ride facilities with significant demand for study area destinations. The recommendations documented under Service Modifications, conformed to the definition of BRT and suggested the integration of BRT vehicles within the HOV guideway and accessing the Uptown-West Loop transitway via Transit Centers at the northern and southern ends of the corridor. This option allowed for enhanced/improved service to the study area as an interim improvement prior to implementation of a system plan. The recommendations for expanded and augmented service were not reflected as a component in the capital cost analysis. Changes in operations and maintenance costs associated with modifications to existing bus service or augmented service were not included. This information will be provided once the regional demand for service is determined.

4.1.4 System Connectivity

The Uptown-West Loop study area is a key component of the existing and future regional travel network. The existing NWTC would provide convenient connections to potential east, west and northwest lines while a proposed transit center at the southern portion of the study area would provide a key access point for south and southwest lines**.**

FIGURE 4.8
SYSTEM CONNECTIVITY



Regional connectivity was an important need expressed by the community. For this reason, improved system connectivity was identified as a major goal of the Uptown-

West Loop Planning Study and METRO Mobility 2025. As part of the system plan assembly, each alignment proposed for this corridor, as well as the other AHCT corridors, was evaluated based on improved access to existing and proposed transit services, transit centers, and park & ride facilities. This connectivity would improve the opportunity for transit patrons to transfer and access more service types and geographic locations in the service area.

4.2 Roadway Impacts

This section documents the potential impacts to roadways by the conceptual alternatives under consideration. Detailed roadway impacts are described in the following sections.

4.2.1 Existing Travel Patterns

Existing travel patterns through the Uptown-West Loop study area are primarily controlled by the major freeways that border the area to the east, north and south, meaning that origins and destinations are dependent on IH-610W, IH-10, and U.S. 59, respectively. Motorists traveling Memorial, Woodway Dr., Post Oak Blvd., San Felipe St., and Westheimer Rd. experience increased traffic and delay as they approach the IH-610W freeway. Delays on IH-610W and on north/south streets such as Post Oak Blvd. cause motorists to begin looking for alternative routes. This creates excessive burden on the surrounding surface streets in the Uptown-West Loop study area.

Motorists north and west of the study area utilize both the IH-10 and U.S. 290 HOV lanes respectively to access the NWTC.

4.2.2 Future Travel Patterns

Travel patterns in the Uptown-West Loop study area will be significantly changed in the near future as a result of proposed roadway and freeway improvements being planned by other agencies. The proposed roadway improvement are described in the following sections.

Arterial and Highway Improvements

IH-610W - The IH-610W improvements from U.S. 59 to IH-10 have been divided into design and construction segments by TxDOT as follows:

- Segment 1 – The U.S. 59 / IH-610W interchange

- Segment 2 – from the U.S. 59 interchange to Post Oak Blvd.
- Segment 3 – from Post Oak Blvd. to IH-10

The total improvement project is scheduled to be completed by 2010. The IH-610W improvement project will provide a wide variety of improvements to the transportation network in the Uptown-West Loop study area:

- At U.S. 59 and IH-610W there will be an increase in lanes from 16 to 24
- At the IH-610W and IH-10 there will be an increase in lanes from 15 to 20
- The West Loop frontage road will continue under U.S. 59, thus improving overall mobility in the area.
- There will be direct access to the Westpark Toll Road from Post Oak Blvd.
- The proposed direct connect ramps from Hidalgo and W. Alabama will provide direct access to heavily traveled corridors in the Uptown-West Loop study area. These direct connect ramps have been termed “hot link” ramps by the Uptown Houston District.

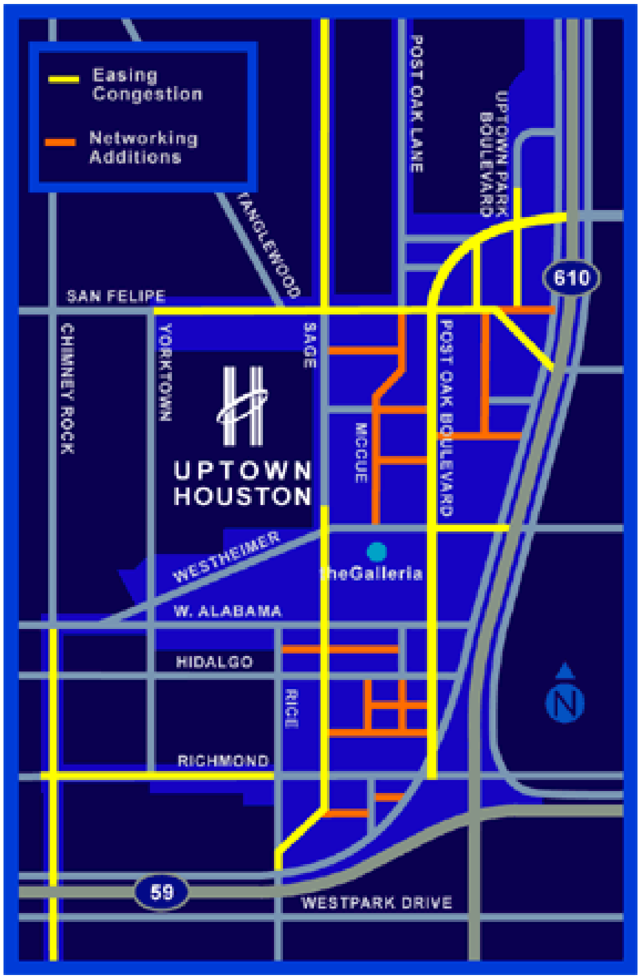
Each one of these improvements will have an effect on the travel patterns in the area. The hot link ramps will change traffic patterns, placing more emphasis on roadways that are currently underutilized such as Hidalgo and W. Alabama. This will help reduce traffic volumes on the other major thoroughfares such as San Felipe St. and Westheimer Rd., which in turn will minimize delays.

Westpark Toll Road. The direct access to the Westpark Toll Road from Post Oak Blvd. will cause an increase in through traffic volumes along Post Oak Blvd. but will help reduce left turning traffic at Post Oak Blvd. at San Felipe St. and Westheimer Rd. A reduction in the left turn movements can be attributed to an increase in motorists accessing the new Westpark Toll Road and a decrease in vehicles accessing IH-610W to use U.S. 59 in the afternoon peak period. By reducing the left turn volumes and increasing the through volumes, the level of service and delay at the intersections can be improved. Left turn movements at a signalized intersection can have an adverse affect on total intersection efficiency. The 2000 edition of the Highway Capacity Manual includes left turn factors which represent how interference from left turning traffic can reduce the saturation flow rate. The saturation flow rate as defined in the Highway Capacity Manual is a rate used to calculate the capacity of a signalized intersection.

Arterial Network Improvements

Other improvements in the area are listed below will help reduce left turn movements at all intersections along Post Oak Blvd., as well as provide alternative routes to help improve the distribution of traffic and change existing travel patterns. (See Figure 4.9)

FIGURE 4.9
ARTERIAL NETWORK IMPROVEMENTS PROPOSED BY UPTOWN HOUSTON DISTRICT



Source: Uptown Houston District – TIRZ #16

- McCue Rd. – The proposed improvement of McCue Rd. includes the extension of the existing two-lane roadway from Ambassador Way to San Felipe St. This proposed improvement will provide a parallel alternate route for vehicular traffic from Woodway Dr. to Westheimer Rd. The opening of McCue Rd. will help alleviate some of the congestion on Post Oak Blvd. by producing a reduction in left turns off of Post Oak Blvd. onto Westheimer Rd.
- Hallmark and Hollyhurst – Hallmark is an east/west roadway that connects the southbound frontage road of IH-610W to San Felipe St. Hollyhurst is a north/south roadway that connects at the intersection of Uptown Park Blvd. and Post Oak Blvd. and continues south to Hallmark. The combined improvements of Hallmark and Hollyhurst will help provide alternative routes

for traffic in the area, which will relieve congestion throughout the Uptown-West Loop study area.

- Ambassador Way and Guilford – Both Ambassador Way and Guilford are east/west corridors that connect McCue Rd. with Post Oak Blvd. The combined improvements of the McCue extension, Ambassador Way and Guilford will help provide alternative routes for traffic in the area, which will provide relief to the existing major thoroughfares in the area.

4.2.3 Roadway and Intersection Analysis

The purpose of this section is to outline the net effects to the roadway system as the result of the potential implementation of a BRT/LRT system in the Uptown/West Loop area.

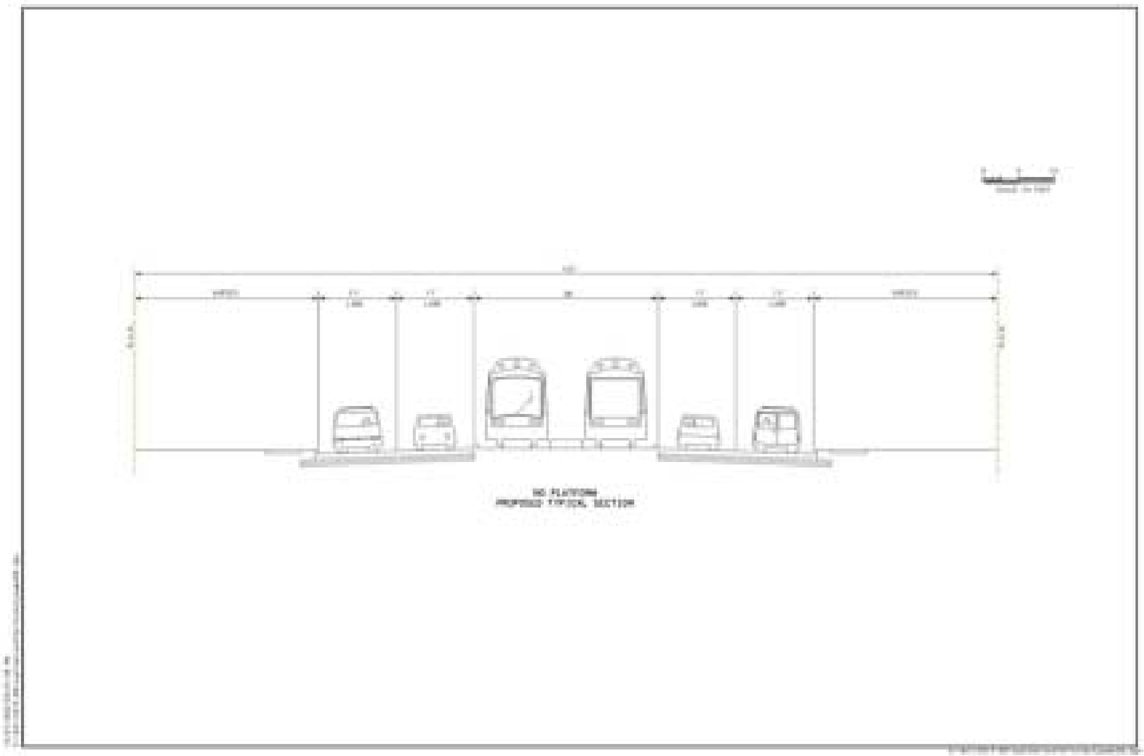
The impact to the intersection delay and level of service (LOS) as a result of an BRT/LRT transit system will be minimal, provided the operation of the transit system would not require any lane reductions from the existing conditions and the proposed improvements to the highway and arterial system are put in place. The results of the LOS and delay from the traffic analysis can be found in Section 4.2.4 of this report.

Operationally, the BRT/LRT system would be integrated with the intersection signal controls for a fully coordinated operation. This would minimize the impact to the intersection traffic by using the traffic signal progression system and operating the transit vehicle within the designed traffic signal green band. The transit vehicle would proceed through the intersection with the vehicular traffic during the through-green phase, thus maintaining a coordinated traffic signal operation. Furthermore, the signal systems would maintain their full integration into the Regional Computerized Traffic Signal System (RCTSS). The proposed method for controlling the traffic signals and providing priority to transit vehicles for the METRO LRT line along Fannin and Main is called predictive priority. Predictive priority uses the existing RCTSS system to allow communication between the transit vehicle and approaching intersections. The traffic signal then accounts for the approaching vehicle while still maintaining vehicular progression, thus avoiding additional delay as a result of the transit vehicle. Predictive priority should be used in the Uptown-West Loop Corridor to avoid additional delay in this area.

N. Post Oak Rd.

The impacts to N. Post Oak Rd. apply only to Alternative 1, Alternative 2, and Alternative 3. Alternative 2A is an aerial alternative that does not impact traffic in the northern section of the study area. Figure 4.10 shows a typical section of the integration of transit along N. Post Oak Rd.

FIGURE 4.10
TYPICAL SECTION – N. POST OAK RD.



N. Post Oak Rd. at Old Katy Rd.

The proposed transit system would cross Old Katy Rd. at N. Post Oak Rd. approximately 20’ east of the intersection. Gates will be required for eastbound and westbound vehicles on Old Katy Rd. All other system controls can be provided by the intersection traffic signal.

The transit crossing of the intersection of N. Post Oak Rd. at Old Katy Rd. would be required if the preferred alternative is LRT. The purpose of this crossing would provide access to a proposed storage area for additional LRT vehicles near the NWTC prior to peak hour use. There would be occasional crossings at this intersection, and preemption would not be required.

In the long term, a transit crossing at this location for either BRT/LRT would be more frequently used provided any future northwest line along U.S. 290 becomes operational. The use of predictive priority, which allows the traffic signal to account for an approaching BRT/LRT vehicle, while maintaining roadway progression would be instrumental in preventing vehicular delays at the intersection in the future.

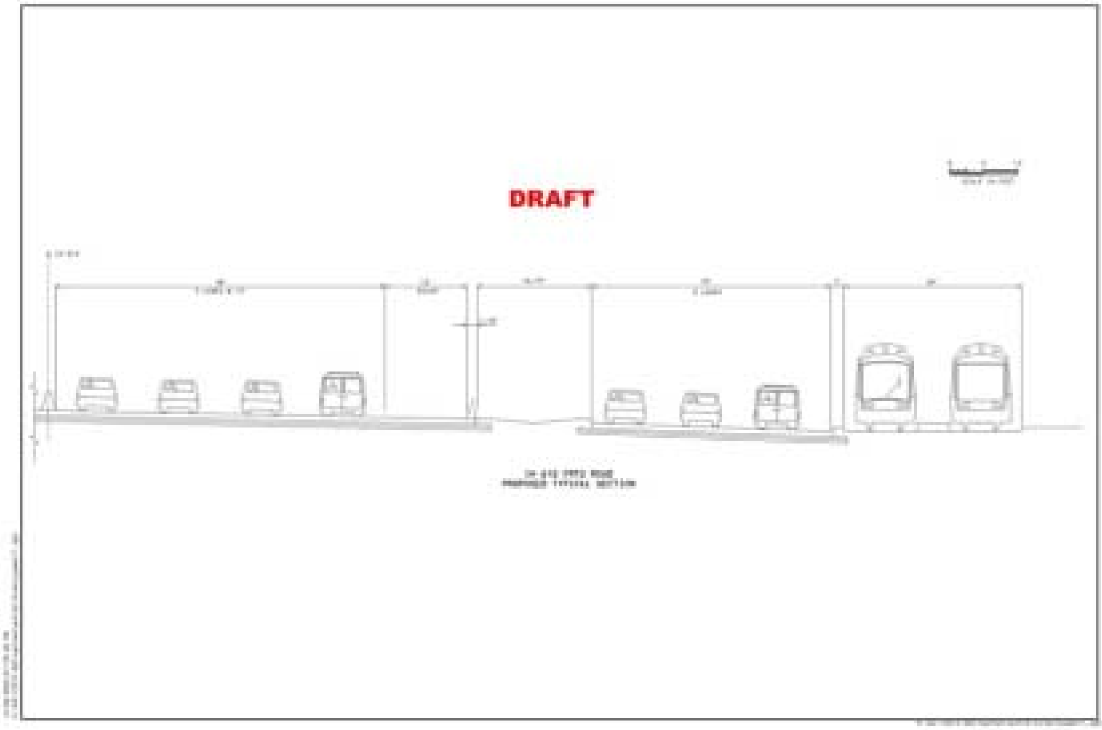
Mid-Block Crossings and Median Openings
A mid-block crossing is proposed approximately 250’ from the IH-10 overpass structure, which is south of the Forum building driveway. The purpose of this crossing is to move the alignment from the east side to the median of N. Post Oak Rd. A gate is proposed at this location for safety and to help preserve the transit corridor from vehicular obstruction particularly if the vehicular queue exceeds 250’ from the signalized intersection of N. Post Oak Rd. and IH-10 frontage. The impact to the through traffic on N. Post Oak Rd. would be minimal due to the short duration of the transit vehicle crossing.

There is the potential that all median openings along N. Post Oak Rd. from the IH-10 crossover south to Memorial Dr. will have to be closed to control vehicular crossing of the transit corridor. The intersection of Lafonte and N. Post Oak Rd. would be recommended for a traffic signal which would provide control and allow one median opening between IH-10 and Memorial to remain open. Lafonte would be the optimal location for a traffic signal due to the spacing of this intersection between IH-10 and Memorial Dr.

A mid-block crossing for the transit vehicle is proposed approximately 150’ from Memorial Dr. The purpose of this crossing would be to move the alignment from the median of N. Post Oak Rd. to the west side of the roadway. Gates will be required for the southbound traffic at this crossing location. The impact to the through traffic would be minimal due to the short duration of the lane closure as the transit vehicle proceeds though the intersection.

IH-610W Frontage Road
The impacts to the IH-610W Frontage Road apply only to Alternative 1, a small part of Alternative 2, and Alternative 3. Alternative 2 has an aerial component, which departs from the IH-610W Frontage Road south of Memorial Dr. Alternative 2A is an aerial alternative that does not impact traffic along the IH-610W southbound Frontage Road. Figure 4.11 shows a typical section of the integration of transit along IH-610W Frontage Road.

FIGURE 4.11
TYPICAL SECTION – IH-610W FRONTAGE ROAD



IH-610W Southbound Frontage at Memorial Dr.
The proposed transit system would cross the intersection of Memorial at IH-610W Southbound Frontage approximately 15’ west of the intersection. Gates would be required for the eastbound and westbound traffic on Memorial. All other system control could be provided by the intersection traffic signal.

IH-610W Southbound Frontage at Woodway Dr. Dr.
The proposed transit system would cross the intersection of Woodway Dr. at IH-610W Southbound Frontage approximately 20’ west of the intersection. Gates would be required for the eastbound and westbound traffic on Woodway Dr. as well as for the right turning traffic from the exclusive right turn lane on the southbound IH-610W frontage.

IH-610W Southbound Frontage at Uptown Park Blvd.
The proposed transit system would cross the intersection of Uptown Park Blvd. at IH-610W Southbound Frontage approximately 20’ west of the intersection. Gates are recommended for the eastbound and westbound traffic on Uptown Park Blvd. A traffic signal is recommended for this intersection to augment the gate system and provide safe intersection control thus assuring a clear transit corridor. The purpose

of the traffic signal would be ensure that no southbound right turning traffic onto Uptown Park Blvd. would cross the transit corridor while an oncoming transit vehicle is approaching. The traffic signal would also serve as a means for clearing the vehicular queue for the eastbound right turning traffic thus maintaining a clear transit corridor from vehicular obstruction. Existing access to and from Uptown Park Blvd would be maintained and there would be no expected adverse effects to traffic operations as a result of the traffic signal.

Uptown Park Shopping Center Access Driveway

The proposed transit system would cross the main driveway to Uptown Park Shopping Center approximately 20’ west of the intersection. Gates would be recommended for this private driveway location due to the high volume of turning movements into the shopping center.

Post Oak Blvd.

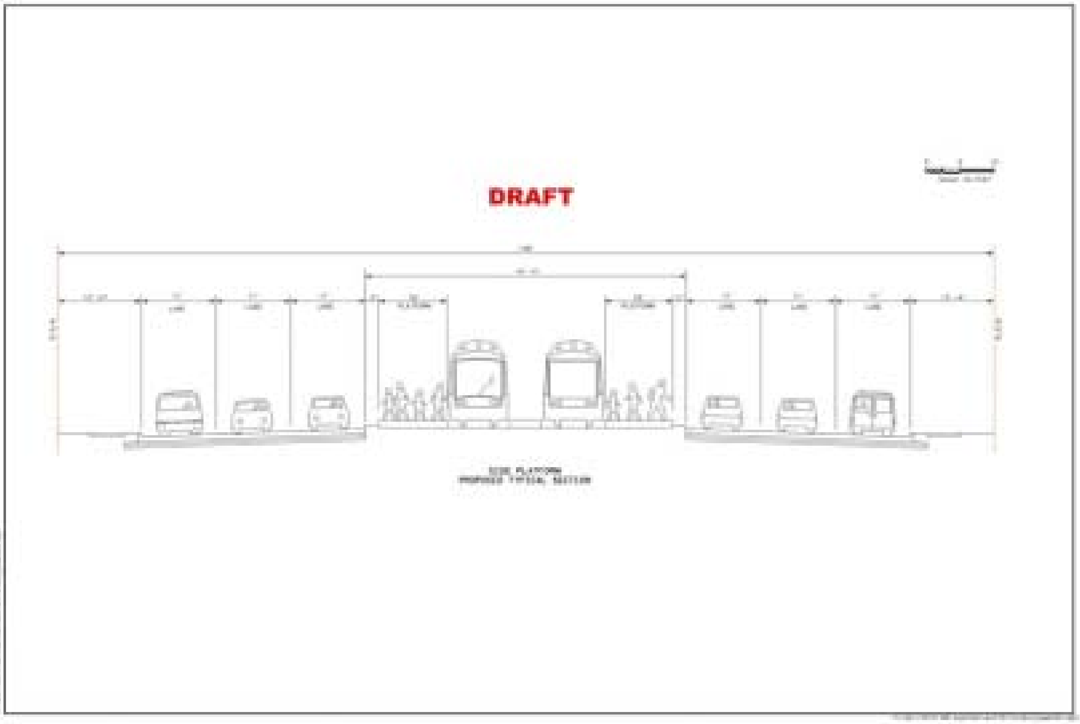
The impacts to Post Oak Blvd. apply to all of the alternatives. Alternatives1, 2, 2A and 3 each enter Post Oak Blvd. at different locations. Alternative 1 would cross into the median from the IH-610W Frontage Rd. where it intersects Post Oak Blvd. Alternative 2 and 2A utilize the proposed underground portal and would not be at-grade until past the intersection of Uptown Park Blvd. Alternative 3 would not enter Post Oak Blvd. at the San Felipe St. intersection. Figure 4.12 shows a typical section of the integration of transit along Post Oak Blvd.

The transit corridor would operate in the median of Post Oak Blvd. To minimize the impact to through traffic, Post Oak Blvd. ROW must be widened to 138’ to accommodate a two-way BRT or LRT operation, and three lanes of vehicular traffic in each direction. Any median openings that do not have traffic signal control must be closed to control traffic crossings of the transit corridor. These improvements are planned by the Uptown Houston District in order to accommodate future AHCT.

Post Oak Blvd. at Uptown Park Blvd.

The proposed alternatives would cross into the median of Post Oak Blvd. at the intersection of Uptown Park Blvd. and Post Oak Blvd. The existing traffic signal can provide all of the necessary control for the transit vehicle to safely cross into the median of Post Oak Blvd. This crossing applies to Alternative 1. Alternatives 2 and 2A would use the proposed underground portal, which ultimately returns to grade condition in the median of Post Oak Blvd. The Hollyhurst improvements proposed by the Uptown Houston District would help alleviate current poor LOS conditions at this intersection.

FIGURE 4.12
TYPICAL SECTION – POST OAK BLVD.



Post Oak Blvd. at San Felipe St.
In Alternatives 1, 2, and 2A, the alternatives cross the San Felipe St. intersection within the median of Post Oak Blvd. The addition of the transit corridor to Post Oak Blvd. would require a lane reduction due to limited ROW availability. This results in the removal of one left turn lane in each direction along Post Oak Blvd., thus reducing the turning lanes from two left turn lanes to one left turn lane. The exclusive right turn lane for the southbound traffic would also have to be removed as a result of the tight ROW constraints. Planned Arterial Network Improvements by the Uptown Houston District would help alleviate poor LOS conditions in the area of this intersection.

Post Oak Blvd. at Westheimer Rd.
To accommodate two-way transit service in the median of Post Oak Blvd., and due to the limited ROW that can be acquired, there is a reduction in lanes from a pair of left turn lanes to a single left turn lane in both the southbound and northbound directions. The exclusive right turn lane for the northbound and southbound traffic will also have to be removed as a result of the tight ROW constraints. The removal of these lanes, without the addition of some alternative route would produce an unacceptable decrease in the LOS and delay at the intersection. Improvements described in the Arterial Network Improvements, as described earlier in this chapter,

would provide relief for the intersection, so that motorists could use alternative routes that are made available. This will assist in dispersing traffic and diffuse turning movements. For the purpose of this analysis, it was assumed that the Arterial Network Improvements, as proposed by the Uptown Houston District, would reduce turning movements at the intersection of Westheimer Rd. and Post Oak Blvd by 50 percent.

Figures 4.13 and 4.14 illustrate the current and proposed layout of Post Oak Blvd. at Westheimer Rd. These graphics indicate that the carrying capacity of Post Oak Blvd. is maintained, thereby minimizing traffic impacts associated with the introduction of transit in the center median of Post Oak Blvd. The intersection of San Felipe St. and Post Oak Blvd. will receive similar treatment to accommodate two-way transit and maintain an acceptable LOS.

FIGURE 4.13
CURRENT INTERSECTION CONFIGURATION – WESTHEIMER RD. AT POST OAK BLVD.

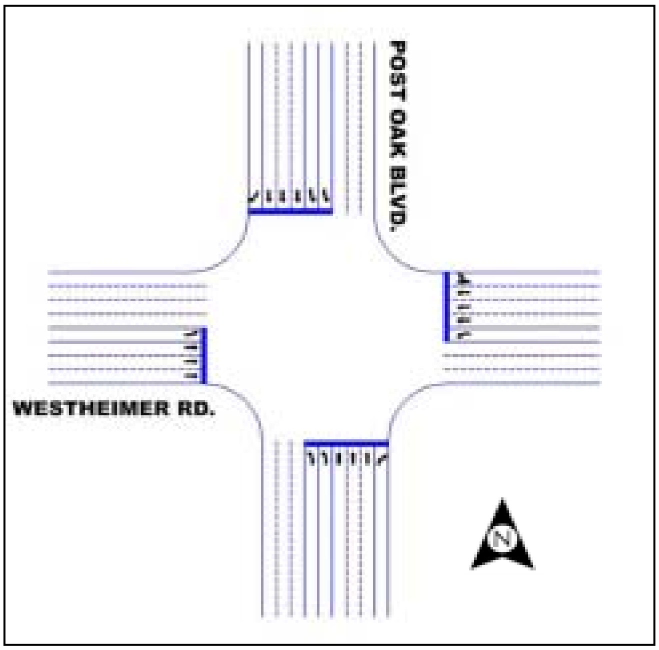
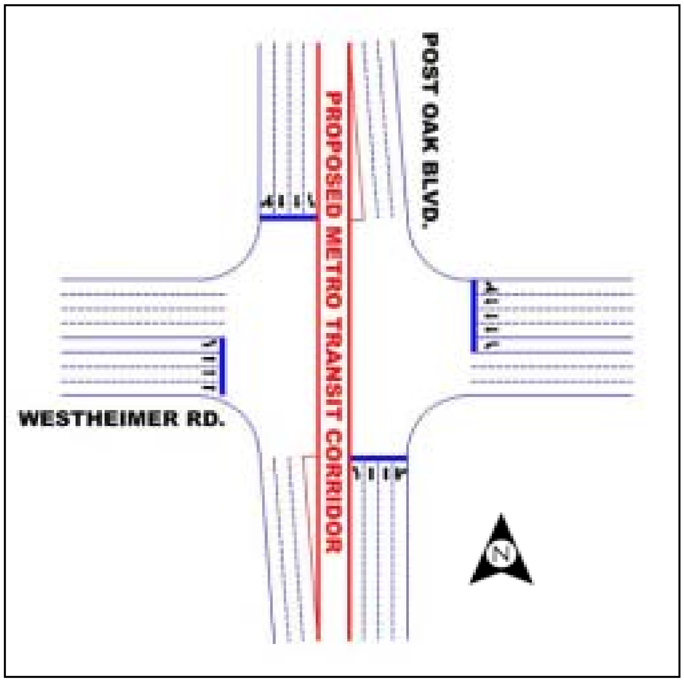


FIGURE 4.14
FUTURE INTERSECTION CONFIGURATION – WESTHEIMER RD. AT POST OAK BLVD.



Post Oak Blvd. at W. Alabama
The proposed transit corridor would traverse the W. Alabama intersection within the median of Post Oak Blvd. The existing traffic signal can provide all of the necessary control for the transit vehicle to safely cross through the intersection within the median. The proposed transit corridor would not affect the current or proposed lane configuration at the intersection. It was assumed that the traffic patterns at the intersection would change once the proposed Arterial Network Improvements, as proposed by the Uptown Houston District, are completed.

Post Oak Blvd. at Hidalgo
The proposed alternatives would cross the W. Alabama intersection within the median of Post Oak Blvd. The traffic signal can provide all of the necessary control for the transit vehicle to safely cross through the intersection within the median. The proposed transit corridor will not affect the current or proposed lane configuration at the intersection. It was assumed that the traffic patterns at the intersection would change once the proposed Arterial Network Improvements, as proposed by the Uptown Houston District, are completed.

Post Oak Blvd. at Richmond Ave.

The proposed transit would cross the Richmond Ave. intersection through the median of Post Oak Blvd. The traffic signal can provide all of the necessary control for the transit vehicle to safely cross along the median of Post Oak Blvd. The proposed transit corridor would not affect the current or proposed lane configuration at the intersection. The direct connection of Post Oak Blvd. to the Westpark Toll Road will cause the through traffic volumes on Post Oak Blvd. to increase by 30 percent at this intersection.

Westpark Dr. Crossing

Each alternative terminates along the Westpark transit corridor, south of Westpark Dr. at a proposed transit center. The crossing at Westpark is complex in that it crosses an HOV lane, the southbound frontage road and Westpark Dr. within a few hundred feet of each other. The HOV lane, frontage road and Westpark Dr. will each require gate controls to help preserve the transit corridor from vehicular obstruction. Transit vehicular speed will be slow through the area due to roadway curves, which provide a connection to the Westpark transit corridor. Average speed of transit vehicle the area would be approximately 15mph. Some increase in vehicular delay at this intersection will occur as a result of the crossings and transit operating speed. The proposed traffic signal at the southbound frontage road and Westpark Dr. could assist in providing control for this complex crossing location. The delay and LOS for this intersection are not listed in this report since traffic volumes and traffic patterns are unknown due to current construction for the Westpark Toll Road in the area.

Woodway Dr.

The impacts to Woodway Dr. only apply to Alternative 3, which departs west from the IH-610W southbound frontage road alignment at Woodway Dr. For Alternative 3 transit alignment to be constructed, significant ROW will have to be purchased to provide enough room for the transit corridor while maintaining the existing lane configuration, or a lane will have to be taken in each direction. The ROW along Woodway Dr. is very confined due to several existing commercial high-rise structures, which were built at or near the existing ROW line. For this reason, it is not deemed feasible to purchase additional ROW along Woodway Dr., thus the analysis performed shows the impacts of removing one lane in each direction on Woodway Dr.

Woodway Dr. at IH-610W Southbound Frontage Road

The proposed transit corridor would cross the westbound lanes of Woodway Dr. and proceeds along the median. The crossing is close enough to the traffic signal that no gates would be required for additional traffic control. A warning system with flashing signs would be required for the right turning traffic off of the southbound frontage road to ensure safe flow through the intersection. As a result of the confined ROW, it is necessary to remove a lane in each direction along Woodway Dr., which has a significant effect on the intersection LOS and traffic delay. For this reason, Alignment 3 is not a preferred alignment segment from a traffic engineering standpoint due to the excessive adverse traffic conditions it causes.

Woodway Dr. at S. Post Oak Ln.
The proposed transit corridor turns from Woodway Dr. onto S. Post Oak Ln. through the signalized intersection. The traffic signal can provide all of the necessary control for the transit vehicle to safely cross from the middle of Woodway Dr. into the middle of S. Post Oak Ln. The impacts to the intersection are significant due to ROW constraints in the area and the heavy traffic on Woodway Dr. The transit corridor will reduce the lanes on Woodway Dr. from two through lanes and a dual left turn lane to one through with one left turn lane. The impacts to S. Post Oak Ln. would also be significant due to the removal of one lane in each direction as a result of the similar ROW constraints along S. Post Oak Ln.

S. Post Oak Ln.
The impacts to S. Post Oak Ln. apply to Alternative 3. For the Alternative 3 transit alignment to be constructed, significant ROW will have to be purchased to provide room for the alternative while maintaining the existing lane configuration, or a lane will have to be taken in each direction. The ROW along S. Post Oak Ln. is confined due to several existing residential developments built along both sides of S. Post Oak Ln. For this reason, it is not deemed feasible to purchase additional ROW along S. Post Oak Ln., thus the analysis performed shows the impacts of taking one lane in each direction.

S. Post Oak Ln. at West Oak
The proposed transit corridor would proceed in the middle of S. Post Oak Ln. through the intersection at West Oak. Due to ROW constraints, a lane must be taken in each direction to accommodate the proposed transportation corridor. The traffic signal can provide all of the necessary control for the transit vehicle to safely cross through the intersection of West Oak at S. Post Oak Ln.

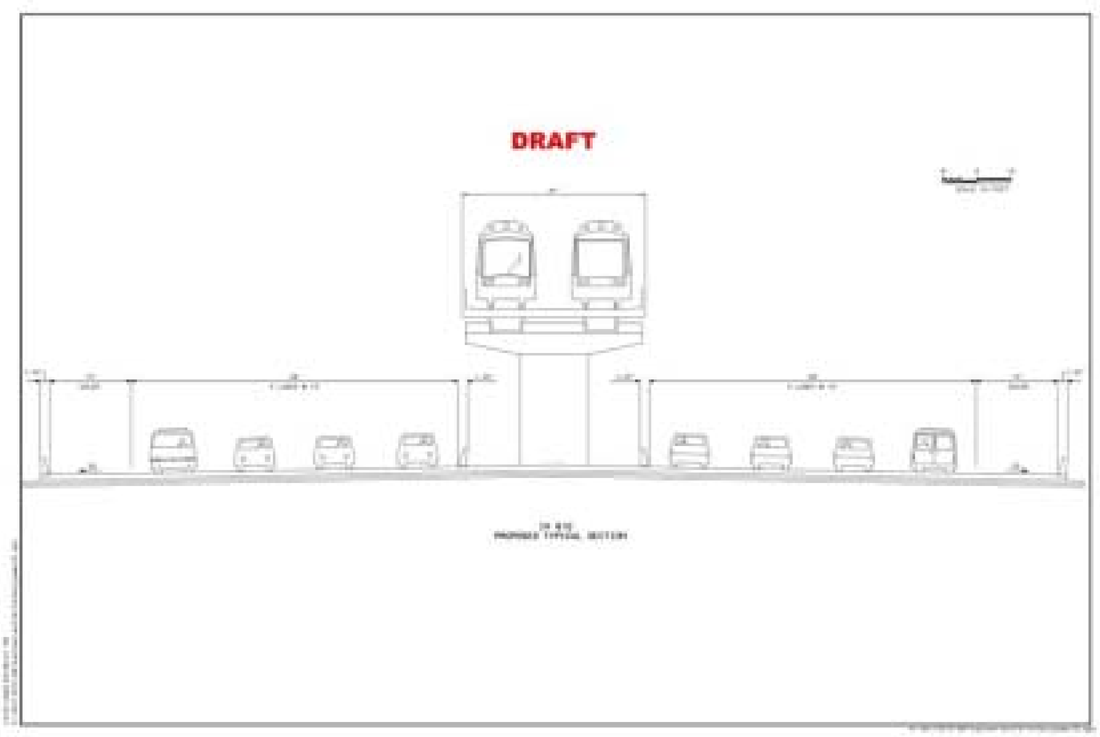
S. Post Oak Ln. at San Felipe St.
The proposed transit corridor would turn from S. Post Oak Ln. onto San Felipe St. through the signalized intersection. The traffic signal can provide all of the necessary control for the transit vehicle to safely cross from the middle of S. Post Oak Ln. into the middle of San Felipe St. The impacts to the intersection would be

significant due to the ROW constraints in the area and heavy traffic on San Felipe St. The alternative would reduce the lane configuration on S. Post Oak Ln. from a dual left turn lane, one through lane, and one right turn lane to one left turn lane with one shared through right turn lane. The impacts to San Felipe St. would include the reduction of one lane in each direction between Post Oak Blvd and S. Post Oak Ln.

IH-610W

There would be no traffic impact associated with the introduction of AHCT into the IH-610W profile. The segments of Alternatives 2 and 2A that use the TxDOT facility are elevated on an exclusive guideway above the mainlanes of the freeway. Figure 4.15 shows a typical section of the integration of transit within IH-610W. It should be noted that in the current design for IH-610W TxDOT improvements, insufficient ROW exists for accommodating an at-grade alignment within the median of the facility.

FIGURE 4.15
TYPICAL SECTION – IH-610W



4.2.4 Level of Service

The intersection analysis to determine the LOS and delay was performed using Synchro 5.0, which uses the methods outlined in the 2000 edition of the Highway Capacity Manual. In the analysis, a comparison is made between the existing 2002 condition, the No Build 2025 condition and the 2025 build condition, which includes system improvements.

The existing condition analysis was performed using turning movement counts, which were performed in the summer of 2002. Turning movement counts are provided in the intersection analysis in Technical Report F.

The 2025 No Build analysis was performed based on an assumed annual growth rate of 1 percent over 23-years, which is comparable to the previous growth rate experienced on several roadways in the area over the last 14 years. Adjustments were made to the projected traffic volumes to account for the increase in traffic that will occur on Post Oak Blvd. as a result of the Westpark Toll Road. Adjustments were also made to the projected traffic volumes to account for the increase in traffic that is anticipated as a result of the direct ramp access proposed along Hidalgo and Alabama.

By comparing the 1988 volumes from the Uptown Houston Area Traffic Engineering Study to the traffic counts performed in 2002, there is an approximate annual growth rate of 0.5 percent to 1.5 percent throughout the study area over the last 14 years. For this reason, a 1 percent annual growth rate has been assumed to determine the projected 2025 traffic volumes.

The 2025 build condition analysis with system improvements was performed based on the same growth rates and volume adjustment assumptions as the 2025 No Build condition. System improvements were factored in to address the change in travel patterns along Post Oak Blvd. that are anticipated as a result of the proposed roadway improvements. The system improvements were included in the Build condition to reiterate the importance of the proposed improvements and their relation to the proposed transit system. Descriptions of the system improvements that would provide improved traffic flow along Post Oak Blvd. are included in Section 4.2.2.

It was anticipated that the BRT/LRT system would assist in reducing traffic throughout the corridor due to the potential shift from automobiles to transit. The Level of Service analysis did not reflect this reduction in traffic volumes for the 2025 Build condition.

Outlined below are the results of the traffic analysis showing LOS and delay for the existing 2002, 2025 No Build, and 2025 build conditions. In most instances, the difference at most intersections between 2025 build and No Build conditions would be negligible. It was concluded that the increases in delay are attributable to increased growth in the Uptown-West Loop Corridor should an LPIS be carried forward to implementation, additional measures to help mitigate traffic would be explored.

N. Post Oak Rd. at Old Katy Road

Existing a.m. Peak	LOS:B	Delay:19.7 seconds
2025 No Build a.m. Peak	LOS:C	Delay:29.2 seconds
2025 Build a.m. Peak	LOS:C	Delay:29.2 seconds
Existing p.m. Peak	LOS:D	Delay:39.9 seconds
2025 No Build p.m. Peak	LOS:E	Delay:71.9 seconds
2025 Build p.m. Peak	LOS:E	Delay:71.9 seconds

There are no significant impacts anticipated at the intersection as a result of the introduction BRT or LRT service.

IH-610W Southbound Frontage at Memorial Dr.

Existing a.m. Peak	LOS:C	Delay:20.4 seconds
2025 No Build a.m. Peak	LOS:D	Delay:44.0 seconds
2025 Build a.m. Peak	LOS:D	Delay:44.0 seconds
Existing p.m. Peak	LOS:B	Delay:15.9 seconds
2025 No Build p.m. Peak	LOS:D	Delay:38.5 seconds
2025 Build p.m. Peak	LOS:D	Delay:38.5 seconds

There are no significant impacts anticipated at the intersection as a result of the introduction BRT or LRT service.

IH-610W Southbound Frontage at Woodway Dr.

Existing a.m. Peak	LOS:E	Delay:76.4 seconds
2025 No Build a.m. Peak	LOS:F	Delay:118.9 seconds
2025 Build a.m. Peak	LOS:F	Delay:118.9 seconds
Existing p.m. Peak	LOS:D	Delay:73.4 seconds
2025 No Build p.m. Peak	LOS:F	Delay:135.1 seconds
2025 Build p.m. Peak	LOS:F	Delay:135.1 seconds

There are no significant impacts anticipated at the intersection as a result of the introduction BRT or LRT service.

Post Oak Blvd. at Uptown Park Blvd.

Existing a.m. Peak	LOS:D	Delay:39.8 seconds
2025 No Build a.m. Peak	LOS:E	Delay:60.6 seconds
2025 Build a.m. Peak	LOS:E	Delay:60.6 seconds
Existing p.m. Peak	LOS:C	Delay:28.4 seconds

2025 No Build p.m. Peak	LOS:F	Delay:140.0 seconds
2025 Build p.m. Peak	LOS:F	Delay:140.0 seconds

There are no significant impacts anticipated at the intersection as a result of the introduction BRT or LRT service.

Post Oak Blvd. at San Felipe St.

Existing a.m. Peak	LOS:C	Delay:24.0 seconds
2025 No Build a.m. Peak	LOS:E	Delay:61.1 seconds
2025 Build a.m. Peak	LOS:E	Delay:69.3 seconds
Existing p.m. Peak	LOS:D	Delay:48.0 seconds
2025 No Build p.m. Peak	LOS:F	Delay:120.5 seconds
2025 Build p.m. Peak	LOS:F	Delay:153.7 seconds

Due to the loss of a left turn lane in each direction, the delay increases for both the a.m. and p.m. peak periods. This result is to be expected since both the northbound and southbound left turn movements are extremely heavy. The inclusion of arterial network improvements in the 2025 build condition, such as the parallel facility McCue Road, lessen the significance of the impact to the intersection as would have been realized without implementation.

Post Oak Blvd. at Westheimer Rd.

Existing a.m. Peak	LOS:C	Delay:31.3 seconds
2025 No Build a.m. Peak	LOS:F	Delay:112.8 seconds
2025 Build a.m. Peak	LOS:D	Delay:54.5 seconds
Existing p.m. Peak	LOS:D	Delay:45.5 seconds
2025 No Build p.m. Peak	LOS:F	Delay:96.5 seconds
2025 Build p.m. Peak	LOS:F	Delay:107.2 seconds

The proposed arterial network/system improvements help augment the effect of the left turn lane restriction at the intersection of Westheimer Rd. and Post Oak Blvd. The removal of one left turn in each direction and the removal of the southbound right turn lane causes a slight increase in the delay during the p.m. peak period. The increase in delay is minimal. The a.m. peak period would operate more efficiently as a result of the proposed system improvements, thus lane reductions and the introduction of the transit corridor do not adversely affect the intersection during the morning peak period.

Post Oak Blvd. at W. Alabama

Existing a.m. Peak	LOS:A	Delay:9.3 seconds
2025 No Build a.m. Peak	LOS:B	Delay:27.3 seconds
2025 Build a.m. Peak	LOS:B	Delay:27.3 seconds
Existing p.m. Peak	LOS:B	Delay:11.9 seconds

2025 No Build p.m. Peak	LOS:F	Delay:120.5 seconds
2025 Build p.m. Peak	LOS:F	Delay:120.5 seconds

There are no significant impacts anticipated at the intersection as a result of the introduction BRT or LRT service.

Post Oak Blvd. at Hidalgo

Existing a.m. Peak	LOS:A	Delay:11.5 seconds
2025 No Build a.m. Peak	LOS:B	Delay:17.8 seconds
2025 Build a.m. Peak	LOS:B	Delay:17.8 seconds
Existing p.m. Peak	LOS:B	Delay:12.8 seconds
2025 No Build p.m. Peak	LOS:C	Delay:34.0 seconds
2025 Build p.m. Peak	LOS:C	Delay:34.0 seconds

There are no significant impacts anticipated at the intersection as a result of the introduction BRT or LRT service.

Post Oak Blvd. at Richmond Ave.

Existing a.m. Peak	LOS:B	Delay:14.9 seconds
2025 No Build a.m. Peak	LOS:B	Delay:18.3 seconds
2025 Build a.m. Peak	LOS:B	Delay:18.3 seconds
Existing p.m. Peak	LOS:E	Delay:73.4 seconds
2025 No Build p.m. Peak	LOS:F	Delay:97.5 seconds
2025 Build p.m. Peak	LOS:F	Delay:97.5 seconds

There are no significant impacts anticipated at the intersection as a result of the introduction BRT or LRT service.

IH-610W Southbound Frontage Road at Woodway Dr. (Alternative 3 only)

Existing a.m. Peak	LOS:E	Delay:76.4 seconds
2025 No Build a.m. Peak	LOS:F	Delay:118.9 seconds
2025 Build a.m. Peak	LOS:F	Delay:192.1 seconds
Existing p.m. Peak	LOS:E	Delay:73.4 seconds
2025 No Build p.m. Peak	LOS:F	Delay:135.1 seconds
2025 Build p.m. Peak	LOS:F	Delay:160.3 seconds

The effect of taking one lane in each direction along Woodway Dr. has a negative impact on the intersection delay and LOS. This impact would cause a ripple effect throughout the Uptown-West Loop Planning Study area as motorists begin to look for alternative routes.

Woodway Dr. at S Post Oak Ln. (Alternative 3 only)

Existing a.m. Peak	LOS:C	Delay:31.5 seconds
2025 No Build a.m. Peak	LOS:D	Delay:35.8 seconds
2025 Build a.m. Peak	LOS:F	Delay:155.1 seconds

Existing p.m. Peak	LOS:D	Delay:37.6 seconds
2025 No Build p.m. Peak	LOS:F	Delay:224.0 seconds
2025 Build p.m. Peak	LOS:F	Delay:235.5 seconds

The effect of taking one lane in each direction along Woodway Dr. and taking one lane in each direction along S. Post Oak Ln. has a significant negative impact on the intersection delay and LOS. This impact would cause a ripple effect throughout the Uptown-West Loop Planning Study area as motorists begin to look for alternative routes.

S. Post Oak Ln. at West Oak (Alternative 3 only)

Existing a.m. Peak	LOS:A	Delay:1.0 seconds
2025 No Build a.m. Peak	LOS:A	Delay:1.9 seconds
2025 Build a.m. Peak	LOS:A	Delay:2.5 seconds
Existing p.m. Peak	LOS:A	Delay:1.1 seconds
2025 No Build p.m. Peak	LOS:A	Delay:1.2 seconds
2025 Build p.m. Peak	LOS:A	Delay:3.3 seconds

The LOS and delay are still within acceptable levels due to the fact that the cross street, West Oak, does not have a high volume of traffic during the a.m. and p.m. peak periods, thus sufficient green time can be allotted for the north/south traffic on S. Post Oak Ln. The effect of taking one lane in each direction along S. Post Oak Ln. would have a negative impact on the intersection delay and LOS.

S. Post Oak Ln. at San Felipe St. (Alternative 3 only)

Existing a.m. Peak	LOS:C	Delay:20.1 seconds
2025 No Build a.m. Peak	LOS:D	Delay:41.5 seconds
2025 Build a.m. Peak	LOS:F	Delay:131.2 seconds
Existing p.m. Peak	LOS:C	Delay:29.5 seconds
2025 No Build p.m. Peak	LOS:D	Delay:44.9 seconds
2025 Build p.m. Peak	LOS:F	Delay:170.4 seconds

The effect of taking one lane in each direction along San Felipe St. and S. Post Oak Ln. has a negative impact on the intersection delay and LOS. The impact would cause a ripple effect throughout the Uptown-West Loop Planning Study area as motorists begin to look for alternative routes.

4.2.5 Travel Times

Table 4.10 shows a comparison in travel times between the vehicular traffic and BRT/LRT from the NWTC to the proposed transit center in the southern part of the study area. The BRT/LRT travel times were calculated for Alternative 1, which is entirely at-grade, and provides a comparison to the vehicular traffic in the area.

Differences in average speed between the alternatives is not significant. Minor speeds gains are realized for Alternatives 2 and 2A due to their aerial elements. The selection of at-grade provides the most conservative estimate.

Information was not available for vehicular travel times from Richmond Ave. to the proposed transit center due to construction occurring in the area. Existing traffic volumes were not available at the time of this study due to construction and roadway closures in the area. Furthermore, traffic patterns will change dramatically once the construction of the depressed section under U.S. 59 is complete since it will provide continuous frontage along IH-610W.

Table 4.10
PM Peak Hour Travel Times

From/To	BRT/LRT Alternative 1	Vehicular SB	Vehicular NB
NWTC to Memorial Dr.	2.75 min	2.9 min	2.1 min
Memorial to Woodway Dr.	1.9 min	2.75 min	2.9 min
Woodway Dr. to San Felipe St.	4.6 min	4.25 min	4.4 min
San Felipe St. to Westheimer Rd.	1.5 min	1.6 min	2.5 min
Westheimer Rd. to Richmond Ave.	3.25 min	2.6 min	2.5 min
Richmond Ave. to Proposed Transit Center	2.9 min	N/A	N/A
Total (from NWTC to Richmond Ave.)	14.0 min	14.1 min	14.4 min

4.2.6 Safety

The proposed alternatives would integrate traffic and transit controls that are familiar to drivers and pedestrians in a typical auto/pedestrian environment. Traffic and transit management controls will be used to mitigate any potential conflicts between transit and general traffic and pedestrians. The proposed AHCT has an exclusive runningway and management controls will include the elimination of non-signalized turning movements and mid block crossings across the transitway. Other measures will require the use of safety crossing gates in locations where they are deemed necessary. Pedestrian movement and circulation will be controlled through signalized cross walks.

Potential impacts on emergency vehicles may result from changes in study area travel patterns and traffic volumes. If significant impacts occur as result of the project, and require additional capital facilities or staffing to maintain existing levels of service, these impacts would be identified and appropriate mitigating measures identified.

Accident information was gathered for some of the high volume intersections through the Uptown – West Loop study area for the year 2000 (most recent year analyzed). Of the intersections analyzed, only Woodway Dr. at IH-610W Frontage has persistent accident occurrences.

5.0 Development Potential

This chapter provides a qualitative assessment of the development potential along the conceptual alignments considered in the Uptown-West Loop Planning Study.

The purpose of this assessment was to identify parcels along the conceptual alignments that could be developed to different or higher uses and the effect transit would have on potential development within the study area. The analysis highlighted the differences among the alternatives in their ability to affect or induce existing and future development. The measure for development potential in this analysis examined vacant land and property currently being used as surface parking.

During this phase of study, the corridor’s development potential was identified. Relative to this development potential, the build alternatives and their respective alignments were evaluated based on their ability to provide transit services to areas with high development potential. This was measured through potential station area assignments and their proximity to developable parcels. Subsequent analysis will focus on the introduction of specific transit improvements and technologies within the corridor. At that time, the potential to attract additional public and private investment and the potential to induce development and redevelopment at higher densities was identified. However, general assumptions regarding transit investment, transportation and land use are introduced here.

Indicators for future growth in the Uptown-West Loop corridor are strong. The area's historic trends in population, employment, retail sales and building permits -- presented in Chapter 1, Purpose and Need -- provide a picture of sustained economic vitality. Forecasts of population and employment prepared by the Houston-Galveston area Council (H-GAC) for the year 2025, also described in Chapter 1 of this report, suggest that the Uptown-West Loop area will capture a healthy share of future regional economic growth, leading to increasing population and employment densities within the area. Furthermore, local plans and policies, described in Section 3.1.1 of this report, generally encourage and promote continued development of the area. Indicators suggest that the long-term outlook for development potential in the Uptown-West Loop corridor remains strong for the foreseeable future.

5.1 No Build Alternative

The No Build Alternative consists of committed, financially constrained construction projects, as identified in the FY 2002-04 TIP. For planning purposes, TIP projects are assumed to be programmed and in place for the No Build and Build Alternatives.

The No Build Alternative could potentially constrain economic growth in the corridor as traffic congestion worsens and the need for off-street parking facilities intensifies. New real estate development and redevelopment would no doubt continue to occur, but would likely suffer from a gradual but inevitable deterioration of access. The requirement for additional off-street surface and structured parking facilities could have the effect of displacing developable land, reducing the amount of building space that could be devoted to office, retail, residential, or open space, and diminishing the quality of life in the corridor.

5.2 Build Alternatives

The Build Alternatives offer superior possibilities for stimulating new development when compared to the No Build Alternative, and as a consequence could generate higher tax revenues. Transit-supportive land use patterns -- dense concentrations of housing, jobs, and other destinations around proposed station sites -- appear to be present within the corridor. With the right planning tools and incentives, and a strong real estate market, transit systems -- stronger evidence exists with light rail systems -- could encourage dense development around station sites, which offer high levels of accessibility and transportation choice.

The assessment of the Build Alternatives also considered local plans including the Uptown Houston District's vision document that examined future development patterns for the area.

Increased transit access spurs economic development around transit stations. It is generally assumed that the benefits accrue to an area defined by a quarter-mile radius (1,320 feet) around the stations, the distance considered to represent a reasonable (maximum) distance a transit-user would be willing to walk to and from a station.

The Uptown-West Loop Corridor has a considerable amount of undeveloped land currently used for surface parking lots that could be converted to residential or commercial uses. The amount of vacant and surface parking properties within a quarter-mile radius around each of the proposed transit stations is shown in the following table. (Note that since many station vicinities overlap, the acreage for all station locations cannot be summed to yield total acreage by alternative.) Other properties occupied by older, non-historic buildings could conceivably be regarded as available for redevelopment but were not included; inclusion of these parcels would increase the estimate of "developable land" (see Table 5.1 below).

This section analyzed station assignments detailed in Chapter 2 of this report and incorporated two other potential locations where future stations could be included at such time that development warrants, contingent upon engineering constraints. The addition of these two stations, denoted with asterisks in Table 5.1, constitutes a future scenario where development may include the conversion of low-density uses to higher density development and an increase in the demand for transit. A comparative breakdown of land use by proposed transit station is provided in Figure 5.1 and Figure 5.2. Corresponding land use was based on visual updates to the City of Houston Geographic Information Database (COHGIS) Release 8 (see Figure 1.4).

Table 5.1
Acres of Developable Land within Quarter-Mile of Transit Stations

Station	Conceptual Alignment	Approximate Acres of Potentially Developable Land
1	1, 2, 2A, and 3	12
2*	1, 2, and 3	14
3	1, 2, and 3	10
4	1 and 3	1
5*	1, 2 and 2A	29
6	1, 2, 2A, and 3	20
7	1, 2, 2A, and 3	23
8	1, 2, 2A, and 3	28
9	1, 2, 2A, and 3	19
10	1, 2, 2A, and 3	38
11	1, 2, 2A, and 3	32
12	3	12
13	3	20

*Potential future station location

FIGURE 5.1
PROPOSED STATION LOCATIONS

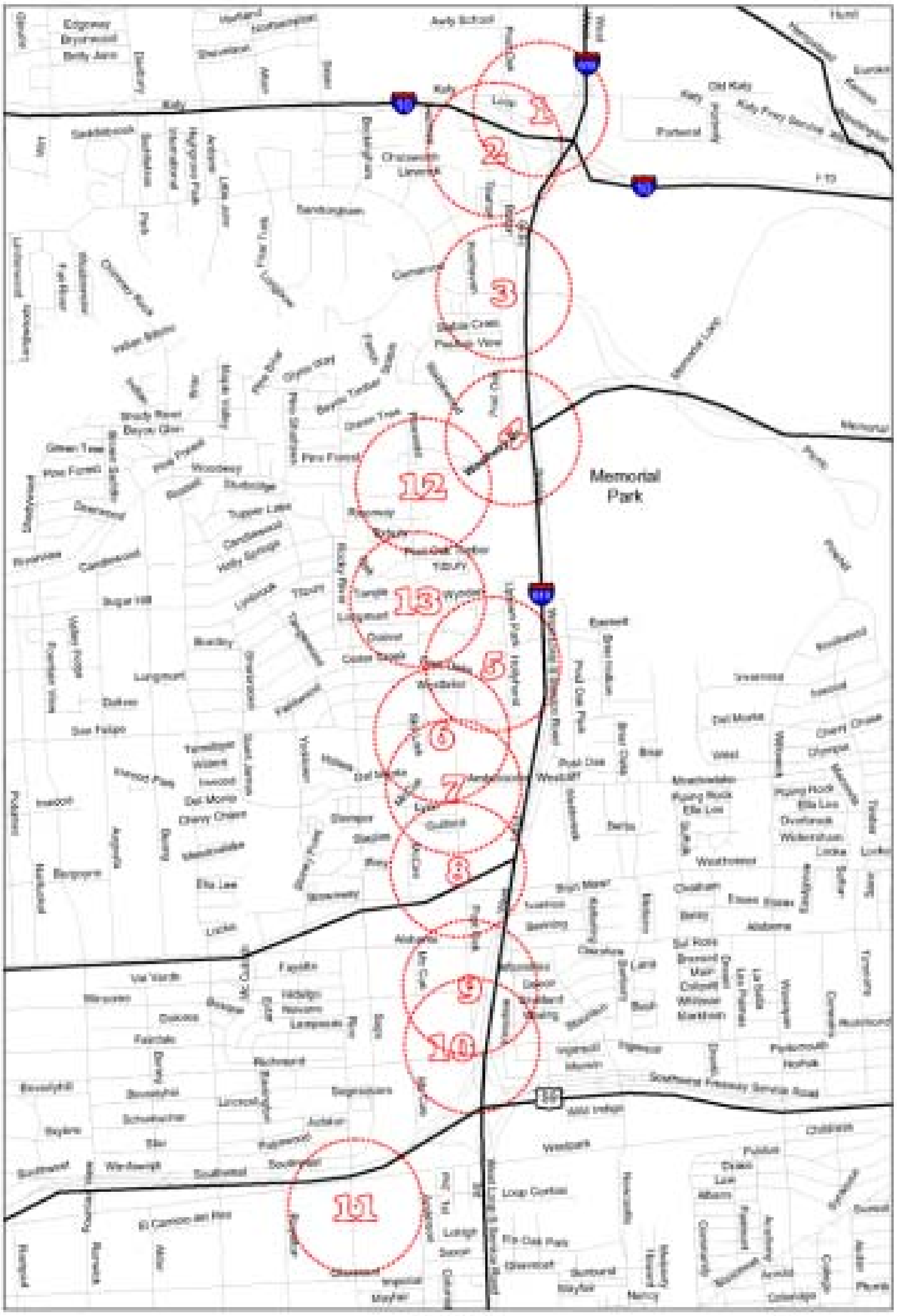
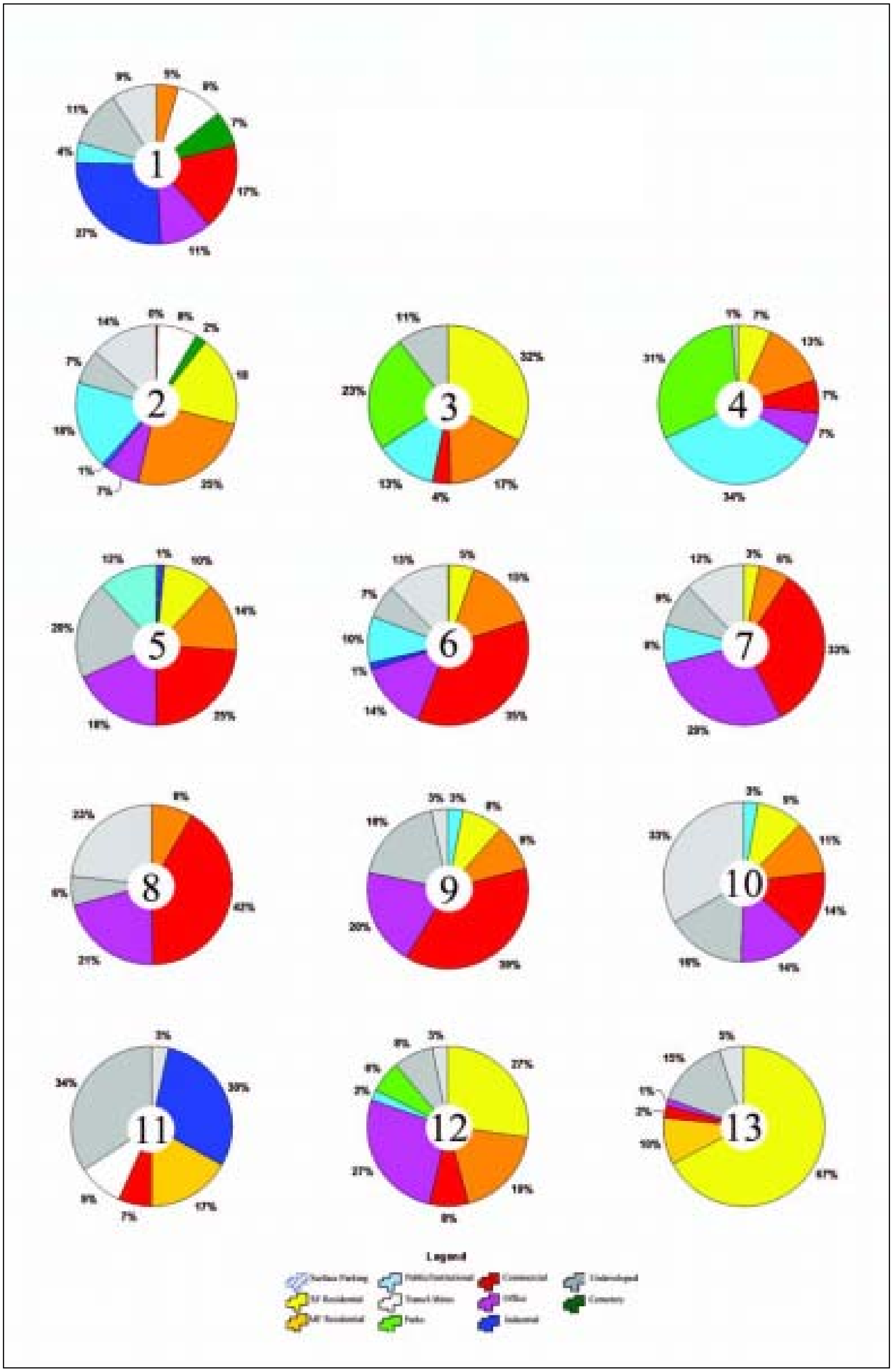


Figure 5.1
Uptown West Loop
Proposed Station
Locations
November, 2002

FIGURE 5.2
LAND USE BY PROPOSED STATION AREA



As shown in Table 5.1, the majority of developable land within the station catchment area occurs along Post Oak Boulevard. All Build Alternatives have Post Oak Boulevard in common. For this analysis, only minor development advantages accrue to at-grade and partially at-grade alternatives versus those on aerial or elevated structure. It was assumed that Alternatives 2 and 2A have slightly less potential to induce development resulting from fewer stations along these alignments. With Post Oak Boulevard in common, and only minor differences in development potential along the northern segments, all alternatives showed similar development potential.

6.0 Cost Estimates

This chapter presents estimates of the potential capital, operations and maintenance costs associated with the alternatives carried forward for detailed evaluation. The methodology used to develop the capital, operations and maintenance costs is provided in the following sections.

6.1 Capital Costs

6.1.1 Methodology

No Build

The No Build Alternative consists of committed, financially constrained construction projects, as identified in the FY 2002-04 TIP as described in Section 2.4.1. For planning purposes, TIP projects are assumed to be programmed and in place for the No Build and Build Alternatives. In addition, major transportation improvements supported by the TIRZ within the study area are included in the assessment. Though not traditionally included in the TIP, specific TIRZ improvements may have significant localized effects.

Build Alternatives

Capital cost estimates for each corridor study and in the assembled plan were developed using a standardized method. The capital cost estimates were based on METRO experience and supplemented with national cost when applicable. Capital cost estimating spreadsheets were developed for the following transit technologies:

- Light Rail Transit,
- Commuter Rail,
- Bus Rapid Transit, and
- High Occupancy Vehicle

Each spreadsheet defined the elements to be estimated and specified the unit cost for each element. Quantities were then estimated for each element to develop the cost estimate. In early stages of study, quantities were more grossly defined, reflecting the level of definition of the alignments. The spreadsheets at this stage provided an order of magnitude comparison of costs and included project contingency, management, overhead, and ROW costs.

As greater engineering definition is available and the alignments are more specifically defined, the spreadsheets are used to provide refined capital costs. Unit costs remain constant to ensure consistency. For buses and light rail vehicles, adjustments to life cycle costs are based on current FTA guidance and METRO operating experience.

6.1.2 Results

Capital costs described in this section are based on conceptual design. Their purpose is to discern major differences in potential capital costs among the alternatives being studied and to provide relative costs for decision makers during the assembly of a draft System Plan and eventual selection of the LPIS.

Table 6.1 and 6.2 summarize the potential capital costs associated with each alignment by transit technology. Though the Uptown-West Loop Alternatives are similar in terms of alignment and design, the major differences occur with the addition of elevated structures or guideway on the northern segment for Alternatives 2 and 2A. This cost is incurred by both LRT and BRT technologies. This higher capital cost reflects a trade-off between reduced number of stations with decreased travel times requiring fewer vehicles and higher costs associated with the construction of elevated structures. Detailed Capital Cost tables are provided in Technical Report G.

For capital cost and operations planning purposes, a major assumption was that two LRT vehicles (two-car trains) would be used for each trip. Station spacing, acceleration and deceleration rates, dwell times, attained speeds, and recovery time at the beginning and end of each alignment were used to determine the number of LRT vehicles required for each alternative to maintain policy headways. Twice as many BRT vehicles are required for an equivalent level of service based on relative capacity comparisons with LRT. (Please see Section 2.4.8 – Vehicle Requirements – of this report).

It is anticipated that a variety of service patterns will be offered to support these alternatives. The recommendations for expanded and augmented service are not reflected as a component in the capital cost analysis. Additionally, changes in operations and maintenance costs associated with modifications to existing bus service or augmented service are not included.

Table 6.1
Capital Cost Summary for LRT Alternatives

Cost Category	{Alternative/Corridor 1} Total Cost Dollars	{Alternative/Corridor 2} Total Cost Dollars	{Alternative/Corridor 2A} Total Cost Dollars	{Alternative/Corridor 3} Total Cost Dollars
Vehicles	$ 41,860,000	$ 41,860,000	$ 35,420,000	$ 45,080,000
Stations	$ 11,091,600	$ 9,859,200	$ 12,745,200	$ 12,324,000
Guideway/Roadway	$ 103,748,424	$ 154,212,942	$ 177,302,783	$ 113,321,364
Maintenance/Inspection Facilities	$ 11,559,600	$ 11,559,600	$ 9,781,200	$ 12,448,800
Transit Center	$ 9,032,400	$ 9,032,400	$ 9,032,400	$ 9,032,400
Park and Ride	$ -	$ -	$ -	$ -
Road Reconstruction	$ 13,670,280	$ 13,670,280	$ 12,600,432	$ 10,817,352
Right-of-Way	$ 31,691,642	$ 29,471,825	$ 27,935,028	$ 28,740,017
Project Contingency	$ 22,265,395	$ 26,966,625	$ 28,481,704	$ 23,176,393
Total Cost (2002 Dollars)	$ 244,919,341	$ 296,632,871	$ 313,298,747	$ 254,940,326
Total Length in Miles	4.4	4.4	4.4	4.6
Cost per Mile (2002 Dollars)	$ 55,917,658	$ 67,187,513	$ 71,775,200	$ 55,785,629

Source: General Planning Consultant, March 2003

Table 6.2
Capital Cost Summary for BRT Alternatives

Cost Category	{Alternative/Corridor 1} Total Cost Dollars	{Alternative/Corridor 2} Total Cost Dollars	{Alternative/Corridor 2A} Total Cost Dollars	{Alternative/Corridor 3} Total Cost Dollars
Vehicles	$ 32,890,000	$ 32,890,000	$ 27,830,000	$ 35,420,000
Stations	$ 11,934,000	$ 10,608,000	$ 15,022,800	$ 13,260,000
Guideway/Roadway	$ 58,839,768	$ 112,019,903	$ 131,105,801	$ 59,321,028
Maintenance/Inspection Facilities	$ 13,759,200	$ 13,759,200	$ 11,793,600	$ 15,069,600
Transit Center	$ 9,032,400	$ 9,032,400	$ 9,032,400	$ 9,032,400
Park and Ride	$ -	$ -	$ -	$ -
Road Reconstruction	$ 13,670,280	$ 13,670,280	$ 12,600,432	$ 10,817,352
Right-of-Way	$ 31,691,642	$ 29,471,825	$ 27,935,028	$ 28,740,017
Project Contingency	$ 17,181,729	$ 22,145,161	$ 23,532,006	$ 17,166,040
Total Cost (2002 Dollars)	$ 188,999,019	$ 243,596,768	$ 258,852,067	$ 188,826,436
Total Length in Miles	4.4	4.4	4.4	4.6
Cost per Mile (2002 Dollars)	$ 43,150,461	$ 55,212,323	$ 59,301,734	$ 41,318,695

Source: General Planning Consultant, March 2003

Assumptions by Alternative:

Unit prices assigned in this cost estimate were developed and based on a methodology provided by METRO (see section 6.1.1). Although the Uptown Houston District/Harris County TIRZ #16 has plans to acquire additional ROW along Post Oak Blvd., the capital cost estimate includes all ROW necessary for the accommodation of transit. The following assumptions for estimating capital costs for each alternative by transit technology is described below:

Alternative 1 – LRT:

- 13 vehicles will be required for Alternative 1 based on the number of stations, required headways, and the average speed attained. The basis for comparison was an assumption of two LRT vehicles (two-car trains) for each trip.
- The guideway in-street quantity includes the sections in the center median of N. Post Oak Rd. and Post Oak Blvd.
- The exclusive surface quantity includes the section alongside IH-610W southbound frontage road as well as along the approach to the Westpark Corridor on the south end of the project.
- The segment that will pass through a depressed section under U.S. 59 is quantified as exclusive surface because at time of construction, the civil work will be completed as part of the Westpark Toll Road project resulting in a cost that is less than the in-street assignment.
- The elevated sections include a bridge structure adjacent to the N. Post Oak Rd. bridge over IH-10 and a short segment along the IH-610W frontage road that crosses Buffalo Bayou.
- The maintenance and inspection facility cost was estimated on the calculation for the number of vehicles operating in the corridor.

Alternative 1 – BRT:

- 26 BRT vehicles will be required for Alternative 1 based on the number of stations, headways, comparable LRT capacity/level of service, and average speed. Basis for comparison was an assumption of two LRT vehicles (two-car trains) for each trip – with all other operational characteristics held constant. Based on capacity, each alignment requires twice the number of LRT vehicles for a comparable service level.
- In-street quantities were calculated for at-grade segments; elevated quantities were calculated for aerial segments; and underground quantities were calculated for the portal segment.

Alternative 1 – Cost estimate assumptions common for both LRT and BRT:

- Nine proposed station locations along this alignment – see Chapter 2, Figure 2.19 of this report.
- The maintenance and inspection facility quantity was calculated based on the number of vehicles operating in the corridor.
- Road reconstruction was estimated/calculated by assuming two lanes would be reconstructed along Post Oak Blvd. A segment of Old Katy Rd., N. Post Oak Rd. and the intersection at Westpark will also require reconstruction. The quantity was assumed to be two lane-miles from Sta. 335+80 to Sta. 336+80 for Old Katy Rd., one lane-mile from Sta. 314+00 to 324+00 for N. Post Oak Rd and from Sta. 117+80 to 119+75 for the intersection of the guideway and Westpark Dr. See Section 2.4.9 - Figures 2.27 to 2.30 of this report.
- Proposed ROW along Post Oak Blvd. was based on 138' including six 12-foot lanes, exclusive guideway in the median, and a 9'-4" clearance from the edge of pavement to the ROW line. The proposed 138' of ROW along Post Oak Blvd. accommodates transit and related facilities, a consistent LOS, and conforms to existing plans with the Uptown Houston District and ingress/egress requirements for improvements to IH-610W and U.S. 59. Existing ROW along the corridor varies from 98' to 120' according to the Harris County Appraisal District's maps. Additional ROW requirements along Post Oak Blvd. were calculated by estimating the difference between existing and proposed ROW. See Section 2.4.9 - Figures 2.27 to 2.30 of this report.
- The necessary ROW and facility requirements for a maintenance facility were calculated based on the number of vehicles. Approximately 13 acres will be required to provide offices, inspection, cleaning services, light maintenance, parking and a detention pond(s). The 13 acres includes an allowance for a less than efficient shape of available land. ROW cost estimates for the southern transit center and maintenance/inspection facilities was based on average costs provided for the Westpark Corridor Sub-area Study.
- The proposed transit center to be located at the southern terminus of the project alternatives was estimated to be the same size and parking capacity as the NWTC. Facilities and amenities common to METRO transit centers including bus bays, canopies, and layover area are included in the cost estimate.

Alternative 2 – LRT:

- 13 vehicles will be required for Alternative 2 based on the number of stations, required headways, and the average speed attained. The basis for comparison was an assumption of two LRT vehicles (two-car trains) for each trip.
- The guideway in-street quantity includes the sections in the center median of N. Post Oak Rd. and Post Oak Blvd.
- The exclusive surface quantity includes the section alongside IH-610W southbound frontage road as well as along the approach to the Westpark Corridor on the south end of the project.
- The segment that will pass through a depressed section under U.S. 59 is quantified as exclusive surface because at time of construction, the civil work will be completed as part of the Westpark Toll Road project resulting in a cost that is less than the in-street assignment.
- The elevated sections include a bridge structure adjacent to the N. Post Oak Rd. bridge over IH-10 and the segment that transitions the LRT alternative from the frontage road to the center of the IH-610W profile.
- The underground segment is quantified from where the elevated section in the center of IH-610W transitions underground and below the main lanes and passes through the preserved portal. The length of the subway section was calculated without true elevations.

Alternative 2 – BRT:

- 26 BRT vehicles will be required for Alternative 2 based on the number of stations, headways, comparable LRT capacity/level of service, and average speed. Basis for comparison was an assumption of two LRT vehicles (two-car trains) for each trip – with all other operational characteristics held constant. Based on capacity, each alignment requires twice the number of LRT vehicles for a comparable service level.
- In-street quantities were calculated for at-grade segments; elevated quantities were calculated for aerial segments; and underground quantities were calculated for the portal segment.

Alternative 2 – Cost estimate assumptions common for both LRT and BRT:

- Eight proposed station locations along this alignment – see Chapter 2, Figure 2.20 of this report.

- The maintenance and inspection facility quantity was calculated based on the number of vehicles operating in the corridor.
- Road reconstruction was estimated/calculated by assuming two lanes would be reconstructed along Post Oak Blvd. A segment of Old Katy Rd., N. Post Oak Rd. and the intersection at Westpark also will require reconstruction. The quantity was assumed to be two lane-miles from Sta. 335+80 to Sta. 336+80 for Old Katy Rd., one lane-mile from Sta. 314+00 to 324+00 for N. Post Oak Rd and from Sta. 117+80 to 119+75 for the intersection of the guideway and Westpark Dr. See Section 2.4.9 - Figures 2.27 to 2.30 of this report.
- Proposed ROW along Post Oak Blvd. was based on 138' including six 12-foot lanes, exclusive guideway in the median, and a 9'-4" clearance from the edge of pavement to the ROW line. The proposed 138' of ROW along Post Oak Blvd. accommodates transit and related facilities, a consistent LOS, and conforms to existing plans with the Uptown Houston District and ingress/egress requirements for improvements to IH-610W and U.S. 59. Existing ROW along the corridor varies from 98' to 120' according to the Harris County Appraisal District's maps. Additional ROW requirements along Post Oak Blvd. were calculated by estimating the difference between existing and proposed ROW. See Section 2.4.9 - Figures 2.27 to 2.30 of this report.
- The necessary ROW and facility requirements for a maintenance facility were calculated based on the number of vehicles. Approximately 13 acres will be required to provide offices, inspection, cleaning services, light maintenance, parking and a detention pond(s). The 13 acres includes an allowance for a less than efficient shape of available land. ROW cost estimates for the proposed southern transit center and maintenance/inspection facilities was based on average costs provided for the Westpark Corridor Sub-area Study.
- The proposed transit center to be located at the southern terminus of the project alternatives was estimated to be the same size and parking capacity as the NWTC. Facilities and amenities common to METRO transit centers including bus bays, canopies, and layover area are included in the cost estimate.

Alternative 2A – LRT:

- 11 vehicles will be required for Alternative 2A based on the number of stations, required headways, and the average speed attained. The basis for comparison was an assumption of two LRT vehicles (two-car trains) for each trip.
- The exclusive surface quantity includes the section alongside IH-610W southbound frontage road as well as along the approach to the Westpark Corridor on the south end of the project.

- The segment that will pass through a depressed section under U.S. 59 is quantified as exclusive surface because at time of construction, the civil work will be completed as part of the Westpark Toll Road project resulting in a cost that is less than the in-street assignment.
- The underground segment is quantified as the elevated section in the center of IH-610W transitioning underground and below the main lanes and passing through the preserved portal. The length of the subway section was calculated without true elevations.

Alternative 2A – BRT:

- 22 BRT vehicles will be required for Alternative 2A based on the number of stations, headways, comparable LRT capacity/level of service, and average speed. Basis for comparison was an assumption of two LRT vehicles (two-car trains) for each trip – with all other operational characteristics held constant. Based on capacity, each alignment requires twice the number of LRT vehicles for a comparable service level.
- In-street quantities were calculated for at-grade segments; elevated quantities were calculated for aerial segments; and underground quantities were calculated for the portal segment.

Alternative 2A – Cost estimate assumptions common for both LRT and BRT:

- Six proposed station locations along this alignment – see Chapter 2, Figure 2.21 of this report. Stations assignments are reduced to six due to the amount of elevated structure in alignment 2A.
- The alignment proceeds from the NWTC on an elevated structure weaving through the IH-10/IH-610W interchange and remaining elevated until it passes through the preserved portal located in the center of IH-610W and returning to grade in the Post Oak Blvd. median.
- The underground segment is quantified as the elevated section in the center of IH-610W transitioning underground and below the main lanes and passing through the preserved portal. The length of the subway section was calculated without true elevations. Preliminary engineering and existing traffic elements will determine where the alternative may return to grade.
- The maintenance and inspection facility quantity was calculated based on the number of vehicles operating in the corridor.
- Road reconstruction was estimated/calculated by assuming two lanes would be reconstructed along Post Oak Blvd. The intersection of Westpark and the guideway will require reconstruction. The quantity was assumed to be one

lane-mile from Sta. 117+80 to 119+75 for the intersection of the guideway and Westpark. No roadway reconstruction is required for N. Post Oak Rd. or Old Katy Rd. because the guideway is elevated for this alternative. See Section 2.4.9 - Figures 2.27 to 2.30 of this report.

- Proposed ROW along Post Oak Blvd. was based on 138' including six 12-foot lanes, exclusive guideway in the median, and a 9'-4" clearance from the edge of pavement to the ROW line. The proposed 138' of ROW along Post Oak Blvd. accommodates transit and related facilities, a consistent LOS, and conforms to existing plans with the Uptown Houston District and ingress/egress requirements for improvements to IH-610W and U.S. 59. Existing ROW along the corridor varies from 98' to 120' according to the Harris County Appraisal District's maps. Additional ROW requirements along Post Oak Blvd. were calculated by estimating the difference between existing and proposed ROW. See Section 2.4.9 - Figures 2.27 to 2.30 of this report.
- The necessary ROW and facility requirements for a maintenance facility were calculated based on the number of vehicles. Approximately 13 acres will be required to provide offices, inspection, cleaning services, light maintenance, parking and a detention pond(s). The 13 acres includes an allowance for a less than efficient shape of available land. ROW cost estimates for the proposed southern transit center and maintenance/inspection facilities was based on average costs provided for the Westpark Corridor Sub-area Study.
- The proposed transit center to be located at the southern terminus of the project alternatives was estimated to be the same size and parking capacity as the NWTC. Facilities and amenities common to METRO transit centers including bus bays, canopies, and layover area are included in the cost estimate.

Alternative 3 – LRT:

- 14 vehicles will be required for Alternative 3 based on the number of stations, required headways, and the average speed attained. The basis for comparison was an assumption of two LRT vehicles (two-car trains) for each trip. The increase in the number of vehicles is due in part to the increased overall length, reduced speeds, and additional station for this alternative verses Alternative 1 at-grade.
- The guideway in-street quantities were estimated for San Felipe, S. Post Oak Ln., and Woodway Dr.
- The elevated sections include a bridge structure adjacent to the N. Post Oak Rd. bridge over IH-10 and a short segment construction or reconstruction along Woodway Dr. crossing Buffalo Bayou. The proposed bridge over Buffalo Bayou

in Alternative 3 is shorter than the bridge over Buffalo Bayou in Alternative 1 due to the crossing location, thereby reducing the elevated quantity.

- The segment that will pass through a depressed section under U.S. 59 is quantified as exclusive surface because at time of construction, the civil work will be completed as part of the Westpark Toll Road project resulting in a cost that is less than the in-street assignment. The exclusive surface quantity includes the approach to the Westpark Corridor.
- The maintenance and inspection facility cost increased due to the one additional vehicle required for Alternative 3.
- Estimated roadway reconstruction decreased in Alternative 3 as a result of the alignment difference from Alternative 1. This alignment requires the taking of a through lane in each direction on S. Post Oak Ln. and Woodway Dr. due to ROW constraints.

Alternative 3 - BRT:

- 28 BRT vehicles will be required for Alternative 3 based on the number of stations, headways, comparable LRT capacity/level of service, and average speed. Basis for comparison was an assumption of two LRT vehicles (two-car trains) for each trip – with all other operational characteristics held constant. Based on capacity, each alignment requires twice the number of LRT vehicles for a comparable service level.
- The maintenance and inspection facility cost increased due to the two additional vehicles required for Alternative 3.
- In-street quantities were calculated for at-grade segments; elevated quantities were calculated for aerial segments; and underground quantities were calculated for the portal.

Alternative 3 – Cost estimate assumptions common for both LRT and BRT:

- 10 proposed station locations along this alignment – see Chapter 2, Figure 2.22 of this report.
- Estimated roadway reconstruction decreased in Alternative 3. The alignment requires the taking of a through lane in each direction on S. Post Oak Ln. and Woodway Dr. due to ROW constraints. Road reconstruction was estimated/calculated by assuming 2 lanes would be reconstructed along Post Oak Blvd. from the southern end terminus to San Felipe. A portion of Old Katy Rd., N. Post Oak Rd. and the intersection at Westpark will require reconstruction. The quantity was assumed to be two lane-miles from Sta. 335+80 to Sta. 336+80 for Old Katy Rd., one lane-mile from Sta. 314+00 to

324+00 for N. Post Oak Rd and from Sta. 117+80 to 119+75 for the intersection of the guideway and Westpark Dr. See Section 2.4.9 - Figures 2.27 to 2.30.

- Proposed ROW along Post Oak Blvd. was based on 138' including six 12-foot lanes, exclusive guideway in the median, and a 9'-4" clearance from the edge of pavement to the ROW line. The proposed 138' of ROW along Post Oak Blvd. accommodates transit and related facilities, a consistent LOS, and conforms to existing plans with the Uptown Houston District and ingress/egress requirements for improvements to IH-610W and U.S. 59. Existing ROW along the corridor varies from 98' to 120' according to the Harris County Appraisal District's maps. Additional ROW requirements along Post Oak Blvd. were calculated by estimating the difference between existing and proposed ROW. ROW along Post Oak Blvd. is less than the other alternatives due to the variation of the alignment that joins Post Oak Blvd. at San Felipe. See Section 2.4.9 - Figures 2.27 to 2.30 of this report.
- The necessary ROW and facility requirements for a maintenance facility were calculated based on the number of vehicles. Approximately 13 acres will be required to provide offices, inspection, cleaning services, light maintenance, parking and a detention pond(s). The 13 acres includes an allowance for a less than efficient shape of available land. ROW cost estimates for the southern transit center and maintenance/inspection facilities was based on average costs provided for the Westpark Corridor Sub-area Study.
- The proposed transit center to be located at the southern terminus of the project alternatives was estimated to be the same size and parking capacity as the NWTC. Facilities and amenities common to METRO transit centers including bus bays, canopies, and layover area are included in the cost estimate.

6.2 Operating and Maintenance Costs

Project Approach and Cost Estimating Methodology

The development of METRO Solutions was achieved through a phased approach. This document explains the development of appropriate operating and maintenance (O&M) cost estimates for each phase of the study. The methodologies and associated results for each phase are presented below.

Phase One – Corridor Level Sketch Planning

In Phase One, various high capacity transit alignments and modal technologies were formulated and evaluated along ten corridors within the METRO service area. The purpose of the Phase One evaluation was to screen high capacity transit alternatives using criteria that could differentiate among alternatives at a gross level of comparison. A differential assessment of O&M costs was not conducted as part of the Phase One evaluation because the major characteristics of the initial list of alternatives, such as route alignments and transit operating plans, were similar and would not, at this gross level, identify major cost trade-offs among the alternatives within each corridor. Other criteria, such as access to population and employment, connectivity to the regional system, and improved travel time or quality of travel were used to screen the alternatives.

Phase Two – Corridor Refinement

In Phase Two, indicators of capital and O&M costs were developed to narrow the range of alignment and technology alternatives carried forward into system planning. During this phase, ridership forecasts were generated from a sketch planning tool that was not designed to provide alternative-specific vehicle hours and vehicle miles, which are equilibrated to ridership; thus, detailed O&M cost estimates were not calculated. Instead, O&M cost estimates were indexed on the estimated number of passengers as proposed for the CBD to Reliant Park light rail line.

A cost index was developed for each high capacity transit technology under consideration: LRT and BRT. The four operating scenarios were:

- Exclusive one-car LRT operation (LRT-1);
- Mixed operation using a balance of one and two-car trains (LRT-1.5);
- Exclusive two-car LRT operation (LRT-2); and
- BRT operation.

Since the CBD to Reliant Park light rail line was designed for initial operation with one-car trains, the operating costs of LRT-1 simply used the cost estimates provided in METRO's METRORail Operations and Maintenance Plan report for the CBD to Reliant Park light rail line. This report provides an estimation of vehicle hours of service and operator costs based on a specific plan of operation. Some cost adjustments were made to reflect system extension operations versus system start-up operation. The cost of LRT-1.5 was computed by reducing vehicle hours of service and operator cost to 75 percent of LRT-1. The cost of LRT-2 was computed by reducing vehicle hours of service and operator costs to 50 percent of LRT-1. BRT costs were developed as a hybrid of METRO-operated park & ride bus service and LRT costs, assuming each BRT vehicle could carry 45 percent of the capacity of one light rail car.

The annual O&M costs to carry the same number of passengers as was proposed for the METRORail CBD to Reliant Park light rail line were estimated for each scenario. These calculations were based on the budgeted light rail operations and maintenance costs for FY2005 (revised as of first quarter of 2003). Each scenario retained the level of service required to carry the same number of passengers, but differed according to the number of trains (or buses) required to accommodate that level of ridership, as follows: LRT-1, $12,708,406; LRT-1.5, $11,875,868; LRT-2, $11,043,331; and BRT, $10,673,852.

The O&M Cost Index was then calculated by dividing the Total Annual Cost of each mode by the baseline case (LRT-1) to show the relative difference in O&M cost estimates of the other modes, as follows: LRT-1, 1.0; LRT-1.5, .934; LRT-2, .869; and BRT, .840. In the simplified case of providing service to carry the initial METRORail ridership, BRT had a slightly lower annual cost and, thus, lower O&M Cost Index.

However, one of the advantages of a light rail system is the cost savings realized through system expansion. As levels of ridership increase with the expansion of the system, LRT has a lower O&M cost than BRT to carry the higher ridership. The more limited carrying capacity of a BRT vehicle results in a faster growth rate for O&M costs than realized in a LRT system. Eventually, BRT O&M costs exceed LRT O&M costs when the system expands. This is due to the higher capacity of LRT vehicles as compared to BRT buses. For example, in each LRT scenario noted above, 15 LRT vehicles were assumed to provide the required level of service. Under the BRT scenario, 34 vehicles would be required to provide the same level of service shown for LRT. If capacity need doubled with expansion of the system, 30 LRT vehicles would be required, compared to 67 BRT buses.

At the end of Phase Two, BRT was not carried forward into system planning. While other factors established BRT as a non-viable option for this system, the reduced capacity provided by BRT vehicles compared with light rail on a systemwide basis of high ridership corridors and the strong community preference for LRT as the high capacity mode of choice were noted in this element of the study.

Phase Three – System Refinement

In Phase Three, capital and O&M cost estimates were developed for four system plan scenarios (No Build, Minimum Build, Mid-Range Build, and Maximum Build) and used as evaluation criteria. In this phase, METRO's EMME/2-based Long Range regional travel demand model replaced the sketch planning tool to forecast ridership. O&M costs were estimated systemwide using the cost factors shown in Table 6.3, as well as cost factors for bus service from METRO's bus cost allocation model. Peak vehicle, revenue mile, and revenue hour outputs were also used from the travel demand model. Each of the cost factors shown in Table 6.4 are multiplied by the respective quantity of revenue train hours, revenue car miles, peak vehicles, number of stations, and guideway miles. The results are summed to produce the total annual cost.

Table 6.3
Estimated Service Costs By Scenario (shown in constant FY 2002 dollars)

	METRO Rail	LRT-1	LRT-1.5	LRT-2
Cost/Rev Train Hour	$69.40	$53.15	$54.36	$56.79
Cost/Rev Car Mile	$6.23	$5.71	$5.71	$5.71
Cost/Peak Vehicle	$42,976	$18,222	$18,222	$18,222
Cost/Station	$138,702	$109,455	$109,455	$109,455
Cost/Guideway Mile	$341,404	$292,265	$292,265	$292,265

Source: METRORail Operations and Maintenance Plan, Revision: 0, Date: 11/07/01; Calculations of LRT scenarios prepared by General Planning Consultant, March 2003.

When the cost indicators and service inputs shown in Table 6.3 were applied, the following annual systemwide O&M cost estimates were generated. Annual systemwide costs include all fixed-route service but do not include costs for METROLift, special events, and other unmodeled services.

Table 6.4
Estimated Annual Systemwide Operating & Maintenance Costs By System Scenario and Service Type (Fixed Route services, constant FY 2002 dollars)

Mode	No Build	Minimum Build	Mid-Range Build	Maximum Build
Local Bus	$207,089	$241,768	$241,764	$238,852
Express Bus	$ 19,422	$46,904	$ 46,328	$ 45,055
Commuter Bus	$ 49,326	$71,212	$ 66,125	$ 22,381
Rail	$ 10,736	$65,314	$125,883	$172,928
Total	$286,572	$425,198	$480,100	$479,215

Notes: in thousands, constant FY2002 dollars
Source: Calculations based on LRT cost estimates documented in METRORail Operations and Maintenance Plan, Revision: 0, Date: 11/07/01; Based on the budgeted light rail operations and maintenance costs for FY2005 (revised as of first quarter of 2003).

The scenario-specific cost indicators and service inputs generated the following annual LRT O&M costs for the three Alternatives Analysis corridors (Table 6.5). The METRO travel demand model produces daily service inputs that were annualized by multiplying them by 300, a generally accepted practice by the transit industry. The O&M costs were calculated assuming all one-car trains or all two-car trains to provide a range of costs.

Table 6.5
Estimated Annual LRT Operating & Maintenance Costs by Corridor and Alignment

Corridor/Alignment	One-Car Trains	Two-Car Trains
Southeast-Universities-Hobby		
SH01	$15,809	$14,079
SH02	$13,764	$12,271
SH03	$11,849	$10,499
SH04	$12,258	$11,091
North-Hardy		
NH01	$15,761	$14,337
NH02	$11,885	$10,763
NH03	$10,255	$9,027
NH04	$9,734	$8,732
Uptown-/West Loop		
Alternative 1	$5,996	$5,238
Alternative 2	$5,755	$5,066
Alternative 2a	$5,431	$4,837

Note: in thousands, constant FY2002 dollars
Source: General Planning Consultant Calculations of March 2003

7.0 Evaluation of Alternatives

This chapter documents the evaluation of alternatives conducted for the Uptown-West Loop Planning Study.

7.1 Goals Attainment

Based on the needs, opportunities, and constraints outlined in Chapter 1, Purpose and Need, the following goals and objectives were developed for the Uptown-West Loop Planning Study. The specific evaluation criteria used to screen the alternatives developed for the Uptown-West Loop Planning Study are based on the overall goals defined for the project. This process allows the METRO Board of Directors to assess the degree to which each alternative 1) addresses specific problems or deficiencies identified in the Purpose and Need, and 2) satisfies project goals. The transportation goals and objectives for the Uptown-West Loop Planning Study include the following:

Goals

∉ Increase ridership and improve mobility and access for existing and future transit riders, local residents, commuters, and travelers who have origins and/or destinations in the Uptown-West Loop area;

  a. Improve access to/from and within the study area by providing additional, faster and more reliable transit service
  b. Provide integrated, seamless transit connections to residential areas and major activity centers throughout the region
  c. Improve multi-modal access to the study area by better integrating the area's transit and highway systems, including important METRO facilities
  d. Support pedestrian linkages both within the study area and to adjacent communities

∉ Promote the operating efficiency of METRO services in the Uptown-West Loop area;

  a. Reduce delay for transit services within and through the study area
  b. Provide highway and street priority to transit services to the maximum extent possible without compromising the performance of the general traffic system

c. Optimize the integration of transit services internal to the study area with other regional transit services

∉ Develop cost-effective transportation improvements in the corridor;

a. Design transit services and facilities to be consistent with expected transit markets
b. Make maximum use of existing highway, street and transit resources
c. Minimize project capital and operating costs by using innovative technologies and implementation and operating strategies (e.g. physical and service improvements that minimize human, material and financial resource requirements)

∉ Provide transportation improvements that enhance the urban environment and support the urban design initiatives of the Uptown/Galleria area;

a. Identify transit alternatives that minimize impacts on immediate residential, recreational, commercial, shopping and other land uses and contribute to regional environmental goals (e.g., air quality improvement) and preserve ecologically sensitive areas, historic and cultural resources
b. Improve transit in ways that will encourage and support transit-friendly, pedestrian-oriented development
c. Provide transit service that supports and is consistent with the character of existing and future land use and development throughout the corridor
d. Provide stops/stations that encourage transit use and are compatible with and enhance the character of their surroundings
e. Integrate transit facility designs with urban design initiatives within the public ROW
f. Lay out and design alternatives to maximize the potential for joint development opportunities

Goals and objectives established for the Uptown-West Loop Planning Study reflect a wide variety of interests and perspectives, which assist in effective screening and evaluation. The goals and objectives developed for this study reflect the objectives of METRO, as well as input received during the initial public outreach efforts. They encompass such items as mobility and transit improvements, fostering more livable communities, economic development, and preserving or improving the environment and the quality of life in the study area. It is important to note that the goals encompass more than transportation issues, they also reflect quality of life related needs of the study area. The goals and objectives address specific issues identified in previous studies related to the corridor as well as the integration of the goals and objectives developed as part of the Uptown-West Loop Planning Study. The goals and objectives also conform to METRO's Mobility 2025 Plan and the 2022 MTP.

The initial long-list of conceptual alternatives developed for the Uptown-West Loop Planning Study were designed to incorporate and integrate as many elements outlined in the goals and objectives as possible. The conceptual alternatives were developed and refined to include competing alignments and modes deemed reasonable and appropriate for consideration. Based on the screening of Uptown-West Loop Conceptual Alternatives described in Section 2.3, all Build Alternatives moving forward into the detailed evaluation phase satisfied project goals and objectives developed for the study. Those alternatives that did not perform well relative to the project goals were eliminated from further consideration. Evaluation criteria developed for this analysis were based on the goals and objectives. The assessment of environmental, traffic, transit, economic development and community impacts are summarized in the following sections.

7.2 Summary of Potential Environmental Impacts

Chapter 3 of this report presented the environmental screening of project alternatives. The alternatives were assessed for their potential to affect urban and natural elements, and cultural resources in the Uptown-West Loop Corridor. They were also evaluated for potential construction impacts, cumulative impacts and environmental justice issues. A qualitative and comparative summary of potential effects is presented in Table 7.1. Potential effects are shown for each of the project alternatives within each of the geographic segments. The description of potential effects is based on the impact quantities and analysis presented in the previous chapters. The two technologies considered, BRT and LRT, would only produce minor variations in the environmental screening based on analysis conducted to date. Accordingly, the summary of the potential environmental impacts is discussed by alignment. This section provides a rationale for the evaluation of each alternative.

As the selected conceptual alternatives moved forward in the detailed analysis phase, the alignments were divided into analysis segments for evaluating their performance in terms of engineering, operations, traffic impacts, relative cost and environmental and community impacts. The analysis segments are divided along major thoroughfares that intersect the alignments at points where major distinctions in the conceptual alternatives occur. The segments are as follows:

Segment 1 - NWTC to Memorial Dr.

Segment 2 - Memorial Dr. to San Felipe
- via S. Post Oak Ln.
- via IH-610W elevated facility
- via IH-610W frontage road (with variations)

Segment 3 - San Felipe to Richmond Ave.
Segment 4 - Richmond Ave to Proposed Southern Transit Center

Table 7.1
Summary of Potential Environmental Impacts

Segment	Project Alternative	Consistent with Area Growth Plans & Policies?	Visual Impacts	Impacts to Local Business Access (after construction)	Land Use Displacement	Impacts to Known Hazardous Materials Sites	Vegetation Impacts	Wildlife Impacts	Water Resource Impacts	Impacts to Wetlands/Waters of the U.S.	Impacts to Cultural Resources	Construction Impacts	Cumulative Impacts	Disproportionately High and Adverse Impacts to Low-Income and Minority Communities	Economic Development Potential
1	No-Build	No	None	Low	None	None	None	None	None	None	Low	None	Moderate	None	Moderately Beneficial
	1	Yes	Low	Low	Low	Moderate	Low	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
	2	Yes	Low	Low	Low	Moderate	Low	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
	2A	No	High	Low	Low	None	Low	Low	Low	Low	Low	Low	Moderate	Low	Highly Beneficial
	3	Yes	Low	Low	Low	Moderate	Low	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
2	No-Build	No	None	Low	None	None	None	None	None	None	Low	None	Moderate	None	Moderately Beneficial
	1	Yes	Low	Low	High	Low	Low	Low	Moderate	Moderate	High	Moderate	Moderate	Low	Highly Beneficial
	2	No	High	Low	Low	Low	Low	Low	Low	Low	Moderate	Moderate	Moderate	Low	Highly Beneficial
	2A	No	High	Low	High	Low	Low	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
	3	No	Low	Low	Low	Moderate	Low	Low	Moderate	Moderate	High	Moderate	Moderate	Low	Highly Beneficial
3	No-Build	No	None	Low	None	None	None	None	None	None	Low	None	Moderate	None	Moderately Beneficial
	1	Yes	Low	Low	High	High	Moderate	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
	2	Yes	Low	Low	High	High	Moderate	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
	2A	Yes	Low	Low	High	High	Moderate	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
	3	No	Low	Low	High	High	Moderate	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
4	No-Build	No	None	Low	None	None	None	None	None	None	Low	None	Moderate	None	Moderately Beneficial
	1	Yes	Low	Low	Low	Moderate	Low	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
	2	Yes	Low	Low	Low	Moderate	Low	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
	2A	Yes	Low	Low	Low	Moderate	Low	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial
	3	Yes	Low	Low	Low	Moderate	Low	Low	Low	Low	Low	Moderate	Moderate	Low	Highly Beneficial

Note: Please refer to Chapter 3 of this report for a full description of the environmental screening conducted for the detailed alternatives in the Uptown-West Loop Planning Study.

Consistency with Area Growth Plans & Policies. The No Build Alternative is inconsistent with the Uptown Houston District's transportation infrastructure development plans, while the Build Alternatives -- intended to improve transportation access and circulation -- are generally consistent. The local resident's opposition to new elevated transportation facilities in Segment 1 makes Alternatives 2 and 2A less desirable. Alternative 3 uses S. Post Oak Ln. and is seen by the public and residents as incompatible with the residential character of that street. Alternative 1 is the most consistent with local growth plans and policies. However, Alternatives 1 and 3 have the potential to impact Memorial Park, which runs counter to the preferences of local park preservationists. These alternatives require additional evaluation and special approvals under federal law.

Noise Impacts. The noise screening procedure used the general screening distance found in the FTA Transit Noise and Vibration Impact Assessment Guidance Manual and was refined to include light rail and bus source reference levels, vehicle headways, and speeds. The analysis was based on projected future traffic volumes with the project as well as forecasted background growth, and programmed transportation improvements. Noise and vibration impacts from the project alternatives could be intensified in locations where (1) future sensitive receptors would be built near the transitway, and/or (2) where future noise-producing uses would be developed near sensitive receptors that would be impacted by the Build Alternatives' noise and vibration. Generally, technologies considered produced discernable differences in noise impacts, but not the alignments.

It is projected that no noise impacts will occur for any of the Build Alternatives using LRT as the AHCT technology. The LRT source level came from the specifications of the vehicle expected to be used in Houston.

The BRT option has a higher potential to create noise impacts. The bus noise source level was assumed to be that of a diesel articulated bus, as the data for a hybrid bus was not available. This assumption is representative of the existing technology and represents a worst-case scenario. For Alternative 1, 29 noise impacts are projected with 27 at residential buildings and two at parks. 28 noise impacts are projected for Alternative 2, one of which is at a park and the other 27 are at residential buildings. Alternative 2A has the least projected noise impacts, 11, all of which are at residential buildings.

It should be noted that at the time the noise and vibration analysis was conducted, Alternative 3 had already been eliminated from further consideration. However, other environmental impact analysis was performed for Alternative 3 and has been enumerated in detail in Chapter 3 of this report.

***Visual Impacts**.* The No Build Alternative would not directly introduce new visual barriers into the Uptown-West Loop Corridor, although the visual quality of the corridor could diminish over time as traffic congestion worsens and more of the landscape becomes devoted to automobile parking. The visual impact of the Build Alternatives is generally considered to be "low," except for Alternatives 2 and 2A which both involve the construction of new elevated structures along IH-610W. All Build Alternatives introduce new at-grade facilities including, but not limited to, catenary poles, overhead trolley wire or catenary systems, open-ballast track, electric sub-stations, new transit stations, and vehicle storage areas. All Build Alternatives also involve the removal of the landscaped median along Post Oak Blvd. These aspects of the Build Alternatives could negatively affect visual quality, with the overall effect heavily dependent on project design details, aesthetic treatments and landscaping.

Impacts to Local Business Access (after construction). In the long run, access to local businesses in the corridor is expected to be slightly worse than today, regardless of which action is taken. Under the No Build Alternative, traffic congestion will worsen, but would probably be partially (and incrementally) addressed through low-cost improvements to intersection geometry, signal timing and other traffic control measures (i.e., Transportation Systems Management). The Build Alternatives will improve access to the corridor for transit passengers. The motoring public, however may experience turning-movement restrictions and more circuitous routes due to operational safety requirements along streets that feature a transitway. For these reasons, the degree of adverse effect on business access is considered "low" for all project alternatives.

Land Use Displacement. All Build Alternatives will displace privately owned land, especially in Segments 2 and 3. Alternatives 1 and 3 have the highest potential to impact publicly owned park land in Segment 2 and 3, thus triggering Section 4(f) of the Department of Transportation Act of 1966 (as amended). Alternatives 2 and 2A convert the least amount of private property to public use and utilize existing public transportation ROW where applicable.

Impacts to Known Hazardous Materials Sites. All Build Alternatives would potentially encounter known hazardous materials sites, especially in Segment 3.

Vegetation Impacts. Aerial photography and field observations were used to identify and verify areas of native vegetation within the project area. Memorial Park consists of a large, contiguous area containing a substantial amount of native vegetation. Alternatives 1 and 3 would require some ROW from Memorial Park. All Build Alternatives will require removal of the landscaped median in Post Oak Blvd. As defined, the Build Alternatives will generally have only minor effects on vegetation.

Wildlife Impacts. Adverse effects in this category are expected to be low due to the predominantly urban character of the corridor.

Water Resource Impacts. Alternative 1 and 3 will require a new structure for crossing Buffalo Bayou that could potentially result in adverse effects to water quality both during and after construction. Alternatives 2 and 2A would cross the bayou within the existing IH-610W facility.

Impacts to Wetlands/Waters of the U.S. Adverse effects in this category are considered "moderate" for Alternatives 1 and 3 for the same reasons as cited in the preceding paragraph.

Impacts to Cultural Resources. No significant adverse impacts to architecturally and/or historically significant structures are anticipated. An archival search and field survey of the corridor area revealed only a handful of structures near potential alignments that were both 50 years old and/or that appeared to be architecturally or historically significant. In several other instances there are documented historic resources within one-quarter mile of alignments but due to the distance away from the roadways, and due to intervening development that serves to buffer the buildings, no adverse effect on those resources or their settings would be anticipated. No formal determination of effects per the Criteria of Effect (the measures specified for assessing impacts for Federally-assisted projects) has been made at this point in project planning, nor should a property being included in this section be considered as a determination.

Potential impacts by the alternatives on significant publicly owned public parks and recreational land as cultural resources have also been identified. Alternatives 1 and 3 have the highest potential to impact publicly owned parks. Preliminary investigations indicate that Alternative 2 is constructible without infringement on Weiss Park. However, further analysis is necessary for a final determination.

Construction Impacts. Moderate adverse construction impacts are anticipated for all Build Alternatives. The actual severity of these impacts will depend on the construction approach and duration. Final project design, construction techniques and construction phasing will determine construction impacts. Careful planning and design will mitigate construction impacts to minimize the construction effects on the surrounding neighborhoods, businesses, infrastructure, and natural environment. Though relatively short, construction impacts may have the potential to be disruptive to normal, daily activities. Measures to minimize or mitigate construction impacts will be assessed during further detailed analysis.

Cumulative Impacts. No significant unavoidable adverse impacts to the Uptown-West Loop Corridor are expected to occur. A "moderate" level of adverse effects could occur where other public and private projects are constructed near (spatially and temporally) the proposed Build Alternatives.

Disproportionately High and Adverse Impacts to Low-Income and Minority Communities. Although low-income and minority communities are present within the Uptown-West Loop Corridor in percentages greater than the national average, project effects are not expected to fall disproportionately on these communities.

Economic Development Potential. The amount of vacant land and surface parking lots within the station vicinities of all Build Alternatives suggests the potential for substantial land development oriented to improved, high-capacity transit access. The majority of developable land within the corridor occurs along Post Oak Blvd. All Build Alternatives have Post Oak Blvd. in common. For this analysis, only minor development advantages accrue to at-grade and partially at-grade alternatives versus those on aerial or elevated structure. Assumptions can be drawn regarding Alternatives 2 and 2A and their lessened potential to induce development resulting from fewer stations along the alignments. With Post Oak Blvd. in common, and only minor differences in development potential along the northern segments, all alternatives perform equally well since they are in close proximity of parcels that are candidates for development.

7.3 Summary of Potential Transportation Impacts

Although Alignment 3 performed well initially, several elements compromised the alignment's capacity for potential implementation. Sufficient engineering was performed that identified significant potential operational and engineering constraints. As the alignment was evaluated against project criteria, several other potential adverse impacts were identified, thus meriting the alternative's elimination. Alternative 3 was eliminated for the following reasons:

- Limited ROW to accommodate transit and traffic operations along Woodway Dr. and S. Post Oak Ln.
- Significant traffic impacts due to reduced capacity on Woodway Dr. and S. Post Oak Ln. required to integrate transit operations
- Limited operating speeds due to tight turns at S. Post Oak Ln., Woodway Dr. and San Felipe
- Potential noise impact and higher operating costs due to tight turns
- Reduced demand potential due to low density character of the neighborhood
- Negative community input

Traffic analysis was conducted for all alternatives under consideration. With the elimination of Alternative 3, only Alternatives 1, 2 and 2A are discussed in this section. Due to their similarities, traffic impacts are not a distinguishing characteristic among the alternatives. At-grade, in-street transit operation in Segment 1 by Alternatives 1 and 2 does not appear to significantly reduce LOS or increase delay in the existing or a 2025 build condition for Segment 1 intersections. An introduction of transit in the 2025 build condition does not appear to impact Segment 2 intersections. Alternatives 2 and 2A use preserved ROW within IH-610W and are removed from normal traffic operation except where they return to grade at Uptown Park Blvd. in the median of Post Oak Blvd. Decreases in LOS and corresponding increases in delay attributable to transit are not anticipated for that intersection. Alternative 1 traverses intersections at Woodway Dr., Post Oak Blvd., and Uptown Park Blvd.; no adverse impacts are anticipated. (Please see Section 4.2 – Roadway Impacts)

Though not a distinguishing characteristic among the alternatives, due to the fact that all Uptown-West Loop alternatives share Post Oak Blvd. as a conceptual alignment, minor impacts are associated with Segment 3 intersections at Westheimer and San Felipe. Changes in intersection LOS and delay are generally attributable to increases in trip volumes between the current condition and the 2025 No-Build condition. Only minor increases in delay are expected with the introduction of AHCT between the 2025 No Build and the 2025 build condition.

7.4 Community and Political Positions

Comments received during the preparation and presentation of the short list of conceptual alternatives shared many commonalities. Residents generally favored improving mobility and access in the Uptown-West Loop study area and believe there is a real need for AHCT in the Houston region. The community also felt that METRO must address the larger context of the region when considering transit by providing regional connectivity and that transit investment should be examined in the broader context of the region. Detailed descriptions of public involvement activities are provided in Chapter 10 of this report.

Concerns voiced at meetings or by correspondence also included impacts of the project on traffic in the Uptown-West Loop Corridor, increased traffic congestion near intersections, pedestrian access and safety, impacts on property value, ridership analysis, and environmental impacts on Memorial Park. Numerous questions were asked regarding BRT and LRT technologies. BRT technologies were not viewed favorably by the community.

<u>Segment Specific Comments:</u>

Segment 1: Meeting participants voiced an overwhelming opposition to any alignment using aerial/elevated structures in the vicinity of residential neighborhoods. Especially in the northern segment (Segment 1), residents felt that elevated structures eliminate any transit benefit for the community while forcing neighborhoods to absorb all negative impacts associated with the project, such as noise, visual, construction, and safety impacts. Generally, meeting attendees were in favor of the typical sections depicting an alternative running at-grade in the median of N. Post Oak Rd.

Three individual stakeholder meetings were held with the civic association leaders from the five sections of Lafayette Place. The meetings were held for the benefit of the leadership to convey to the project team their issues, concerns and any consensus among those they represented. General consensus was reached regarding a preference for an at-grade alignment for the northern segment. The visual intrusion of an additional elevated element, regardless of shared ROW within the IH-610W configuration and the potential to mask additional structures within the IH-10 and IH-610W interchange, was viewed as unacceptable. Several residents in these neighborhoods have lobbied TxDOT to change the ramp design and have filed a lawsuit to enjoin TxDOT from moving forward on their planned improvements. Stakeholders attending these meetings have voiced concern about additional noise being generated from any transit improvement and requested that any plans moving forward include screening as a mitigation for noise and visual impacts. A sufficient buffer between transit and residential structures should also be preserved.

Segment 2: The vast majority of comments received regarding Segment 2 were from S. Post Oak Ln. area residents who felt that the Woodway Dr./S. Post Oak Ln. segment of Alternative 3 was flawed. Potential impacts to their neighborhood included the deterioration of traffic level of service due to a reduction in capacity because of minimal ROW. Other potential impacts to S. Post Oak Ln. included visual and noise impacts, which would be a detriment to the low-density character of the neighborhood. The elimination of an alignment using S. Post Oak Ln. was announced at a public meeting held on October 24, 2002.

In additional to regularly scheduled SAC meetings, several individual meetings were held with agencies and advocates serving Uptown Houston District, Memorial Park and other Segment 2 areas. The City of Houston Parks and Recreation Department, Memorial Park Conservancy, community members and the Park People voiced strong concern regarding the potential for park impacts associated with alternatives 1 and 3. They expressed strong support for transit and enhanced access to the park. They favored alternatives that minimize the potential for park impacts and reduce the amount of aerial structure in the vicinity of Memorial Park.

The Uptown Development Authority, working cooperatively with property owners in the study area, has collectively presented comments on the alternatives under review. Uptown Development Authority favors an alignment that uses the preserved portal in the median of IH-610W transitioning to the median of Post Oak Blvd.

Segment 3: The Uptown Houston District, representing area businesses, has provided comment regarding the use of Post Oak Blvd. as a transit corridor. Uptown Houston District supports an at-grade LRT alignment in the median of Post Oak Blvd. that will provide and support reliable, convenient, attractive, cost-effective internal circulation and regional mobility. The Uptown Houston District supports the station locations provided in the Uptown-West Loop Alternatives and feels that they are consistent with their future plans. They feel strongly that the project should not sacrifice vehicular capacity at the expense of transit and that every effort should be taken to reduce conflicts between pedestrians, transit and vehicular traffic. AHCT should function as an internal circulator within the corridor and provide connections to the NWTC and proposed southern transit center at Westpark. The District has committed funding for the design and construction of the transit portal passing under U.S. 59. In addition, they have stated a commitment to use TIRZ #16 programmed funds to enhance the pedestrian amenities along the corridor in support of transit and a pedestrian network.

Segment 4: All comments support the utilization of the preserved portal being constructed as part of the Westpark Toll Road project and a proposed transit center with parking facilities in the Westpark Corridor.

7.5 Study Findings

The purpose of the Uptown-West Loop Planning Study was to examine a comprehensive range of transit improvements within the study area following TEA-21 guidelines, relative to major transportation investments. The entire planning exercise was predicated on a cooperative and collaborative process whereby public agencies and the community assist in the development of a definition, general scope of potential solutions and the foundation for evaluation criteria. The planning study provides an analysis regarding the potential benefits, costs and consequences (economic, social and environmental) of alternative transportation investment strategies in the study area.

Planning studies were conducted in the other METRO Mobility 2025 corridors. Findings from all studies were used to assemble the draft system plan. Widespread outreach will solicit community feedback on the draft plan. In July 2003, METRO adopted a final transit system plan, which will include the selection of a LPIS in the Uptown-West Loop corridor.

The Alternatives Analysis – Findings Report documents the process that led to the findings submitted to METRO for assembly and inclusion in the Transit System Plan that included the selection of the LPIS in the Uptown-West Loop corridor. As required by federal project development processes, the LPIS must be included in the MTP and TIP, which are developed by H-GAC, the regional MPO. In addition, once the LPIS is documented in the Final Report, a DEIS will be prepared to fulfill the NEPA requirements for transportation improvements that require federal funds.

Four alternatives were defined in the *Uptown-West Loop Definition of Alternatives* and carried forward for detailed evaluation. Through the intermediate evaluation, Alternative 3 was eliminated. Table 7.2 provides a comparative summary of the alternatives that are presented for analysis in the draft system plan assembly phase. The summary is intended to articulate discernable characteristics and the trade-offs required by each alternative for minimizing impacts, creating operational efficiencies, and satisfying project goals and objectives. Table 7.3 describes the differences in the physical characteristics of each alternative. Reviewing the physical characteristics required by each alternative provides an understanding and context for the criteria listed in the evaluation matrix. It also begins to discern the relationship between the physical characteristics and alternative performance and cost.

Common trade-offs occur between the absolute effectiveness of an alternative as determined by such measures as environmental impacts, the amount of grade separation, demand potential, viable technologies, community impacts and the overall cost-effectiveness or financial feasibility. For instance, while one alternative might be particularly effective in meeting the transportation and land use goals of the area, the benefits it provides may be small when compared to the costs. At the same time, a different conceptual alternative might be more cost-effective, but may significantly increase the impacts to cultural resources. Community support also plays a large role when looking at the trade-offs among conceptual alternatives and will become increasingly important role in system plan assembly.

The Uptown-West Loop alternatives share many common features and attributes. Each conceptual alternative accesses and uses Post Oak Blvd. as an at-grade, in-street alignment providing access to the main activity center located in the study area. All alternatives also follow the same alignment on the southern end of the corridor, utilizing preserved ROW within a depressed section under U.S. 59 to access a proposed transit center providing connections within the U.S. 59 and Westpark corridors – where significant increases in person trips to the Uptown-West Loop area are expected. The potential transit investment along Post Oak Blvd. in terms of the quantity and location of stations and other facilities are shared among the alternatives under consideration. The proposed southern transit center, parking facilities, and other required amenities for efficient operation are also equal among the alternatives. A light maintenance/inspection facility is also required for all alternatives and included in the costs estimate. Though minor cost

Table 7.2
Evaluation Matrix

Evaluation Criteria	Alternative 1		Alternative 2		Alternative 2a	
	BRT	LRT	BRT	LRT	BRT	LRT
Estimated Capital Cost	$189 M	$245 M	$244 M	$297 M	$259 M	$313 M
Operating & Maintenance Cost Index	0.84	0.869	0.84	0.869	0.84	0.869
Demand Potential Index	100	100	94	94	94	94
Estimated Average Speed (mph)	19	19	20	20	21	21
Access Impacts to Adjacent Property	Low	Low	Low	Low	Low	Low
Potential Traffic Impacts	Low	Low	Low	Low	Low	Low
Potential Visual Impacts	Low	Low	Med	Med	High	High
Potential Noise Impacts	Low	Low	Low	Low	Low	Low
Potential Cultural Resource Impacts	High	High	Med	Med	Low	Low
System Connectivity**	**addressed during system plan assembly					

Table 7.3
Key Characteristics

Characteristic	Alternative 1	Alternative 2	Alternative 2A
	All Modes	All Modes	All Modes
Alignment Length (miles)	4.4	4.4	4.4
Number of Stations	9	8	7
Estimated ROW Requirement (acres)	28.9	28	27.4
Length of Aerial Segments (feet)	950	5544	9926
Length of Depressed Segments (feet)	0	2429	2429
Maintenance and Inspection Facilities	1	1	1
Future Transit Center	1	1	1

differences among the alternatives are realized for this facility, they are similar in terms of operation. The variations in costs for the facility reflect the differences in the alternatives' proposed fleet sizes, which are a function of the length and technology used. BRT and LRT technologies have distinctly different capacities, resulting in the need for approximately twice the number of BRT vehicles to provide similar levels of service and consistent operations.

While the conceptual alternatives share many commonalities, they differ greatly in the northern section in Segments 1 and 2. These segments use different alignments to reach Post Oak Blvd. from the NWTC. The alignments differ in terms of environmental impacts, access and transfer opportunities, community impacts and relative cost. There are no significant differences in alternative speeds, construction or traffic impacts and only minor gains in demand potential for each alternative. And, as determined through the screening process, each of the alternatives moving forward into detailed analysis and the system planning phase performs well in terms of future system connectivity, project goals and objectives.

Traffic analysis has been conducted for all three alternatives under consideration relative to alignment, operational characteristics, safety standards and transit technology in a 2025 Build and No Build condition. Generally speaking, traffic impacts were not a distinguishing characteristic among the alternatives. This is mainly due to the fact that all Uptown-West Loop alternatives share Post Oak Blvd. as a conceptual alignment where minor impacts associated with Segment 3 intersections at Westheimer and San Felipe are anticipated.

7.5.1 Alternative Technologies

The conceptual alternatives have been designed to accommodate either exclusive BRT or LRT technologies. In terms of operations, it anticipated that both technologies will have similar performance characteristics and would operate equally through the corridor relative to the alignments and system design. Major differences in the two transit technologies relative to system operating characteristics should not be significant. As defined, BRT must be convertible to LRT. Therefore, for this evaluation, guideways, alignment geometry, ROW, utility relocation, platform placement and design have been conceptually developed to accommodate a minimum requirement for the introduction of an LRT technology. Relative costs estimates for alternative comparisons have been based on these assumptions.

7.5.2 Alternative 1 – Comparative Evaluation

Conceptual Alternative 1 accommodates either BRT or LRT technologies. The attributes of Alternative 1 are characterized by at-grade in-street operation. The relative capital costs assigned to this alternative are $189 million and $245 million for BRT and LRT respectively. This alternative requires a fleet size of 13 LRT vehicles or 26 BRT vehicles (see Section 6.1.2). Alternative 1 has lower relative costs for both BRT and LRT than Alternatives 2 and 2A.

The primary difference in the cost estimate indicated for Alternative 1, when compared to the other alternatives, is reflected in the smaller quantity of grade separation required. The other alternatives being examined require significant quantities of aerial structure within the IH-610W ROW and a depressed section connecting the segment from IH-610W to Post Oak Blvd. This alternative also requires approximately one more acre of ROW be converted to transportation use. The ROW requirement includes 13 acres for a light maintenance/inspection facility and 9.9 acres for the proposed southern transit center in the Westpark corridor (common to each alternative); the balance of the ROW, 6.04 acres, is related to requirements along the exclusive guideway in Segments 2 and 3. As described in the previous section, trade-offs occur between alternatives and in-street operation presenting both positive and negative impacts. An at-grade alternative allows greater opportunity for station placement and access, potentially attracting stronger ridership. At nine stations, this alternative has the highest number of potential stations. This alignment is also overwhelmingly preferred among northern area neighborhoods. These neighborhoods have been very involved in the planning process and are sharply opposed to any aerial facilities within the vicinity of this residential area citing potential visual and noise impacts. However, a significant potential for environmental impacts, 4(f) issues, or incursions into publicly owned park properties has been identified with this alternative, posing the prospect of significant mitigation measures that may be required for the current design if a prudent alternative is available – regardless of cost. Additionally, park advocates have strongly opposed any alignment impacting park property. While supporting this transit study, they prefer an alternative that minimizes any potential for impact while maintaining future park access.

7.5.3 Alternative 2 – Comparative Evaluation

Conceptual Alternative 2 accommodates either BRT or LRT technologies. The attributes of Alternative 2 are characterized by at-grade in-street operation in Segment 1, 3 and 4, and aerial structures and a depressed section in Segment 2. The relative capital costs assigned to this alternative are $244 million and $297 million for BRT and LRT respectively. This alternative requires a fleet size of 13 LRT vehicles or 26 BRT vehicles (see Section 6.1.2). Alternative 2 has higher relative costs for both BRT and LRT than Alternative 1, but lower than 2A.

As with all the alternatives, the primary difference in the cost estimate, when compared to the other alternatives, is reflected in the quantity of grade separation required. This alternative uses some aerial structure within the IH-610W ROW between Memorial Dr. and Post Oak Blvd. A depressed section is also required linking the segment from IH-610W to Post Oak Blvd. This alternative consumes approximately one acre less of ROW than Alternative 1. Because this alignment transitions to the center of IH-610W via an aerial structure after Memorial Dr., additional ROW for Segment 2 is not required. The ROW requirement includes 13 acres for a light maintenance/inspection facility and 9.9 acres for the proposed southern transit center in the Westpark corridor (common to each alternative); the majority of the remaining ROW required is along Post Oak Blvd. for the accommodation of transit. As described in the previous section, trade-offs occur between alternatives. Alternative 2 remains at-grade along N. Post Oak Rd., avoiding aerial structures in the vicinity of residential neighborhoods. The alignment allows for a station location and access to Memorial Park. The alignment begins transitioning to the center of IH-610W on an elevated structure south of Memorial, precluding the possibility for a station until Post Oak Blvd. in the vicinity of Uptown Park Blvd. and San Felipe. At eight stations, this alternative has the second highest number of potential stations, providing access to Memorial Park and surrounding neighborhoods in the northern section of the corridor. Though not overwhelmingly preferred among northern area neighborhoods, this alternative does remain at-grade in Segment 1, running parallel to the residential neighborhood. These neighborhoods have been very involved in the planning process and are sharply opposed to any aerial facilities within the vicinity of this residential area, citing potential visual and noise impacts. This alternative remains at-grade where feasible and incorporates elevated elements when potentially advantageous. The elevated section of Alternative 2 avoids the potential for significant environmental impacts, 4(f) issues, or incursions into publicly owned park properties along the western IH-610W frontage roads. Park advocates have strongly opposed any alignment impacting park property and this alternative minimizes the potential for impact while maintaining park access. However, segments of aerial structure may have potential visual and noise impacts to the park and surrounding neighborhoods.

7.5.4 Alternative 2A – Comparative Evaluation

Conceptual Alternative 2A was conceived as a variation to Alternative 2, connecting the NWTC on a plus-two elevated platform configuration via an aerial structure to the center of IH-610W, as opposed to an at-grade platform at the NWTC. The alternative provided a variation to mitigate any potential traffic, future system connectivity or engineering constraints that might be encountered with the at-grade options.

Conceptual Alternative 2A accommodates either BRT or LRT technologies. The attributes of Alternative 2A are characterized by elevated/aerial structures in Segment 1 and 2, and a depressed section providing a connection from the IH-610W facility to the median of Post Oak Blvd. The relative capital costs assigned to this alternative are $259 million and $313 million for BRT and LRT respectively. This alternative necessitates a fleet size of 11 LRT vehicles or 22 BRT vehicles, smaller than the other alternatives (see Section 6.1.2). Alternative 2A has the highest relative costs for both BRT and LRT of the alternatives under consideration.

Due to the configuration of Alternative 2A, significant quantifies of grade separation are required, reflecting the primary cost difference when compared to the other alternatives. This alternative uses significant quantities of aerial structure within the IH-610W ROW between the NWTC and Post Oak Blvd. Additional grade separation (depressed section) is also required linking the segment from IH-610W to Post Oak Blvd. This alternative consumes slightly less ROW than Alternative 1 or 2. Because this alignment uses existing ROW in the center of IH-610W on an aerial structure beginning at the NWTC and running to Post Oak Blvd., additional ROW along Segment 1 and 2 is not required. The ROW requirement includes 13 acres for a light maintenance/inspection facility and 9.9 acres for the proposed southern transit center in the Westpark corridor (common to each alternative); the remaining ROW, 4.5 acres, is required for the accommodation of transit along Post Oak Blvd. This alignment avoids the potential for any traffic conflicts in the northern section of the corridor, and as a function of this attribute, has minor speed advantages. As with the other alternatives, this alignment has certain trade-offs. There are only seven stations incorporated into the design of this alignment. Due to the longer aerial segments of Alternative 2A, there are no stations between the NWTC and Post Oak Blvd. Speed advantages are realized and potential traffic impacts are lessened with this alternative, however, service to northern area neighborhoods and transfer opportunities, as well as service to Memorial Park, are precluded.

This alternative is not preferred by northern area neighborhood groups, Memorial Park advocates or park planners, or from other area groups wanting some benefit that a station in the northern segment would offer. Park advocates have strongly opposed any alignment impacting park property, but prefer maintaining some limited park access. Northern area neighborhoods have been very involved in the planning process and are sharply opposed to any aerial facilities within the vicinity of this residential area citing potential visual and noise impacts. These groups have been embroiled in debate with TxDOT and their plans to construct several elevated ramps impacting this area. This alternative does require an elevated facility running parallel in close proximity to residential neighborhoods. Aerial structures have potential visual impacts to the park and surrounding neighborhoods. The elevated section of Alternative 2A avoids all potential for significant environmental impacts, 4(f) issues, or incursions into publicly owned park properties along the western IH-610W frontage roads.

8.0 System Plan Issues

The findings from the Uptown-West Loop Alternatives Analysis – Draft Findings Report were used in the development of a regional System Plan. The System Plan identified a regional transit network that includes a wide array of service improvements and some AHCT services to be implemented through 2025. The development of the System Plan will build on the framework established in the 2025 Plan approved by the METRO Board in 2001, which called for an integrated regional transit system that combines bus service and facility improvements, with the need for AHCT in high travel demand corridors.

To determine which transit improvement alternatives or combination of alternatives are most suitable for AHCT, several factors were considered. These factors included: system connectivity, capital and operating costs, use of existing ROW and facilities, and potential to generate increased transit ridership.

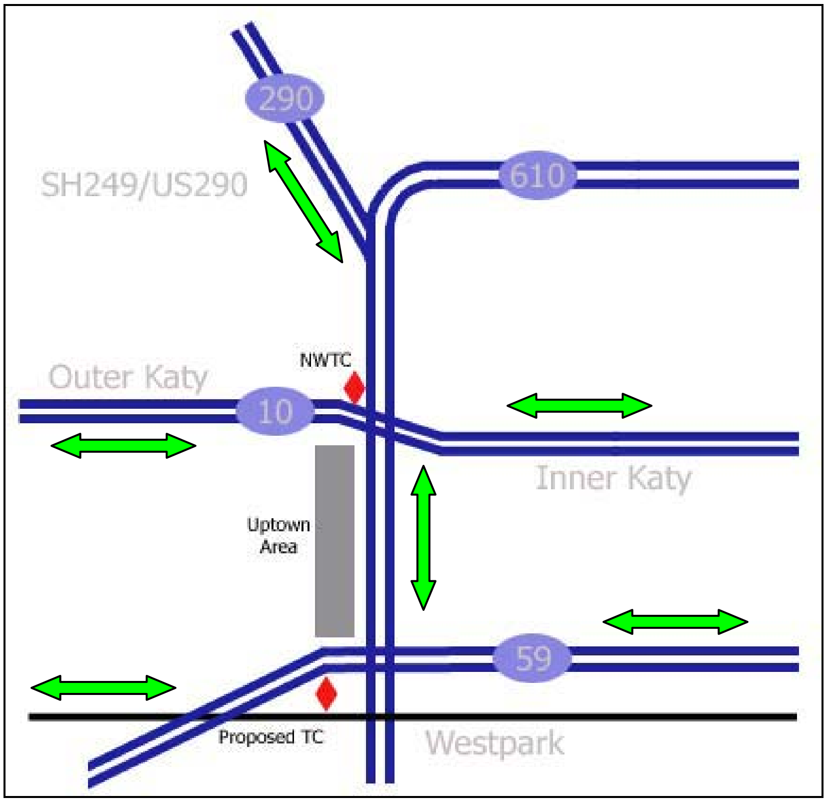
These factors were examined in three phases. Phases 1 and 2 of the development process evaluated and compared possible transit improvement alignments and technologies on an order-of-magnitude basis in each individual corridor. The evaluation criteria focused on capital and operating costs, population and employment projections, demand potential, travel times and system connectivity, economic development, and environmental fatal flaws, as well as community and agency support. The Phase 1 and Phase 2 evaluations provided the rationale for eliminating less viable alignments and technologies from further consideration and to carry forward more suitable alternatives into Phase 3.

Phase 3 evaluation determined which System Plan scenario produced the best overall systemwide results, effectively serving the Houston area and generating public support. The System Plan identified alignments, station locations, operating plans, and technologies to be used in the AHCT network, as well as the complementary improvements to METRO's bus service and facilities to support the System Plan.

8.1 System Plan Compatibility

The Uptown-West Loop study area is a key component of the existing and future regional travel network. The existing NWTC would provide convenient connections to potential east, west and northwest lines while a proposed transit center at the southern portion of the study area would provide a key access point for south and southwest lines.

FIGURE 8.1
SYSTEM CONNECTIVITY



Regional connectivity was an important need expressed by the community. For this reason, improved system connectivity was identified as a major goal of the Uptown-West Loop Planning Study and METRO Mobility 2025. As part of the system plan assembly, each alignment proposed for this corridor, as well as the other AHCT corridors, was evaluated based on improved access to existing and proposed transit services, transit centers, and park & ride facilities. This connectivity would improve the opportunity for transit patrons to transfer and access more service types and geographic locations in the service area.

9.0 Next Steps

With adoption of the System Plan, the METRO Board of Directors approved the Uptown-West Loop Locally Preferred Investment Strategy (LPIS). As part of the implementation of the approved System Plan, the Uptown-West Loop DEIS will commence in the near future. The completion of the Uptown-West Loop segment is expected in 2014.

9.1 Public Meetings

Between January and March 2003, public meetings were held and information disseminated to build awareness and to receive comments related to METRO's proposed Transit System Plan.

A summary of the System Plan public involvement activities leading up to July 2003 Board approval is provided below.

Table 9.1
System Plan Public Involvement Activities

MONTH	PUBLIC INVOLVEMENT ACTIVITY
January 2003	City of Houston and City of Southside Place Water Bill Survey; Focus Groups; Stakeholder Meetings; Public Meetings; Newsletter
February 2003	Public Meetings
March 2003	Stakeholder Briefings
April 2003	Proposed City of Houston Water Bill Survey; Draft System Plan Available for Public Review
May/June 2003	Public Meetings on the Draft System Plan; Focus Groups; Newsletter
July 2003	Final System Plan Published; METRO Board of Directors Approval

9.2 Preparation of the System Plan

Based on the technical evaluation of System Plan alternatives and the initial public input, the Draft System Plan was adopted by the METRO Board in April 2003. A series of public meetings was conducted in May and June 2003 to elicit public comments on the Draft Plan.

9.3 Adoption of System Plan and Preferred Corridor Investment Strategy

METRO's Final System Plan (METRO Solutions) was adopted by the METRO Board in August 2003.

With adoption of the System Plan, the METRO Board of Directors approved the Uptown-West Loop LPIS. The plan includes the LRT element of Alternative 2, referred to as the Uptown-West Loop LPIS.

A special election was held for approval of the METRO Solutions Plan including seeking authorization to issue bonds, notes and other obligations for implementation of the Plan and METRO's continued funding of General Mobility Projects through September 30, 2014. On November 4, 2003, Houstonians approved the METRO System Plan.

10.0 Public and Agency Involvement

This chapter describes the extensive public and agency involvement conduced for the Uptown-West Loop Planning Study. The PIP developed for the study provided the framework for all public and agency involvement activities.

The PIP was a critical activity that commenced during the scoping and project definition phase and continued throughout the planning process, enabling the public to be fully involved in the development and evaluation of the alternatives. Public involvement activities continued through system plan assembly. The plan complies with all rules and regulations set forth under the Transportation Equity Act for the 21st Century (TEA-21) and National Environmental Policy Act of 1969, as amended (NEPA).

Throughout the duration of the AA phase of the Uptown-West Loop Planning Study, the project team has performed extensive public involvement, endeavoring to create a climate for the open exchange of ideas and views. A variety of outreach and communications strategies were employed to engage the public and facilitate discussion with citizens, interested community, business, and environmental groups, elected and appointed officials, agencies and jurisdictions, tasks forces, and minority populations. The PIP ensured that all issues were addressed and presented to the general public before key project decisions were made. Public participation activities were scheduled to ensure that public input was received before related technical work was conducted.

The PIP was structured to collect information from many different audiences. Public comments were received and documented throughout the planning process. Additionally, the public was provided opportunities to request information about, or comment on the project by way of correspondence, e-mail, a project website (www.uptownwestloop.org), community, scoping and public meetings, working group sessions, other agencies and key stakeholders, and special outreach efforts, as well as newsletters, fact sheets, visual materials, and media advisories (see Table 10.2 - Public Involvement Program Activities).

10.1 Agency Coordination

Agency coordination continued throughout the Uptown-West Loop Planning Study process involving coordination with local, state and federal agencies. Agency coordination included agency interviews prior to scoping, a pre-scoping meeting, a formal scoping meeting, public involvement working group meetings (PIWG), as well as ongoing meetings with TxDOT, H-GAC and others. Agency coordination was intended to provide METRO with an overview of agency concerns in the corridor. Project staff continued to coordinate with agency representatives as the project advanced.

An Interagency Steering Committee was formed consisting of representatives from various federal, state and local governmental agencies. The Steering Committee provided technical guidance and information as the study progressed. It was extremely important that any improvements examined for the Uptown-West Loop Planning Study were compatible with other agency plans.

Specific agency participation was necessary for the successful development and evaluation of Uptown-West Loop conceptual alternatives. The timing was very important because at the time, TxDOT was in final design for the reconstruction of IH 610W and IH 10. The TxDOT project has since commenced and is underway. Their participation and input was an integral component of the development and review process for the alternatives considered. METRO also maintained agreements with TxDOT for the preservation of alignments so as not to preclude the analysis of viable alternatives occurring in TxDOT ROW.

The City of Houston Parks and Recreation Department also provided important input into the process. The City of Houston maintains park properties that affected the evaluation of two alternatives that were considered. Potential impacts by the alternatives on significant publicly-owned parks and recreational land as cultural resources was identified in the AA. Both Section 4(f) of the U.S. Department of Transportation (DOT) Act of 1966 and the Texas Parks and Wildlife Codes apply to publicly owned parks and recreational space. Additional agency participation, as it related to scoping, is described in Section 10.2.1.

10.2 Public and Agency Participation

The public involvement program included formal scoping meetings (5 sessions), stakeholder identification and interviews, stakeholder briefings (4 meetings), public information meetings (4 meetings), agency steering committee meetings (2 meetings), informal public/stakeholder meetings (25 throughout the corridor), newsletters (2), updates, and project information available in a variety of media (website, oral, written and internet feedback form). Table 10.1 summarizes the various types of meetings that were undertaken at key milestones during the AA phase of the Uptown-West Loop Planning Study.

Table 10.1
Summary of Public and Agency Meetings

Meeting Type	Date and Time	Location	Purpose
Stakeholder Advisory Committee Meeting #1	January 31, 2002 5-6:30 p.m.	Williams Tower Mezzanine Level Houston, TX 77056	To brief SAC on project scope and solicit input
Public Scoping Meeting #1 Public Scoping Meeting #2	February 12, 2002 Meeting #1: 11a.m.-2 p.m. Meeting #2: 6-8 p.m.	J.W. Marriott Hotel Exhibition Center Houston, TX 77056	To solicit input on project scope and identify issues of concern to citizens and groups
Agency Scoping Meeting & Public Open House	February 27, 2002 Agency Scoping Meeting: 3-5 p.m. Public Open House: 5-7 p.m.	Houston-Galveston Area Council 2nd Floor Houston, TX 77027	To solicit input on project scope and identify issues of concern to citizens and groups The open house was held to brief concerned citizens and groups on the project scope and to solicit input
Public Information Meeting #1 Public Information Meeting #2	February 21, 2002 Meeting #1: 11 a.m.-2 p.m. Meeting #2: 5-7 p.m.	Williams Tower Mezzanine Level Houston, TX 77056	To brief citizens, agencies and concerned groups on project status and solicit input on the Long List of Conceptual Alternatives
Stakeholder Advisory Committee Meeting #2	May 16, 2002 5:30-7:00 p.m.	Williams Tower Mezzanine Level Houston, TX 77056	To brief SAC on project status, screening of conceptual alternatives and solicit input
Public Information Meeting #3	June 13, 2002 5:00-8:00 p.m.	St. Martins Episcopal Church Bagby Parish Hall 717 Sage Road Houston, TX 77056	To brief citizens, agencies and concerned groups on project status and solicit input on screening of conceptual alternatives
Stakeholder Advisory Committee Meeting #3	July 25, 2002 5:30-7:00 p.m.	Williams Tower Mezzanine Level Houston, TX 77056	To brief SAC on project status and solicit input on Short List of Conceptual Alternatives
Public Information Meeting #4	October 24, 2002 5-7:30 p.m.	St. Martins Episcopal Church Bagby Parish Hall 717 Sage Road Houston, TX 77056	To brief citizens, agencies and concerned groups on project status and solicit input on Short List of Conceptual Alternatives

Table 10.2 summarizes the wide range of activities and materials used to involve the general public and agencies to solicit input at key milestones during the Uptown-West Loop Planning Study.

Table 10.2
Public Involvement Program Activities

Activity	Summary of Key Elements or Features
Project Email *uptown-westloop@ridemetro.org*	∉ Received numerous emails throughout the project ∉ Most were requests to be added to the mailing list ∉ Significant number of emails were dedicated to voicing an opinion on a particular alternative being considered
Project Website *www.uptownwestloop.org*	∉ Includes project publications, maps, materials for download and general project information ∉ Provides overview of project and project schedule ∉ Identifies the alternatives and technologies being considered ∉ Provides comment area ∉ Provides links to other METRO Mobility projects and www.ridemetro.org, the METRO website ∉ Identifies opportunities to get involved with the study ∉ As of December, 2002 – Website received: Page Views: 13,790; Sessions: 7,172
Comment Cards	∉ Designed for specific meetings to ensure they were attributed to the correct event and documented in the appropriate context ∉ Designed to elicit as much information as possible for accurate input into comments database ∉ Available at all public meetings ∉ Received numerous cards at public meetings and after meetings by mail
Databases	∉ Designed to synchronize with other project databases to build one central database for METRO ∉ Used to categorize comments and document information from people involved or wishing to become involved in the study ∉ Over 1,400 entries (mailing addresses and comments) made since project inception
Meetings with Agencies, Task Forces, and Key Stakeholder Groups	∉ Held to solicit input, provide project updates and address relevant issues ∉ Held frequently to keep interested agencies and others up-to-date at key decision points ∉ 5 Scoping Sessions ∉ 25 Key Stakeholder meetings throughout

	the corridor
Stakeholder Identification	∉ Used to identify those who would potentially be most affected ∉ Employed various sources including the City of Houston, TxDOT, METRO, H-GAC, local businesses and others
Stakeholder Advisory Committee (SAC)	∉ A group of key stakeholders representing a group or interest in the study area ∉ Meet regularly to discuss project status, updates and issues ∉ Pivotal in helping the project team understand the issues of residents and businesses in the study area ∉ Meetings held in a central part of the study area ∉ 5 SAC meetings to date
Public Meetings/Open Houses	∉ Held regularly to solicit input from the public at-large and to inform about project status, updates and issues ∉ Held in a convenient, easily accessible location in the project area ∉ 4 Public Information meetings to date
Coordination with Agencies	∉ Met regularly with agencies to update on project status, solicit input and inform about key issues ∉ Helped to keep affected agencies up-to-date ∉ Useful in building rapport and avoiding potential conflicts
Newsletters	∉ Used to provide project status and key information at major milestones ∉ Announced time, date and location of upcoming public meetings and opportunities to participate in the project ∉ Mailed to residents, businesses, elected officials and agencies ∉ 3 newsletters distributed to over 4,500 people
Post Card Meeting Notification	∉ Mailed to inform public of upcoming meetings and opportunities to comment on the study ∉ Mailed to over 1,000 parties in the study area
Media and Public Relations	∉ Newspaper and other printed media ∉ Announced time, date and location of meetings

10.2.1 Public and Agency Scoping Meetings

Public Meetings

On January 9, 2002, a Notice of Intent was published announcing METRO's intent to prepare an Environmental Impact Statement (EIS) in the Federal Register, Vol. 67, No. 6, and in local publications. The publications corresponded with the implementation of METRO Mobility 2025, a long-term plan to improve transportation efficiency and effectiveness throughout the Houston region. Both the plan and the federal environmental regulations direct that the process begin with a scoping effort in order to solicit agency and public comment on potential transportation improvements and alternatives. The major focus of the scoping process for the Uptown-West Loop corridor was the timely distribution of information to the public. To that end, METRO staff maintained a web page featuring links to the METRO Mobility 2025 planning studies. METRO staff was also accessible by e-mail and telephone during the scoping process. For a limited time, a scoping announcement flyer was distributed on all METRO buses, and there was a report on METRO on public television inviting the public to the scoping meetings. The culmination of the scoping process was a series of public meetings held during February 2002. Table 10.1- Summary of Public and Agency Meetings, lists the dates, times and locations of the scoping meetings.

Agency Meetings:

While the general public was invited to both types of meetings, the agency scoping meeting was intended to be a formal opportunity for regulatory agencies to respond to the idea of a proposed transit investment and express issues of concern within certain corridors. The following agencies sent representatives to attend the agency scoping meeting:

- City of Houston (planning, parks, public works, air quality, transportation programming)
- Federal Highway Administration
- Federal Aviation Administration
- Federal Transit Administration
- Harris County
- Harris County Tollroad Authority
- Harris County Flood Control District
- Houston-Galveston Area Council
- Houston-Harris County Agency on Aging
- Houston Airport System
- Houston Archeological and Historical Commission
- Houston Police Department

- Texas Department of Transportation
- Texas General Land Office
- Texas Historical Commission
- Texas Natural Resource Conservation Commission
- Texas Parks and Wildlife
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- U.S. Environmental Protection Agency

The purpose of the meeting was to establish early coordination and opportunities for agency input into the planning process. The representatives were given overviews of previous scoping activities and the responses received, and more specific details pertaining to each corridor were briefly presented. Agency representatives were then invited to comment on issues of special concern within each corridor. METRO staff recorded the comments and separated them by issue and corridor for distribution to each corridor's planning team. Agency comments and responses were used along with other transportation and environmental data and analysis collected during scoping to assist in the development of alternatives and the evaluation process. Agency representatives generally responded favorably towards the development of transit investments in the study area. Agency representatives stated that the following issues are of special concern:

- Air quality
- Subsidence and drainage
- Flooding
- Hurricane evacuation routes
- Long range demographics, with particular emphasis on the elderly population
- Accessibility
- Data collection and interpretation
- A variety of commute patterns (e.g., suburb to suburb travel)
- Historic resources

10.2.2 Public Information Meetings

Four public information meetings were held during the AA phase of the Uptown-West Loop Planning Study. The public information meetings were designed to inform and involve members of the general community in the study process at significant milestones. The main goal for the public meetings was to foster valuable two-way communication between the study team and members of the community.

The meetings were held in central locations, accessible by bus and by persons with disabilities. The meeting formats consisted of open houses and presentations followed by a workshop style question and answer and comment session. Mounted displays were arranged around the meeting room so that people could circulate and absorb information prior to, or following, the presentation. Project staff answered questions and recorded comments.

10.2.3 Stakeholder Advisory Committee

The Stakeholder Advisory Committee (SAC) was comprised of 62 representatives from key neighborhood associations and agencies within the project area. The SAC complemented the larger scale public outreach meetings. Their input was critical in refining many of the ideas and solutions presented and in the screening of the alternatives.

10.2.4 TMA Coordination

The project team coordinated with transportation management associations (TMA) and providers, such as Trip Reduction Efficiency Council (TREK), to solicit and share information on access, facility and distribution/collection requirements.

10.2.5 Public Involvement Working Group

The PIWG, made up of members from the consultant teams, TxDOT, H-GAC and METRO, was formed to maintain agency communication among project teams and to share ideas about what worked best in terms of public involvement and outreach. Meeting monthly, the PIWG shared information and strategy on past and future outreach efforts and assessed the effectiveness of efforts of the past in order to improve upon outreach in the future. Working closely together, the PIWG has successfully demonstrated the value of idea exchange and strategy development in order to communicate the goals of METRO and the Uptown-West Loop Planning Study to the public at large.

10.2.6 Coordination with Existing, Planned and Proposed Developments

The project team coordinated activities with planned and proposed developments within a 1,500-foot walking distance of potential alignments. The team met with developers, management districts, property owners and/or tenants to assess potential impacts of planned development.

10.3 Communications

10.3.1 Communications During Scoping

The following is a summary of the main themes and key issues derived from the public and agency scoping phase of the Uptown-West Loop Planning Study:

Issues

- Provide service and connections to the rest of the region
- The study should address short-term traffic and mobility issues
- The study should consider the land use and transportation relationship and factor transit-oriented development and induced growth, as part of the analysis

Environmental

- Memorial Park land should be preserved, however, transit connections to the park and rest of the city would be beneficial
- Negative impacts should be considered in the analysis including noise, aesthetics, environmental justice/community cohesion, and construction

Mobility/Connectivity

- The analysis should consider how this corridor and any prescribed alternatives are integrated into the larger context of the region; without connecting linkages, this study may be of limited use. Consider linkages to:
  - High capacity transit corridors under study
  - Inner-Katy corridor
- The planning effort should not be conducted in a vacuum; rather, inclusive of other planning activities occurring regionally
- Multi-modal concepts should be explored
- Integrate existing and planned transit center facilities into study effort
- Proposed improvements should integrate pedestrian and bicycle facilities

  <u>Other transit issues:</u>
  - The analysis must consider how pervasive traffic issues will impact any transit improvements; and how any transit solution may impact traffic
  - Interim improvements should be considered
  - Address freight railroad impacts on local traffic
  - This exercise should consider the input and efforts of past studies, but not be a repeat of past studies after which little improvement occurred. The study should not be duplicative of any current studies, e.g., the Westheimer Traffic Study

Economic

- The analysis should not rely solely on growth projections provided by others but include potential economic development that might be induced by specific types of transit investments

Corridor Specific Issues

- The IH-10 expansion project directly impacts the northern portion of the corridor. The expansion project detracts from considered alternatives and improvements
- Recommendation that a transit advocacy group should be formed for the study area to ensure that the LPIS goes forward and receives funding; this structure has proven politically effective in other districts
- Underground or below grade technologies should be considered
- Alternatives should not infringe on Memorial Park (park property is located on both sides of IH-610W)
- The prevalence of non-home based traffic, due to the various office, hotel, retail and entertainment sites is unique to this corridor

10.3.2 Communications During Evaluation Phase

Numerous opportunities were provided to engage the public in discussions of mobility improvements for the Uptown-West Loop study area. More than 360 people attended public information meetings and participation in the SAC was high. Other outreach included conducting key stakeholder meetings and presentations to civic clubs and interested groups such as the Galleria Chamber of Commerce. Input from the stakeholders and general public was incorporated into the evaluation of alternatives. Their concerns were addressed by modifying elements of the alternatives or determining that certain alternatives generated environmental or community impacts that could not be easily mitigated and should be dropped. Over 475 individuals submitted comments through the Uptown-West Loop Planning Study website (www.uptownwestloop.org), project e-mail, letters and comment cards. A summary of written and oral comments follows:

Screening of the Long List of Conceptual Alternatives
Comments received during the screening of the long list of reasonable alternatives shared several themes. Many attendees voiced support for METRO and for the process allowing opportunity for their input and for their concerns to be heard. With the description of the screening process provided, attendees understood how non-performing alignments would be eliminated from further consideration.

During this phase of screening, the vast majority of respondents voiced concern over alignments using Sage Rd. and Chimney Rock. There was general consensus that any preferred alignment should steer away from predominately single family neighborhoods with limited ROW available for transportation improvements.

In all venues where the conceptual alternatives were presented, there was an overwhelming opposition to any alignment using aerial structures in the vicinity of residential neighborhoods. Especially in the northern segment of the corridor, residents felt that elevated structures eliminate any transit benefit for the community while forcing neighborhoods to absorb all negative impacts associated with the project such as noise, visual, construction, and safety impacts. Generally, meeting attendees were in favor of the typical sections depicting an alternative running in the median of N. Post Oak Rd.

Regional connectivity was a major concern. Participants felt that any planning effort or transit project should be examined in the broader context of the region. Statements were offered that this corridor would not be successful without meaningful connections to other major activity centers within the region.

Concerns expressed in the written comments also included potential impacts of the project on traffic in the Uptown-West Loop study area, increased traffic congestion near intersections, pedestrian access and safety, impacts on property value, making the system useful to study area residents, and environmental impacts on Memorial Park. Questions and comments were fielded on the technologies be considered including noise and air quality.

Evaluation of the Short List of Conceptual Alternatives

Comments received during the preparation and presentation of the short list of conceptual alternatives shared many commonalities. Residents generally favored improving mobility and access in the Uptown-West Loop study area and believed there was a real need for AHCT in the Houston region. However, METRO must address the larger context of the region when considering transit by providing regional connectivity. Any transit investment should be examined in the broader context of the region.

The vast majority of comments received were from S. Post Oak Ln. area residents who felt that the Woodway Dr./S. Post Oak Ln. segment of Alternative 3 was flawed. Potential impacts to their neighborhood included the deterioration of traffic LOS due to a reduction in capacity because of minimal ROW. Other potential impacts to S. Post Oak Ln. included visual and noise impacts, which would be a detriment to the low-density character of the neighborhood. The elimination of an alignment using S. Post Oak Ln. was announced at a public meeting held on October 24, 2002.

Concerns voiced at meetings or by written correspondence also included impacts of the project on traffic in the Uptown-West Loop corridor, increased traffic congestion near intersections, pedestrian access and safety, impacts on property value, including ridership analysis, and environmental impacts on Memorial Park. Numerous questions were asked regarding BRT and LRT technologies.

Oral and written comments regarding impacts to Memorial Park were received. The City of Houston Parks and Recreation and Memorial Park Conservancy voiced strong concern about the potential for park impacts associated with the at-grade alternatives. They expressed strong support for transit and enhanced access to the park. They favored alternatives with least potential for park impacts.

10.3.3 Comment Summary Matrix

The Comment Summary Matrix is the product of a specific query made to the Comment and Participant Database that was updated and regularly maintained during the course of the Uptown-West Loop Planning Study. A record of public comments was maintained by the project team to provide input to the analysis of alternatives. The summary is a cumulative collection of comments accessible by various comment fields and entries. The full Comment Summary Matrix is available in Technical Report H.

Comment and Participant Database

The project team maintained a database of elected and appointed officials, agencies at the federal, regional, state and local levels; interested parties; individual stakeholders (business or resident) and groups; civic associations; and developers. The database included the following information: first name, last name, title, street, city, state, zip code, company, affiliation, source, telephone number, facsimile number, e-mail address, recipient of specific documents e.g., Notice of Intent (NOI), invitation to meetings, and comment during scoping, public meetings, public hearings and AA circulation. Individuals and groups listed in the distribution database received printed project-related materials and notices.

Glossary of Abbreviations

The following is an alphabetical list of abbreviations commonly used by METRO and throughout the Alternatives Analysis Report:

- AA – Alternatives Analysis
- ADT – Average Daily Trips
- AGT – Automated Guideway Transit
- AHCT – Advanced High Capacity Transit
- APE – Area of Potential Effect
- BRT – Bus Rapid Transit
- CBD – Central Business District
- CIP – Capital Improvement Plan
- COHGIS – City of Houston Graphic Information Database
- DEIS – Draft Environmental Impact Statement
- DPI – Demand Potential Index
- EIS – Environmental Impact Statement
- EPA – United States Environmental Protection Agency
- FEIS – Final Environmental Impact Assessment
- FEMA – Federal Emergency Management Agency
- FHWA – Federal Highway Administration
- FTA – Federal Transit Administration
- GIS – Geographic Information System
- GPC – General Planning Consultant
- HBW – Home Based Work (Trips)
- H-GAC – Houston-Galveston Area Council
- HOV – High Occupancy Vehicle
- IAH – George Bush Intercontinental Airport
- ISC – Interagency Steering Committee
- ITS – Intelligent Transportation System
- LOS – Level of Service
- LPIS – Locally Preferred Investment Strategy
- LPST – Leaking Petroleum Storage Tank
- LRT – Light Rail Transit
- LUST – Leaking Underground Storage Tank
- METRO – Metropolitan Transit Authority of Harris County
- MPO – Metropolitan Planning Organization
- MTP – Metropolitan Transportation Plan
- NEPA – National Environmental Policy Act of 1969, as Amended
- NHPA – National Historic Preservation Act
- NOI – Notice of Intent
- NWI - National Wetland Inventory
- NWTC – Northwest Transit Center

- PE – Preliminary Engineering
- PIP – Public Involvement Plan
- PIWG – Public Involvement Working Group
- PST – Petroleum Storage Tank
- PTC – Potential Transit Center
- RCRA - Resource Conservation and Recovery Act
- RCTSS – Regional Computerized Traffic Signal System
- ROW – Right of Way
- SAC – Stakeholder Advisory Committee
- SPILLS - Database Maintained By TCEQ
- TAC – Technical Advisory Committee
- TAZ – Traffic Analysis Zone
- TEA-21 – Transportation Equity Act for the 21st Century (1998)
- TC – Transit Center
- TCEQ – Texas Commission on Environmental Quality
- THC – Texas Historical Commission
- TIP – Transportation Improvement Plan
- TIRZ – Tax Increment Reinvestment Zone
- TMA – Transportation Management Association
- TPWD - Parks & Wildlife Department
- TRC – Texas Railroad Commission
- TREK – Trip Reduction Efficiency Council
- TxDOT – Texas Department of Transportation
- UPRR – Union Pacific Railroad
- U.S. DOT – United States Department of Transportation
- USACE – United States Army Corps of Engineers
- VCP – Voluntary Cleanup Program

www.uptownwestloop.org