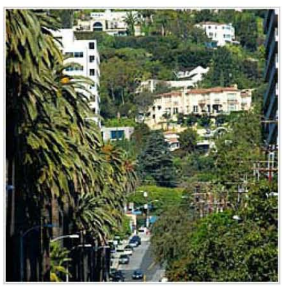

Connecting Los Angeles
BEVERLY DR
Rodeo Dr
The Beverly Hills
PASADENA
LONG BEACH



WESTSIDE EXTENSION TRANSIT CORRIDOR STUDY

Project No. PS-4350-2000

Task 7.1
Deliverable (47d)
Final Alternatives Analysis Report

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PREFACE

Context of the Alternatives Analysis

The Metro Westside Extension has been an integral element of local, regional and federal transportation planning since the early 1980s. Extending westward from the Los Angeles Central Business District (CBD), the Westside Extension has been the subject of in-depth technical studies and extensive community involvement during this period. Ultimately, the transit investment has been envisioned to extend toward Beverly Hills, Century City, Westwood (UCLA), West Los Angeles, and Santa Monica.

In the early 1990s, plans were underway to extend the Metro Red Line to the west. Construction was already underway on the Metro Red Line from Union Station to Westlake/MacArthur Park, to Wilshire/Western Station, and to Hollywood/Vine Station. The new planning effort examined options detouring to the south of Wilshire Boulevard to avoid the federally prohibited methane gas hazard zone; a zone that was designated in 1985 after naturally occurring methane gas caused a fire in the Fairfax District. The planning for subway in this corridor was later suspended in 1998 due to a ballot initiative that prohibited subway funding and planning began on the development of a Westside Bus Rapid Transit system. This led to the Wilshire Bus Lane Demonstration Project, which operated successfully for three years but was never fully implemented due to community opposition.

At the request of Metro and the City of Los Angeles, the American Public Transportation Association (APTA) organized a Peer Review Panel of experts to reconsider the feasibility of Westside Corridor tunneling along the federally precluded Wilshire Boulevard segment in October 2005. The panel evaluated advances in worldwide tunneling technology and the safety of building and operating transit tunnels in the identified hazard zone along Wilshire Boulevard. The panel concluded that advances in tunneling technology and practice in the past 20 years would now permit that such tunneling would be feasible and could be undertaken at no greater risk than other subway systems in the United States. As a result, legislation was introduced in Congress to repeal the federal prohibition on subway construction along Wilshire Boulevard. The repeal of the prohibition was passed by Congress in 2007 and enacted into law in 2008.

In July 2006, the Metro Board of Directors authorized the resumption of an Alternatives Analysis study for all reasonable fixed guideway transit alternatives for the portion of the Westside Corridor north of the Exposition Corridor. Based on the findings of the APTA Peer Review Panel, the Board authorized the consideration of all reasonable alternatives for the Westside Extension Transit Corridor, including the previously excluded subway alternatives. An Early Scoping Notice to resume the Alternatives Analysis Study was issued by Metro and the Federal Transit Administration on October 1, 2007.

Purpose of the Alternatives Analysis Report

The purpose of the Alternatives Analysis Report is to focus on a specific transportation need (or set of needs) in a given corridor, identify alternative actions to address these needs, and generate the information needed to select a preferred project for implementation, or a smaller set of viable alternatives for further study. An Alternatives Analysis typically addresses such issues as costs, benefits, environmental and community impacts, financial feasibility, and community acceptance.

The Alternatives Analysis is the first step in the Federal Transit Administration's New Starts Project Planning and Development process. During the Alternatives Analysis process, a wide range of alternatives are identified and evaluated, the alternatives are screened against established criteria, and the most promising alternative(s) is (are) recommended for further evaluation in the next phase of the New Starts process.

Organization of the Alternatives Analysis Report

The Alternatives Analysis Report begins with a summary of the information contained in the entire report. The remainder of the report is organized into eight chapters:

- Executive Summary
- Chapter 1.0: Purpose and Need
- Chapter 2.0: Alternatives Considered for Early Scoping
- Chapter 3.0: Environmental Issues
- Chapter 4.0: Tunnel Feasibility Review
- Chapter 5.0: Urban Design
- Chapter 6.0: Financial Analysis
- Chapter 7.0: Comparative Analysis of Alternatives
- Chapter 8.0: Public Involvement Process and Agency Coordination and Consultation

Los Angeles County
Metropolitan Transportation Authority

LOS ANGELES WESTSIDE EXTENSION TRANSIT CORRIDOR ALTERNATIVES ANALYSIS STUDY

> Executive Summary
January 2009

Introduction

The Metro Westside Extension has been an integral element of local, regional, and federal transportation planning since the early 1980s. Extending westward from the Los Angeles Central Business District (CBD), the Westside Extension has been the subject of in-depth technical studies and extensive community involvement during this period. Ultimately, the transit investment has been envisioned to extend toward Beverly Hills, Century City, Westwood (UCLA), West Los Angeles, and Santa Monica.

In the early 1990s, plans were underway to extend the Metro Red Line to the west. Construction was already underway on the Metro Red Line from Union Station to Westlake/MacArthur Park, to Wilshire/Western Station, and to Hollywood/Vine Station. The new planning effort to avoid the federally prohibited methane gas hazard zone—a zone that was designated in 1985 after naturally occurring methane gas caused a fire in the Fairfax District—examined options detouring south of Wilshire Boulevard. The planning for a subway in this corridor was later suspended in 1998 due to a lack of funding, including a ballot initiative that prohibited local funds from being used for subway construction. Planning began on the development of the Exposition Line and a Westside Bus Rapid Transit system instead. A Wilshire Bus Lane Demonstration Project operated successfully for three years from 2003 to 2006 and is now being developed as a separate project.

In October 2005, at the request of Metro and the City of Los Angeles, the American Public Transportation Association (APTA) organized a Peer Review Panel of experts to reconsider the feasibility of tunneling along the federally precluded Wilshire Boulevard segment of the Westside Corridor. As a result of this review (which concluded that tunnels can be safely constructed and operated in the Wilshire Boulevard corridor), legislation was approved in Congress repealing the federal prohibition on subway construction along Wilshire Boulevard in December 2007.

In July 2006, the Metro Board of Directors authorized an Alternatives Analysis (AA) Study for all reasonable fixed-guideway transit alternatives, including the previously excluded subway alternatives, for the portion of the Westside Corridor north of the Exposition Corridor. An Early Scoping Notice to start the AA Study was issued by Metro and the Federal Transit Administration (FTA) on October 1, 2007.

Alternatives Analysis Study Purpose

An Alternatives Analysis is the first step in the FTA's New Starts Project Planning and Development process. The purpose of an AA Study is to focus on a specific transportation need (or set

Metro

U.S. Department of Transportation
Federal Transit Administration

of needs) in a given corridor, identify alternative actions to address these needs, and generate the information needed to select a preferred project for implementation, or a smaller set of viable alternatives for further study. During the AA process, a wide range of alternatives were identified and evaluated; the alternatives were screened against established criteria; and the most promising alternative(s) will be recommended for further evaluation in the next phase of the New Starts process. An AA typically addresses such issues as costs, benefits, environmental and community impacts, and financial feasibility.

Alternatives Analysis Study Recommendations

The AA evaluated a universe of alternatives within the Westside Extension Transit Corridor (Figure S-1). The Westside Extension Transit Corridor Study Area is in western Los Angeles County and encompasses approximately 38 square miles. The Study Area is east-west oriented and includes portions of five jurisdictions: the Cities of Los Angeles, West Hollywood, Beverly Hills, and Santa Monica, as well as portions of unincorporated Los Angeles County near the West L.A. Veteran's Administration Hospital. As illustrated in Figure S-1, the boundaries of the Study Area generally extend north to the base of the Santa Monica Mountains along Hollywood, Sunset, and San Vicente Boulevards, east to the Metro Rail stations at Hollywood/Highland and Wilshire/Western, south to Pico Boulevard, and west to the Pacific Ocean.

Figure S-1 also illustrates the more than 17 different alignments that were considered in the AA Study for several transit modes. After a multi-step evaluative process—which screened the alternatives against a wide range of criteria—the universe of alternatives was reduced to a set of the five most promising alternatives. This set of five alternatives was then evaluated on a more detailed level and further reduced to the two alternatives—Alternatives 1 and

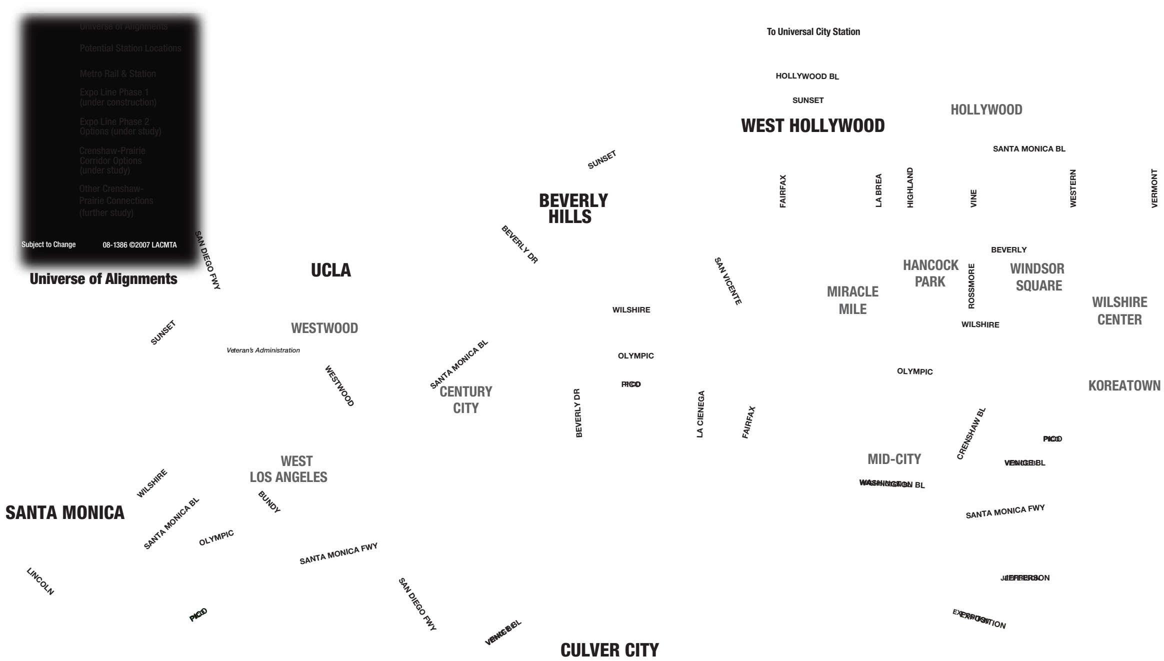


Figure S-1 Westside Extension Study Area Universe of Alternatives

11—that are being recommended for further environmental review in the next phase of the New Starts process.

Wilshire Boulevard Alignment Heavy Rail Transit (HRT) Subway (Alternative 1)—Extends from the Metro Purple Line Wilshire/Western Station to 4th Street and Wilshire Boulevard in Santa Monica underground with 10 stations and 1 optional station (Figure S-2).

Wilshire/Santa Monica Boulevards Combined HRT Subway (Alternative 11)—Includes the full Wilshire Boulevard HRT Subway and adds a second line extending west from the Metro Red Line Hollywood/Highland Station via Santa Monica Boulevard to join the Wilshire Line in Beverly Hills. The total combined line is 17 miles long and includes 14 stations and 1 optional station (Figure S-3).

Westside Extension Study Corridor and Metro System Connections

The proposed Westside Extension would complement and extend the existing Metro transit system (Figure S-4). Since 1990, Metro has constructed a regional fixed-guideway transit system that consists of HRT, light rail transit (LRT), bus rapid transit (BRT), and commuter rail. This system currently includes more than 73 miles of Metro Rail (HRT and LRT) service and 14 miles of BRT service. In addition, the Southern California Regional Rail Authority (Metrolink) has opened more than 500 miles of Metrolink commuter rail lines serving five counties.

The existing fixed-guideway transit service in the region is complemented by the transit corridors currently under study, including: Westside, Canoga BRT, Crenshaw, Regional Connector, Gold Line Eastside Phase 2, and Mid-City/Exposition Phase 2. The Westside Extension Study Corridor would provide direct connections from the Westside of the County to all of the elements

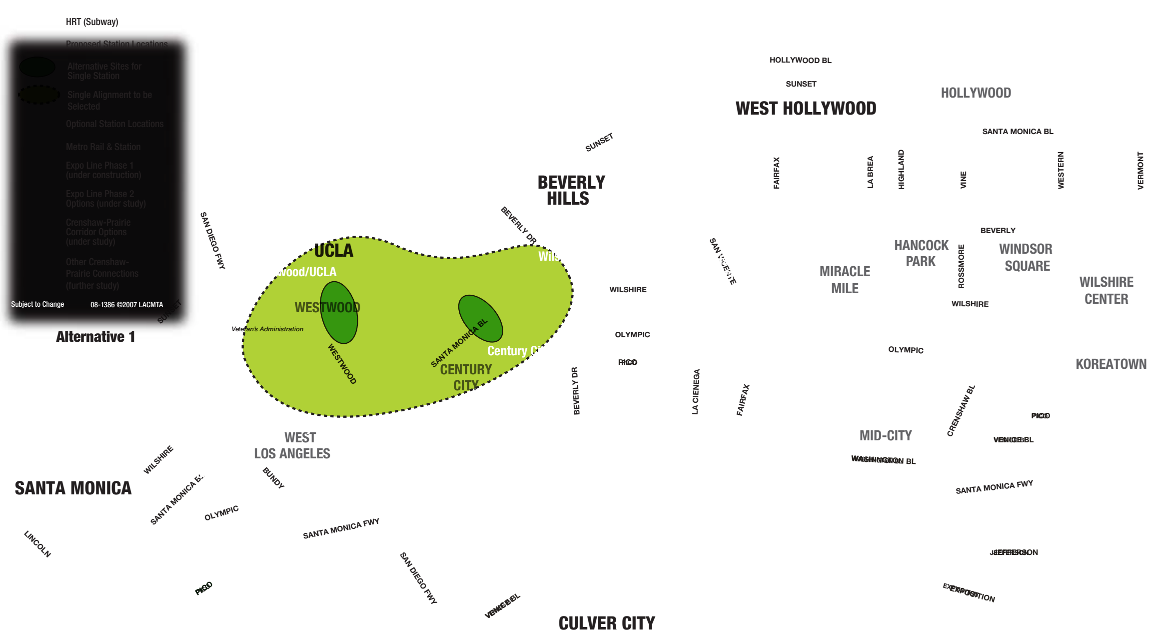


Figure S-2 Alternative 1

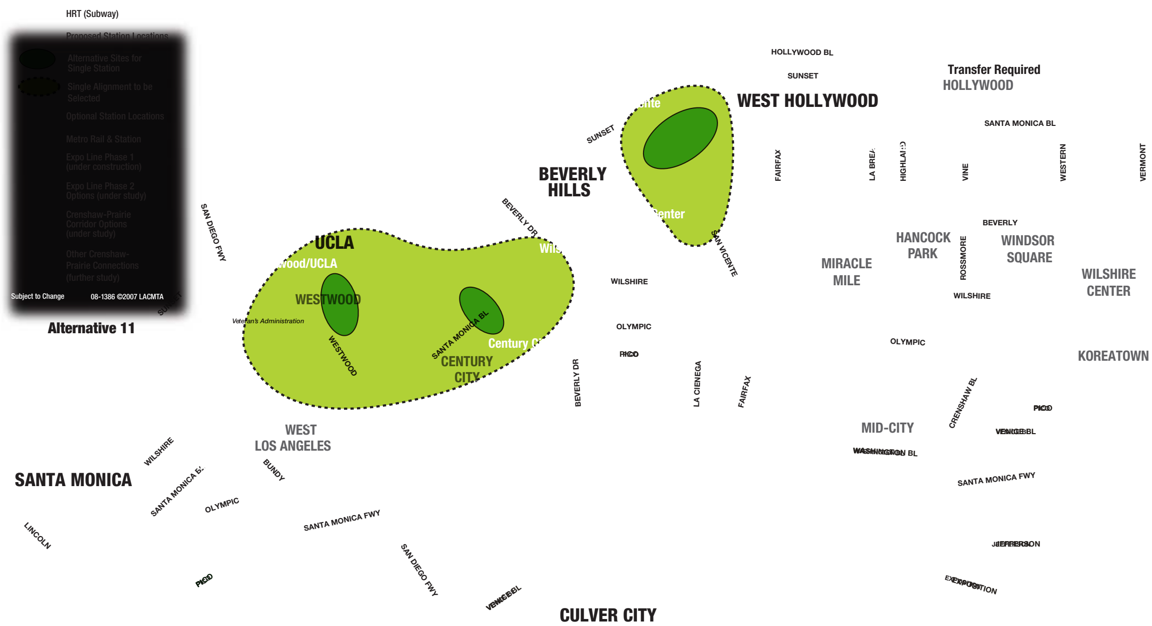


Figure S-3 Alternative 11

of the existing Metro System (Table S-1 in Section S.2, Need for Transit Improvements, lists the growing network of transit in Los Angeles County).

Organization of the Summary

This Summary provides a synopsis of the AA Study, with the following sections:

- S.1 – First Step in Planning Process
- S.2 – Need for Transit Improvements
- S.3 – Early Scoping Meetings
- S.4 – Initial Definition of Alternatives
- S.5 – Evaluation Criteria Used for Screening Alternatives
- S.6 – Initial Screening of Alternatives
- S.7 – Screening of Most Promising Alternatives
- S.8 - Issues to be Resolved in the Environmental Impact Report/Environmental Impact Statement (EIR/EIS)
- S.9 – Tunnel Feasibility Assessment
- S.10 – Station Planning and Urban Design Concepts
- S.11 - Public Involvement
- S.12 - Results of Detailed Evaluation
- S.13 - Recommendations of the AA Study

Figure S-4 Westside Extension Study Corridor and Metro System Connections

Map shows how the proposed Westside Extension would compliment and extend the existing Metro transit system, as well as the five-county Metrolink Commuter rail system. The Expo Line and Gold Line Eastside Extension are currently under construction.

S.1 First Step in the Planning Process

The AA Study represents the first step of a multi-year process that is required to complete the planning, design, and construction of a project of this magnitude. Figure S-5 depicts the major steps that are involved in this process.

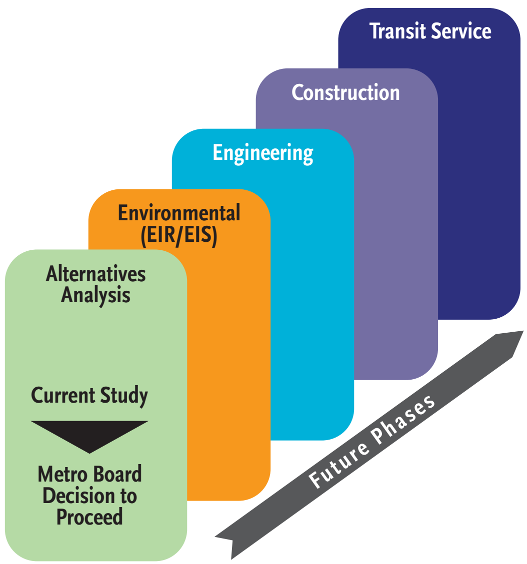


Figure S-5 Steps in Planning Process

The **Alternatives Analysis (AA)** step focuses on a specific transportation need (or set of needs) in a given corridor, identifies alternative actions to address these needs, and generates information needed to select a preferred project for implementation or a smaller set of viable alternatives for further study. Conceptual engineering drawings are prepared during an AA. These drawings, along with the scoping, screening, and evaluative efforts, allow for a wide range of alternatives to be narrowed down to the most promising alternatives. The most promising alternatives are then recommended to be carried forward into the next phase.

If the Metro Board approves the decision to proceed to the next step, then the ***Environmental Impact Report/Environmental Impact Statement (EIR/EIS)*** is initiated. This step evaluates the potential environmental impacts of the project alternatives at an Advanced Conceptual Engineering level. A combined EIR/EIS allows the lead agency to simultaneously comply with both State (California Environmental Quality Act, or CEQA) and Federal (National Environmental Policy Act, or NEPA) environmental regulations. The official CEQA/NEPA Scoping is conducted, and the Draft EIR/EIS (DEIR/EIS) is prepared that presents findings of potential impacts and measures to reduce impacts on a wide range of categories. Public hearings are held on the DEIR/EIS, and then a Locally Preferred Alternative (LPA) is selected. At the conclusion of this step, Metro would apply for entry into FTA's Preliminary Engineering (PE) phase.

If entry into the FTA PE phase is granted, the Final EIR/EIS (FEIR/EIS) is prepared at the New Starts PE level of engineering. Once the FEIR/EIS is approved, a Notice of Determination (NOD) and Record of Decision (ROD) are issued. Metro would then apply for entry into the FTA Final Design phase. This step includes right-of-way acquisition, utility relocation, and the preparation of final construction plans (including construction management plans), detailed specifications, construction cost estimates, and bid documents. The project's financial plan is completed—which is required of all projects seeking a Full Funding Grant Agreement (FFGA) from the FTA. Metro would enter into an FFGA with the FTA and continue with Final Design.

Once Final Design is completed, Metro would begin construction of the project, perform project testing, and then initiate transit service.

Figure S-6 depicts the normal schedule for completing the phases of the New Starts pro-

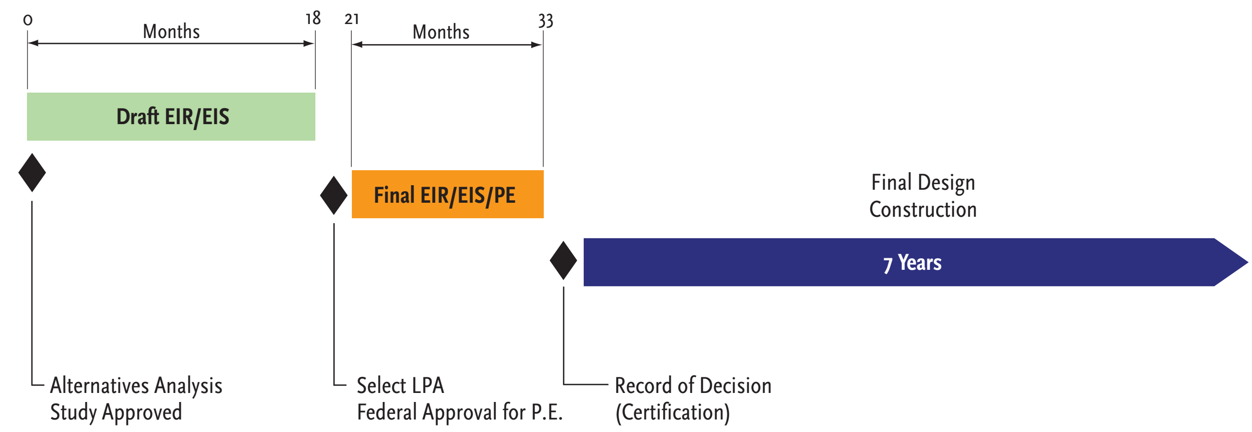


Figure S-6 Schedule for New Starts Process

cess described above. Once the AA is approved, the DEIR/EIS process would be completed in approximately 18 months. After this step is completed, a Locally Preferred Alternative (LPA) would be selected and federal approval would be sought to enter into the FEIR/EIS/PE step, which would be completed in approximately 12 months. After a Record of Decision (ROD) is issued, Final Design and construction would be completed in approximately seven years.

S.2 Need for Transit Improvements

The purpose of the Westside Extension Transit Corridor Study is to address the mobility needs of residents, workers, and visitors traveling to, from, and within the highly congested Westside Extension Study Area by providing faster and more reliable high-capacity public transportation than existing services which operate in mixed-flow traffic. The improvement in public transit service will bring about a significant increase in east-west capacity and improvement in person-mobility by reducing transit travel times.

On a county-wide level, the project will strengthen regional access by connecting Metro bus, Metro rail, and Metrolink networks to a high-capacity transit solution serving the Study Area. The project would provide the Cities of Los Angeles, West Hollywood, Beverly Hills, and Santa Monica with improved fixed-guideway east-west transit service between the existing terminus of the Metro Red Line and Metro Purple Line near Highland Avenue and/or Western Avenue in the City of Los Angeles and Ocean Avenue in the City of Santa Monica.

Possible western extensions of the Metro Purple Line would generally follow Wilshire Boulevard (from the Metro Purple Line Wilshire/Western Station). Possible extensions from the Metro Red Line would generally follow Santa Monica Boulevard (from the Metro Red Line Hollywood/Highland Station). The overall goal of the project is to improve mobility in the Westside Extension Transit Corridor by extending the benefits of the existing Metro Red/Metro Purple Line rail and bus investments beyond their current termini.

Additional considerations supporting the project's need in the Westside Extension Corridor include the following:


Congestion

- The high concentration of regional activity centers and destinations.
- Increasing traffic congestion on the highway network, which has led to public and political support for a high-capacity transit alternative to the automobile.
- The "Centers Concept" General Plan of the City of Los Angeles, which is transit–based.
- The existing concentration of transit-supportive land uses.
- Concurrence with these land uses as supported by the City of Los Angeles/Metro Land Use Transportation Policy.
- High population and employment densities.
- Local redevelopment plans that are highly supportive of, and dependent on, high-capacity transit services.
- The existing high ridership levels on bus lines.
- Significant transit-dependent population.
- Forecasts of significant future population and employment growth.
- Existing and future travel demand patterns that demonstrate a strong and growing demand for high-capacity transit.
- Emerging travel patterns associated with a job-rich Study Area that has led to significant westbound congestion during the morning rush hours and corresponding eastbound congestion during the evening rush hours.
- Local policy directed toward travel-demand management and transit solutions rather than expansion of the street and highway network.
- The need for transit improvements has been established in previous studies.
- Strategy to respond to climate change as mandated by California State law.

By extending the benefits of fixed-guideway transit service westward beyond the current Metro Red/Purple Line termini, the project will offer a viable alternative to driving in the heavily congested Westside Extension Transit Corridor. The mobility improvements offered by such a system will improve job accessibility for transit-dependent residents within, as well as outside, the Study Area, as well as greater Los Angeles, and improve transportation equity for all population groups. The high-quality transit solution will complement existing transit-supporting land uses and present new opportunities for mixed-use and high-density development in the Study Area.

Environmental benefits will be afforded as individuals live closer to work, cultural, and social opportunities, and trade personal vehicles for alternative transportation modes. The economic, social, and environmental benefits attributed to the project are expected to translate into public support for high quality, convenient, and reliable east-west transit service through the corridor.

Transit is Heavily Utilized

Metro is the principal transit provider in the Study Area. Table S-1 presents the growing network of transit in Los Angeles County. The Study Area is also served by Santa Monica's Big Blue Bus, Los Angeles Department of Transportation (LADOT) DASH, LADOT

Commuter Express, Culver CityBus, and West Hollywood CityLine/DayLine, as well as Santa Clarita Transit and Antelope Valley Transportation Authority commuter services. These transit-service providers offer bus transit coverage on most major east-west and north-south arterials in the Study Area. All bus service is provided in mixed-flow lanes, subjecting bus transit to the congestion experienced by automobiles. Metro's Wilshire corridor route (Line 20/720/920), with more than 70,000 daily boardings, is recognized as one of the highest ridership bus routes in the nation.

High Levels of Congestion

Table S-2 illustrates the Los Angeles metropolitan region's unflattering distinction of being the most congested urbanized area in the nation, according to one recent study. The Los Angeles-Long Beach-Santa Ana Metropolitan Statistical Area (MSA) ranks No. 1 in annual delay per traveler, travel time index, and wasted fuel per traveler based on 2005 mobility data published by the Texas Transportation Institute in the *2007 Urban Mobility Report*. Further, the Westside Study Area has been recognized as one of the most congested areas in the greater Los Angeles region. The Study Area includes portions of the I-10 freeway, which runs east-west outside the Study Area until the Santa Monica city limits, and the I-405 freeway, which runs north-south through the Study Area just west of Westwood. These two freeways, like most freeways in Southern California, experience some of the highest levels of congestion throughout the day and particularly during the peak commute periods.

In addition, the Study Area contains some of the most congested streets in Los Angeles County. Both east-west streets—such as Wilshire Boulevard, Santa Monica Boulevard, Sunset Boulevard, Hollywood Boulevard, Olympic Boulevard, and Pico Boulevard—and north-south streets—such as Western Avenue, Crenshaw Boulevard, La Brea Avenue, Fairfax Avenue, La Cienega Boulevard, Westwood Boulevard, Sepulveda Boulevard, Bundy Drive, and Lincoln Boulevard—operate at congested conditions throughout the day. Most of the intersections between these east-west and north-south arterials operate at or near capacity during weekday peak periods with a level of service (LOS) of E or F.

With little or no room to widen or expand roadway facilities within the Study Area, plans are being envisioned that would improve capacity and average vehicle travel speeds through Transportation System Management (TSM) strategies that make more efficient use of existing resources. For example, the City of Los Angeles is considering an initiative to convert Pico and Olympic Boulevards into a one-way pair with a contra-flow peak-period transit/van-pool lane. However, even innovative TSM projects cannot prevent the Study Area's congestion from worsening by 2030. Mobility in the Study Area is expected to decrease as the number of intersections operating at LOS E and F continues to rise.

The various transit services in the Study Area, with the exception of the Metro Rail Red/Purple Lines in the eastern portion, use the general roadway network. The major factors influencing bus-operating conditions are the traffic conditions under which the service operates, whether signal priority is available to buses, passenger loading time, and bus-stop spacing. The Study Area has substantial traffic congestion, high ridership and load factors, and closely spaced bus stops. Combined, these factors result in declining bus operating speeds over recent years.

The current average speeds of the Metro Rapid buses traveling through the Study Area range between 10 and 15 miles per hour (mph) along Wilshire Boulevard and between 11 and 14

Table S-1 Growing Network of Transit in Los Angeles County

Metro HRT/LRT Lines	
Red/Purple Lines	• Opened in phases between 1993 and 2000 • 17.4-mile Red Line HRT extends from Union Station to west & north with two branches • Both lines run together & share 6 stations between Union Station & the Wilshire/Vermont Station • Purple Line extends westward along Wilshire Boulevard for 2 additional stations • Red Line extends for 8 additional stations through Hollywood & Universal City • Ridership for both lines = 150,000 average weekday daily boardings (Sept 08)
Blue Line	• Opened for service in 1990 • 22-mile LRT operates between downtown L.A. & Long Beach • Ridership = 85,000 average daily boardings (Sept 08)
Green Line	• Opened for service in 1995 • 20-mile LRT operates between Redondo Beach & Norwalk, primarily in median of I-105 Freeway • Ridership = 45,000 average weekday daily boardings (Sept 08)
Gold Line	• Opened for service in July 2003 • 13.8-mile LRT operates between downtown L.A. & Pasadena • Ridership = 26,000 average weekday daily boardings (Sept 08)
Gold Line Eastside Extension	• Scheduled to open for service in 2009 • 6-mile Eastside Extension will connect Union Station in downtown L.A. with Little Tokyo, Boyle Heights & East L.A. • Will operate as through running extension of Gold Line
Expo Line	• Scheduled to open for service in 2010 • 8.5-mile LRT Line will run along Flower Street & Metro-owned Exposition right-of-way from existing Metro Rail station at 7th Street/Metro Center in downtown L.A. to Washington/National in Culver City
Metro BRT Lines/Rapid Arterial Bus Lines	
Metro Orange Line	• Opened for service in 2005 • 14.0-mile urban busway (BRT) extends westward across San Fernando Valley from North Hollywood end of Red Line to Warner Center • Ridership = 28,000 average weekday daily boardings (Sept 08)
Metro Rapid Arterial Bus Routes	• Metro has developed a predominately non-fixed guideway, rapid bus system in Los Angeles County that uses bus signal priority and additional features of BRT to create an arterial-based transit network. The first two lines of this network opened for service in 2000, and the network currently includes 26 lines. • When completed, the Metro Rapid Program will operate a network of 28 lines covering 450 miles, complementing light and heavy rail transit throughout Los Angeles County.
Metrolink Commuter Rail	
Metrolink Commuter Rail	• Initially opened for service in 1992 • Service provided by Southern California Regional Rail Authority (Metrolink) • Connects Ventura, Los Angeles, Orange, San Bernardino, Riverside, & San Diego counties using existing rail rights-of-way • Ridership = more than 48,000 average daily boardings (Sept 08) along more than 500 miles of service

Table S-2 Key Mobility Measures (2005) for Urbanized Areas

Urbanized Areas	Annual Delay per Traveler		Travel Time Index		Wasted Fuel per Traveler	
	Hours	Rank	Value	Rank	Gallons	Rank
Los Angeles-LB-Santa Ana, CA	**72**	**1**	**1.5**	**1**	**57**	**1**
San Francisco-Oakland, CA	60	2	1.41	3	47	2
Washington, DC-VA-MD	60	2	1.37	7	43	5
Atlanta, GA	60	2	1.34	11	44	3
Dallas-Fort Worth-Arlington, TX	58	5	1.35	9	40	7
San Diego, CA	57	6	1.4	4	44	3
Houston, TX	56	7	1.36	8	42	6
Detroit, MI	54	8	1.29	21	35	10
San Jose, CA	54	8	1.34	11	38	9
Orlando, FL	54	8	1.3	17	35	10

Source: Adapted from The 2007 Urban Mobility Report, Table 1 (Texas Transportation Institute).

mph along Santa Monica Boulevard. Figure S-7 shows the travel-time savings expected from several new and proposed fixed-guideway transit investments by comparing those values to existing mixed-flow bus service.

Regional transportation planning for Southern California's five-county area is the responsibility of the Southern California Association of Governments (SCAG), which is the Metropolitan Planning Organization (MPO) for the area. In 2007, the SCAG Regional Council adopted the Regional Transportation Plan (RTP) titled "Destination 2030" to establish the goals, objectives, and policies for the transportation system and to establish the implementation plan for transportation investments over the next 25 years. The RTP includes regional performance indicators with objectives against which specific transportation investments can be measured. Designated as one of the most congested areas in the five-county region, the Study Area will need significant improvements in these categories to meet the regional objectives for mobility, accessibility, and reliability.

The Westside is a Job Center for the Southern California Region

The Westside Study Area has the second-highest concentration of employment centers and major attractions in the Southern California region after Downtown Los Angeles. The Study Area is widely recognized as one of the preeminent employment generators in California. The greatest employment densities occur along or near the Wilshire and Santa Monica Boulevard Corridors.

Job-rich districts in the Westside rival the employment densities of many U.S. Central Business Districts (CBDs). Figure S-8 compares the total employment (in 2006 and expected in 2030) of the Westside CBD (consisting of Westwood/UCLA, Century City, and Beverly Hills) to the CBDs of a range of comparable downtowns, including San Diego, Sacramento, Phoenix, Denver, Los Angeles, Seattle, and San Francisco. Fixed-guideway transit is a key component of worker mobility for each CBD listed. This comparison shows that Los Angeles has a Westside CBD that is comparable in terms of overall employment to other downtowns in many mid-sized American cities.

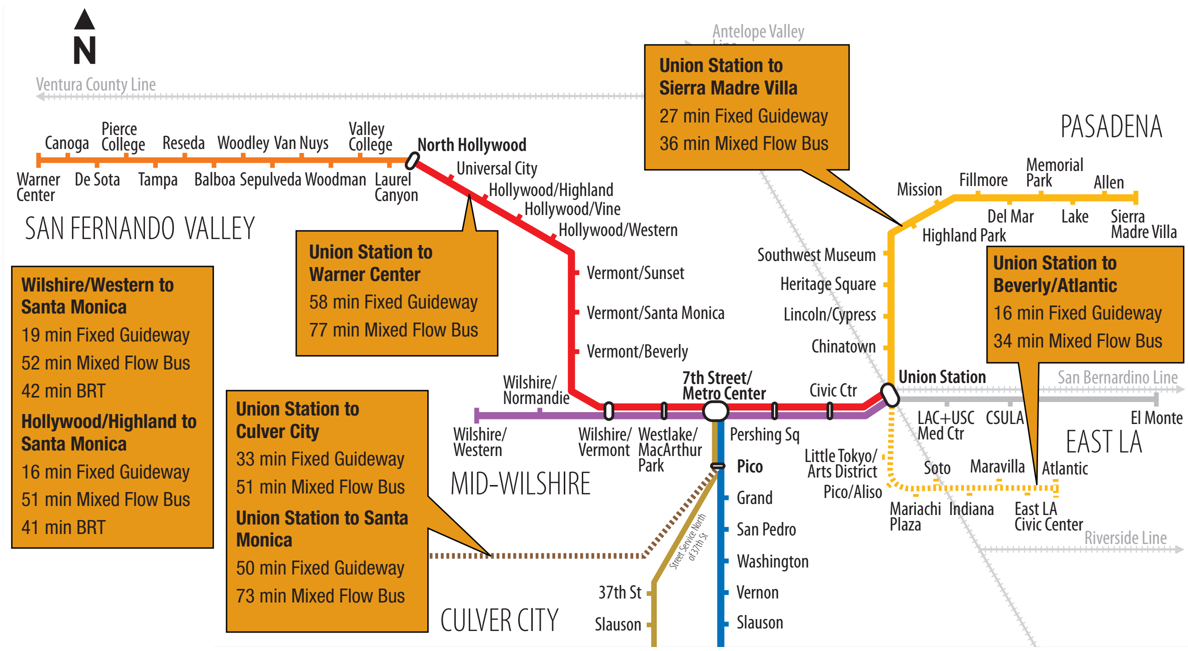


Figure S-7 Fixed Guideway and Mixed Flow Bus Travel Times for Transit Corridors

Figure S-9 compares the employment density, shown in jobs per square mile (in 2006 and expected in 2030), of the Westside CBD to the CBDs of the same cities listed above plus denser cities such as London, Tokyo, and New York. The areas comprising the Westside CBD exhibit an employment density similar to the CBDs of San Diego, Sacramento, and Phoenix, which are all served by LRT and commuter rail. While not comparable to New York City, the Westside CBD has a higher number of jobs than many mid-sized American cities and is increasing in both density and total jobs. This comparison demonstrates that employment densities exist within the Study Area to justify a fixed-guideway transit investment.

In addition to the numerous employment centers, countless local metropolitan and neighborhood centers, and many regional and world-famous cultural, entertainment, and education facilities are located in the Study Area, as listed below.

Major Business Districts

- Koreatown (Wilshire/Vermont to Wilshire/Western)
- Century City (Santa Monica/Avenue of the Stars)
- Beverly Hills
- Westwood
- UCLA
- I-405/Olympic Boulevard area
- Downtown Santa Monica

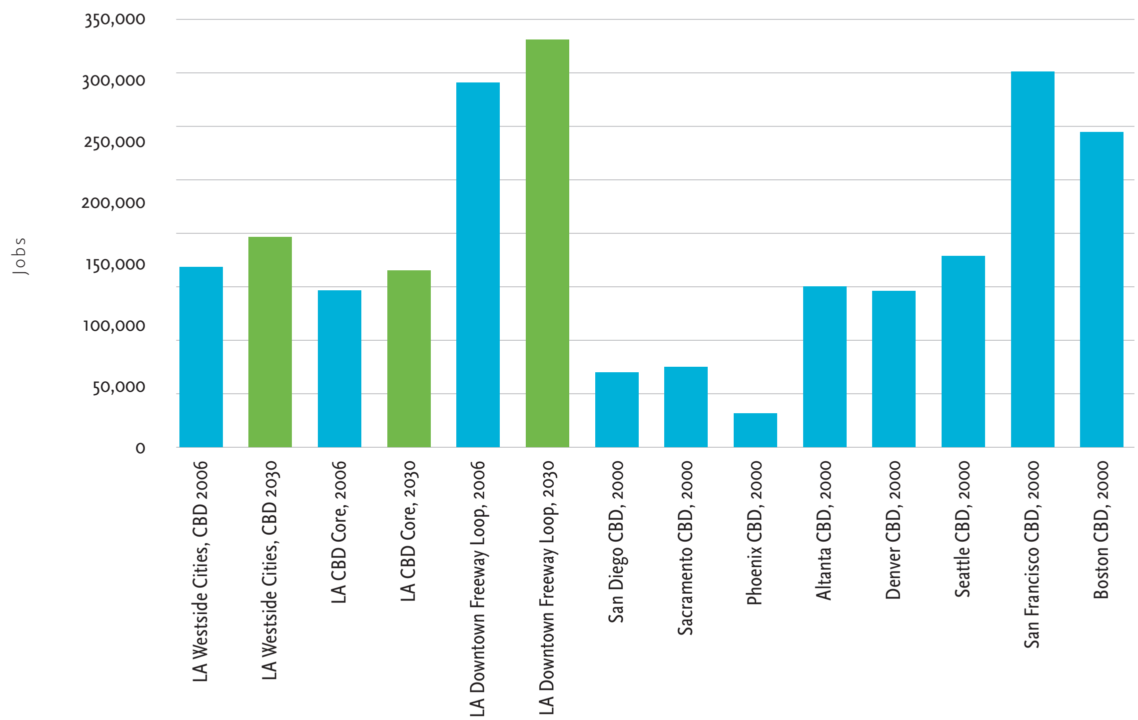


Figure S-8 Total Employment of CBDs and Westside

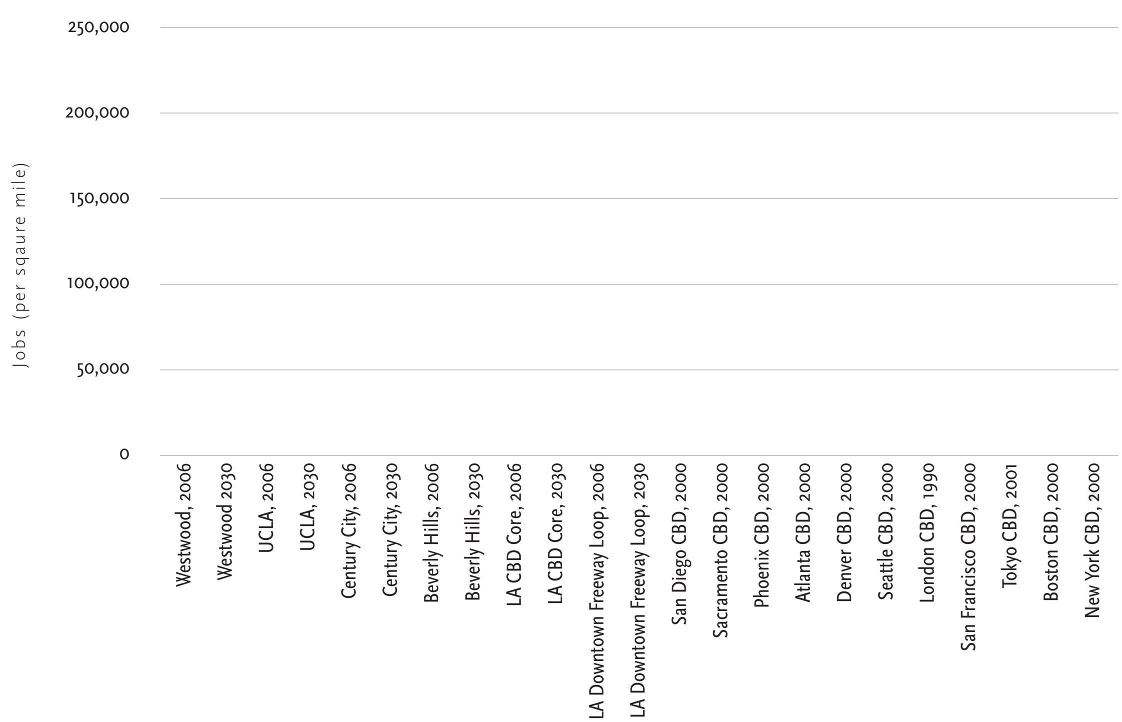
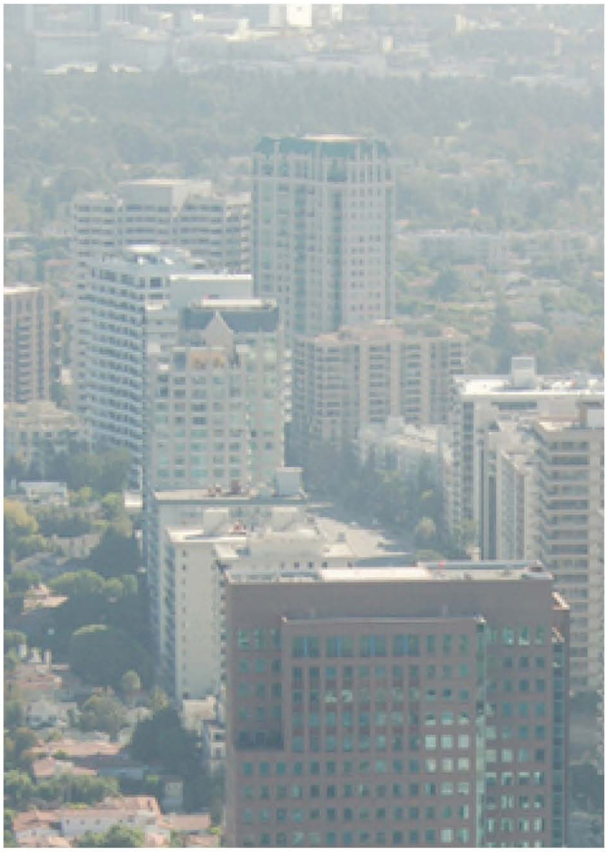


Figure S-9 Employment Densities (Jobs per Sq. Mi.) of CBDs and Westside



Wilshire Boulevard in Westwood

Retail/Entertainment Districts and Attractions

- Rodeo Drive (Beverly Hills)
- Hollywood/Highland (Hollywood Walk of Fame)
- Sunset Strip (West Hollywood)
- The Grove/Farmers Market (3rd Street/Fairfax)
- Santa Monica 3rd Street Promenade
- Santa Monica Boulevard in West Hollywood
- Westwood Village
- Beverly Center Shopping Mall (Beverly/La Cienega)
- Century City Westfield Shopping Mall
- Westside Pavilion Shopping Center (Westwood/Pico)
- Pacific Design Center

Institutional

- UCLA (research university, medical center, and hospital)
- Veterans Administration
- Cedars-Sinai Medical Center

Museums and Culture

- Los Angeles County Museum of Art
- UCLA Hammer Museum
- Peterson Automotive Museum
- Getty Center (adjacent)

Growing Population and Employment Centers

Population and employment densities in the Study Area are among the highest in the metropolitan region, averaging approximately 13,100 persons per square mile and 12,500 jobs per square mile. These high population and employment concentrations make the Study Area one of the densest places to live and work in the county.

Century City

The employment density of the Study Area is about 11 times that of Los Angeles County and about 54 times that of the entire region. It is lower than that of Downtown Los Angeles, but it is much higher than that of Long Beach and Pasadena. The greatest employment densities in the Study Area are found along the Wilshire and Santa Monica Boulevard Corridors. According to a market trend analysis by Grubb & Ellis,[1] 32% of Los Angeles County's 186 million square feet of office space is in the West Los Angeles and

1 *Araghi, Amir, 2007. Office Market Trends Los Angeles, Grubb & Ellis.*

Mid-Wilshire areas. This amount of office space makes the Study Area one of the largest office markets in Los Angeles, although it only encompasses 38 square miles, or less than one percent, of Los Angeles County.

Approximately five percent of the population (504,000) and 10% of the jobs (479,000) in Los Angeles County are concentrated in the Study Area.

According to SCAG's forecasts, population density in the Study Area will increase to more than 14,500 persons per square mile and 14,600 jobs per square mile by 2030. This represents an increase of 10% in population density and a 17% jump in employment density.

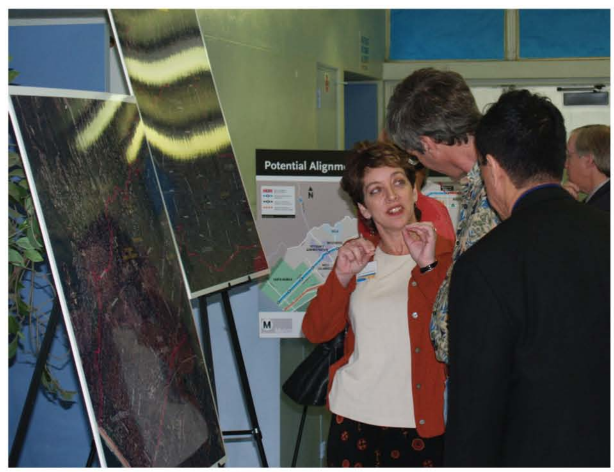
As a regional job center, the Study Area attracts a high number of daily commute trips to work from throughout the region. As shown in Figure S-10, 311,000 commute trips to work enter the Study Area every morning. During this same morning peak period, 137,000 Study Area residents leave for jobs outside the area and 88,000 commute to jobs within the Study Area. The very high number of commuters to and from jobs in the Study Area would benefit significantly from reliable, high-capacity transit service that avoids the high congestion levels that occur throughout the Study Area's roadway network.

The Westside Study Area is currently one of the largest transit markets in the region. It has 5% of the residents in Los Angeles County, yet 10% of the jobs are located here. Furthermore, 17% of all transit trips in the County start or end in the Study Area. Districts in the Study area have higher transit trip densities than the rest of Los Angeles County, with the exception of Downtown Los Angeles.

S.3 Early Scoping Meetings

Consistent with the FTA guidance for an AA, an early scoping process was used to help define the appropriate range of issues and the depth of analysis to be addressed during the AA. The intent of Early Scoping for the Westside AA was to inform the public about the project and solicit feedback on what transit improvements should be studied and how transit improvements should be evaluated. Formal public scoping will be conducted again at the start of the environmental work.

Early Scoping Comment Period
October 1 – November 7, 2007



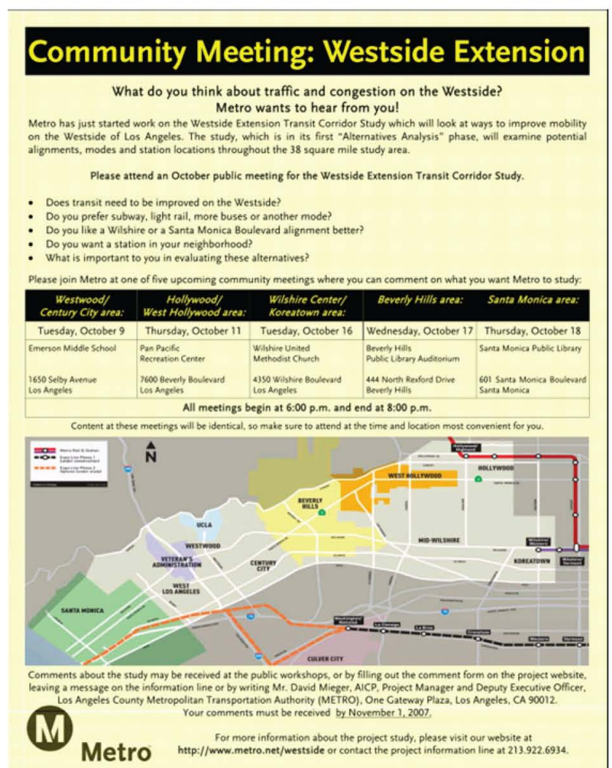
Participants at Early Scoping Meetings

The Early Scoping process included the identification of prospective participants, notification for all meetings, and holding of the meetings (more details on the meetings is presented in Section S.11, Public Involvement). Official notification began with an Early Scoping notice published in the Federal Register Volume 72, No. 189 on October 1, 2007. The official scoping comment period extended until November 7, 2007. The general public and agency representatives were given the opportunity to attend public meetings. At these

Figure S-10 Travel To Westside Job Centers (Home/Work AM Peak Period Trips)

meetings, the attendees were presented with information on the basic definition of alternatives (alignment types and technology or modal types) and were then asked to provide verbal and written comments on this information. In addition, those wishing to provide comments could also view similar project information on Metro's website and then respond in writing or by e-mail. The information provided to the public and a summary of comments received appears to the right.

Participants at Early Scoping Meetings



Community Meeting: Westside Extension

What do you think about traffic and congestion on the Westside?
Metro wants to hear from you!

Metro has just started work on the Westside Extension Transit Corridor Study which will look at ways to improve mobility on the Westside of Los Angeles. The study, which is in its first "Alternatives Analysis" phase, will examine potential alignments, modes and station locations throughout the 38 square mile study area.

Please attend an October public meeting for the Westside Extension Transit Corridor Study.

- Does transit need to be improved on the Westside?
- Do you prefer subway, light rail, more buses or another mode?
- Do you like a Wilshire or a Santa Monica Boulevard alignment better?
- Do you want a station in your neighborhood?
- What is important to you in evaluating these alternatives?

Please join Metro at one of five upcoming community meetings where you can comment on what you want Metro to study:

Westwood/ Century City area:	*Hollywood/ West Hollywood area:*	*Wilshire Center/ Koreatown area:*	*Beverly Hills area:*	*Santa Monica area:*
Tuesday, October 9	Thursday, October 11	Tuesday, October 16	Wednesday, October 17	Thursday, October 18
Emerson Middle School 1650 Selby Avenue Los Angeles	Pan Pacific Recreation Center 7600 Beverly Boulevard Los Angeles	Wilshire United Methodist Church 4350 Wilshire Boulevard Los Angeles	Beverly Hills Public Library Auditorium 444 North Rexford Drive Beverly Hills	Santa Monica Public Library 601 Santa Monica Boulevard Santa Monica
All meetings begin at 6:00 p.m. and end at 8:00 p.m.				

Content at these meetings will be identical, so make sure to attend at the time and location most convenient for you.

Comments about the study may be received at the public workshops, or by filling out the comment form on the project website, leaving a message on the information line or by writing Mr. David Mieger, AICP, Project Manager and Deputy Executive Officer, Los Angeles County Metropolitan Transportation Authority (METRO), One Gateway Plaza, Los Angeles, CA 90012.
Your comments must be received by November 1, 2007.

Metro

For more information about the project study, please visit our website at **http://www.metro.net/westside** or contact the project information line at 213.922.6934.

Informational Notice Distributed for Early Scoping Meetings

Participants at Early Scoping Meetings

and S-14 illustrate the range of fixed-guideway transit modes presented at the meetings that could be considered for the Westside Extension AA Study. These technologies have proven over time to be practical transit technologies that meet purpose and need, minimize environmental impacts, and are cost effective. These transit technologies were selected to carry forward into scoping for the Alternatives Analysis for evaluation against the No-Build and TSM Alternatives, which include Rapid Bus systems (Figure S-15).

Alignment Alternatives Presented at Early Scoping

Primary alignments were identified for consideration during the Early Scoping meetings based on previous planning studies in the Westside Extension Corridor. These general corridor alignments, depicted in Figure S-11, included the Wilshire Boulevard and Santa Monica Boulevard corridor alignments and represented street rights-of-way that could reasonably be used in an at-grade or elevated configuration and a subway configuration, and that could connect existing transit service to new activity centers with demonstrated strong transit usage. As shown in Figure S-11, the termini of the alternatives are the Wilshire/Western station at the end of the Metro Purple Line, the Hollywood/Highland station along the Metro Red Line before it turns north to the Universal City station, and Downtown Santa Monica near 4th Street and Wilshire Boulevard.

Technology Alternatives Presented at Early Scoping

The existing Metro Fixed Guideway system is comprised of Heavy Rail Transit or HRT (Metro Red Line and Metro Purple Line), Light Rail Transit or LRT (Metro Blue Line, Metro Green Line, Metro Gold Line, and Metro Expo Line, under construction), and Bus Rapid Transit or BRT (Metro Orange Line). Figures S-12, S-13,

Modes Presented at Early Scoping

- Heavy Rail Transit

- Light Rail Transit

- Bus Rapid Transit

Modes Suggested by Community Comments

- Monorail

Comments Received during Early Scoping

An extensive set of scoping comments were received from the public. As shown in Table S-3, comments were received on modes, stations, alignments, general issues about the study, and evaluation criteria. Based on comments received, a variety of alternative modes and alignments were suggested for consideration in addition to those presented at the scoping meetings. Those comments received that were directly related to the team's decision to add or refine the mode/alignment alternatives are presented below.

Comments on Technologies (Modes) Suggested

The comments provided by the speakers, from the written comments of attendees, e-mail comments, and letter comments at the early scoping meetings and during the official comment period, strongly supported the subway (HRT) mode (262 comments). Several commenters expressed favor for a potential monorail elevated

Figure S-11 Alignment Alternatives Presented at Early Scoping

alternative (22 comments). Several other commenters expressed support for light rail transit (18 comments). Other commenters expressed a preference for additional bus rapid transit service (14 comments).

Based on these comments, aerial monorail transit technology was added to the evaluation (Figure S-16). All other modes presented by Metro at the scoping meetings remained for screening.

Comments on Alignments Suggested

Speakers at the early scoping meetings were supportive of the Wilshire alignment (107 comments), although Santa Monica Boulevard also received support (49 comments), and many supported the combined Wilshire-Santa Monica alignments (52 comments).

A number of speakers suggested route alignment deviations from either Wilshire or Santa Monica Boulevards to serve major activity centers not located directly on those routes. These included route deviations to serve Farmers Market/The Grove, Cedars-Sinai/Beverly Center, the Sunset Strip, the University of California at Los Angeles (UCLA) campus and others.

Speakers also suggested several north-south alignments. These included an alignment from the San Fernando Valley to Los Angeles International Airport (LAX), a connection from Hollywood/Highland to the Exposition Corridor, and Burbank Airport to LAX via Hollywood/Highland. There were also comments suggesting an alignment under Burton Way, continuing east below Santa Monica Boulevard to Downtown, following Sunset Boulevard to La Cienega Boulevard, and connections to the Exposition Line either via the 3rd Street Promenade or near the Water Garden on 26th Street in Santa Monica. A group of speakers from the Spaulding Square community just east of Fairfax Avenue, between Hollywood and Sunset Boulevards, advocated

Figure S-12 Example of Heavy Rail Transit (HRT) in Subway

Figure S-13 Example of Light Rail Transit (LRT)

Figure S-14 Example of Bus Rapid Transit (BRT)

Figure S-15 Example of Metro Rapid Transit Service

Table S-3 Summary of Comments from the Early Scoping Meetings (continued on next page)

Mode

Subway		Aerial/ Monorail		LRT		BRT			
Yes	No	Yes	No	Yes	No	Yes	No	Other	
262	8	22	1	18	8	14	22	At-grade (1) Auto expressway under Wilshire (1) High Speed Rail (1) Increase DASH service (1) Increase local service (2)	Just Bus (1) More Buses (8) Moving sidewalks (1) Street Car (2) Underground BRT (1)

Stations

Century City (31)	San Vicente (4)	La Brea, not (1)
UCLA (21)	Wilshire/Fairfax (4)	La Brea/Fairfax (1)
Connection to Expo (14)	405 (3)	La Brea/Santa Monica (1)
Beverly Hills (13)	Santa Monica/ San Vicente (3)	Le Conte (1)
North/South (12)	The Grove (3)	Museum Row (1)
Beverly Center (11)	Hollywood Bowl (2)	Pacific Coast Highway (1)
Santa Monica (11)	Hospitals (2)	Pico/Fairfax (1)
Santa Monica Boulevard (11)	Lincoln Boulevard (2)	Red line (1)
West Hollywood (10)	Rodeo (2)	Robertson (1)
Beverly Center/Cedars-Sinai (9)	San Fernando Valley (2)	Rodeo/Beverly (1)
Wilshire/Westwood (8)	Sunset/Fairfax, not (2)	Santa Monica Community College (1)
Avenue of the Stars (7)	Westwood/LeConte (2)	Santa Monica Pier (1)
Constellation (7)	17th-20th Streets (1)	Santa Monica/Fairfax (1)
Crenshaw (7)	20th St (1)	Sepulveda Boulevard (1)
La Brea (7)	20th/Santa Monica Boulevard (1)	Sunset (1)
LAX (7)	3rd/Fairfax (1)	UCLA Campus (1)
Westwood (7)	4th Street (1)	West of 405 (1)
Beverly Triangle (6)	Beverly Glen (1)	Western (1)
Veterans Administration Building (6)	Century City Mall (1)	Wilshire/Doheny (1)
3rd Street (5)	Crenshaw, not (1)	Wilshire/Gayley/Lot 32 (1)
Beverly Drive (5)	Crescent Heights (1)	Wilshire/La Cienega (1)
Burbank Airport (5)	Dodger Stadium (1)	Wilshire/Santa Monica (1)
Fairfax (5)	Downtown (1)	Wilshire/Veteran (1)
Grove/Farmers Market (5)	Echo Park (1)	Wilshire/Westholm (1)
La Cienega (5)	Fairfax, not (1)	Plummer Park (1)
Sunset/Fairfax (5)	Hollywood (1)	Windsor, not (1)
Bundy (4)	Irving, not (1)	

Note: "Not" refers to comments received that stated a station was not wanted at that location

Table S-3 Summary of Comments from the Early Scoping Meetings (continued from previous page)

	Wilshire		Santa Monica		Both		
	Yes	No	Yes	No	Yes	No	Other
Alignments	107	3	49	1	52	9	3rd St Promenade connection to Exposition (1) 405 (2) Burbank Airport to LAX via Hollywood (1) Burton Way (1) Don't zig-zag (1) Hollywood/Highland follow red car diagonal to Santa Monica (1) Hollywood/Highland to La Brea to Santa Monica (1) Highland (2) Hollywood/Highland (1) Hollywood/Vine to Sunset to La Cienega (1) La Brea to LAX (1) Lincoln Boulevard (1) Must go to the Sea (4) N/S Hollywood/Highland to Expo (2) N/S Route to Valley & LAX (1) N/S Service Connections (3) Not all the way to Santa Monica (1) Olympic Boulevard (3) Provide for express trains (1) Rapid Bus on Olympic (1) San Vicente (1) Santa Monica Blvd straight to Downtown Los Angeles (1) Sunset (3) Under LA County Club (1) Wilshire to Expo via Water Garden (1)
Issues	Noise and Vibration (16) Joint development can help pay (8) Tunneling under historic homes, vibration (7) Increase taxes/Fees (6) System connectivity (6) Need N/S Connections (5) Parking at stations (5) Traffic Diversion associated w/ BRT (5) Need Local Connectors/Shuttles (4) Service availability (3) Speak w/ one voice in Washington (3) Impact on green house gasses (2) Economic Development opportunities (2) Safety at stations (2) Shadows and visual impacts associated with elevated trains (2) Sunset/Fairfax station location is a business (2) Accidents on 6th Street (1) Additional congestion to streets near stations (1) Area serviced (1) Need nighttime service (4)						Signage and wayfinding (4) Additional land use opportunities (3) Drilling in methane area (3) Expand community outreach outside study area, different formats, wider demographics(3) Incorporate bicycles in planning (8) Segment project to address funding (3) Bus Lanes (1) Concerned about noise and vibration at the Spaulding and Sunset Squares, and Sunset Flats (1) Congestion caused by buses (2) Connection to LAX (1) Connection with employment centers (1) Consider parallel arterial capacity (1) Don't let funding drive schedule (1) Don't complete in phases (1) Earthquake safety (1) Ease of transfer (1) Environmental factors addition people on the road, train and power station exhaust(1) Express service (1) External costs of driving accidents, health(1) Fire/life/safety access (what happens if a fire truck is caught at a crossing gate?)(1) General Congestion (1) GPS Tracking (1) If Purple to sea, Expo on Venice (1) Impacts to geologic & water table (1) Include Olympic/Pico one-way (1) Land use (1) Line naming (1) Park/Ride options (1) Preserve pedestrian amenities on Wilshire (1) Property values (1) Questions ridership and user demographics (1) Repair curb lanes used by buses (1) Station amenities (1) Study benefits of electric vehicles (1) System connectivity (1) Timeliness of service (1) Traffic light synchronization (1) Underground utilities (1) Use of solar power (1)

Tables S-3 Summary of Comments from the Early Scoping Meetings (continued from previous page)

Additional congestion to streets near stations (1)	Express and rush hour services (1)
Area serviced (1)	Fire/life/safety access (1)
Benefits to community, including young people (1)	Land use (1)
Bicycle Safety (1)	Noise and Vibration (13)
Travel Speed (2)	Station Accessibility (1)
Overall Capacity (1)	Station power (1)
Construction Safety in earthquake zones (1)	System connectivity (1)
System improvements (1)	Underground utilities (1)
Density at stations (1)	
Economic development opportunities (4)	

an alignment that would avoid their area as they were concerned that potential tunneling would damage their 1920s-era homes.

These comments suggest a number of possible alignment configurations. Suggested alignments to serve north-south travel were not carried into screening, however, as these did not reflect the principal east-west orientation of the study scope and many extended well outside of the study corridor.

Comments on Stations Suggested

People who spoke at the Early Scoping meetings generally supported the potential station locations that were presented and are shown on Figure S-17. However, some attendees suggested additional stations as well. Speakers suggested that a station near Cedars-Sinai Hospital and the Beverly Center was needed. Others commented that the station in Century City should be south of Santa Monica Boulevard, closer to the center of Century City. There was interest for a station on the UCLA campus and a station at The Grove/Farmers Market. There were also comments to include a station on Wilshire Boulevard between 17th and 20th Streets, near the UCLA/Santa Monica and St. John's Hospitals. Concern was expressed by several speakers regarding a station on Wilshire Boulevard at Crenshaw Boulevard or elsewhere in the Park Mile area of Wilshire Boulevard.

Figure S-16 Example of Aerial Monorail Guideway Vehicle

These comments suggested a variety of station location options that were tested further as part of the alternatives screening and detailed evaluation.

Summary of Substantive Comments

The overwhelming majority of comments received supported the need for a transit improvement in the Westside Extension Transit Corridor Study Area. The Wilshire subway alignment was the most favored route and mode, with nearly as many people advocating for subways on both the Wilshire and Santa Monica alignments. In many cases, where the public supported both the Wilshire and the Santa Monica alignments, most thought that the Wilshire alignment should take precedence. Limited support was voiced for aerial/monorail, LRT, or BRT modes, with opposition to each of these modes expressed as well.

The public input in the Early Scoping process strongly favored a subway extension along Wilshire Boulevard.

S.4 Initial Definition of Alternatives

As a result of the Early Scoping process conducted during Fall 2007, 17 representative build alternatives were developed for evaluation in the AA Study (Figure S-18). In addition to the No Build and Transportation Systems Management (TSM) alternatives, the 17 alternatives are presented in five major categories:

- Wilshire Boulevard-based Heavy Rail Transit (HRT) Subway alignments
- Santa Monica Boulevard-based HRT Subway alignments
- Combined Wilshire Boulevard/Santa Monica Boulevard HRT Subway alignments
- HRT, Light Rail Transit (LRT), and Monorail elevated alignments
- Bus Rapid Transit (BRT) alignments

No Build Alternative

The No Build Alternative includes all existing highway and transit services and facilities and the committed highway and transit projects in the current Metro Long-Range Transportation Plan and the current Southern California Association of Governments' 2007 Regional Transportation Plan.

Proposed major highway improvements affecting the Westside Transit corridor between now and 2030 only include completing missing seg-

Figure S-17 Alignment Alternatives Presented at Early Scoping

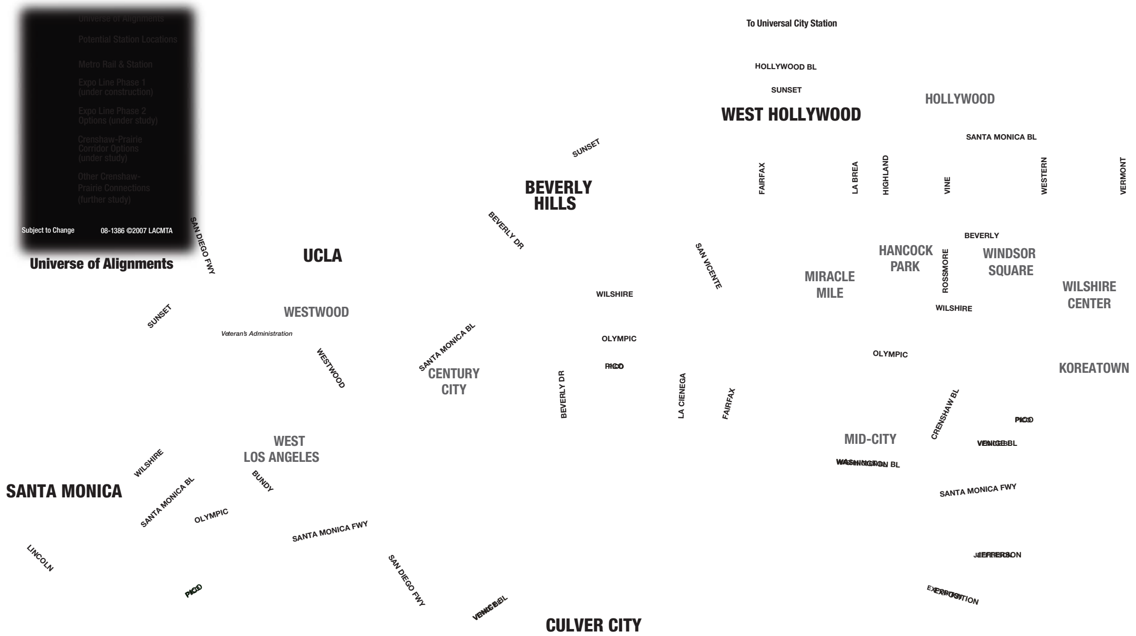


Figure S-18 Universe of Alternatives that emerged from Early Scoping

ments of high occupancy vehicle (HOV) lanes on the Interstate 405 (I-405) Freeway.

From a rail transit perspective, the No Build Alternative includes the Metro Purple and Metro Red Lines along the eastern and north-eastern edges of the Study Area. Additional rail service committed in 2030 (2001 Metro Long Range Transportation Plan, Baseline) includes: 1. Metro Gold Line Eastside Extension: from Union Station to East LA; 2. Exposition LRT Line: from 7th/Metro to Culver City; and 3. LAX People Mover: from the Aviation/LAX station of the Metro Green Line to the LAX main terminal (to be funded by others).

A rich network of local, express, and Metro Rapid bus routes will also continue to be provided, with both bus route additions and modifications proposed (Table S-4).

Table S-4 Metro Rapid No Build Alternative Bus Route Additions and Modifications

Santa Monica Boulevard Metro Rapid Bus	704
Culver City Bus Rapid 6	Operated by Culver City Bus
Torrance Transit Rapid 3	Operated by Torrance Transit
Manchester Avenue Metro Rapid Bus	715
Wilshire Boulevard Metro Rapid Bus	720
San Fernando - Lankershim Metro Rapid Bus	724
Olympic Boulevard Metro Rapid Bus	728
Pico Boulevard Metro Rapid Bus	730
Pico Boulevard Santa Monica Big Blue Bus Rapid 7	Operated by Santa Monica Big Blue Bus
Reseda Metro Rapid Bus	741
Central Avenue Metro Rapid Bus	753
Long Beach Boulevard Metro Rapid Bus	760
Atlantic Boulevard Metro Rapid Bus	762
Garvey Avenue – Chavez Metro Rapid Bus	770
San Fernando South Metro Rapid Bus	794
Wilshire Boulevard Metro Rapid Express Bus	920

These routes will offer an increased high quality of service in 2030 for purposes of alternative comparison.

TSM Alternative

The Transportation Systems Management (TSM) Alternative enhances the No Build Alternative and improves upon the existing Metro Rapid Bus service and local bus service in the Westside Study Area. This alternative emphasizes more frequent service to reduce delay and enhance mobility. Although the frequency of service is already very good, service frequency is proposed to be improved between 2 and 10 minutes during peak periods on selected routes.

A number of Metro local and rapid bus routes would see frequency enhancements over the No Build during the peak period (Table S-5).

Table S-5 Metro TSM Local Bus and Rapid Bus Route Enhancements

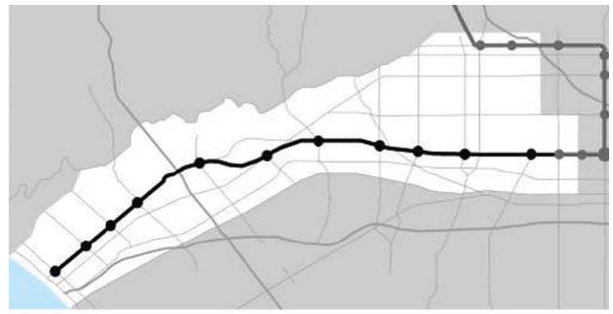
Route	Line #
Sunset Boulevard (short line (SL) Westwood)	2
Santa Monica Boulevard SL	4
Beverly Boulevard SL	14
West Third Street Limited	16
Wilshire Boulevard-Westwood	20
Vermont Avenue SL	204
Western Avenue SL	207
Santa Monica Boulevard Metro Rapid Bus	704
Wilshire Boulevard Metro Rapid Bus	720
Olympic Boulevard Metro Rapid Bus	728
Vermont Avenue Metro Rapid Bus	754

Wilshire Boulevard-Based HRT Subway Alignments

Of the 13 alternatives considered in the HRT subway category, three were focused primarily along Wilshire Boulevard. They were Alternatives 1, 12, and 14 and are described briefly below.

Alternative 1 – Wilshire Boulevard Alignment HRT Subway

- Extends from direct connection from Metro Purple Line Wilshire/Western station to 4th Street and Wilshire in Santa Monica, primarily under Wilshire, with 11 stations.



Alternative 12 – Wilshire Boulevard/Beverly Boulevard Centers HRT Subway

- Extends from Metro Purple Line Wilshire/Western station to 4th Street and Wilshire in Santa Monica, with 11 stations. Alignment is generally under Wilshire to La Brea Avenue, continues under La Brea to Beverly Boulevard, stays under Beverly to Santa Monica Boulevard, continues under Santa Monica Boulevard, transitions to Wilshire, and continues under Wilshire to 4th Street in Santa Monica.

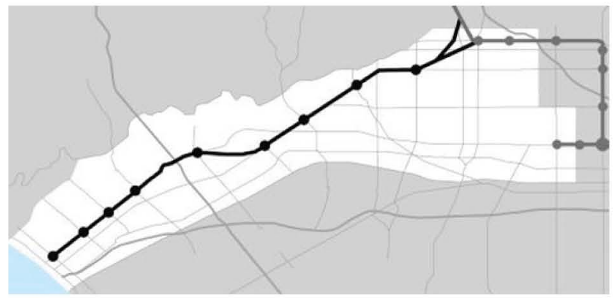
Alternative 14 – Wilshire Boulevard/Fairfax Centers HRT Subway

- Extends from Metro Purple Line Wilshire/Western station to 4th Street and Wilshire in Santa Monica, with 12 stations. Alignment is generally under Wilshire to Fairfax, continues under Fairfax to Beverly Boulevard, to Beverly Drive and Santa Monica Boulevard, continues under Santa Monica, transitions to Wilshire, and continues under Wilshire to 4th Street in Santa Monica.

Santa Monica Boulevard-Based HRT Subway Alignments

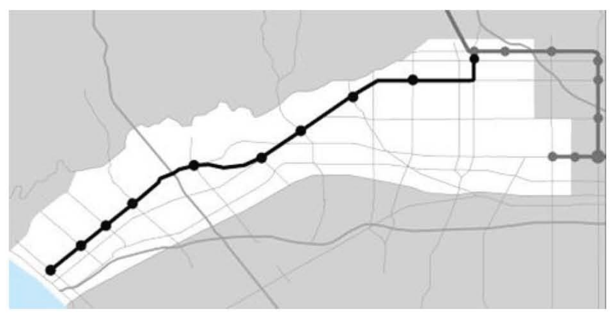
Of the 13 alternatives in the HRT subway major category, five (plus a station approach option) were focused primarily along Santa Monica Boulevard. They were Alternatives 4, 6, 7 (and 7A), 8, and 13 and are depicted below.

Alternative 4 – Santa Monica Boulevard Alignment HRT Subway with Universal City and Hollywood/Highland Metro Red Line Connections



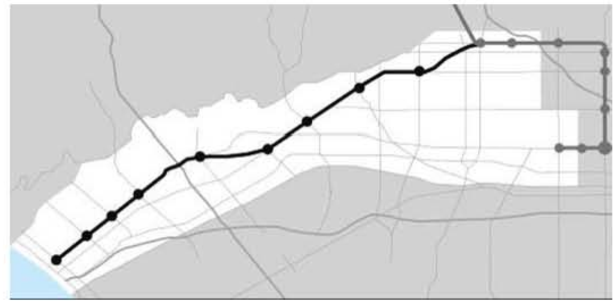
- Extends from Metro Red Line at Universal City and Hollywood/Highland stations to 4th Street and Wilshire in Santa Monica, with 9 stations. Underground alignment transitions from Red Line to West Hollywood at Fairfax and Santa Monica Boulevard, continues under Santa Monica to Century City, transitions to Wilshire, and continues under Wilshire to 4th Street in Santa Monica.

Alternative 6 – Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Metro Red Line Connection



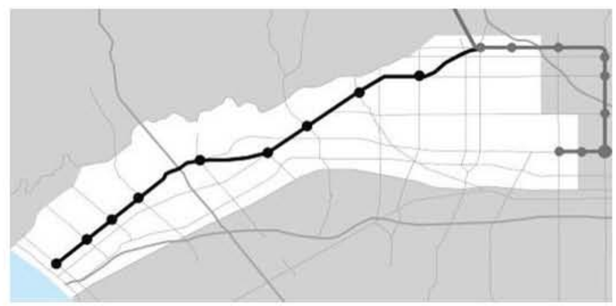
- Extends from Metro Red Line at Hollywood/Highland station to 4th Street and Wilshire in Santa Monica, with 10 stations. Underground alignment transitions from Metro Red Line, continues under Highland to Santa Monica Boulevard, under Santa Monica to Century City, transitions to Wilshire, and continues under Wilshire to 4th Street in Santa Monica. A new underground transfer station near Hollywood/Highland is included to transfer to and from Metro Red Line.

Alternative 7 – Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Metro Red Line Connection/Galaxy North



- Extends from direct connection to Metro Red Line at Hollywood/Highland station to 4th Street and Wilshire in Santa Monica, with 9 stations. Underground alignment transitions from Metro Red Line to Santa Monica Boulevard at Fairfax north of Galaxy shopping center, continues under Santa Monica to Century City, transitions to Wilshire, and continues under Wilshire to 4th Street in Santa Monica.

Alternative 7A – Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Metro Red Line Connection/Galaxy South



- Extends from direct connection to Metro Red Line at Hollywood/Highland station to 4th Street and Wilshire in Santa Monica, with 9 stations. Underground alignment transitions from Metro Red Line to Santa Monica Boulevard at Fairfax south of Galaxy shopping center, continues under Santa Monica to Century City, transitions to Wilshire, and continues under Wilshire to 4th Street in Santa Monica.

Alternative 8 – Santa Monica Boulevard Alignment HRT Subway with Hollywood/Vine Metro Red Line Connection

- Extends from direct connection to Metro Red Line at Hollywood/Vine station to 4th Street and Wilshire in Santa Monica, with 9 stations. Underground alignment transitions from Metro Red Line to Santa Monica Boulevard at Fairfax, continues under Santa Monica to Century City, transitions to Wilshire, and continues under Wilshire to 4th Street in Santa Monica.

Alternative 13 – Santa Monica/San Vicente/ Wilshire Boulevards HRT Subway

- Extends from direct connection to Metro Red Line at Hollywood/Highland station to 4th Street and Wilshire in Santa Monica, with 10 stations. Extends from Metro Red Line under Santa Monica, San Vicente, and Wilshire Boulevards to 4th Street in Santa Monica.

Combined Wilshire Boulevard/Santa Monica Boulevard-based HRT Subway Alignments

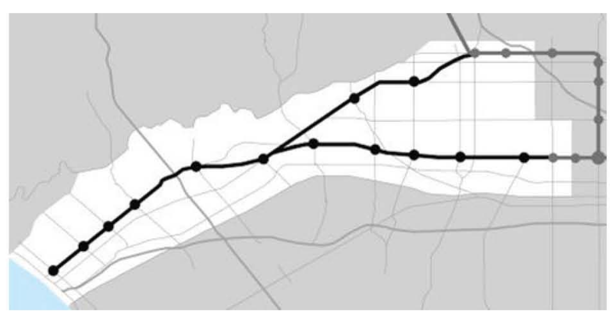
Of the 13 alternatives in the HRT subway major category, five represent maximum coverage alternatives using both the Wilshire and Santa Monica corridors. The five, shown below, are Alternatives 9, 10, 11, 15, and 16.

Alternative 9 – Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt 1 + Alt 4)

- Extends from Metro Purple Line Wilshire/ Western station and from Metro Red Line at Universal City and Hollywood/Highland stations to 4th Street and Wilshire in Santa Monica underground, with 13 stations. See Alternatives 1 and 4 for more detail.

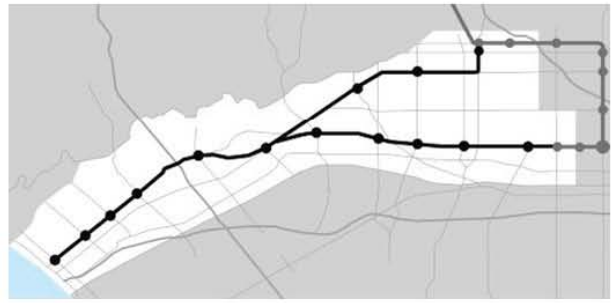
Alternative 10 – Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt 1 + Alt 7)

- Extends from Metro Purple Line Wilshire/ Western station and from Metro Red Line at Hollywood/Highland station to 4th Street and Wilshire in Santa Monica underground, with 13 stations. See Alternatives 1 and 7 for more detail.



Alternative 11 – Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt 1 + Alt 6)

- Extends from Metro Purple Line Wilshire/Western station and from Metro Red Line at Hollywood/Highland station without a Metro Red Line direct connection to 4th Street and Wilshire in Santa Monica underground, with 14 stations. See Alternatives 1 and 6 for more detail.



Alternative 15 – Wilshire/Santa Monica Boulevards Combined Centers HRT Subway (Alt 13 + Alt 14)

- Extends from Metro Purple Line Wilshire/Western station and from Metro Red Line Hollywood/Highland station to 4th Street and Wilshire in Santa Monica underground, with 14 stations. See Alternatives 13 and 14 for more detail.

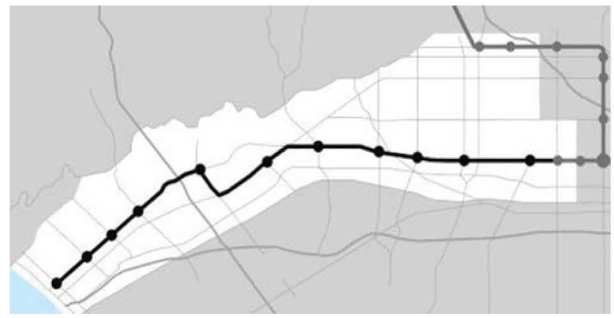
Alternative 16 – Wilshire/Santa Monica Boulevards Combined Centers HRT Subway (Alt 13 + Alt 14) with transfer at Hollywood/Highland

- Extends from Metro Purple Line Wilshire/Western station and from Metro Red Line Hollywood/Highland station to 4th Street and Wilshire in Santa Monica underground, with 14 stations and a transfer at Hollywood/Highland. See Alternatives 13 and 14 for more detail.

HRT, LRT, and Monorail Elevated Alignments

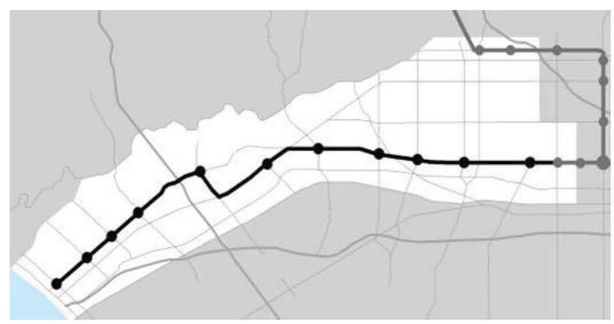
- Three elevated configurations (Alternatives 2, 3, and 5) were proposed for screening. For each alternative, three modes were common: HRT, LRT, and Monorail.

Alternative 2 – Wilshire Boulevard Alignment HRT Elevated



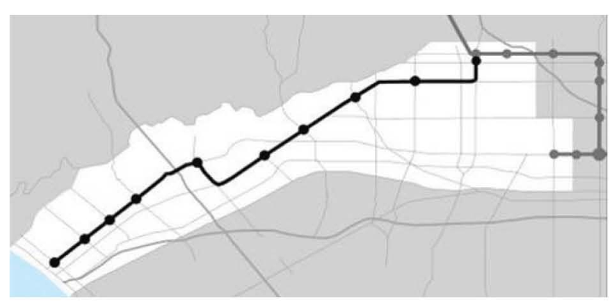
- Extends from Metro Purple Line Wilshire/Western station to 4th Street and Wilshire in Santa Monica, with 11 stations. Alignment is elevated above Wilshire to Santa Monica Boulevard, above Santa Monica to Westwood Boulevard, above Westwood to Wilshire, and above Wilshire to 4th Street in Santa Monica. To transition from subway to elevated, alignment requires a major portal between existing Wilshire/Western Metro Purple Line station and proposed Wilshire/Crenshaw station.

Alternative 3 – Wilshire Boulevard Alignment LRT/Monorail Elevated



- Extends from Metro Purple Line Wilshire/Western station to 4th Street and Wilshire in Santa Monica, elevated with 12 stations. Alignment is elevated above Wilshire to Santa Monica Boulevard, above Santa Monica to Westwood Boulevard, above Westwood to Wilshire, and above Wilshire to 4th Street in Santa Monica. To transition from subway to elevated, alignment requires a physical transfer between existing Wilshire/Western Metro Purple Line station and proposed Wilshire/Western elevated station.

Alternative 5 – Santa Monica Boulevard Alignment HRT, LRT, Monorail Elevated



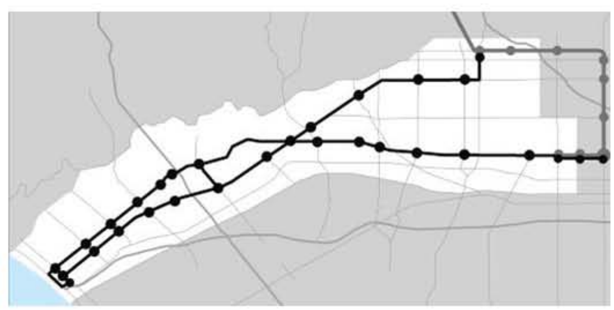
- Extends from Metro Red Line Hollywood/Highland station elevated to Wilshire and 4th Street in Santa Monica, with 10 stations. Alignment heads south from Hollywood/Highland above Highland to Santa Monica Boulevard, above Santa Monica to Westwood Boulevard, above Westwood to Wilshire, and then above Wilshire to 4th Street in Santa Monica.

BRT Alignments

- The BRT alternative consists of a specially operated dedicated peak-period curb lanes predominantly along Santa Monica Boulevard with two branches, one to 4th Street in Downtown Santa Monica with 13 stations and the second along Santa Monica Boulevard to UCLA via Westwood Boulevard with 9 stations. The BRT alternative also includes a similarly operated Wilshire Line from the end of the Metro Purple Line along Wilshire Boulevard to Ocean Avenue, with a turn-around along Ocean Avenue back to 5th Street and Colorado Avenue in Downtown Santa Monica with 15 stations. Metro is currently evaluating dedicated bus lanes on Wilshire Boulevard in the City of Los Angeles as part of an FTA Very Small Starts Grant (separate project).

Alternative 17 – Wilshire/Santa Monica Boulevards BRT At-Grade

- Predominantly uses Wilshire and Santa Monica Boulevards on street with physical transfers at Wilshire/Western Metro Purple Line station and Hollywood/Highland Metro Red Line station. Operates with three separate lines: Wilshire to Downtown Santa Monica (Line 1, 15 stops); Santa Monica Boulevard to Downtown Santa Monica (Line 2, 13 stops); and Santa Monica Boulevard to Westwood Boulevard and Westwood Village (Line 3, 9 stops) as a branch of Line 2.



S.5 Evaluation Criteria Used for Screening Alternatives

Once the 17 alternatives described above were defined, they were evaluated through a multi-step process. Figure S-19 shows the general process used to evaluate and narrow the alternatives.

Step 1 (Screening) involves an evaluation of the alternatives on a systems planning level. The screening first focuses on answering key questions or concerns that proved to be distinguishers among major choices. The key questions related to the following:

- Vertical Alignment/Degree of Right-of-Way Separation
- Transit Mode/Technology
- Horizontal Alignment
- Ridership
- Cost-Effectiveness

Evaluating the alternatives based on these key questions helped to identify those alternatives that would best meet the goals and objectives of the project. Eliminating those that would not meet the objectives ensured that the bulk of the study effort, as well as public scrutiny and review, was devoted to the most promising alternatives and transportation improvements. In this manner, the various transportation proposals under consideration continued to evolve as the study progressed. The alternatives not carried forward at the conclusion of each step were carefully documented in terms of the reasons they were eliminated from further consideration.

In addition to the key questions identified above, specific goals and objectives were structured to capture the priorities for mobility improvement and transit performance that have been raised and discussed by transportation planning agencies, community leaders, and concerned citizens and stakeholders for the past several years.

The established goals and objectives for the Westside Extension Transit Corridor addressed the major considerations related to making choices among different transportation alternatives, such as effectiveness in improving mobility, impacts, cost-effectiveness, financial feasibility, and equity. For the Westside Extension Transit Corridor, seven goals are used based on Federal Transit Administration (FTA) guidance.

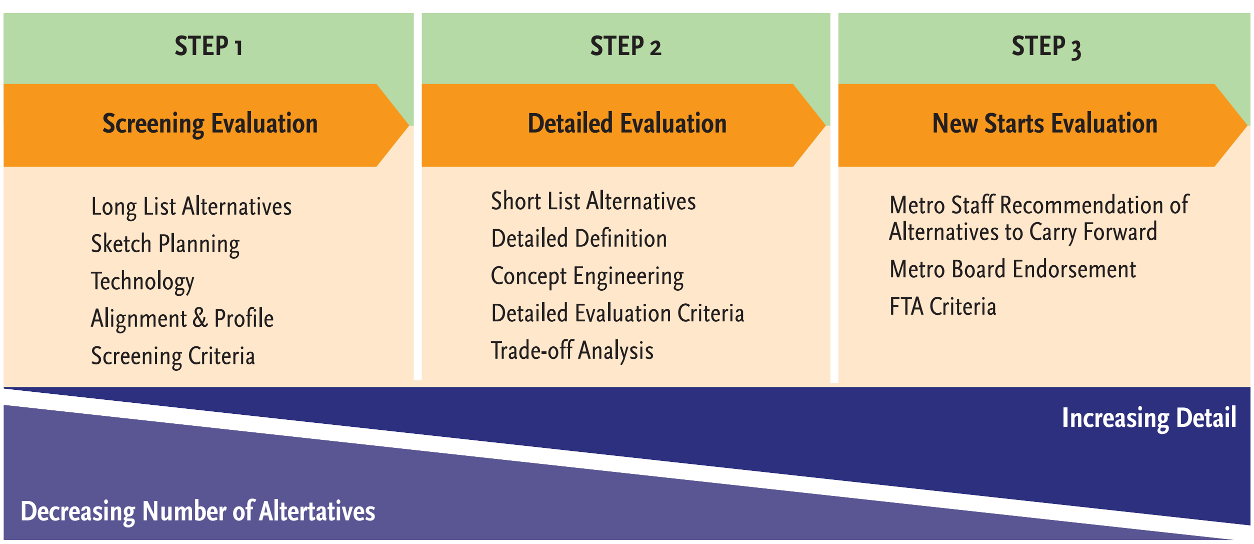


Figure S-19 Evaluation Framework

Goal A – Mobility Improvement: The primary purpose of the project is to improve public transit service and mobility in the Westside Extension Transit Corridor. To evaluate the goal of Mobility Improvement, the analysis examined how well each alternative improves the ability of residents and employees to reach desired destinations through the provision of high quality, convenient, and reliable east-west transit service throughout the corridor.

Goal B – Transit-Supportive Land Use Policies and Conditions: A major aspect of this goal is to locate transit alignments and stations in areas with existing land uses conducive to transit use or in areas that have the greatest potential to develop transit-supportive land uses.

Goal C – Cost-Effectiveness: This goal ensures that both the capital and operating costs of the project are commensurate with its benefits.

Goal D – Project Feasibility: The fourth goal is that the project be financially feasible: in other words, that funds for the construction and operation of the alternative be readily available and do not place undue burdens on the sources of those funds. This goal also includes minimizing risk associated with project construction.

Goal E – Equity: This goal evaluates project solutions based on how well costs and benefits are distributed fairly across different population groups with particular emphasis on serving transit-dependent communities.

Goal F – Environmental Considerations: The purpose of this goal is to develop solutions that minimize impacts to environmental resources and communities within the Study Area.

Goal G – Public Acceptance: This goal aims to develop solutions that are acceptable to a reasonable portion of the public, with special emphasis on residents and businesses within the Study Area.

Performance measures were identified to measure the achievement of the goals and objectives according to a set of FTA evaluation criteria, as shown in Figure S-20.

GOALS	OBJECTIVES	CRITERIA
MOBILITY IMPROVEMENT (Effectiveness)	Reduce transit travel times.	Travel time savings.
	Improve trip reliability.	Trip reliability.
	Provide sufficient capacity to meet 2030 transit demand and beyond (expandability).	Transit capacity.
	Maximize potential transit ridership.	Ridership.
	Enhance linkages to the transportation system as well as major trip attractors/generators within the corridor.	System connectivity.
TRANSIT SUPPORTIVE LAND USE POLICIES AND CONDITIONS	Provide transit service to areas with transit supportive land uses and policies.	Transit supportive land uses.
	Integrate with local redevelopment plans and policies.	Economic benefit.
COST EFFECTIVENESS	Provide solutions with benefits commensurate with their costs.	Cost-effective (e.g. "bang for the buck") to enhance project competitiveness for federal transit funds.
PROJECT FEASIBILITY	Provide transportation solutions that are financially feasible.	Financial feasibility.
	Minimize risk associated with project construction.	Constructability/construction impacts.
EQUITY	Improve transit service available to transit dependent communities, especially access to job opportunities.	Mobility for transit dependents.
	Provide solutions that distribute both economic and environmental costs and benefits fairly across different population groups.	Equity.
ENVIRONMENTAL CONSIDERATION (Impacts)	Minimize displacement of homes and businesses.	Right-of-way impacts.
	Minimize impacts to the traffic and circulation system.	Traffic and circulation.
	Minimize impacts to the character of the community.	Visual/noise and vibration.
	Provide for the safety and security of pedestrians and transit users.	Safety and security.
	Minimize impacts on sensitive and protected environmental resources.	Natural and cultural resources.
	Reduce, not add to, tailpipe emissions/non-renewable fuel consumption.	Air quality/sustainability.
PUBLIC ACCEPTANCE	Develop public support of private and public stakeholders.	Public support.
	Attain support of elected officials representing participating jurisdictions.	Local support.
	Develop solutions which enhance and are sensitive to quality of life issues for communities in the study area.	Community acceptance.

Figure S-20 Goals, Objectives and Evaluation Criteria

S.6 Initial Screening of Alternatives

Once the alternatives for the AA were defined, they were screened and evaluated through a series of steps outlined in the previous section. Specific criteria and measures were developed for each goal identified in the previous section as a means of assessing whether an alternative meets the goal. A comparative analysis among the alternatives was then conducted to determine how well each one performs against the others.

The primary purpose of the project is to improve public transit service and mobility in the Westside Extension Transit Corridor. The ability of each mode considered for the Westside Corridor was evaluated based on the carrying capacity. Figure S-21 illustrates the operating characteristics, including carrying capacity, of the various modes. This figure assumes a common number of vehicles or trains per hour.

The Westside Corridor ridership analysis consistently demonstrated a need for a mode that could provide a capacity of more than 700 passengers per train set, as systems must be sized for the high-capacity peak period loading along the Wilshire and Santa Monica alignments. As shown in Figure S-21, LRT, Monorail, and BRT technologies provide less capacity than HRT and cannot accommodate the forecasted demand.

The pros and cons of each of these modes, along with vertical and horizontal alignments, to meet the goals and objectives of the study are discussed below.

Carrying Capacity

Mode		Actual Operating Characteristics Normalized to 18 vehicles/hour/direction	Systems Sampled
HRT		Up to 800 passengers/train (6 cars) Top Speed of 70 mph (32 mph average) Up to **14,000** passenger/hour/direction	Metro Red Line Metro Purple Line
LRT		Up to 425 passengers/train (3 cars) Top Speed of 55-65 mph (24-35 mph average) Up to **7,600** passengers/hour/direction	Metro Blue Line Metro Green Line Metro Gold Line
Monorail		Up to 350 passengers/ train (6 cars) Top Speed of 40-50 mph (18-30 mph average) Up to **6,300** passengers/hour/direction	Las Vegas Monorail Seattle Monorail Disneyland Monorail Disneyworld Monorail
BRT		Up to 100 passengers/bus (articulated) Top Speed of 35 mph (13-22 mph average) Up to **1,800** passengers/hour/direction	Metro Orange Line Wilshire Metro Rapid

Figure S-21 Carrying Capacity by Mode

HRT

Los Angeles is familiar with the technology behind the Metro Red and Purple Lines, and the HRT alternatives continue the use of this technology. HRT would require the expansion of the existing Metro HRT Yard or development of a new yard somewhere accessible from the existing or proposed HRT system. As HRT would be a continuation of the existing system, no transfer would be needed at the Metro Purple Line Wilshire/Western station.

A direct connection at the Hollywood/Highland station would be convenient for passengers from the San Fernando Valley. However, it may impact train operations throughout the system. A transfer station at this location may result in a minor drop in ridership. However, train operations in a push-pull configuration would be superior because a higher number of trains could operate on the Santa Monica Boulevard alignment. HRT is the highest capacity system of those studied and has the most potential for future capacity expansion.

LRT

With three existing systems in operation in Los Angeles (Metro Blue, Green, and Gold), LRT is a familiar technology. However, with two LRT lines under construction and others being studied, existing maintenance yards are reaching capacity. A new maintenance yard would be needed on the Westside to support an LRT on Wilshire Boulevard.

Because this technology differs from the HRT currently terminating at the Metro Purple Line Wilshire/Western station, a transfer would be needed at this location, which may affect ridership and travel times. LRT capacity is not as high as HRT and may be unable to accommodate the forecasted ridership within the Westside Transit Corridor.

Monorail

While not a part of the Los Angeles Metro system, Monorails are in operation in several U.S. locations, including Seattle, Las Vegas, airports, and theme parks. This technology requires the construction of a dedicated maintenance facility (estimated to be approximately 15 acres in size) on the Westside. Also, the introduction of a new, unfamiliar technology would require construction of new storage and maintenance facilities, as well as additional training and less cross-utilization of Metro train operators.

Because this technology differs from the HRT currently terminating at the Metro Purple Line Wilshire/Western station, a transfer would be needed at this location, which may affect ridership and travel times. The capacity of a Monorail system is similar to that of LRT.

BRT

BRT is the lowest cost mode studied; however, it would not be in an exclusive right-of-way. Dedicated bus lanes would help to speed buses; however, dedicated bus lanes would still have shared driveways, right-turning vehicles, and all intersections. Therefore, the ridership and travel time savings are significantly lower than that would be with the rail alternatives.

Because this technology differs from the HRT currently terminating at the Metro Purple Line Wilshire/Western station, a transfer would be needed at this location, which may affect ridership and travel times. The system capacity of BRT is significantly lower than that of HRT, LRT, or Monorail systems. BRT systems typically have lower capital costs than fixed-rail guideways.

Summary

HRT was identified as the preferred mode for further study because it has the capacity to meet the anticipated ridership demand and limit the number of transfers. BRT was also selected for further study because of its comparatively lower cost.

Vertical Alignment Issues

Elevated Alignments

While aerial structures can be less costly to build in low-density areas with available right-of-way than subway tunnels, a number of factors within the Westside Extension Transit Corridor make aerial alignment alternatives undesirable for this Study Area:

- Column placement would require the removal of two to three traffic lanes. This would result in major traffic impacts and conflicts with the project objective to add capacity to the corridor.
- To mitigate traffic impacts associated with the removal of two to three traffic lanes, and to accommodate station elevators and escalators, right-of-way would need to be purchased on one or both sides of the alignment. This cost is prohibitive. Additionally, existing buildings and land uses would be affected.
- Land use impacts are high in station areas (for stations and ancillary operations structures) and for traffic mitigation.
- There would be visual, noise and vibration, and shadow impacts, along with potential impacts to sightlines of historic structures.
- An engineering analysis developed several conclusions regarding aerial alignments and the three proposed technologies. Aerial guideways and stations for HRT, LRT, and monorail are very similar. There are no significant differences in sizes or costs when designing a system using similar aerial U.S. systems as guidance. A typical cross-section of an elevated system is shown in Figure S-22. A typical cross-section of an elevated platform and station area is shown in Figure S-23.
- Cities that have fully aerial systems or systems with aerial segments include Los Angeles (Metro Blue Line, and portions of the Metro

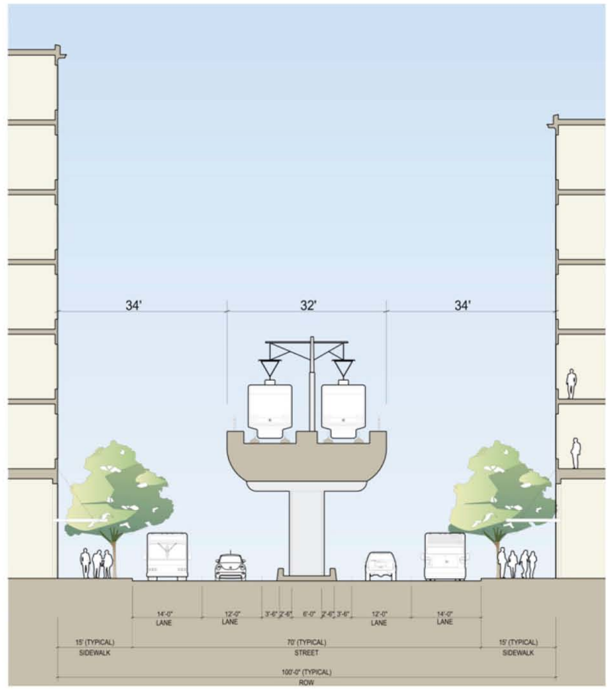


Figure S-22 Typical Cross Section: Elevated LRT

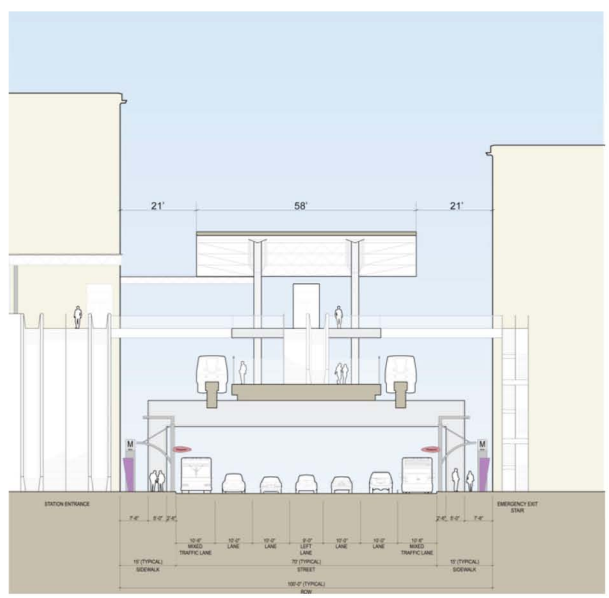


Figure S-23 Typical Cross Section: Monorail Station Platform

Gold Line LRT and Metro Green Line LRT), Las Vegas (fully aerial monorail system), and the San Francisco Bay Area (portions of the BART HRT system outside Downtown San Francisco and Oakland). The aerial LRT segments in Los Angeles are located in medium-density commercial areas and freeway medians. The aerial monorail system in Las Vegas is approximately one block off the "Strip," maintaining a separation between pedestrian environments and the elevated structure. Land uses adjacent to the Las Vegas monorail are generally commercial/industrial. Aerial portions of BART are primarily in the East Bay and south of Downtown San Francisco along freeway corridors.

Summary

The analysis indicates that application of these aerial systems in the dense, highly urban corridors, such as Wilshire or Santa Monica Boulevards, would not be suitable; therefore they were not recommended. Figure S-24 shows the existing intersection at Wilshire and Fairfax. A photo simulation, shown in Figure S-25, illustrates how an elevated monorail station at the densely developed intersection would appear.

Subway Alignments

- In suburban and low-density urban areas, subway alignments can be less cost-effective than at-grade or elevated alignments; however, in higher density, high land price areas, tunneling can often be the most cost-effective option.
- Land use impacts are high in station areas (for stations and ancillary operations structures) and for traffic mitigation.
- While Metro endeavors to tunnel under public streets, the nature of the City's layout and of train system design requiring wide radius curves means that occasionally tunneling occurs under private property.

Figure S-24 Photo of Existing Intersection at Wilshire and Fairfax

Figure S-25 Photo-simulation of Elevated Monorail Station at Wilshire and Fairfax

Summary

In this corridor, an underground alignment is recommended as it has fewer land use, traffic, visual, historical, and noise impacts than an elevated alignment. This is due to the impacts an elevated alignment would have on adjacent buildings (some historical), visual, shadow, noise, excessive land acquisition, traffic, and mitigations needed.

Horizontal Alignment Issues

Santa Monica Boulevard Alignments

- Stand-alone Santa Monica Boulevard subway alternatives (Alternatives 4, 6, 7, 7a, 8, and 13) did not perform as well as stand-alone Wilshire Boulevard and the combined Wilshire/Santa Monica subway alternatives.
- The transfer station at Hollywood/Highland provides superior connections to existing rail lines, resulting in improved train frequencies. It allows the option of adding a station at Santa Monica/La Brea. This applies to the combined Wilshire/Santa Monica alternatives as well.
- To support cost-effectiveness, Santa Monica HRT subway alignments may need to serve the Cedars Sinai/Beverly Center area instead of following a lower density alignment through Beverly Hills along Santa Monica Boulevard. This required some modifications to Alternatives 9, 10, and 11.

Wilshire Boulevard Alignments

- High ridership and travel-time savings offset relatively high costs, resulting in an overall good cost-effectiveness performance. High costs may require phased development of this alternative because of funding limitations.
- Alternative 1 does not provide direct service to Farmer's Market/The Grove or Cedars Sinai/Beverly Center, but generally minimizes tunneling beneath private property.
- Alternative 12 does not serve major activity centers of the Los Angeles County Museum of Art (LACMA), Farmer's Market/The Grove, and misses the City of Beverly Hills' preferred station location at the intersection of Wilshire Boulevard and Beverly Drive.
- Alternative 14 requires reconfiguration because of the inability to locate stations at LACMA and Farmer's Market/The Grove on tight turns. This can be designed, but requires some alignments under residential and commercial properties on large radius turns.
- The Greater Wilshire Neighborhood Council requested, during the public comment period, that the Wilshire/Crenshaw station be reconsidered. After reviewing ridership forecasts, population and employment density forecasts, and area land uses, this station will be shown as an optional station pending further planning.

Combination Santa Monica/Wilshire Boulevards Alignments

- In terms of cost effectiveness, the combined Santa Monica/Wilshire Boulevards alignment performed better that the stand-alone Santa Monica Boulevard alignment, but not as well as the stand-alone Wilshire Boulevard alignment. High costs may require phased development of a combination alternative because of funding limitations.
- The transfer station at Hollywood/Highland provides superior connections to existing rail lines, resulting in improved train frequencies. It allows the option of adding a station at Santa Monica/La Brea, and it avoids most of the tunneling under residential areas. This applies to the Santa Monica Boulevard alternatives as well.
- To support cost-effectiveness, combined Santa Monica/Wilshire HRT subway alignments were reconfigured to serve the Cedars Sinai/Beverly Center area instead of following a lower-density alignment through Beverly Hills on Santa Monica Boulevard. This required some modifications to Alternatives 9, 10, and 11.
- Alternatives 9, 10, and 11 do not serve Farmer's Market/The Grove and require slightly more tunneling under residential areas.
- Alternatives 15 and 16 require reconfiguration because of the inability to locate stations at LACMA and Farmer's Market/The Grove on

tight turns. This can be resolved but requires some alignments under residential and commercial properties on large radius turns.

- The Greater Wilshire Neighborhood Council requested, during the public comment period, that the Wilshire/Crenshaw station be reconsidered. After reviewing ridership forecasts, population and employment density forecasts, and area land uses, this station will be shown as an optional station pending further planning.
- Westwood Homeowners requested that additional alignments be considered between Century City and Westwood. This request applies to all HRT subway alternatives.

Summary

Overall, the Wilshire Boulevard alternatives performed better than the Santa Monica Boulevard alternatives in nearly every category. The majority of public input also supported the Wilshire Boulevard alternatives over a stand-alone Santa Monica Boulevard alignment. The Combined Santa Monica/Wilshire Boulevards alignment also performed well and was supported by the community. As such, the preferred horizontal alignments for further study were the Wilshire Boulevard alignments and the Combined Santa Monica/Wilshire Boulevards alignments.

Based on the pros and cons of the alternatives discussed above, several alternatives were eliminated from further consideration. Table S-6 summarizes the reasons why 12 of the initial 17 alterna-

Table S-6 Summary of Reasons Alternatives were Dropped from Consideration

Alt.	Operations (Branching)	Environmental Issues	Land Use Issues	Low Capacity	Low Ridership/ New Transit Trips	Less Cost Effective	Alternatives Retained after Initial Screening
1							✓
2		X	X	X		X	
3		X	X	X	X	X	
4	X				X	X	
5		X	X	X	X	X	
6	X				X	X	
7	X				X	X	
7a	X				X	X	
8	X				X	X	
9	X					X	
10	X				X	X	
11							✓
12*	X						
13	X				X	X	
14							✓
15*	X						
16							✓
17							✓

**Key elements of Alternatives 12 and 15 are found in Alternatives 14 and 16, respectively.*

tives were dropped from further consideration. As shown in the table, operational and environmental issues, in addition to capacity of various modes, played a role in the elimination of alternatives. Operational issues from branching of the rail lines may negatively affect train operations throughout the system. Alternatives with direct connections at the Universal City, Hollywood/Highland, and/or Hollywood/Vine stations were eliminated. Alternatives with a transfer station at Hollywood/Highland provided superior connections to existing rail lines resulting in improved train efficiencies. Environmental and land use issues at this level of screening focused on the impacts of elevated alternatives.

S.7 Screening of Most Promising Alternatives

At the conclusion of the initial screening of the 17 alternatives, the five most promising alternatives were carried forward for more detailed analysis. A description of these five alternatives (Alternatives 1, 11, 14, 16, and 17) and the results of the more detailed analysis are presented below.

The No Build and TSM Alternatives are also included in the analysis, per FTA requirements. These alternatives are defined below (and in more detail in Section S.4).

No Build

The No Build Alternative represents the "do nothing" alternative. This alternative includes the existing transportation infrastructure, as well as the transportation projects that are committed in the current Metro Long-Range Transportation Plan and the current Southern California Association of Governments' 2007 RTP (Figure S-26).

Table S-4 in Section S.4 lists the bus route additions and modifications for the No Build Alternative.

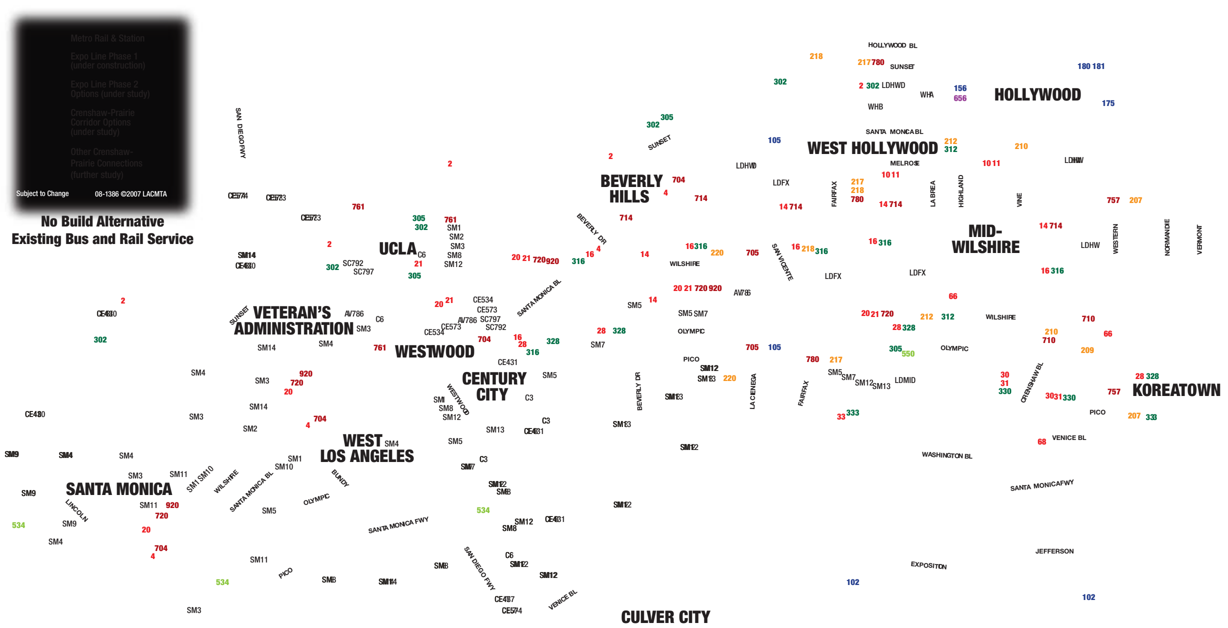


Figure S-26 No Build Alternative

TSM

The Transportation System Management (TSM) Alternative builds upon the No Build Alternative by enhancing the existing Metro Rapid Bus service and local bus service in the Westside study area (Figure S-27). No changes were made to the TSM Alternative as originally defined. The alternative emphasizes more frequent service to reduce delay and enhance mobility. Although the frequency of service is already very good, service frequency is proposed to be improved between 2 and 10 minutes during peak periods on selected routes.

Table S-5 in Section S.4 lists the bus-route enhancements for the TSM Alternative.

S.7.1 Definition of Most Promising Alternatives

The most promising build alternatives are defined below (and in more detail in Section S.4). A brief overview and a more detailed alignment map are provided in this section for each of the most promising alternatives.

Heavy Rail Alternatives

Four HRT subway alternatives and several alignment options were identified for further study based on their performance and results during the step 1 initial screening process. These alternatives are described below.

Attributes common to all HRT alternatives:

- Based on comments received from the public, the Wilshire/Crenshaw station will be optional and studied further.
- Several underground alignment options between the Wilshire/Beverly and Wilshire/Westwood stations remain for further study.

Alternative 1 – Wilshire Boulevard Alignment HRT Subway

This alternative extends underground from the Metro Purple Line Wilshire/Western station to 4th Street and Wilshire Boulevard in Santa

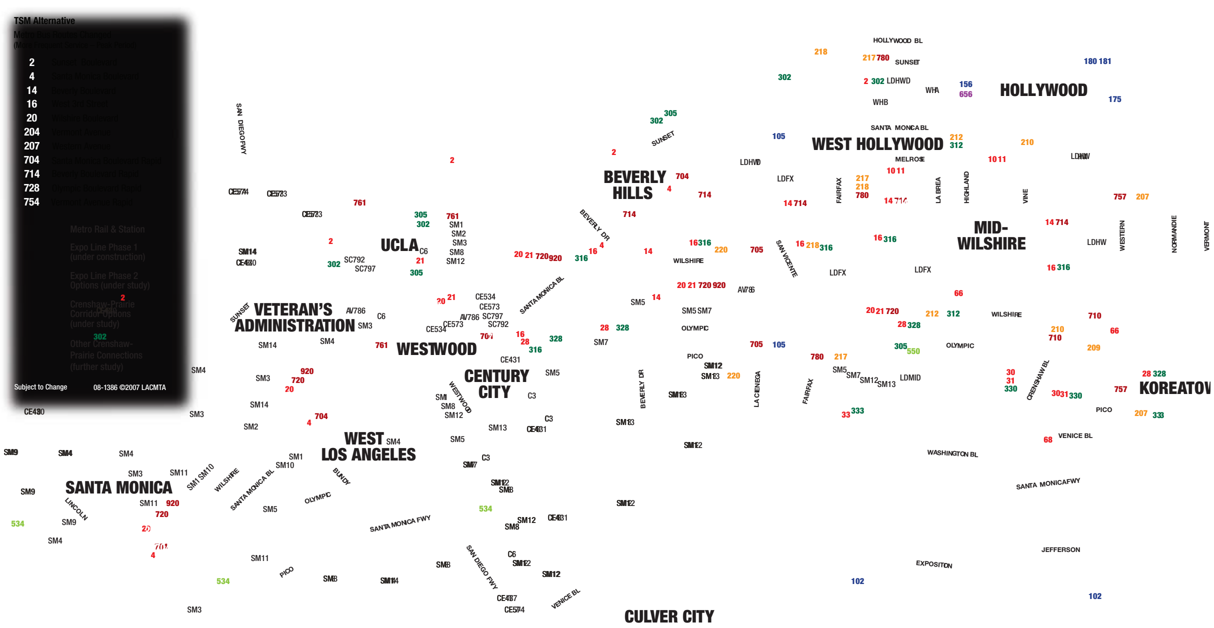


Figure S-27 TSM Alternative

Monica. It has 10 stations and 1 optional station (Figure S-28). The alignment is generally under Wilshire Boulevard with a direct connection at the Wilshire/Western station.

Alternative 11 – Wilshire/Santa Monica Boulevards Combined HRT Subway

This alternative extends underground from the Metro Purple Line Wilshire/Western station and from the Metro Red Line at the Hollywood/Highland station without a Red Line direct connection to 4th Street and Wilshire Boulevard in Santa Monica. It has 14 stations and 1 optional station (Figure S-29).

Public input received during community meetings and positive preliminary analysis results led to adding a proposed new station at Santa Monica/La Brea to the original list of stations.

Alternative 11 – Alignment Options

There are two alignment options in the Beverly Center area: Option 11A follows San Vicente from Santa Monica Boulevard to La Cienega Boulevard, where it curves south and then west to meet the Wilshire Boulevard alignment (Figure S-30). Option 11B follows La Cienega from Santa Monica Boulevard, past the Beverly Center, and curves west at Wilshire Boulevard (Figure S-31).

Alternative 14 – Wilshire Boulevard/Fairfax Centers HRT Subway

This alternative extends underground from the Metro Purple Line Wilshire/Western station to 4th Street and Wilshire Boulevard in Santa Monica. It has 11 stations and 2 optional stations (Figure S-32).

This alignment is generally under Wilshire Boulevard to Fairfax Avenue, continues under Fairfax Avenue to Beverly Boulevard, continues under Beverly Boulevard, stays underground to La Cienega Boulevard, continues under La Cienega Boulevard, transitions to Wilshire Boulevard, and continues under Wilshire Boulevard to 4th Street in Santa Monica.

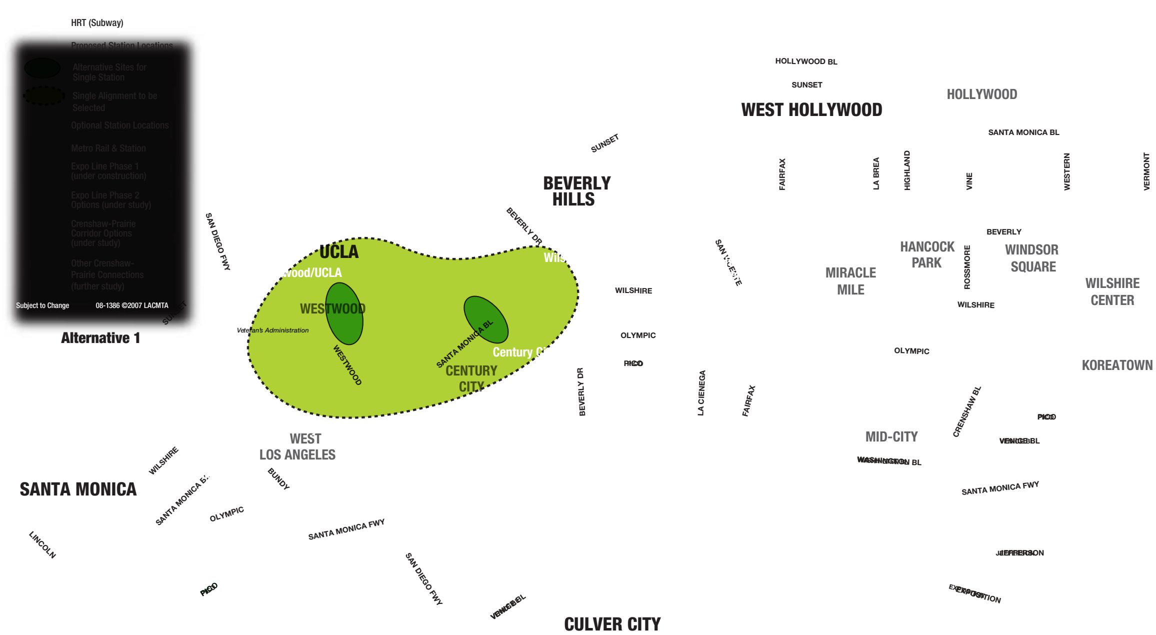


Figure S-28 Alternative 1—Wilshire Boulevard Alignment HRT Subway

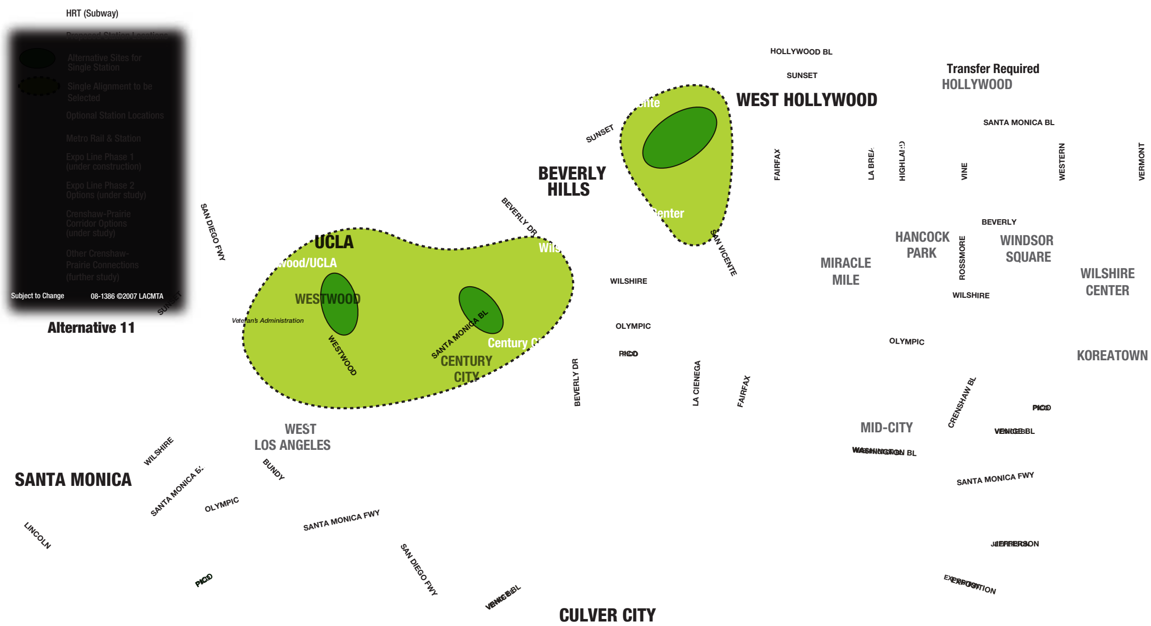


Figure S-29 Alternative 11—Wilshire/Santa Monica Boulevards Combined HRT Subway

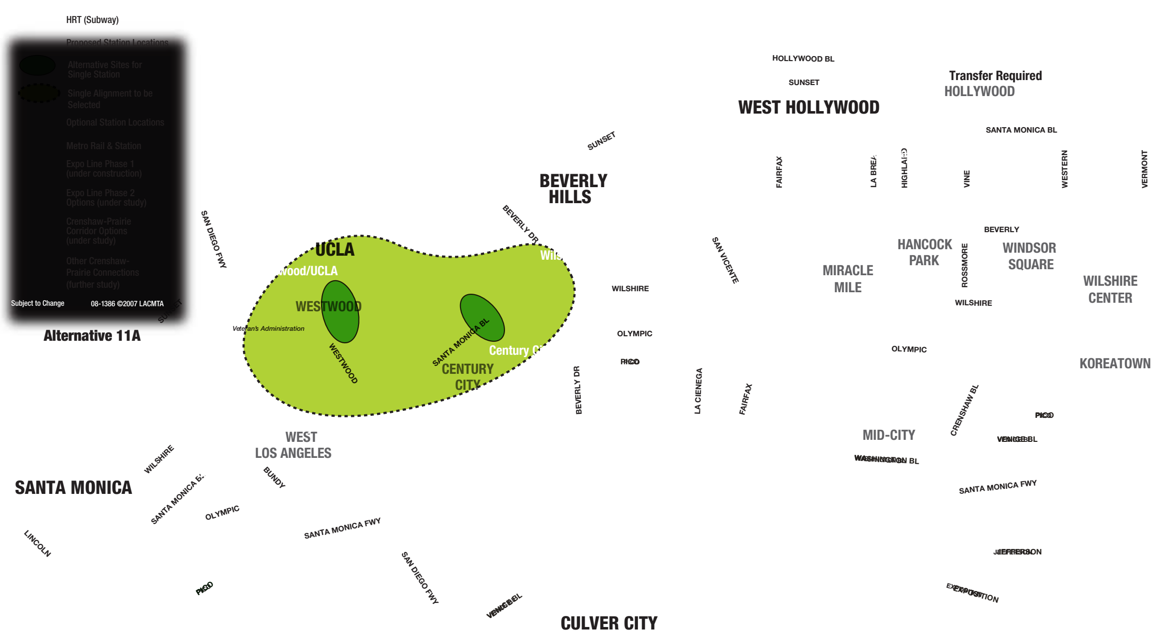


Figure S-30 Alternative 11A—Wilshire/Santa Monica Boulevards Combined HRT Subway

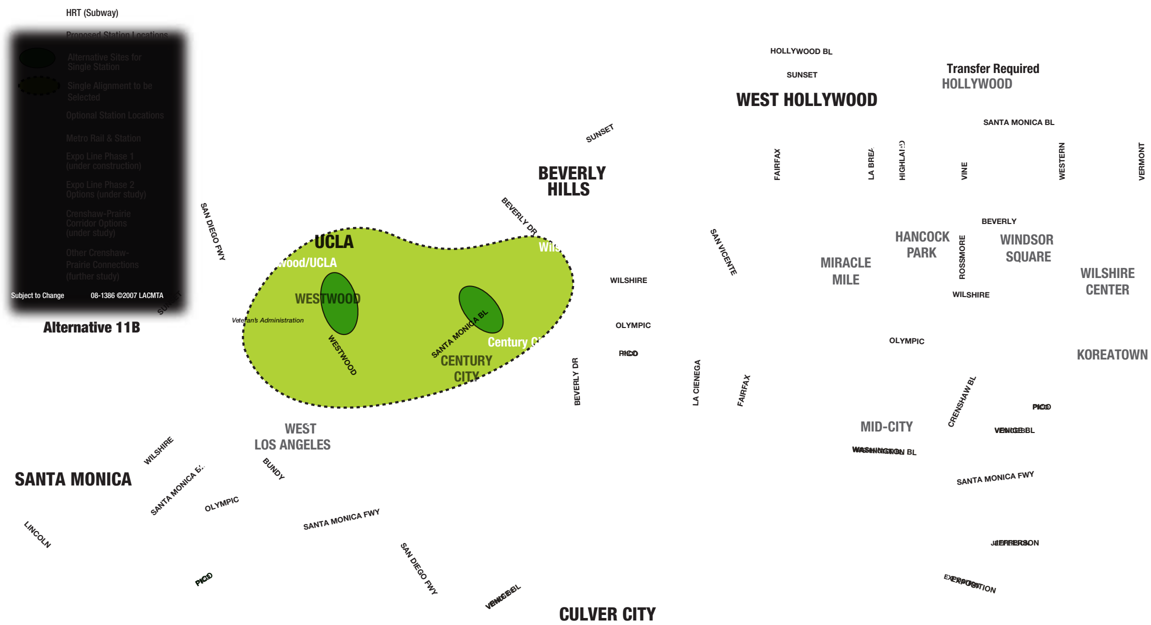


Figure S-31 Alternative 11B—Wilshire/Santa Monica Boulevards Combined HRT Subway

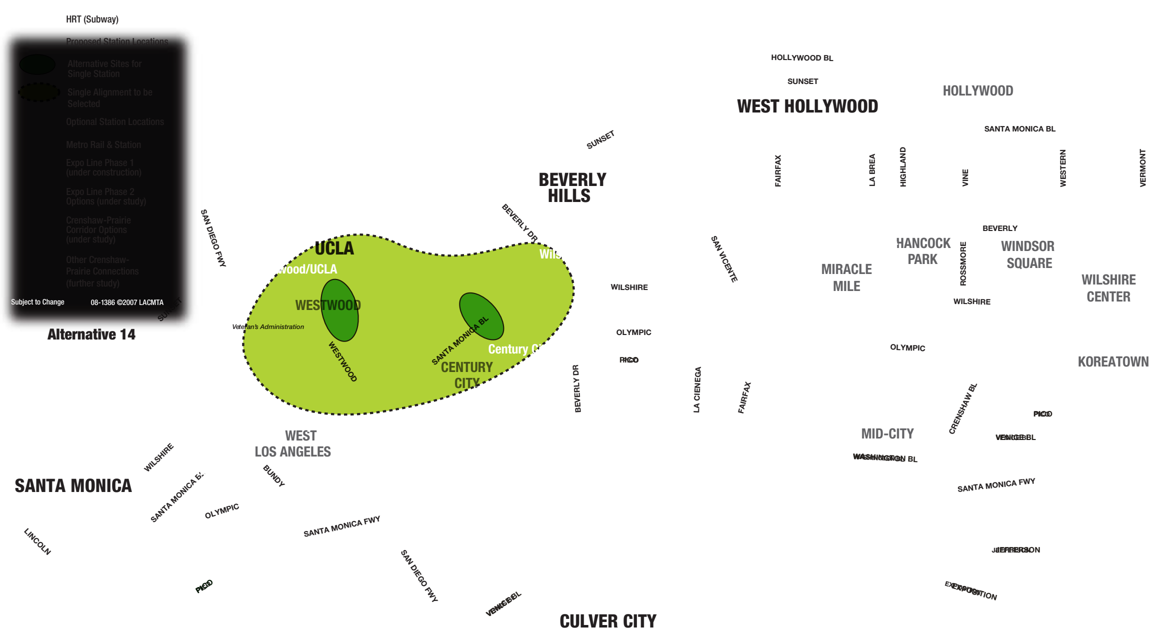


Figure S-32 Alternative 14—Wilshire Boulevard/Fairfax Centers HRT Subway

Alternative 16 - Wilshire/Santa Monica Boulevards Combined Centers HRT Subway with Transfer at Hollywood/Highland
This alternative extends underground from the Metro Purple Line Wilshire/Western station and from the Metro Red Line Hollywood/Highland station to 4th Street and Wilshire Boulevard in Santa Monica. It has 15 stations and 2 optional stations, including a transfer at the Hollywood/Highland station (Figure S-33).

The Santa Monica Boulevard portion of the alignment transitions south under La Cienega, past the Beverly Center, and then curves west at Wilshire Boulevard. The Wilshire alignment and the Santa Monica alignment meet at approximately Beverly Boulevard, with a station located just south of the junction.

This alignment is generally under Wilshire Boulevard to Fairfax Avenue, continues under Fairfax Avenue to south of Beverly Boulevard, stays underground to La Cienega Boulevard, continues under La Cienega Boulevard, transitions to Wilshire Boulevard, and continues under Wilshire Boulevard to 4th Street in Santa Monica.

Public input received during community meetings and positive preliminary analysis results led to the addition of a proposed new station at Santa Monica/La Brea to the original alternative.

Alternative 17 – Wilshire/Santa Monica Boulevards BRT At-Grade
This alternative predominantly uses Wilshire and Santa Monica Boulevards on street with physical transfers at the Wilshire/Western Metro Purple Line station and Hollywood/Highland Metro Red Line station. It would provide service to Downtown Santa Monica on both Wilshire and Santa Monica Boulevards (Figure S-34).

This alternative operates with three separate lines: Wilshire Boulevard to Downtown Santa Monica (Line 1); Santa Monica Boulevard to Downtown Santa Monica (Line 2); and Santa

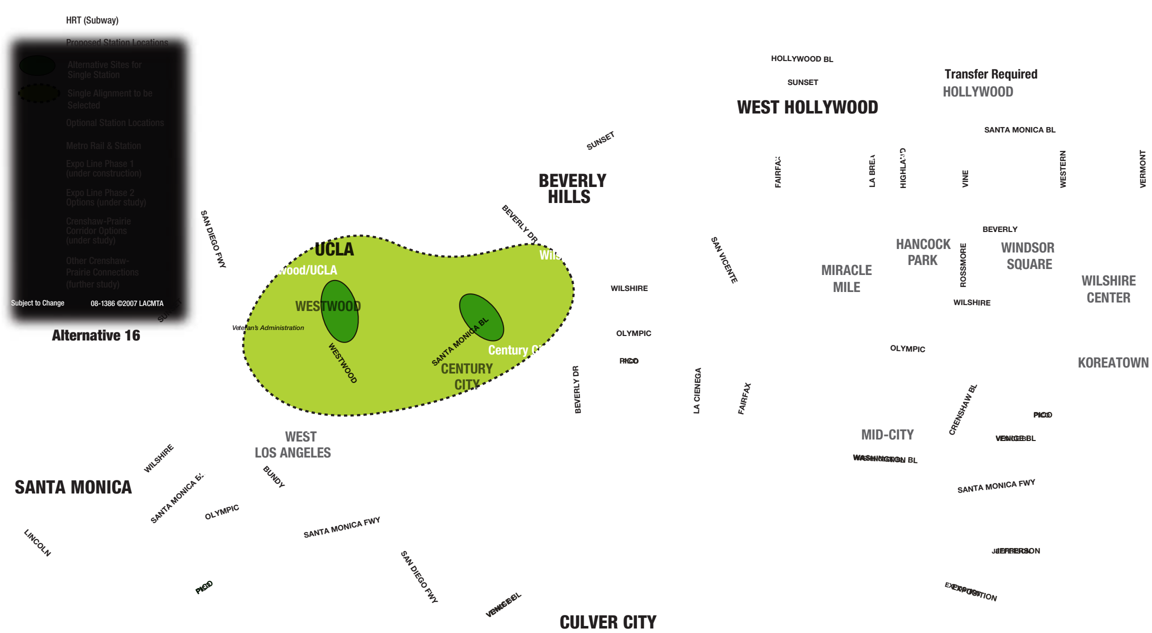


Figure S-33 Alternative 16—Wilshire/Santa Monica Boulevards Combined Centers HRT Subway with transfer at Hollywood/Highland

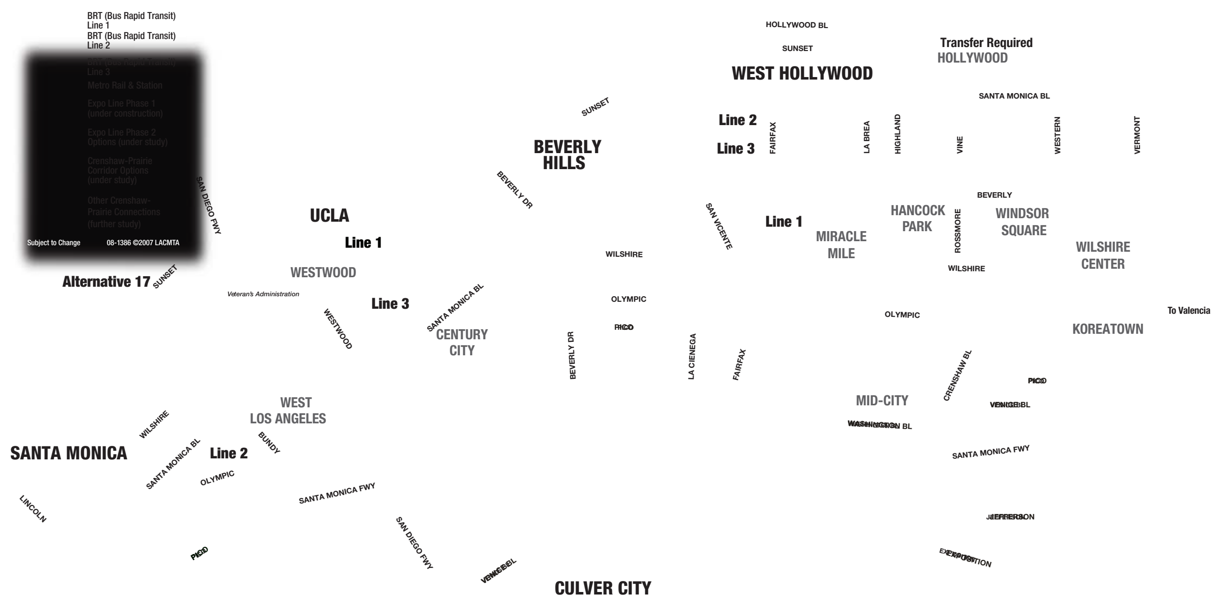


Figure S-34 Alternative 17—Wilshire/Santa Monica Boulevards BRT at Grade

Monica Boulevard to Westwood Boulevard and Westwood Village (Line 3) as a branch of Line 2. Line 1 has 15 stops; Line 2 has 13 stops; and Line 3 has nine stops.

S.7.2 Detailed Evaluation of Alternatives

After the five most promising build alternatives were identified, the next step was to compare the merits of each of the alternatives against the seven identified goals in order to recommend alternatives to carry into the full environmental review. The No Build and TSM Alternatives are required by the State and Federal processes to be included in the environmental review.

Mode Analysis

As with the Initial Screening and Detailed Analysis processes, one of the first steps was to evaluate the five alternatives against the Mobility Improvement goal. The major objectives of the Westside Extension Transit Corridor Study are to reduce transit travel times, improve trip reliability, provide sufficient transit capacity to meet 2030 transit demand, maximize potential transit ridership, and to enhance links to the transportation system. These mobility goals vary significantly by mode of transit.

Figures S-35 and S-36 illustrate that the Bus Rapid Transit Alternative 17 did not perform as well as the HRT alternatives under consideration across a number of these mobility measures. Figure S-35 shows that the estimated maximum capacity of the BRT was significantly less than the estimated capacity of the HRT options and only slightly more than the capacity of the No Build Alternative. The low capacity estimated for BRT limits the potential to expand the system in the future, whereas there was more flexibility with the HRT alternatives to accommodate growth in population and demand.

Likewise, Figure S-36 illustrates that the average end-to-end transit operating speed of the BRT system was significantly lower than that for the HRT alternatives. The lower operating speed

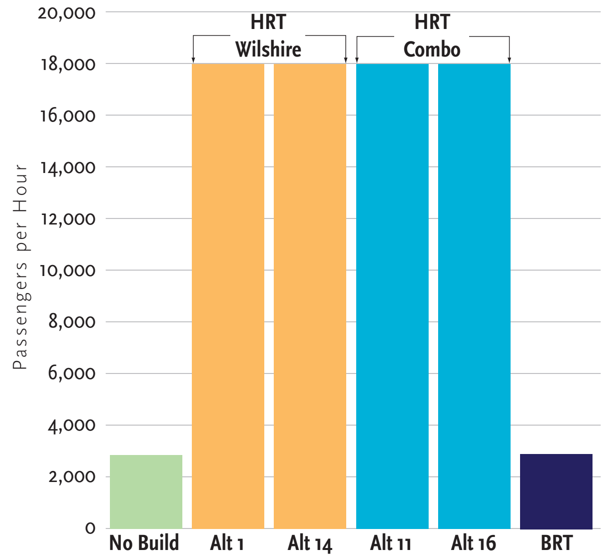


Figure S-35 Estimated Maximum Capacity of New EW Transit Service. Assuming 18 trains per hour or 30 buses per hour

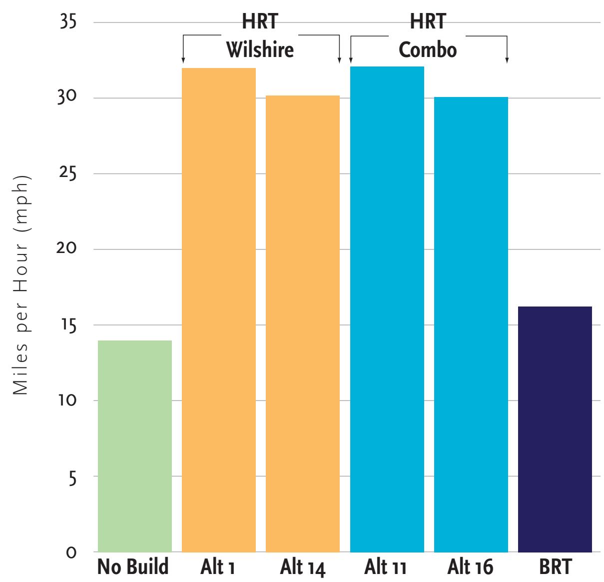


Figure S-36 Average End-to-End Transit Operating Speeds (mph) between Union Station (Downtown) and 4th/Wilshire (Santa Monica)

for BRT was because it operates in mixed-flow traffic conditions at intersections. Even with a dedicated curb lane, the BRT still needs to navigate intersections, which affects travels speeds.

Faster operating speeds indicate higher transit reliability, which means that the effectiveness and efficiency of the facility is maximized due to on-time performance. Additionally, the BRT alternative resulted in significantly fewer new transit trips than the HRT alternatives, as shown in Figure S-37.

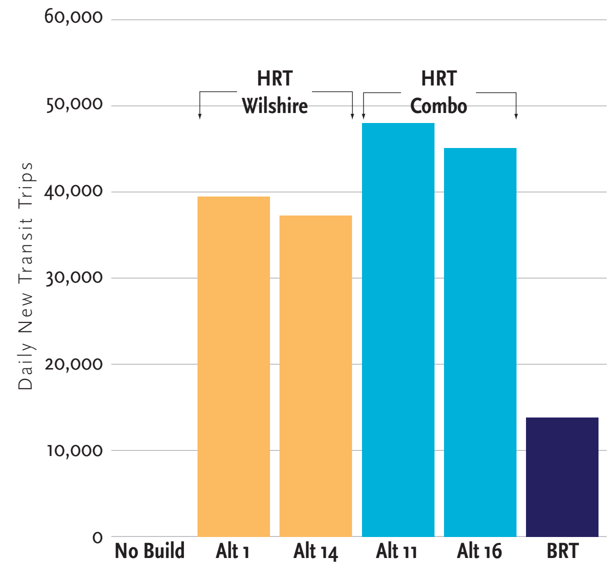


Figure S-37 Daily New Transit Trips (As compared to No Build)

Therefore, based on the considered mobility goals and the comparison to the HRT alternatives, the **Bus Rapid Transit Alternative 17 was not recommended to be carried into the next phase of analysis**. The BRT alternative is a good near-term solution but does not provide sufficient capacity in the long term and does not provide as reliable a trip-time performance as the HRT alternatives. Currently, within the City of Los Angeles, a federally sponsored program will provide peak-period bus lanes as a quality near-term solution.

Best Wilshire Alignment

The next step in the comparative analysis was to compare the two "Wilshire" alternatives (HRT

Alternatives 1 and 14) under consideration. During Step 1 of the evaluation process, a "standalone" West Hollywood-Santa Monica Boulevard HRT alternative was eliminated from future consideration. Therefore, a West Hollywood connection between Wilshire Boulevard and the Hollywood/Highland Red Line station must only be done in concert with a Wilshire alignment alternative. The process was to first choose the best Wilshire alternative and then add the West Hollywood segment to the best Wilshire alternative to have the best combined alternative.

Table S-7 summarizes the performance of Alternative 1 and Alternative 14 for the various criteria (see also Figure S-35 and Figure S-38 for a comparison of Alternatives 1 and 14). In comparing HRT Alternatives 1 (straight out Wilshire) and 14 (a deviation to serve the 3rd/Fairfax and the Beverly Center areas), the most significant factors favoring Alternative 1 were lower initial capital cost, more new transit trips, higher rail transit usage, faster travel time, and more user benefits (a key Federal evaluation factor).

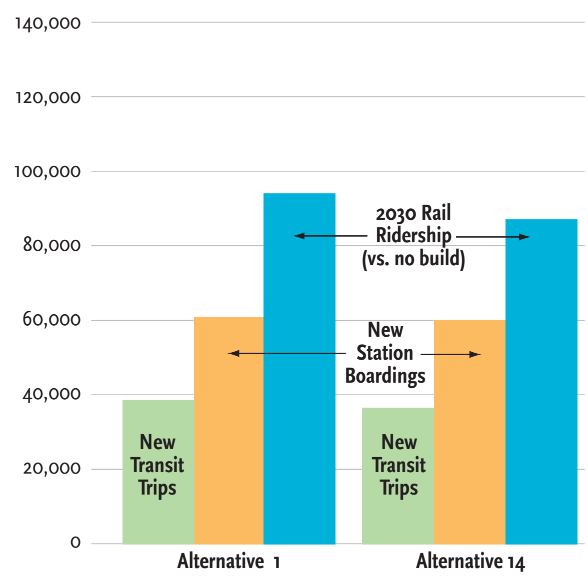


Figure S-38 Comparison of Transit Trips, New Station Boardings and Rail Ridership Projections (Alternative 1 and Alternative 14)

Table S-7 Comparison of Alternatives 1 and 14

Metric	Wilshire Alternative 1	Wilshire Alternative 14 (3rd Street Deviation)
Cost ($2008)	$6.1 B (shorter, fewer stations)	$7.0 B (longer, additional stations)
New Transit Trips	39,300	37,000
New Station Boardings	61,500	59,900
2030 Rail Ridership (vs. no-build)	95,500	88,300
Travel Time Example: Downtown to Westwood	Faster (straighter) 23 minutes	Slower (curves) 28 minutes
Transit User Benefits (Travel Time Saved Compared to No Build)	48,200 hours/day	45,300 hours/day
Station Issues	Accommodates La Cienega/Wilshire	Adds stations at 3rd/Fairfax, Beverly Center Area and Wilshire/ Robertson
Compatibility with Combined Alternative	Yes	Yes
Recommendation	✓ **Further Study in Future Phase**	**X** **Eliminate**

According to the estimates, Alternative 1 would cost $900 million less than Alternative 14 primarily because of its shorter length and the fewer number of stations. Additionally, Alternative 1 would result in approximately 2,000 more new transit trips and 1,500 more new station boardings than Alternative 14. Overall rail ridership projections for the year 2030 was over 7,000 more trips with Alternative 1 than with Alternative 14. The lower ridership projection for Alternative 14 was most likely due to the longer travel time that results from the detour up to 3rd Street. Alternative 14 added approximately five minutes to the overall travel time from Downtown to Westwood. Rather than increasing ridership by locating stations near activity centers, such as the Grove and the Beverly Center, ridership actually decreased with this longer trip length because the major destinations are Beverly Center, Century City, and Westwood/UCLA. The overall user benefits of Alternative 1 were about 3,000 hours per day greater than with Alternative 14. Across all of the criteria shown in Table S-7, Alternative 1 consistently performed better than Alternative 14.

Therefore, based on all the evaluation factors presented in Table S-7 and the discussion above, **HRT Alternative 1 was recommended for future study in the next phase** and Alternative 14 was recommended to be eliminated from further consideration.

Best "Combined" Wilshire-Santa Monica Boulevard Alternative

The selection of the best Combined HRT Alternative (Alternative 11 or 16) was based on the comparative evaluation of Alternatives 1 and 14 and was therefore relatively straightforward. The combined HRT Alternative 16 includes the same alignment consideration as HRT Alternative 14 (Wilshire deviation). Since this Wilshire alignment with the detour up to 3rd Street did not perform as well as the straight alignment along Wilshire on a number of criteria, this alignment also failed to perform as well as the straight alignment when assessing the combined alternatives.

As with the preceding comparison, Alternative 16 costs approximately $300 million more than Alternative 11 (Table S-8). Although this is a smaller difference than in the previous comparison, it is still a significant added cost. Furthermore, Alternative 16 was projected to have lower ridership than Alternative 11 due to increased travel time. In this comparison, the user benefits of Alternative 11 exceeded the user benefits of Alternative 16 by almost 4,000 hours per day (Figure S-39).

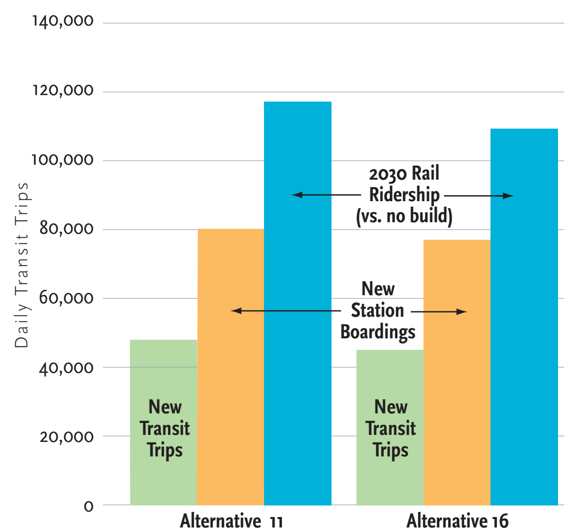


Figure S-39 Comparison of Transit Trips, New Station Boardings and Rail Ridership Projections (Alternative 11 and Alternative 16)

Therefore, Alternative 16 was recommended to be dropped from further consideration. **This left HRT Alternative 11 as the best combined alternative to study in the next phase**. Even though Alternative 11 has a high cost, it more closely meets the Purpose and Need of the Westside Extension Transit Corridor Study and

Table S-8 Comparison of Alternatives 11 and 16

Metric	HRT Combined Alternative 11	HRT Combined Alternative 16 (3rd Street Deviation)
Cost ($2008)	$9.0 B	$9.4 B
New Transit Trips	47,800	44,900
New Station Boardings	80,000	77,100
2030 Rail Ridership (vs. no-build)	117,000	109,000
Travel Time Example: Downtown to Westwood	Faster (straighter) 23 minutes	Slower (curves) 28 minutes
Transit User Benefits (Travel Time Saved Compared to No Build)	57,800 hours/day	54,000 hours/day
Station Issues	Accommodates La Cienega/Wilshire	Adds stations at 3rd/Fairfax, Beverly Center Area and Wilshire/ Robertson
Recommendation	**✓ Further Study in Future Phase**	**X Eliminate**

merits further analysis and consideration in the next phase.

S.7.3 Alternatives Carried Forward

Figure S-40 shows the process followed in this AA. The process began with the identification of the Initial Conceptual Alternatives and Early Scoping. Then a set of 17 initial conceptual alternatives were identified and reduced to a promising set of five alternatives. These five alternatives were then evaluated on a more detailed basis and ultimately reduced to the two alternatives (Alternative 1 and Alternative 11), plus the required No Build and TSM Alternatives, that are being recommended for further study.

Table S-9 lists all of the alternatives considered in this AA, those eliminated after the Initial Screening, those eliminated after the Detailed Evaluation, and those recommended for further environmental review.

S.8 Issues to be Resolved in EIR/EIS

During the EIS/EIR process, the following issues will need to be studied:

- Decisions about optional station at Wilshire/ Crenshaw
- Details of station locations and physical alignments in West Hollywood, Century City, and Westwood
- Impacts identification and proposed mitigation measures
- Costs and possible phasing
- Evaluation of the cost-effectiveness of project elements

The resolution of these issues will lead to the selection of a Locally Preferred Alternative (LPA) and preparation of an application to FTA for advancement into Preliminary Engineering.

The cost-effectiveness of the proposed alternatives is particularly critical when applying for FTA New Starts funding. Figure S-41 illustrates where Alternative 1 and Alternative 11 currently stand in comparison with current FTA standards. In

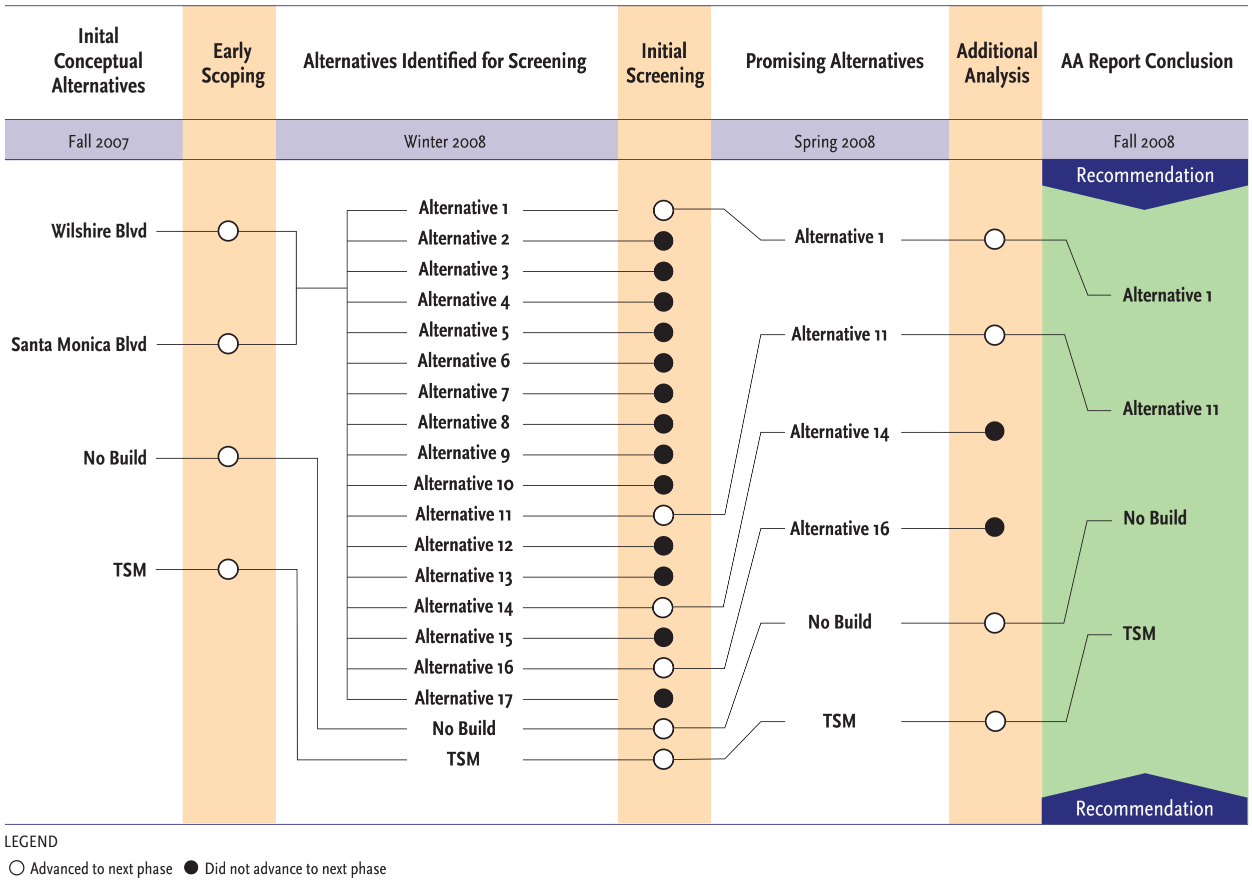


Figure S-40 Alternatives Analysis Process

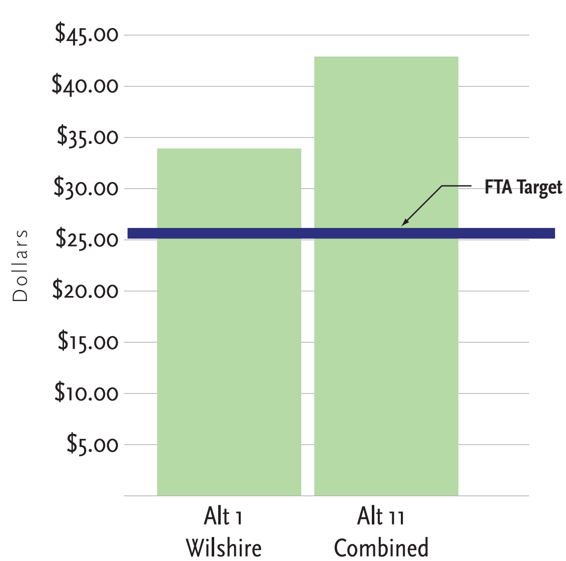


Figure S-41 Cost Effectiveness

general, projects advancing into the FTA PE phase of project development must achieve a cost-effectiveness measure of below $25 per hour of travel time savings. Alternative 1 is currently measured at $34, and Alternative 11 is currently measured at $43. The cost-effectiveness of each alternative is expected to be reduced in the next phase of evaluation based on lower construction costs and refined ridership projections.

Table S-9 Alternatives Considered in Initial and Detailed Screening Analysis

Alternatives Identified for Screening	Initial Screening: Eliminated After Initial Screening	Initial Screening: Carried Through to Detailed Analysis	Detailed Analysis: Eliminated after Detailed Analysis	Detailed Analysis: Recommended for Further Environmental Review
NO BUILD		○		○
TSM		○		○
HEAVY RAIL TRANSIT IN SUBWAY ALTERNATIVES (13)				
Wilshire Boulevard based alignments (3)				
1 Wilshire Blvd Alignment HRT Subway		○		○
12 Wilshire Blvd/Beverly Blvd Centers HRT Subway	●	—	—	—
14 Wilshire Blvd/Fairfax Ave Centers HRT Subway		○	●	—
Santa Monica Boulevard based alignments (5, plus station option)				
4 Santa Monica Blvd Alignment HRT Subway with Universal City and Hollywood/Highland Red Line Connections	●	—	—	—
6 Santa Monica Blvd Alignment HRT Subway with Hollywood/Highland Red Line Connection	●	—	—	—
7 Santa Monica Blvd Alignment HRT Subway with Hollywood/Highland Red Line Connection/Galaxy North	●	—	—	—
7a Santa Monica Blvd Alignment HRT Subway with Hollywood/Highland Red Line Connection/Galaxy South	●	—	—	—
8 Santa Monica Blvd Alignment HRT Subway with Hollywood/Vine Red Line Connection	●	—	—	—
13 Santa Monica Blvd/San Vicente/Wilshire Blvds HRT Subway	●	—	—	—
Combined Wilshire and Santa Monica based alignments (5)				
9 Wilshire/Santa Monica Blvds Combined HRT Subway (Alt 1 + Alt 4)	●	—	—	—
10 Wilshire/Santa Monica Blvds Combined HRT Subway (Alt 1 + Alt 9)	●	—	—	—
11 Wilshire/Santa Monica Blvds Combined HRT Subway (Alt 1 + Alt 6)		○		○
15 Wilshire/Santa Monica Blvds Combined Centers HRT Subway (Alt 13 + Alt 14)	●	—	—	—
16 Wilshire/Santa Monica Blvds Combined Centers HRT Subway (Alt 13 + Alt 14) with transfer at Hollywood/ Highland		○	●	—
LIGHT RAIL, MONORAIL AND HEAVY RAIL ELEVATED ALTERNATIVES (3)				
2 Wilshire Blvd Alignment HRT Elevated	●	—	—	—
3 Wilshire Blvd Alignment LRT/Monorail Elevated	●	—	—	—
5 Santa Monica Blvd Alignment HRT, LRT, Monorail Elevated	●	—	—	—
BUS RAPID TRANSIT ALTERNATIVE (1)				
17 Wilshire/Santa Monica Blvds BRT At Grade		○	●	—

Note: ● *indicates that alternative was eliminated during that particular step in the evaluation process*
○ *indicates that alternative was carried through to the next step in the evaluation process*

S.9 Tunnel Feasibility Assessment

The study of the feasibility of tunneling in the Westside Corridor included research in the geologic conditions in the corridor, an evaluation of appropriate tunneling technologies with a focus on tunnel boring machines (TBMs) and spoils handling, a discussion of potential station construction methods, tunnel safety, and costs associated with tunneling in this area.

Figure S-42 illustrates twin tunnel boring machines similar to those that would be used for this project.

Figure S-42 Tunnel Boring Machines used for Gold Line Eastside Extension

Special analysis was given to tunneling issues following the release of a report prepared in 2005 by the American Public Transportation Association (APTA) regarding the resumption of tunneling activities in the mid-Wilshire area. A panel of experts assembled by APTA concluded that tunnels can now be safely constructed and operated in the Wilshire Boulevard corridor, provided the following:

- Advances in TBM technologies, such as the use of Pressure Face TBMs.
- Increased local and international tunneling experience with Pressure Face tunneling.
- New knowledge about methods to mitigate risks.
- Local experience with subterranean construction along Wilshire Boulevard.
- Improvements in gas measurement and instrumentation technology.
- Successful operation of the existing Metro system within gassy ground.
- Improved attitudes with regard to safety in the industry.

S.9.1 Subsurface Conditions

The geologic units encountered within the Westside Study Area are similar to conditions encountered along existing Metro lines in Los Angeles, with the exception that petroliferous (tar) sand appears to be present within the San Pedro Formation near the La Brea Tar Pits, between approximately Fairfax and Sweetzer Avenues. The South Salt Lake Oil Field crosses Wilshire Boulevard between these two streets. The San Pedro formation would likely be encountered in portions of the tunnel excavation between Western and Fairfax Avenues based on the preliminary alignment profile grades (Alternatives 1 and 11).

In the Mid-Wilshire area, methane and hydrogen sulfide (H2S) gases have been encountered in the San Pedro and Lakewood Formations in the likely tunnel and station areas. These gases migrate upward to the surface from deeper formations. Methane levels can reach up to 90 to 100 percent by volume of the vapor phase (the explosive range is 7 to 24 percent). H2S has been measured in the range of 10 to 600 parts per million (ppm) in the Wilshire/Fairfax area. Safe levels for H2S are less than 10 ppm; however, the odor threshold is much lower: on the order of 2 to 10 parts per billion. For methane, alarms are set for 10 percent of the lower explosive limit.

The City of Los Angeles has identified special building measures for Methane Risk Zones, shown in Figure S-43, which include proper investigation of gases; construction of methane barriers/liners and vent systems beneath building slabs; special heating, ventilating, and air conditioning (HVAC) requirements; and/or methane detection and eradication equipment/systems, among other possibilities. With these measures, many high-rise buildings with deep foundations and/or subterranean parking garages have been successfully constructed and operated in the Methane Risk Zone.

Metro began developing special seismic design criteria for its underground structures in the early 1980s and has continued to update ground motion parameters for design of new structures as the California Division of Mines and Geology publishes new data, or based on findings of site-specific geotechnical investigations. Stations and tunnels are designed to structural standards for reinforced concrete structures under the various loading scenarios that include ground and groundwater loads, earthquake loads, and the dead loads of the structure and adjacent structures as applicable. All design for seismic conditions would be further developed during subsequent project phases. For example, the Santa Monica Fault Zone with respect to the options between Century City and Westwood would need further study (Figure S-44).

Liquefaction

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Liquefaction occurs in saturated soils (soils in which the space between individual particles is completely filled with water). Some Holocene Age sediments (soils that are less than 11,000 years old) located above the groundwater level within the Study Area could undergo liquefaction when saturated. Pre-Holocene alluvial fans and sediments are less likely to undergo liquefaction in all conditions (both saturated and unsaturated).

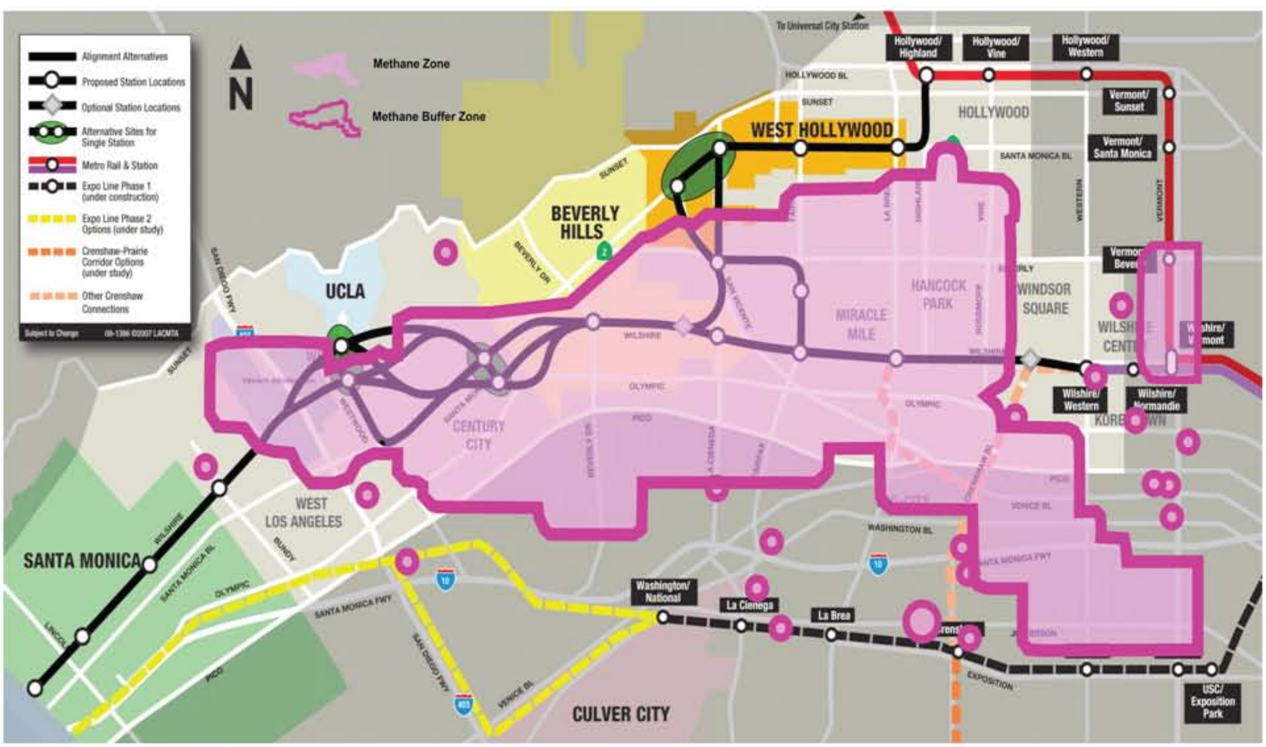


Figure S-43 Study Alignments with Methane Risk Zone and Methane Buffer Zone

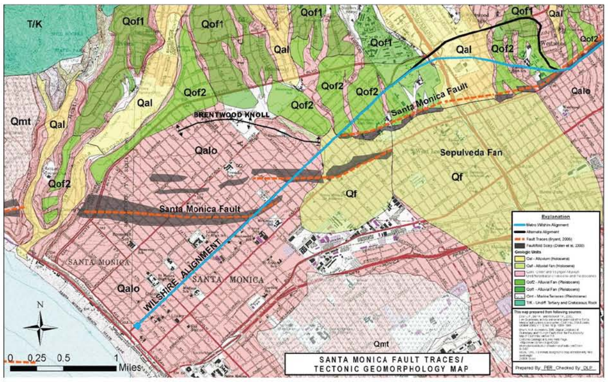


Figure S-44 Santa Monica Fault Zone

Based on the conceptual designs, the tunnels will generally be located below the Holocene Age sediments. As a result, settlement due to liquefaction is considered remote.

S.9.2 Evaluation of Tunneling Technology

The feasibility of tunneling for the Westside Extension Transit Corridor can best be determined based on comparison with past and current experience in Los Angeles and other cities around the U.S. and worldwide. That experience has shown that the proper combination of design, modern tunneling equipment and methods, and the use of sufficient ventilation leads to successful tunnel construction. Evidence of this is found in the now completed Metro Gold Line Eastside LRT tunnels and in similar successes of other tunnel projects in the U.S., such as the North East Interceptor Sewer in Los Angles.

Of these success stories, the Metro Gold Line Eastside Extension is most applicable because it is local and proves that tunnels can be constructed and operated in local (including gassy ground) conditions.

More modern tunneling practice (i.e., the use of earth pressure balance machines) has demonstrated great success in the gassy ground of the Boyle Heights area of Los Angeles. Preliminary analysis by the Consultant and the Metro Tunnel Advisory Panel suggests that the Westside Extension Transit Project will probably use Slurry Face Machines in the highest gas segment(s) of the project corridor and may use an Earth Pressure Balance machine elsewhere. The Eastside tunnels were designed and constructed successfully. Due to higher gas levels in the Fairfax area, additional studies will be performed during the next phases to confirm design criteria.

Evaluation of TBM Technology

There are several types of tunnel boring machines, each of which is suited to different ground conditions and construction methods.

Secant Pile Walls, Barnsdall Shaft, Hollywood

Deep Soil Mix Wall Equipment, Hollywood and Vine Station

Soldier Piles and Lagging With Cross Bracing, Mariachi Plaza, Gold Line

Slurry Wall Excavation, Portland, OR

For the original construction of the Metro Red Line, open-face tunnel boring machines (TBMs) were used. They were called open-face machines because the ground at the face of the machine was exposed to the tunnel atmosphere and relied upon soil properties, plates, jacks, or mechanical doors to attempt to stabilize the face.

For the Westside, a pressure-face, slurry-shield tunneling boring machine (SF TBM) is expected to be used for tunneling in areas where H2S gas requires additional safety precautions during construction. Tunneling using an SF TBM minimizes exposure of workers to elevated gas concentrations underground since the excavated soil is removed in a fully enclosed slurry pipeline to an enclosed treatment plant.

Earth Pressure Balance (EPBs) tunnel boring machines are similar to SF TBMs in that the soil is excavated by a wheel and trapped at the face by a bulkhead in the machine. Removal of the soil is by means of a screw conveyor that also provides the pressure reduction (by friction) from the pressure at the face to ambient at the soil discharge point. Two EPB TBMs were used to construct the Metro Gold Line Eastside Extension.

Spoils Handling and Disposal

Tunneling operations will require worksite space for accessing the tunnel, slurry and grout plants, electrical equipment, spoils storage, dump truck access, segment storage, and other equipment storage. For SF TBMs, a slurry separation plant requires space for slurry handling and separation. Slurry processing is more difficult in clay and silty soils. Additional steps are required for separation of soil from the slurry, and sufficient plant capacity must be available to keep up with the tunnel progress. Wet materials (not fully processed) may be hauled away, but this also means additional cost. Treatment plants for slurry processing would also require air monitoring for hazardous gases (where present) and appropriate ventilation systems.

S.9.3 Station Construction

Existing Metro stations generally have been excavated and supported using conventional methods. Typically, initial ground support has been provided by soldier piles and lagging (timber or shotcrete) followed by a cast-in-place concrete final lining. Exceptions to this have been at Union Station, where slurry walls were used to reduce the need for groundwater treatment, and at the Hollywood/Vine Station, where a deep soil mixing technique was used for initial support. For final walls, all stations have been wrapped with High Density Polyethylene (HDPE) to exclude gas. This construction has occurred successfully in ground containing methane and/or H2S.

Underground Construction in Methane Zone

In addition to Metro stations and other Metro structures, there is now an extensive history of construction in the Westside geology. This includes parking garages successfully excavated and completed in ground containing methane and H2S that extended to depths similar to those anticipated for the Westside Project. The APTA panel noted, “no problems with deep basements along Wilshire Boulevard,” referring to new construction in the Methane Risk Zone since 1985. Several other projects, including those at LACMA, constructed in the Methane Risk Zone were reviewed during this study to determine if problems with gas or tar occurrences have been reported during operations and if any construction issues could be verified. The initial review found no gas detected in existing underground parking garages. During construction of the new LACMA underground parking garage, H2S gas was encountered such that workers had to occasionally wear Personal Protective Equipment.

Subterranean construction (parking garages) in the Methane Risk Zone has been conducted to depths exceeding 50 feet below street level. Many of these structures are within the Methane Risk Zone. Typically, deep excavations use traditional tie-back soldier pile and construction lagging methods. These excavations addressed the challenges of shallow groundwater and of protecting adjacent buildings and streets against settlement (subsidence).

Potential Construction Methods – Metro Stations

Given the success of existing Metro stations and other structures in the Methane Risk Zone, it is possible that similar methods can be used for the Westside project. Because gas levels are expected to be higher than previously encountered, provisions for additional redundancy to ensure no leakage will need to be considered in the most gassy areas, such as the Wilshire/Fairfax station. Station construction methods will be selected based on the ground conditions (soil, water, and gas) and the requirements for the final structure.

Subsequent studies during preliminary and final design would be undertaken to evaluate the best alternative for leak prevention, detection, and repair. Design and construction methods would need to be developed to ensure system safety and reliability in the challenging environmental conditions. In addition to the hazardous subsurface gasses, design must also address effects resulting from seismic shaking.

Operations

Operational safety and procedures will be developed that depend on the alternative selected, subsurface conditions encountered, and advances in equipment and technology in the years prior to construction. Basic operations are likely to be similar to those of existing Metro systems that are designed for locations where gas is known to be present, which include the following:

- Design to exclude gasses through use of barriers such as HDPE barriers and reinforced concrete wall systems.
- Inspection and testing during construction to ensure quality for the concrete placements and barrier construction and to minimize leakage into the structure.
- Installation of ventilation systems capable of purging gas to safe levels. These systems are also used for exhaust smoke in case of fire.
- Installation of gas detection and monitoring equipment to warn if gas levels approach preset alarm levels and to automatically activate additional ventilation.
- Provisions for air-flow during non-revenue service to prevent gas accumulation.
- Inspection and maintenance programs for all of the above.

S.9.4 Cost Methodology Differential

Technical reviews prepared for the AA Study evaluated differential costs for tunneling in areas having elevated methane levels. The differential cost consists of additional structure elements and labor required to address the higher expected levels of methane exposure for twin (two) tunnels. The costs included use of Slurry TBMs, potential for a second tunnel lining, and reduction in excavation rates in contaminated soil. Note that these costs do not constitute a bottom-up cost analysis. For the overall estimate, these costs may be added to the unit costs developed for the AA Study cost estimates. The differential was found to be approximately $9 million per station and between $600 to $1,800 per linear foot for the tunnels. The higher end of the range was used for the capital cost estimate.

S.9.5 Paleontological Resources

The potential for encountering paleontological resources (sites of fossils or ancient life forms) is related in part to the depth of the tunnel in relation to the type of subsurface soil and rock strata (stratigraphy) present at that depth. While a surface or aerial alignment would disturb those strata closest to the surface, tunnel alignments would affect deeper strata. The largest paleontological impact and recovery opportunity would be at station sites, especially those near the La Brea Tar Pits (Figure S-45).

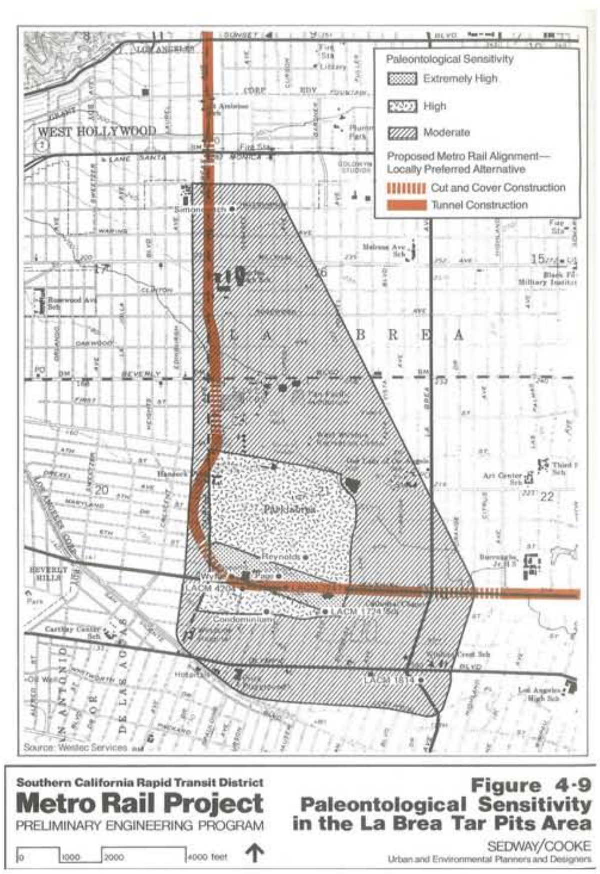


Figure S-45 La Brea Tar Pits Area

A previous study in 1983 identified the La Brea Tar Pits area as an important paleontological resource. The study also noted, however, that the route would pass through and disturb a variety of marine and nonmarine sedimentary deposits ranging in age from Medial Miocene to Holocene. All stratigraphic units, except the Holocene alluvium (young Quaternary alluvium) and the intrusive basalts and andesites in the Topanga Formation, will have at least moderate potential for paleontological resources. The fossiliferous deposits appear to be confined to the uppermost 55 feet below the present surface and are found particularly within the uppermost 25 to 30 feet.

Since the La Brea Tar Pits area lies within the known Methane Risk Zone, there is an increased probability of encountering pockets of presently unknown resources. For other portions of the Methane Risk Zone area, the likelihood of encountering paleontological resources would not be significantly greater in tunneling in those portions of the gas zone when compared with tunneling in areas outside the gas zone. Overall, with an increased likelihood of encountering scientifically significant paleontological resources in this region, it is likely that mitigation measures would need to be implemented to recover and preserve such potentially encountered resources.

S.9.6 Archaeological Resources

Several previous studies identified three known archaeological sites within the Study Area site.

The most important of these is the Mid-Wilshire area site, which contains the La Brea Tar Pits in Hancock Park. Artifacts recovered indicate the La Brea Tar Pits may have been visited for hunting purposes and for acquiring pitch and tar rather than for settlement. The La Brea Tar Pits are a California State Historic Landmark (No. 170) and contain Pleistocene to Early Recent fossil deposits.

Based on the review of previous studies, it is unknown whether there are archaeological resources along much of the candidate alignments. However, since the La Brea Tar Pits site is located within the Methane Risk Zone, it is possible that other archaeological resources may be uncovered nearby because a larger area may have been visited by ancient people. If an archaeological resource is encountered in the Methane Risk Zone, it is not expected that the duration or cost of recovering such resources would be greater than that of recovering resources in other areas. Archaeological recovery efforts typically involve shallow excavation, which is not significantly affected by elevated gas levels.

S.10 Station Planning and Urban Design Concepts

An extensive urban design program was undertaken as part of this Alternatives Analysis. The effort involved a multi-step process that established a set of system-wide urban design principles, including a review of what plans and policies cities had in place that would be supportive of transit; development of an understanding of potential station areas in the corridor and how the existing Metro stations interface with surrounding communities; and development of station area typologies that could be applied to the station sites, including a "Kit of Parts" and an initial design and planning toolkit that communities could begin to use during the station area planning process.

The goals of the urban design program were as follows:

- Facilitate discussion about the vision and identity of the Westside Extension and how individual station areas could be designed to fit within this framework.
- Provide a forum for critical analysis of how the Alternatives Analysis should approach considerations of land use, design, and linkages between stations along the line and their urban neighborhoods.
- Propose design considerations for station areas so they will fit appropriately within the surrounding urban context (Figure S-46).
- Involve stakeholders and the Westside Extension planning team in a comprehensive station planning process (Figure S-47).
- Facilitate discussion about sensitive areas to assist in the station location decision-making process so that alternative station locations can be resolved.
- Help ensure that planning for the corridor considers and builds upon the needs, desires, and policies of the Westside cities.
- Assist in establishing guidelines and standards that may be helpful for future Metro transit corridor initiatives.

Figure S-46 Photo simulation showing possible integration of a historic structure with joint development

The program also is intended to help the Cities of Los Angeles, West Hollywood, Beverly Hills, and Santa Monica understand how station areas within their boundaries relate to other station areas along the corridor.

Figure S-47 Urban Design Workshop with City agencies on July 15, 2008

S.10.1 Urban Design Principles

As part of the urban design process, the following general principles were identified to inform station planning and design at all levels of planning and design:

Promote sustainable design:

- Develop pedestrian and bicycle connections and streetscape improvements to create pedestrian-friendly station areas and promote transit-oriented development (Figures S-48 and S-49).
- Preserve existing cultural and historic resources.
- Promote the use of recyclable materials and alternative energy systems.

Figure S-48 Promote Bicycle connection at Stations

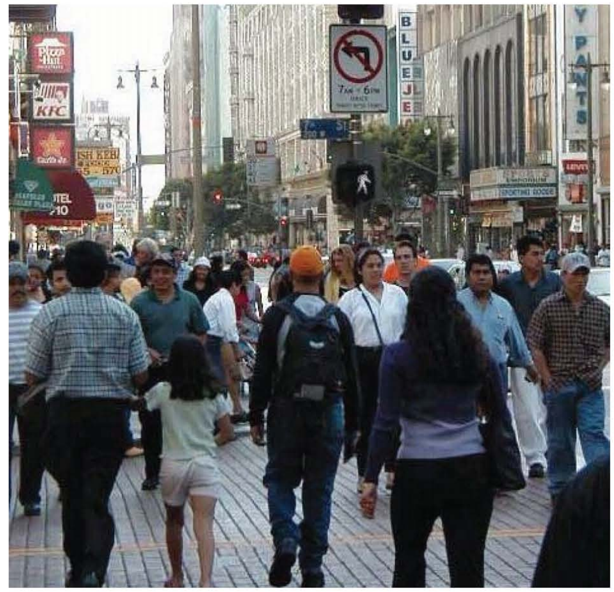


Figure S-49 Station location should serve high pedestrian activity areas

Support local land use goals:

- Anticipate redevelopment and zoning revisions.
- Concentrate development around established activity centers (Figure S-50).
- Provide for future expansion and joint development at station sites.
- Conform to city growth plans and zoning regulations, including general plans and specific plans.

Figure S-50 Stations will connect to key destinations

Promote design excellence and enhance the urban environment:

- Involve urban designers, architects, and artists in the design of the system and its adjacencies.
- Develop innovative design solutions that are cost-effective and promote joint-development objectives.

Reflect a community's vision in station design and station area planning:

- Encourage new design concepts and use innovative materials and technologies.
- Promote design solutions that create environments accommodating to pedestrians and transit riders.

Promote safety, security, and defensible space:

- Promote a sense of community ownership of the station areas through high-quality design.
- Use Crime Prevention through Environmental Design principles in station and station area design.
- Ensure equal access to all transportation facilities and apply Universal Design principles to the design of these facilities.
- Eliminate pedestrian barriers and circulation conflicts at stations.

The stations and station areas along the Westside Extension should be united by an urban design vision that is:

- Linked to intermodal transit connections.
- Comfortable, safe, and inviting to pedestrians and bicyclists.
- "Imageable" to riders – they are memorable and navigable.
- Supportive of transit-oriented development and joint-development opportunities.
- Sensitive to the particular urban context in which they are located.

S-10.2 Existing City Plans and Policies

The Westside Extension team reviewed the plans and policies of the cities along the corridor. The documents from these cities are generally consistent with the Westside Extension proposed alignment alternatives and transit-oriented development expectations. The Cities of Los Angeles, Beverly Hills, and Santa Monica actively support an alignment along Wilshire Boulevard, and all cities include smart growth and/or transit-oriented principles and goals in their planning policies. West Hollywood recognizes Santa Monica Boulevard as the main spine of the city and the area with the highest density and concentration of retail and commercial uses, which makes it appropriate for a potential transit corridor.

S.10.3 Understanding Station Areas

The urban design study included a review and documentation of the Metro Red Line and Purple Line stations and station entrances to identify possible station design prototypes that could be applied to potential station areas for the Westside Extension. The existing Metro system is composed of a combination of standard components and variable design elements. The variable elements, such as signage, amenities, landscaping, special paving, art, and unique entrance designs and canopies, create a site-specific "customer environment" (Figure S-51) for the Metro rider. Designing station public spaces as customer

Figure S-51 Entrance canopy at Vermont/ Santa Monica station environments makes the stations and station areas unique, imaginable, rider-friendly, and responsive to the needs of the communities that the system serves, which is key to the urban design vision for this corridor.

S.10.4 System-Wide Urban Design Principles

A set of system-wide urban design principles were developed. The general categories of principles developed relate to elements of the following:

- Connectivity (bus, bicycle, and pedestrian).
- Joint development and transit-oriented development.
- Parking.
- Placement and design of station ancillary structures.
- Wayfinding (Figure S-52).
- Station amenities.
- Landscaping.
- Lighting.
- Finishes and materials.
- Sustainability and creativity.
- Ensuring convenient, visible, and pleasant bus, bicycle, and pedestrian connectivity.
- Crafting development that is transit-oriented.
- Using sustainable, innovative, and place-specific design elements.

Figure S-52 Metro Signage

S.10.5 Station Area Typologies for the Corridor

The urban design concept is based on a set of station area typologies that can be used as a tool to help identify key urban design issues. Urban form along the corridor varies in scale and aesthetics, and developing station area typologies provides a tool to help make design recommendations that are consistent with the needs and desires of each community within the corridor.

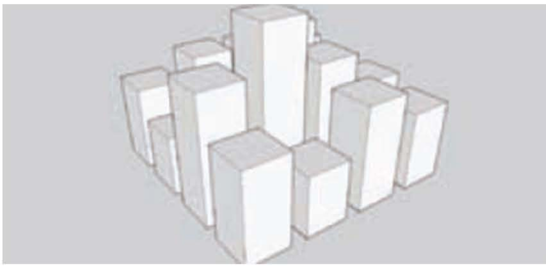
Different typologies were developed to represent different station environments. Elements that make up the different typologies include density, scale, number of station entrances, station orientation, signage, public and station art, vendors, and special paving. Four different typologies were developed for the Westside Extension Corridor (Figure S-53).

S.10.6 Kit of Parts

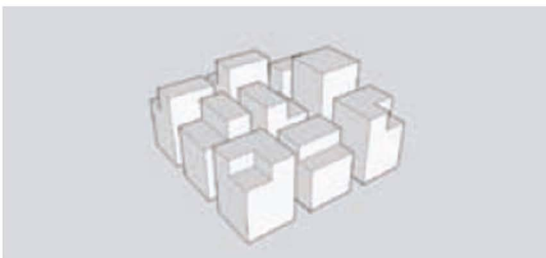
After the station typologies were defined, a “kit of parts” was created that would allow each community to apply different “parts” or station elements that would best fit its stations and station areas.

The kit of parts included different types of station identities, including tourist destination (e.g., museum or pedestrian-oriented area); institutional destination (e.g., near a university or hospital); business center (near substantial employment areas); retail destination; or development potential. The parts of the kit included station orientation, signage, station and/or public art, street vendors and performers, and special paving.

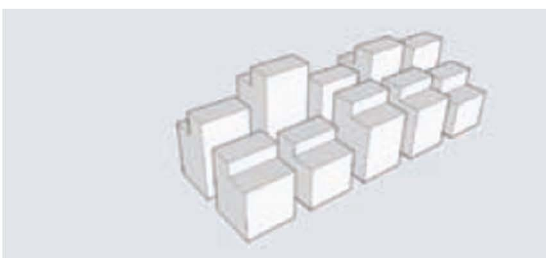
Station-by-station typologies were developed using the potential station areas as a base and applying the station typologies and the kit of parts. These station-by-station typologies created visions of how the different stations along the Westside Extension Corridor could develop and how the communities could mix and match station elements to create a unique station environment.



Major Urban Center



Urban Center



Urban Corridor

Neighborhood Center

Figure S-53 Station Area Typologies

S.11 Public Involvement

The Metro Westside Extension study enjoyed considerable stakeholder interest and support over the approximately 14-month Alternatives Analysis Study. The community outreach effort successfully raised awareness about the study, engaged stakeholders on an ongoing basis and, most importantly, garnered public input at key decision points that demonstrated widespread consensus about the study recommendations that require Board approval in order to move forward into the environmental process.

Public Meeting

Recognizing the size and diversity of the study area, Metro employed a thorough yet creative approach to ensuring an inclusive and transparent outreach effort. Elements of this outreach program included, although were not limited to, the following:

- Public meetings, including one series of early public and agency scoping meetings and three series of public update meetings (17 meetings in total) at key study milestones throughout the Study Area.
- Targeted stakeholder meetings to address specialized issues and localized concerns.
- Multi-lingual outreach to include Korean, Russian, Farsi, and Spanish-speaking stakeholders.
- Multi-tiered meeting notifications, including direct mail, print, broadcast and online media, advertisements, internet-based distribution via e-mail, and onboard Metro buses and trains.

- Employment of new media tools such as blogs, social networking sites, and other internet or web-based tools to involve a wider audience in the decision-making process.

Through the early scoping process, the project team learned that the overwhelming majority of stakeholders supported the need for transit improvement in the Westside Extension Transit Corridor study area, with a Wilshire Boulevard subway identified as the most favored route and mode. While the Santa Monica alignment also received noticeable support, many stakeholders suggested that Metro consider a project that would include both a Wilshire Boulevard and a Santa Monica Boulevard alignment. In many cases, where the public was in favor of both of these alignments, most thought that the Wilshire alternative should take precedence. Limited backing was voiced for aerial/monorail, light rail, and bus rapid transit modes.

After completion of the early scoping meetings, Metro conducted three subsequent series of community meetings and conducted presentations at a number of civic and community meetings to keep stakeholders informed of the project's progress and to receive input and feedback at each decision-making milestone. More than 1,400 people attended all four rounds of community meetings, and more than 900 comments were received in all forms.

At these subsequent public update meetings, the public indicated overwhelming support for transit improvements in the area. Metro consistently heard from stakeholders that their preferred mode of transit is a subway, with more than 90% of comments received favoring a Wilshire alignment. Support was also expressed for a subway on both the Wilshire and Santa Monica alignments, with most commenters requesting the Wilshire alignment be constructed before the Santa Monica alignment, if phasing was necessary. Finally, in the last round of five meetings, the public expressed its support for identifying the two heavy rail alignments for further analysis through the DEIS/DEIR.

S.12 Results of the Detailed Evaluation

Table S-10 summarizes the results of the Detailed Evaluation described in Section S.7. The Detailed Evaluation consisted of evaluating the five most promising alternatives using the seven goals for the evaluation framework. These seven goals include Mobility Improvement, Transit-Supportive Land Use Policies and Conditions, Cost-Effectiveness, Project Feasibility, Equity, Environmental Considerations, and Public Acceptance.

In addition, the environmental evaluation focused on key objectives, including minimizing displacement of homes and businesses (equity), right-of-way impacts, impacts to character of the community (aesthetics/visual quality and noise/vibration), and impacts to sensitive and protected environmental resources (cultural and historic resources). The evaluation focused on describing major differences among the alternatives or demonstrating where the environmental effects were generally similar.

Table S-10 Summary Matrix (continued on next page)

Performance Measures				Alternatives							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
▶ GOAL A: MOBILITY IMPROVEMENT											
Peak Period Travel Times (minutes) between Major Origin—Destination Pairs											
A	1	a	**Transit Peak Period Travel Time (AM Peak) (minutes)—Between Del Mar Station (Gold Line) and:**								
			Century City	80	92	92	80	48		48	
			Santa Monica/San Vicente (WeHo)	72	83	83	64	60		50	
			Wilshire/Beverly (BH)	78	90	90	65	46		46	
			Wilshire/Westwood	82	94	94	75	50		50	
			4th/Wilshire (Santa Monica)	112	129	129	91	57		57	
			Transit Peak Period Travel Time (AM Peak) (minutes)—Between Pershing Square Station (Red Line) and:								
			Century City	48	55	55	47	20		20	
			Santa Monica/San Vicente (WeHo)	49	56	56	37	35		23	
			Wilshire/Beverly (BH)	42	48	48	35	18		18	
			Wilshire/Westwood	54	62	62	45	23		23	
			4th/Wilshire (Santa Monica)	70	81	81	65	29		29	
			Transit Peak Period Travel Time (AM Peak) (minutes)—Between Florence Station (Blue Line) and:								
			Century City	60	69	69	74	41		41	
			Santa Monica/San Vicente (WeHo)	69	79	79	57	53		43	
			Wilshire/Beverly (BH)	64	74	74	56	39		39	
			Wilshire/Westwood	76	87	87	66	44		44	
			4th/Wilshire (Santa Monica)	99	114	114	86	50		50	
			Transit Peak Period Travel Time (AM Peak) (minutes)—Between Reseda Station (Orange Line) and:								
			Century City	72	83	83	66	66		45-52	
			Santa Monica/San Vicente (WeHo)	83	95	95	57	77		41-48	
			Wilshire/Beverly (BH)	80	92	92	71	64		58-65	
			Wilshire/Westwood	59	68	68	71	68		47-54	
			4th/Wilshire (Santa Monica)	97	112	112	86	75		54-61	
			Transit Peak Period Travel Time (AM Peak) (minutes)—Between Covina Station (Metrolink) and:								
			Century City	94	108	108	92	67		67	
			Santa Monica/San Vicente (WeHo)	99	114	114	87	79		69	
			Wilshire/Beverly (BH)	98	113	113	82	65		65	
			Wilshire/Westwood	99	114	114	93	69		69	
			4th/Wilshire (Santa Monica)	119	137	137	108	76		76	
			Transit Peak Period Travel Time (AM Peak) (minutes)—Between Wilshire/Western Station (Purple Line) and:								
			Century City	35	40	40	34	10		10	
			Santa Monica/San Vicente (WeHo)	30	35	35	30	22		22	

Table S-10 Summary Matrix (continued from previous page)

Performance Measures				Alternatives							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
A	1	a	Wilshire/Beverly (BH)	20	26	26	19	8		8	
			Wilshire/Westwood	36	41	41	31	13		13	
			4th/Wilshire (Santa Monica)	51	59	59	47	19		19	
			Transit Peak Period Travel Time (AM Peak) (minutes)—Between North Hollywood Station (Red Line) and:								
			Century City	58	67	67	35	39		14-21	
			Santa Monica/San Vicente (WeHo)	51	59	59	26	51		10-18	
			Wilshire/Beverly (BH)	49	56	56	45	37		27-35	
			Wilshire/Westwood	61	70	70	43	42		16-23	
			4th/Wilshire (Santa Monica)	77	89	89	55	48		23-30	
Average End-to-End Transit Operating Speeds (mph)											
A	1	b	Avg end to end transit operating speed in mph (Between Union Station/Downtown and 4th/Wilshire, SM)	14	12	12	16	32	30	32	30
			Note: Some alternatives (11, 16) require transfer(s) to travel between Union Station and Santa Monica								
Percentage of Transit Alignment Operating in Mixed Flow Traffic											
A	2	a	% of transit alignment operating in mixed flow traffic by operation type	n/a	100	100	100	0	0	0	0
			Note: Removes 2 lanes of traffic								
Number of Transfers between Select Origin—Destination Pairs											
A	2	b	**Transfers Required (AM Peak)—Between Del Mar Station (Gold Line) and :**								
			Century City	1	1	1	1	1		1	
			Santa Monica/San Vicente (WeHo)	1	1	1	2	2		1	
			Wilshire/Beverly (BH)	1	1	1	2	1		1	
			Wilshire/Westwood	1	1	1	2	1		1	
			4th/Wilshire (Santa Monica)	1	1	1	2	1		1	
			Transfers Required (AM Peak)—Between Pershing Square Station (Red Line) and :								
			Century City	0	0	0	1	0		0	
			Santa Monica/San Vicente (WeHo)	0	0	0	1	1		0	
			Wilshire/Beverly (BH)	0	0	0	0	0		0	
			Wilshire/Westwood	0	0	0	0	0		0	
			4th/Wilshire (Santa Monica)	0	0	0	0	0		0	
			Transfers Required (AM Peak)—Between Florence Station (Blue Line) and :								
			Century City	1	1	1	2	1		1	
			Santa Monica/San Vicente (WeHo)	1	1	1	2	2		1	
			Wilshire/Beverly (BH)	1	1	1	1	1		1	

Table S-10 Summary Matrix (continued from previous page)

Performance Measures				Alternatives							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
A	2	b	Wilshire/Westwood	1	1	1	1	1		1	
			4th/Wilshire (Santa Monica)	1	1	1	1	1		1	
			Transfers Required (AM Peak)—Between Reseda Station (Orange Line) and:								
			Century City	1	1	1	2	2		1-2	
			Santa Monica/San Vicente (WeHo)	2	2	2	2	3		1-2	
			Wilshire/Beverly (BH)	2	2	2	3	2		2	
			Wilshire/Westwood	1	1	1	2	2		1-2	
			4th/Wilshire (Santa Monica)	2	2	2	2	2		1-2	
			Transfers Required (AM Peak)—Between Covina Station (Metrolink) and:								
			Century City	1	1	1	2	1		1	
			Santa Monica/San Vicente (WeHo)	1	1	1	2	2		1	
			Wilshire/Beverly (BH)	2	2	1	2	1		1	
			Wilshire/Westwood	2	2	2	2	1		1	
			4th/Wilshire (Santa Monica)	2	2	2	2	1		1	
			Transfers Required (AM Peak)—Between Wilshire/Western Station (Purple Line) and:								
			Century City	1	1	1	1	0		0	
			Santa Monica/San Vicente (WeHo)	1	1	1	1	1		1	
			Wilshire/Beverly (BH)	0	0	0	0	0		0	
			Wilshire/Westwood	0	0	0	0	0		1	
			4th/Wilshire (Santa Monica)	0	0	0	0	0		1	
			Transfers Required (AM Peak)—Between North Hollywood Station (Red Line) and:								
			Century City	1	1	1	1	1		0-1	
			Santa Monica/San Vicente (WeHo)	1	1	1	1	2		0-1	
			Wilshire/Beverly (BH)	1	1	1	2	1		0-1	
			Wilshire/Westwood	1	1	1	1	1		0-1	
			4th/Wilshire (Santa Monica)	1	1	1	1	1		0-1	
Provide Sufficient Transit Capacity											
A	3	a	Estimated maximum capacity (in thousands) of new EW transit service (Passengers per hour) (Assuming 18 trains per hour or 30 buses per hour)	n/a	3	3	3	18	18	18	18
A	3	b	Potential for capacity expansion beyond 2030	L	L	L	Md	H	H	H	H
			Note: L = Low; M = Medium; Md = Moderate; H = High								

Table S-10 Summary Matrix (continued from previous page)

Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT 17	Wilshire HRT 1	Wilshire HRT 14	Combined HRT 11	Combined HRT 16
Transit Ridership											
A	3	b	Daily New Transit Trips (Change from No Build) in thousands		n/a	1.9	13.8	39.3	37.0	47.8	44.9
			Change in Urban Rail Boardings (Change from No Build) in thousands		n/a	-0.8	13.3	95.5	88.3	117.0	109.0
			"New Stations" Urban Rail Boardings in thousands		0	0	0	61.5	59.9	80.0	77.1
Population and Population Density within ½ Mile of the Alignment											
A	4	a	Population/Pop density within ½ mile of each alignment (in thousands)								
			2030 Population within ½ mile of Alignment		n/a	n/a	336	216	225	303	302
			2005/6 Average Population Density per Square Mile within ½ mile of Alignment		n/a	n/a	12.5	16.5	16.2	16.1	16.3
			2030 Average Population Density per Square Mile within ½ mile of Alignment		n/a	n/a	13.8	18.3	17.9	17.7	17.7
Employment and Employment Density within ½ Mile of the Alignment											
A	4	b	Employment/Employment Density within ½ mile of Each Alignment (in thousands)								
			2005/6 Employment within ½ mile of Alignment		n/a	n/a	332	221	235	293	293
			2030 Employment within ½ mile of Alignment		n/a	n/a	387	258	274	342	334
			2005/6 Average Employment Density per Square Mile within ½ mile of Alignment		n/a	n/a	13.6	18.7	18.7	17.1	17.2
			2030 Average Employment Density per Square Mile within ½ mile of Alignment		n/a	n/a	15.9	21.9	21.8	20.0	19.7
			Note: Removes 2 lanes of traffic								
Transit Dependent Populations											
A	4	c	Number of low income HH within ½ mile of each alignment present (in thousands)		39.8	39.8	39.8	18.7	18.6	25.9	26.0

Table S-10 Summary Matrix (continued from previous page)

Performance Measures				Alternatives							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
Competitive Speeds											
A	4	d	Ability for transit to be competitive with the auto in speed for key OD pairs		C	C	C	S	S	T	T
			Note: C = Comparable Speed to Auto, Transfers Req.; S = Much Higher Speed than Auto, No Transfer; T = Much Higher Speed than Auto, Transfers Req.								
Enhancing Linkages and Major Trip Attractors/Generators Within the Corridor											
A	5	a	Ability of alts to continue a one seat ride		L	L	M	H	H	M	H
A	5	b	Number of direct connections within 1/8 mile walk to other lines, NS bus routes, etc		12	12	12	7	8	10	11
A	5	c	Number of transfers required to access regional rail - Metrolink, Amtrak		2	2	2	1	1	1	1
A	5	d	Number of direct connections to key activity centers within 1/8 mile walk		10	10	10	7	9	10	12
			Note: L = Low; M = Medium; Md = Moderate; H = High								
GOAL B: TRANSIT SUPPORTIVE LAND USE POLICIES AND CONDITIONS											
Number of High Density Mixed Use Activity Centers Within ½ Mile of Each Alignment											
B	1	a	Number of high density mixed use activity centers within ½ mile of each alignment		17	17	17	9	12	14	17
			Note: Mixed Use Activity Centers are feature a mixture of land uses such as residential and commercial, and typically provide retail uses that encourage pedestrian travel.								
Number of High Opportunity Areas for Redevelopment Within ½ Mile of Each Alignment											
B	2	a	Number of high opportunity areas for redevelopment within ½ mile of each alignment		n/a	n/a	n/a	W	W	W H	W H
			Note: All Cities within Study Area maintain specific TOD provisions or are receptive to TOD provisions as defined in their general plans, community plans or specific plans W=City of Los Angeles CRA Redevelopment Area in Wilshire Center/Koreatown; H=City of Los Angeles CRA Redevelopment Area in Hollywood								
GOAL C: COST-EFFECTIVENESS											
Cost-Effectiveness											
C	1	a	Order of Magnitude Capital Cost ($ Billions, 2008)		$0.00	$0.134	$1.082	$6.063	$6.997	$9.057	$9.448
			Order of Magnitude Capital Cost (10 years) ($ Billions, YOE)		$0.00	$0.172	$1.387	$7.771	$8.968	$11.610	$12.111

Table S-10 Summary Matrix (continued from previous page)

Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT 17	Wilshire HRT 1	Wilshire HRT 14	Combined HRT 11	Combined HRT 16
C	1	b	Capital Cost Per Route Mile ($ Millions, 2008)		$0	n/a	$34	$475	$489	$509	$507
			Capital Cost Per Route Mile ($ Millions, YOE)		$0	n/a	$44	$609	$627	$652	$650
C	1	c	Order of Magnitude Annual O&M Cost ($ Millions, 2008)		$1,363	$1,378	$1,369	$1,459	$1,473	$1,518	$1,530
C	1	d	Daily Hours of Transit User Benefit compared to No Build		n/a	1,700	13,800	48,200	45,300	57,800	54,000
			Cost per hour of transit system user benefits for selected representative alternatives compared to No Build (CEI)		n/a	$53	$17	$35	$44	$44	$51
			Note: Removes 2 lanes of traffic								
GOAL D: PROJECT FEASIBILITY											
Financial Feasibility											
D	1	a	Relative eligibility of alts for new starts funding*		L	L	H	M	M	M	L
D	1	b	Consistency with Metro's LRTP and financial direction**		C	C	C	N	N	N	N
			Note: * L = Low; M = Medium; H = High; VH = Very High ** C = Consistent; N = No If traffic lanes must be replaced, then increase to Medium.								
GOAL E: EQUITY											
Equity											
E	1	a	Number of low income HH within ½ mile of each alignment present (in thousands)		39.8	39.8	39.8	18.7	18.6	25.9	26.0
E	2	a	Local jurisdiction/communities directly impacted - displacements, construction								
					City of SM	City of SM	City of SM	City of SM	City of SM	City of SM	City of SM
					City of BH	City of BH	City of BH	City of BH	City of BH	City of BH	City of BH
					City of WH	City of WH	City of WH	City of LA (7)	City of LA (8)	City of WH	City of WH
					City of LA (8)	City of LA (8)	City of LA (8)	LAC	LAC	City of LA (8)	City of LA (9)
					LAC	LAC	LAC			LAC	LAC
			Total jurisdictions/ communities		12	12	12	10	11	12	13

Table S-10 Summary Matrix (continued from previous page)

Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT 17	Wilshire HRT 1	Wilshire HRT 14	Combined HRT 11	Combined HRT 16
E	2	b	Number of residents within ½ mile by ethnic group/minority populations								
			Black		15,123	15,123	15,123	9,836	9,781	11,390	11,279
			Amer Indian/Eskimo		1,030	1,030	1,030	521	554	720	694
			Asian		47,951	47,951	47,951	35,528	35,358	38,356	38,620
			Hawaiian/Pacific Islander		354	354	354	208	210	249	241
			Other-Non-Hispanic		1,201	1,201	1,201	750	690	862	807
			2+Races Non-Hispanic		13,180	13,180	13,180	7,977	7,713	9,679	9,450
			Hispanic		47,041	47,041	47,041	21,837	22,012	27,021	27,048
			Note: Removes two lanes of traffic City of SM =City of Santa Monica; City of BH = City of Beverly Hills; City of WH = City of West Hollywood; City of LA = City of Los Angeles; LAC = Los Angeles County								
GOAL F: ENVIRONMENTAL CONSIDERATIONS											
Estimated ROW Impact											
F	1	a	Estimated ROW impact based on proposed alt footprint (thousands of square feet)		None	Mn	1,335	420	480	550	570
			Note: Mn = Minimal								
Impacts to Traffic Circulation in Lane Miles											
F	2	a	Lane miles of traffic lanes removed or impacted		0	0	44.8	0	0	0	0
F	2	b	Lane miles of parking lanes removed or impacted		0	0	26.4	0	0	0	0
			Note: Removes two lanes of traffic								
Estimated Visual and Noise Impacts											
F	3	a	Estimated level of visual impacts to surrounding neighborhoods		None	None	L	Md	Md	Md	Md
F	3	b	Potential noise & vibration impact - Operational Impacts		0	0	0	0	0	0	0
			Note: L = Low; Mn = Minimal, Md = Moderate; H = High, VH = Very High Total amount of acreage, 2 hospitals and 5 schools								
Emergency Exits and Evacuation											
F	4	a	Ability to provide for emergency exits and evacuation		n/a	n/a	n/a	Md	Md	Md	Md
			L = Low; Mn = Minimal; Md = Moderate; H = High; VH = Very High								

Table S-10 Summary Matrix (continued from previous page)

Performance Measures				Alternatives							
							BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	Today	No Build	TSM	17	1	14	11	16
Vehicle/Transit/Pedestrian Conflicts											
F	4	b	Extent of vehicle/transit/ pedestrian conflicts that are not fully protected		Md	Md	L-M	L	L	L	L
			Note: Removes two lanes of traffic L = Low; Mn = Minimal; Md = Moderate; H = High; VH = Very High								
Impacts on Sensitive and Protected Environmental Resources											
F	5	a	Estimated Number of Cultural or Natural Resources Directly Impacted		n/a	n/a	65	45	36	78	65
			City of LA Historic Cultural Monument (HCM)		n/a	n/a	22	11	6	30	22
			City of LA Historic Period Overlay Zone (HPOZ)		n/a	n/a	3	3	2	4	3
			California Historic Landmark (CaHL)		n/a	n/a	3	2	2	3	3
			National Register of Historic Places (NRHP)		n/a	n/a	5	2	1	7	5
			Archeological Resource (AR)		n/a	n/a	22	18	18	22	22
			Note: Removes two lanes of traffic								
2030 Estimated Reduction in VMT											
F	6	a	Estimated Daily 2030 Daily Reduction in VMT (Study Area) Compared to No Build (in thousands)		n/a	6	23	61	55	73	71
			Note: Removes two lanes of traffic								

S.13 Recommendations

As stated at the beginning of this Executive Summary, this comparative analysis recommended that the following alternatives be considered for future study in a Draft EIS/EIR process as the best alternatives that meet the Purpose and Need for the Westside Extension Transit Corridor Study and as the most competitive for possible Federal New Starts funding:

- No Build (required).
- Transportation System Management (required).
- HRT Alternative 1.
- Combined HRT Alternative 11.

Figures S-54, S-55, and S-56 present information on how Alternatives 1 (Wilshire) and 11 (Combined) performed on ridership forecasts, transit user benefits, and capital costs, respectively. Due to a greater number of stations, Alternative 11 had a higher ridership forecast than Alternative 1 by more than 20,000 daily boardings. Additionally, Alternative 11 would provide an additional 10,000 hours per day of user benefits over Alternative 1. However, due to its longer length, the capital costs of Alternative 11 exceeded the costs of Alternative 1 by nearly $3 billion.

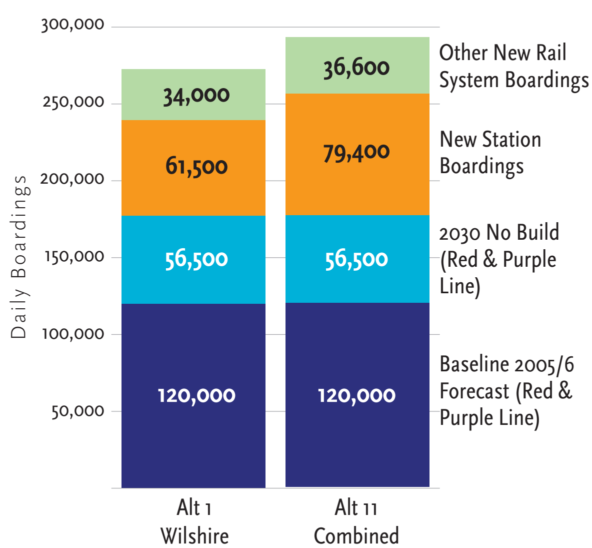


Figure S-54 Ridership Forecasts

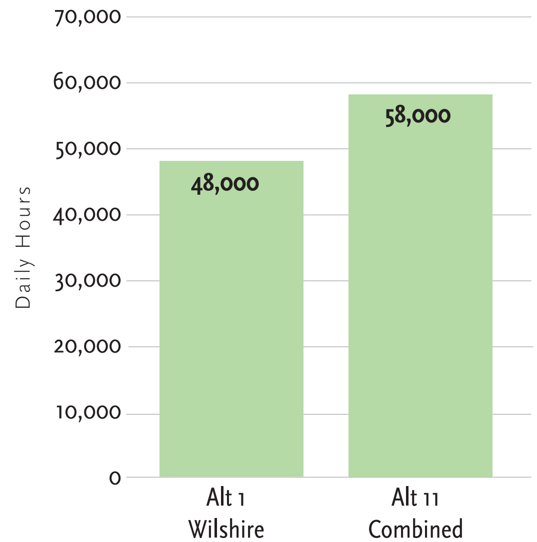


Figure S-55 Transit User Benefits (Daily Hours)

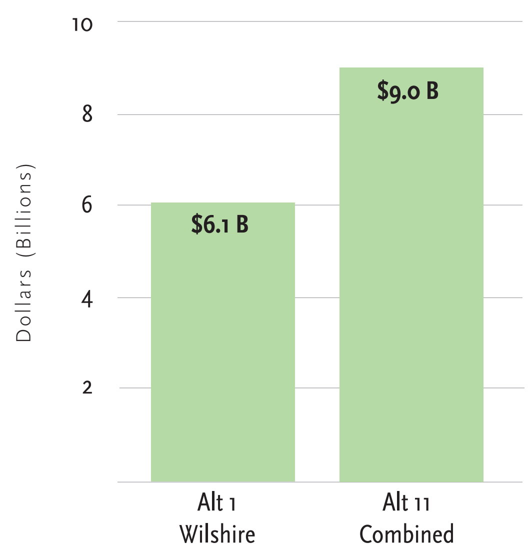


Figure S-56 Capital Costs

Both of these alternatives are recommended for further review and analysis in subsequent planning and environmental studies.

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1.0 PURPOSE AND NEED

1.1 Introduction

This section establishes the purpose and need for transportation investments in the Westside Extension Transit Corridor Study Area. This builds on and uses as a point of departure the *Mid-City/Westside Transit Corridor Re-evaluation/Major Investment Study (MIS)*, released in February 2000, and the *Mid-City/Westside Transit Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) (DEIR)*, released in June 2001, which are incorporated by reference. In the 2000 MIS and 2001 DEIR, a number of themes emerged that helped evaluate whether a major transit investment was warranted. Those themes are continued in the discussion below, with a renewed focus on the Westside Extension Transit Corridor Study Area.

The purpose of the Westside Extension Transit Corridor Study is to address the mobility needs of residents, workers, and visitors traveling to, from, and within the highly congested Study Area by providing faster and more reliable public transportation than existing services, which operate in mixed-flow traffic. The improvement in public transit service will bring about a significant increase in east-west capacity and improvement in person-mobility by reducing transit travel times. On a county-wide level, the project will strengthen regional access by connecting Metro bus, Metro rail, and Metrolink networks to a high-capacity transit solution serving the Study Area.

This report studies transit extensions from the terminus of the Metro Purple Line at the Wilshire/Western Station and/or the Metro Red Line at the Hollywood/Highland Station to downtown Santa Monica. By extending westward the benefits of fixed guideway transit service beyond the current Metro Red/Purple Line termini, the project will offer a viable alternative to driving in the heavily congested Westside Extension Transit Corridor. The mobility improvements offered by such a system will improve job accessibility for transit-dependent residents in the Study Area, as well as greater Los Angeles, and improve transportation equity for all population groups. The high-quality transit solution will compliment existing transit supporting land uses and present new opportunities for mixed-use and high density development in the Study Area.

Environmental benefits will be afforded as individuals live closer to work, cultural, and social opportunities and trade personal vehicles for alternative transportation modes. The economic, social, and environmental benefits attributed to the project are expected to translate into public support for high quality, convenient, and reliable east-west transit service through the corridor.

1.2 History and Background

The Metro Westside Extension has been an integral element of local, regional, and federal transportation planning since the early 1980s. Extending westward from the Los Angeles Central Business District (CBD), the Westside Extension has been the subject of in-depth technical studies and extensive community involvement during this period. Ultimately, the transit investment has been envisioned to extend toward Beverly Hills, Century City, Westwood (University of California Los Angeles [UCLA]), West Los Angeles, and Santa Monica.

1.2.1 Original Metro Red Line Studies (1983-1988)

In 1983, the original Locally Preferred Alternative (LPA) for the extension of the Metro Red Line identified an alignment that followed Wilshire Boulevard to Fairfax Avenue and then north to Hollywood and the San Fernando Valley. In 1985, naturally occurring methane gas caused a fire at a Ross "Dress for Less" store, located in the Fairfax District along the selected LPA alignment, which resulted in an investigation by a special City of Los Angeles Task Force. Conclusions from this investigation lead to a Congressional prohibition on federal funding for subway construction within the designated Methane Gas Risk Zone, as determined by the 1985 Task Force report on subsurface conditions in the region. As mandated by the Congressional prohibition, a Congressionally Ordered Re-Engineering (CORE) study was conducted. The intent of this study was to determine an appropriate alignment through which to link the Los Angeles Central Business District, the San Fernando Valley and the Westside. Over 40 candidate alignments were reviewed and six alignments were studied in detail in environmental reports.

In July 1989, a new LPA was chosen. This new LPA followed an alignment from Downtown Los Angeles Union Station to Wilshire/Vermont and split into two separate lines, one traveling west to Wilshire/Western and the other proceeding north to Hollywood and North Hollywood. The 1983 and 1989 LPA alignments are illustrated in the first of two maps in Figure 1-1.

The 1989 alignment was subsequently approved for construction and completed as a series of projects. The subway was completed from Union Station to Westlake/MacArthur Park in 1993, to Wilshire/Western Station in 1996, to Hollywood/Vine in 1999, and to North Hollywood in 2000.

1.2.2 Early Systems Planning Studies (1989-1990)

There are two important early studies, which have relevance to the current Alternatives Analysis Study. The Southern California Association of Governments (SCAG) prepared the *Metro Red Line Extension System Planning Study* in 1989. This report documented the system-wide framework for the definition of the Westside Transit Corridor and provided the background systems analysis that was used to justify the need for major transit corridor expenditures on the Westside. The map of the SCAG Metro Red Line Extension System Planning Study Area, with the Methane Gas Risk Zone called out, is shown in the second of two maps in Figure 1-1.

In addition, the Los Angeles County Transportation Commission (LACTC) prepared the *Los Angeles Metro Orange Line Extension Transitional Analysis* in 1990. This study considered specific alignments and station locations for an extension of the planned subway project. After an evaluation of a number of potential routes, two of the alignments that showed the greatest promise were the Santa Monica Boulevard Alternative, shown in Figure 1-2, which extended west from Hollywood/Highland Station, and the Wilshire Boulevard Alternative, shown in Figure 1-3, which extended west from Wilshire/Western Station.

Figure 1-1. Locally Preferred Alternatives and System Planning Studies 1983 and 1989

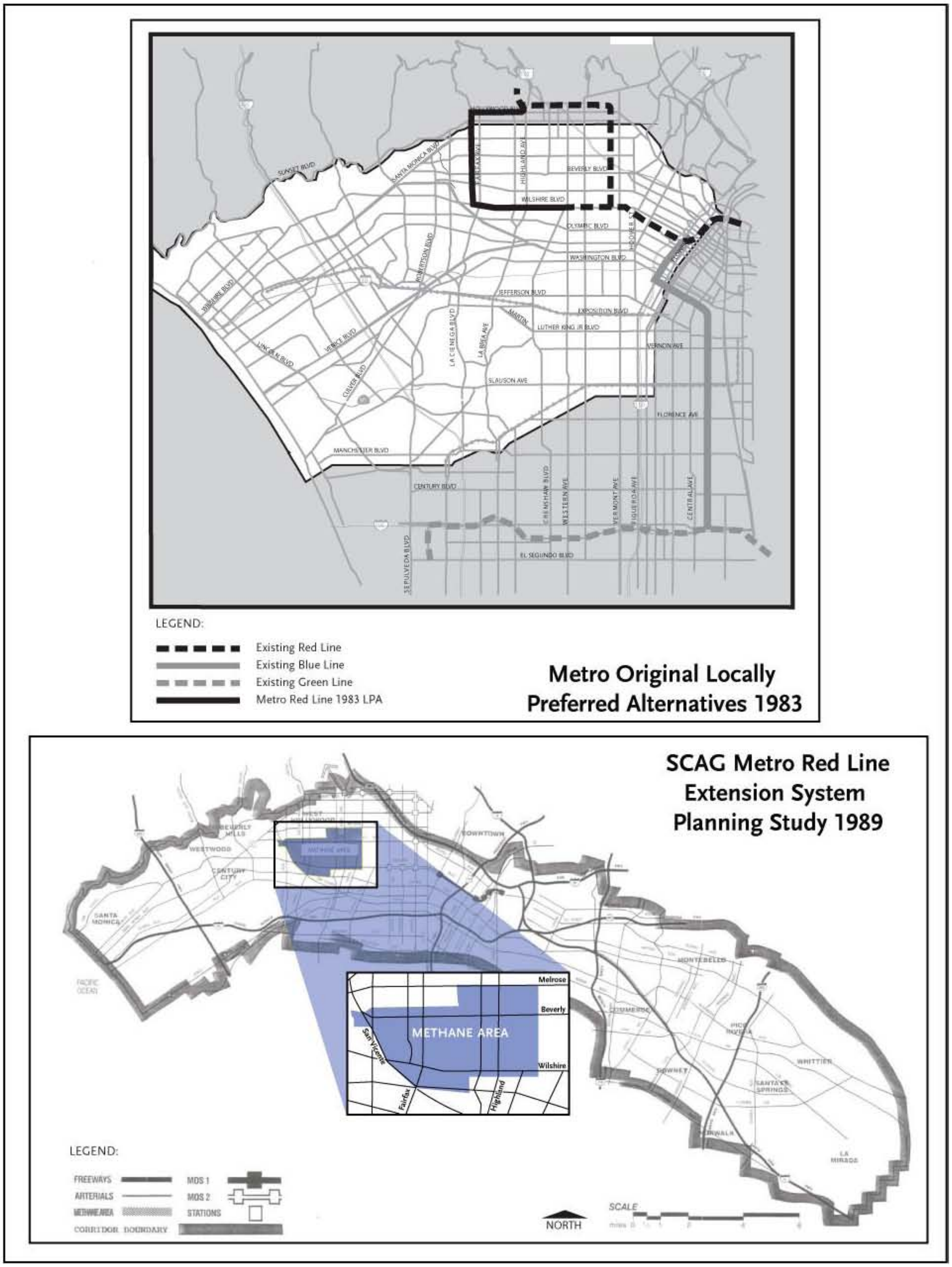


Figure 1-2. Metro Orange Line Extension Santa Monica Boulevard Alternative 1990

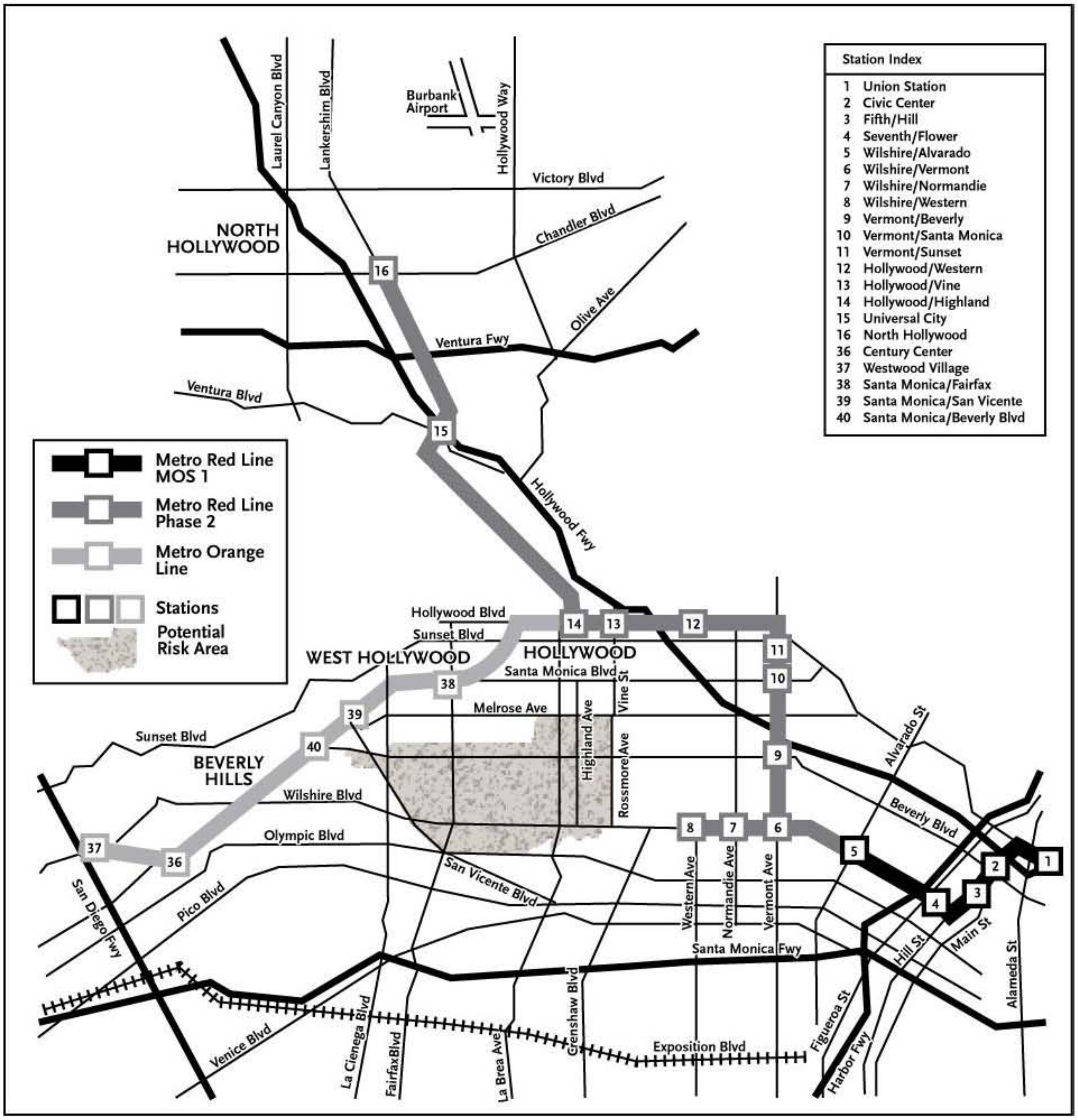
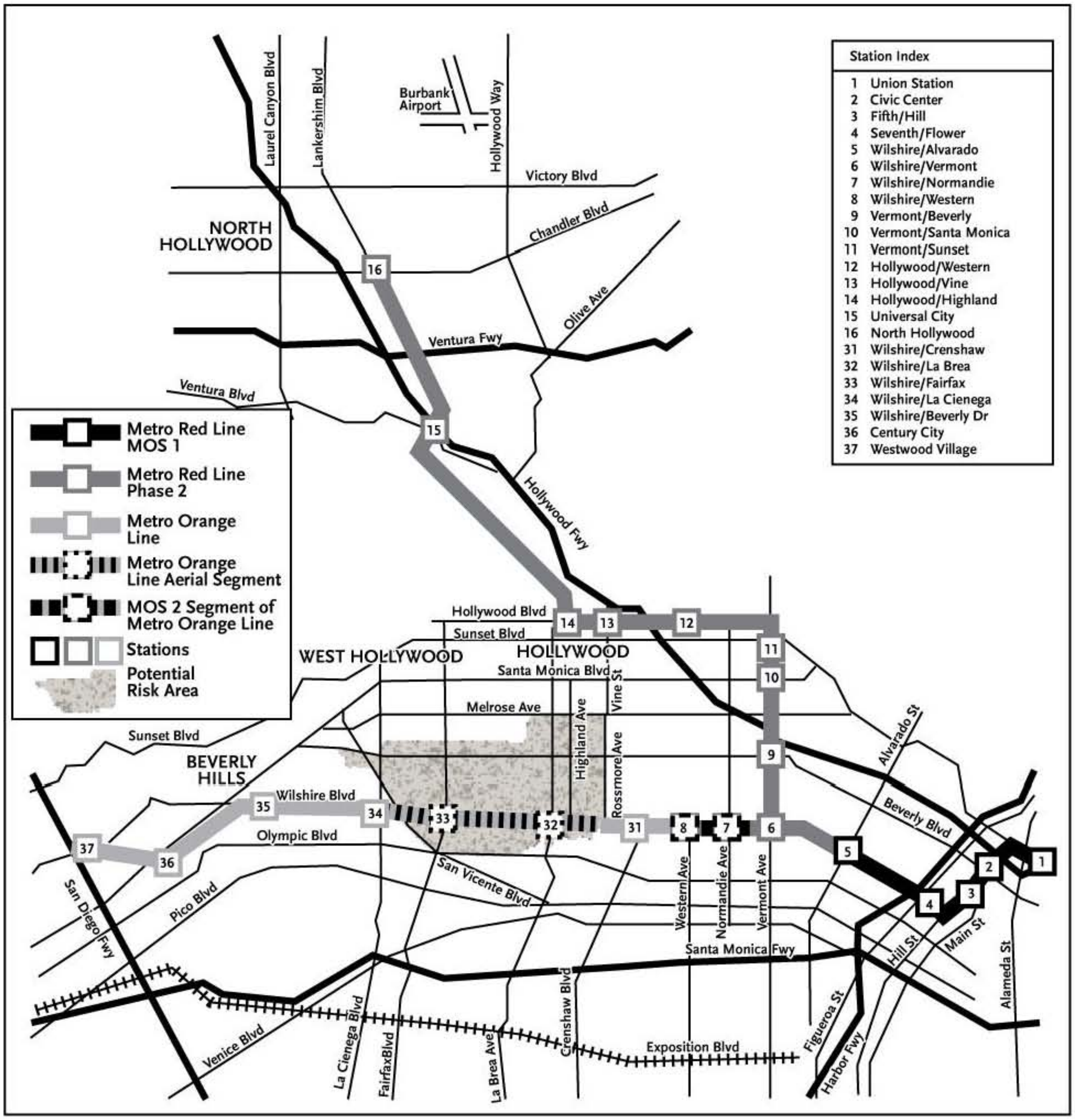


Figure 1-3. Metro Orange Line Extension Wilshire Boulevard Alternative 1990



1.2.3 Mid-City Extension Studies and Ballot Initiatives (1992-1998)

Between 1992 and 1998, Metro continued with efforts to extend the subway to the west by considering alignments that detoured to the south of Wilshire Boulevard to the Mid-City area to avoid the federally prohibited methane gas hazard zone. In 1992, a new Red Line Extension LPA was adopted which would have extended the subway by 2.3 miles from Wilshire/Western Station to Pico and San Vicente Boulevards in the "Mid-City" area via a Crenshaw Boulevard alignment. Engineering design work for the tunneling and stations on this project was suspended in 1994 due to concern about hazardous underground gases along Crenshaw and Pico Boulevards. An optional alignment using Wilton Place, Arlington Avenue, and Venice Boulevard was pursued instead. In January 1998, Metro suspended work on the extension of the Metro Red Line Heavy Rail Subway Project in the Westside Corridor. The North Hollywood Extension of the Metro Red Line was allowed to continue into construction. Figure 1-4 illustrates the completed Metro Red Line Project with the suspended segment in the Mid-City Corridor.

A Metro Restructuring Plan, *Analysis and Documentation of Metro's Financial and Managerial Ability to Complete North Hollywood Rail Construction and Meet the Terms of the Bus Consent Decree*, was approved by the Metro Board of Directors in May 1998, which called for Metro to study "viable and effective options" for transit in all parts of Los Angeles County, with an emphasis on the corridors in which rail lines had been suspended.

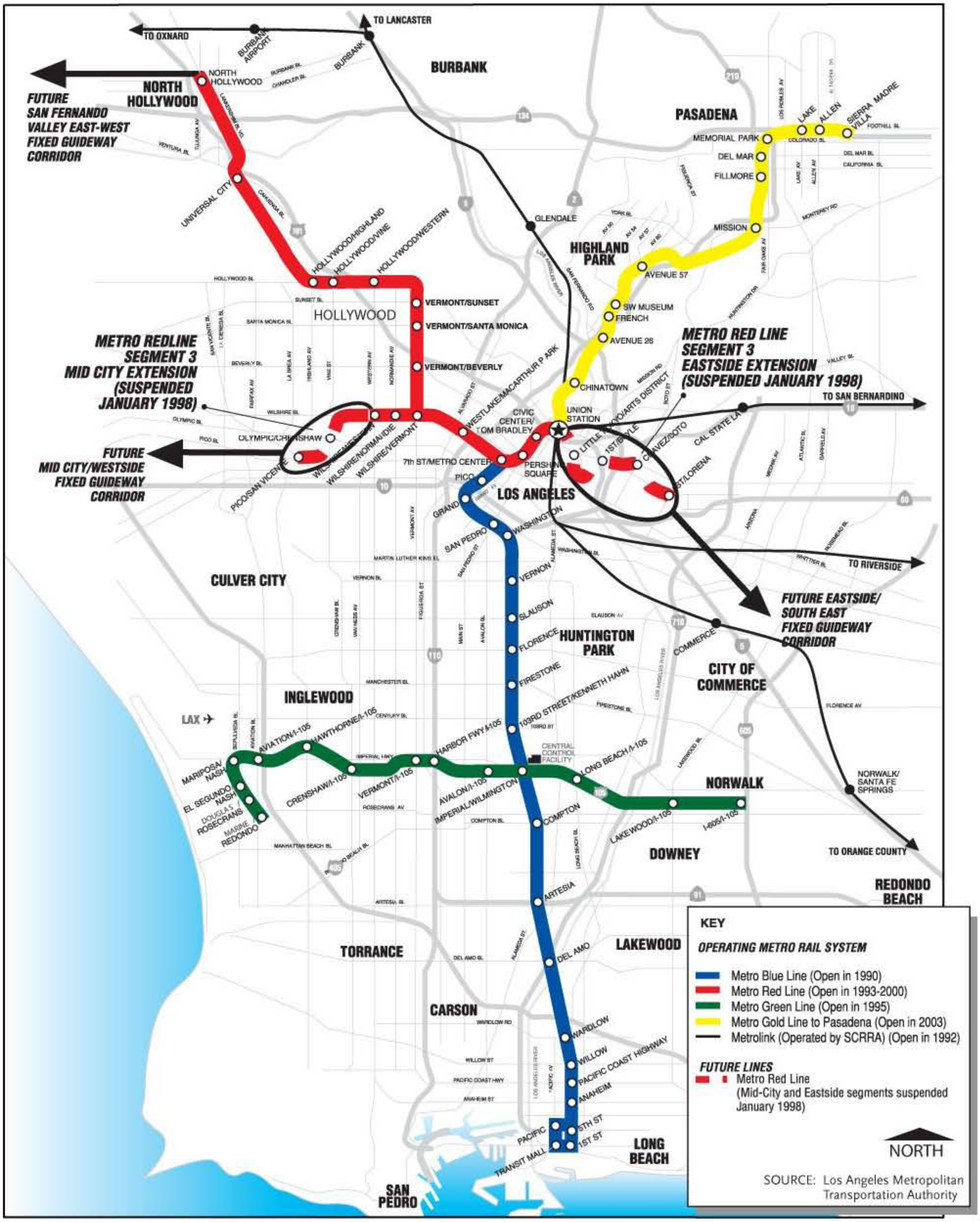
Additional information on Corridor transit needs was developed in the *West Los Angeles Transit Corridor Technical Report: 1998 Regional Transportation Plan (RTP) Transit Restructuring for Use in the MTA Re-evaluation Study*, prepared by SCAG. This study considered alternatives to heavy rail subway extensions to the Westside and developed three conceptual alternatives for different types of transit service. The alternatives identified included:

- Transit Corridors Concept
- Intermodal Linkage Concept
- Centers Access Concept

Integral to the above concepts was the idea that no single corridor could adequately service a Study Area as large as the Westside. Therefore, all of the concepts endeavored to provide a systems context for transit service centered on major corridors and activity centers. The Transit Corridors Concept further proposed that the Wilshire Boulevard Transit Corridor be supplemented with a second corridor along Exposition and Martin Luther King Boulevards, utilizing above ground transit alternatives. The alternatives sought to define lower-cost surface solutions that could be implemented incrementally over time in order to provide improved transit service to larger areas of the Westside more quickly than would be the case with more expensive subway extension solutions.

A *Regional Transit Alternatives Study (RTAA)* was prepared by Metro in November 1998. The study evaluated local funding shortfalls and identified the amount of funding available for new projects between Fiscal Years 1999 and 2004. The study suggested possible funding allocations, identified immediate bus transit improvements in Los Angeles County, and established a framework for further fixed guideway project development in the Eastside, Westside, and San Fernando Valley

Figure 1-4. Metro Red Line and Suspended Segments



corridors. The study included a preliminary evaluation of fixed guideway alternatives in the three corridors but did not make recommendations with regard to preferred fixed guideway transit modes or alignments/configurations. Instead, the study recommended that a MIS level of analysis be conducted to provide more information regarding those choices. The RTAA study resulted in Board approval of the concept of a recommended rapid bus system serving the Eastside, Westside, and San Fernando Valley.

1.2.4 Proposition A Ballot Initiative (Subway Funding Prohibition) (1998)

A 1998 ballot initiative referred to as the Metropolitan Transportation Authority Reform and Accountability Act was approved and became effective on November 3, 1998. The most significant provision of the new law stipulates that no local Proposition A or C sales tax monies shall be used to fund the planning, design, construction, or operation of any "new subway", defined to mean any subway project such as a rail line located in a tunnel below grade other than Metro Red Line Segments 1, 2, or 3 (North Hollywood). As a result, the initiative prohibits the use of these sales tax revenues to build subway extensions in the Westside Extension Transit Corridor. The initiative does not prohibit the use of sales tax revenues to design and construct light rail, at-grade rail, elevated rail systems, or busways. Nor does this initiative prevent Metro from using state or federal revenues, or local revenues other than Proposition A and C sales taxes, to design and construct new subways.

1.2.5 Development of Westside Bus Rapid Transit and Light Rail Transit Projects (1998-2008)

The *Mid-City/Westside Transit Corridor Re-Evaluation/Major Investment Study* was completed in February 2000. The study's purpose was to recommend lower cost, non-subway investments in the Westside Corridor. The study also developed recommendations for the deployment of Metro Rapid Bus improvements along at least ten major arterial routes throughout the Westside.

The Metro Rapid Demonstration Project was implemented in June 2000. This demonstration project implemented Metro Rapid bus lines on Ventura Boulevard in San Fernando Valley and a Whittier to Santa Monica route, with more than half of the route operating on Wilshire Boulevard from downtown Santa Monica to downtown Los Angeles. The Metro Rapid service provided bus service at higher speeds because of the use of transit signal priority at street intersections, fewer stops, and low-floor ease of boarding and exiting. The Metro Board declared the project a success in 2003 and adopted a countywide Metro Rapid Expansion program with new routes and a target completion date of 2008.

In April 2001, the *Mid-City/Westside Transit Corridor Draft EIS/EIR* was completed. This study provided the basis to formally split the then Westside Corridor into two separate corridors. The study recommended pursuing Bus Rapid Transit (BRT) improvements along the newly designated Wilshire Corridor and Light Rail Transit (LRT) improvements along the newly designated Exposition Corridor. A Final EIR was certified for the Wilshire BRT Project in 2002 and a Final EIS/EIR was certified for the Mid- City/Exposition LRT Project in 2005.

The Wilshire BRT Project was never implemented in its entirety except for the implementation of a Wilshire Bus Lane Demonstration Project in 2003. The demonstration project operated successfully for three years. However, it met with community opposition within West Los Angeles and, as a result, was removed in 2006. The improvement of bus speeds along the Wilshire Corridor is now being incrementally implemented through a series of smaller Metro Rapid based improvements, such as bus-only lanes. Dedicated bus lanes will be implemented along portions of a 12.5-mile stretch of Wilshire Boulevard between downtown Los Angeles and the City of Santa Monica. Curb lanes will convert to exclusive use lanes during peak period operations. This is a FTA Small Starts Project. The Metro Exposition Line started construction on the first phase between Downtown Los Angeles and Culver City in September 2006 and is scheduled to open for service in 2010. Planning for the second phase between Culver City and Santa Monica started in early 2007. Figure 1-5 illustrates the alternatives considered in the 2000 MIS for the Wilshire and Exposition Corridors.

1.2.6 Opening of MOS 3 of Metro Red Line (2000)

In June 2000, the last segment of Metro Red Line, known as Minimum Operating Segment 3 (MOS 3) was completed. The segment began revenue operations service from Hollywood/Vine Station to North Hollywood with stops at Hollywood/Highland Station and Universal City Station. The completion of MOS 3 resulted in the completion of the entire Metro Red Line Union Station to North Hollywood alignment, as well as the Union Station to Wilshire/Western alignment. Both alignments operate along the same route from Union Station to Wilshire/Vermont Station, with the North Hollywood alignment and the Wilshire/Western alignment branching out from this transfer station. Simultaneously, the Metro Rapid Demonstration Project began, with Line 720 operating on the Wilshire/Whittier route, while Line 750 operated on the Universal City to Warner Center route along Ventura Boulevard.

1.2.7 Reconsideration of Wilshire Tunnel Options (2005)

At the request of Metro and the City of Los Angeles, the American Public Transportation Association (APTA) organized a Peer Review Panel of experts to reconsider the feasibility of Westside Corridor tunneling along the federally precluded Wilshire Boulevard segment in October 2005. The panel evaluated advances in worldwide tunneling technology and the safety of building and operating transit tunnels in the identified hazard zone along Wilshire Boulevard. The panel concluded that advances in tunneling technology and practice in the past 20 years would now permit that such tunneling would be feasible and could be undertaken at no greater risk than other subway systems in the United States. As a result, legislation was introduced in Congress to repeal the federal prohibition on subway construction along Wilshire Boulevard. The repeal of the prohibition was passed by Congress in 2007 and enacted into law in 2008.

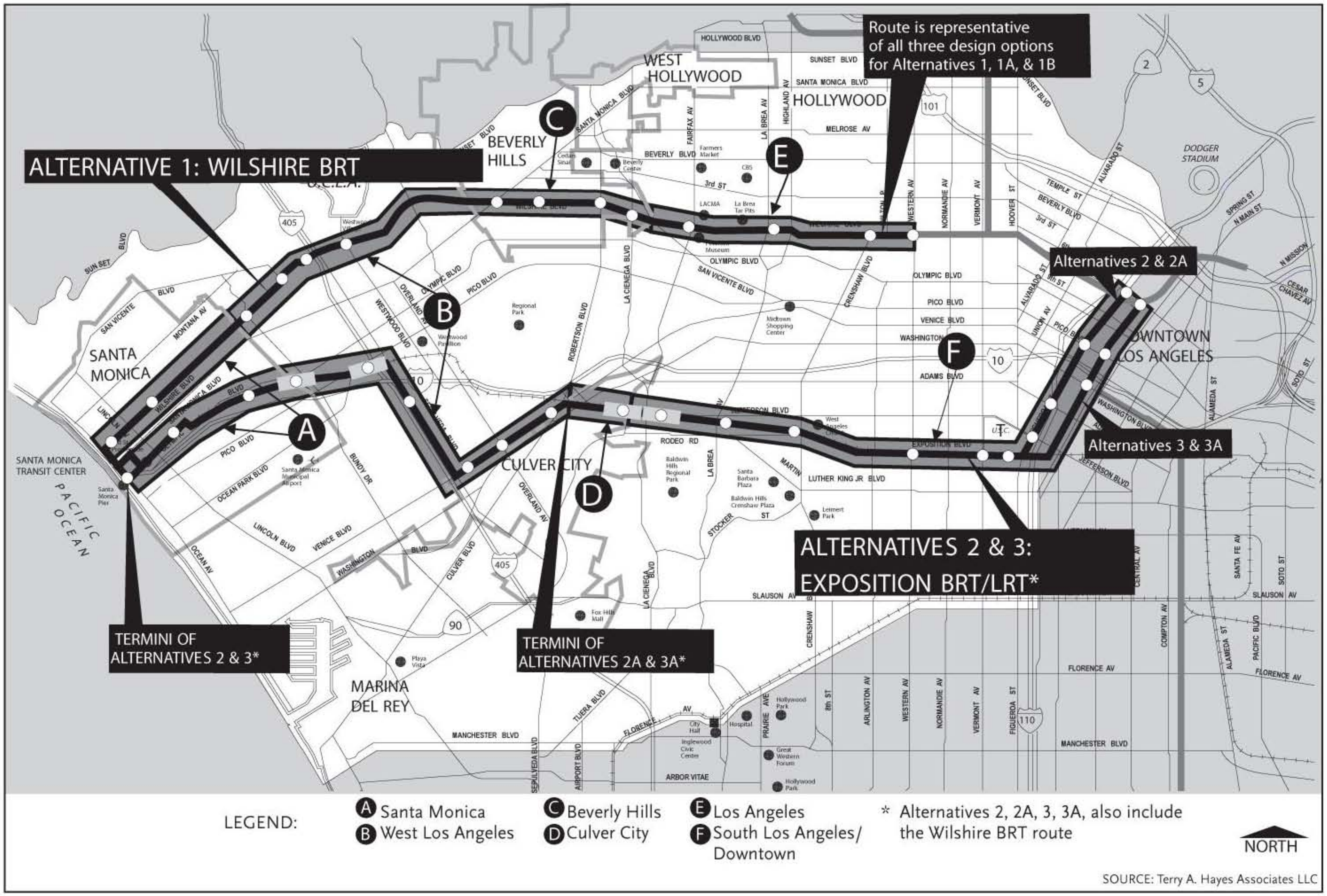
1.2.8 Metro Board Determination to Re-Open Alternatives Analysis for Westside Extension Transit Corridor (2006)

In July 2006, the Metro Board of Directors authorized the resumption of an Alternatives Analysis study for all reasonable fixed guideway transit alternatives for the portion of the Westside Corridor north of the Exposition Transit Corridor. Based on the findings of the APTA Peer Review Panel, the Board authorized the consideration of all reasonable alternatives for the Westside Extension Transit Corridor, including the previously excluded subway alternatives. An Early Scoping Notice to resume the Alternatives Analysis Study was issued by Metro and the Federal Transit Administration on October 1, 2007.

1.2.9 Union Station to Wilshire/Western Branch Renaming (2006)

In December 2006, the Metro Board renamed the branch of the Metro Red Line from Union Station to Wilshire/Western the Metro Purple Line. The Board approval clarifies the operations of this branch of the Metro subway system as distinct from the Union Station to North Hollywood line, which still retains the name Metro Red Line.

Figure 1-5. Mid-City/Westside Major Investment Study Area and Alternatives (2000)



1.3 Study Area Location and Demographics

The Westside Extension Transit Corridor Study Area is in western Los Angeles County and encompasses approximately 38 square miles (Figure 1-6). The Study Area is east-west oriented and includes portions of five jurisdictions: the Cities of Los Angeles, West Hollywood, Beverly Hills, Santa Monica, as well as portions of unincorporated Los Angeles County. As illustrated in Figure 1-7, the boundaries of the Study Area generally extend north to the base of the Santa Monica Mountains along Hollywood, Sunset and San Vicente Boulevards, east to the Metro Rail stations at Hollywood/Highland and Wilshire/Western, south to Pico Boulevard, and west to the Pacific Ocean.

The Study Area is diverse in land use and socio-economic characteristics. To better summarize the socio-economic features and identify major travel patterns, the Study Area and the surrounding SCAG region is divided into districts. Each district is composed of multiple Traffic Analysis Zones (TAZ). Since there are over 4,000 TAZ in Los Angeles County, in order to simplify the presentation of materials, districts were agreed upon by study participants early in the project. This analytical methodology ensures an accurate representation of the Study Area's demographics, travel behavior, and economic characteristics. Figure 1-8 shows the district divisions of the whole region as well as within the Study Area. The Study Area is divided into 23 districts, and the rest of Los Angeles County, Ventura County, San Bernardino County and Riverside County (including Imperial County) is divided into 76 districts with each county outside Los Angeles represented by one district. Within the Study Area, the Cities of Santa Monica, Beverly Hills, and West Hollywood were separated as individual districts. Each neighborhood council in the City of Los Angeles was defined as a single district. If the city or neighborhood council was intersected by the Study Area boundary, it was split into two or more districts. The districts that make up the Study Area and those districts immediately adjacent are illustrated in Figure 1-9.

Approximately five percent of the population (504,000) and 10 percent of the jobs (479,000) in Los Angeles County are concentrated in the Study Area. Population and employment densities in the Study Area are among the highest in the metropolitan region, averaging approximately 13,100 persons per square mile and 12,500 jobs per square mile. These high population and employment concentrations make the Study Area one of the densest places to live and work in the county.

2006 population and employment densities by TAZ are shown in Figure 1-10. As can be seen, population density is high throughout the Study Area, with only a handful of TAZs falling below 5,000 persons per square mile. Study Area employment density demonstrates a similar pattern, with a majority of TAZs generating over 5,000 jobs per square mile. The greatest employment densities in the Study Area are found along the Wilshire and Santa Monica Boulevard Corridors. According to a market trend analysis by Grubb & Ellis[1], 32 percent of Los Angeles County's 186 million square feet of office space is in the West Los Angeles and Mid-Wilshire areas, which makes the Study Area one of the largest office markets in Los Angeles. This is particularly noteworthy as the Study Area encompasses only 38 square miles, or less than one percent, of Los Angeles County.

According to SCAG's forecasts, population density in the Study Area will increase to over 14,500 persons per square mile and 14,600 jobs per square mile by 2030. This represents an increase of 10 percent in population density and a 17 percent jump in employment density. Figure 1-11 shows population and employment densities by TAZ in the Study area.

[1] Araghi, Amir, 2007. *Office Market Trends Los Angeles*, Grubb & Ellis.

Figure 1-6. Project Study Area Location

Figure 1-7. Westside Extension Transit Corridor Study Area

Figure 1-8. Districts for Study Area and Region

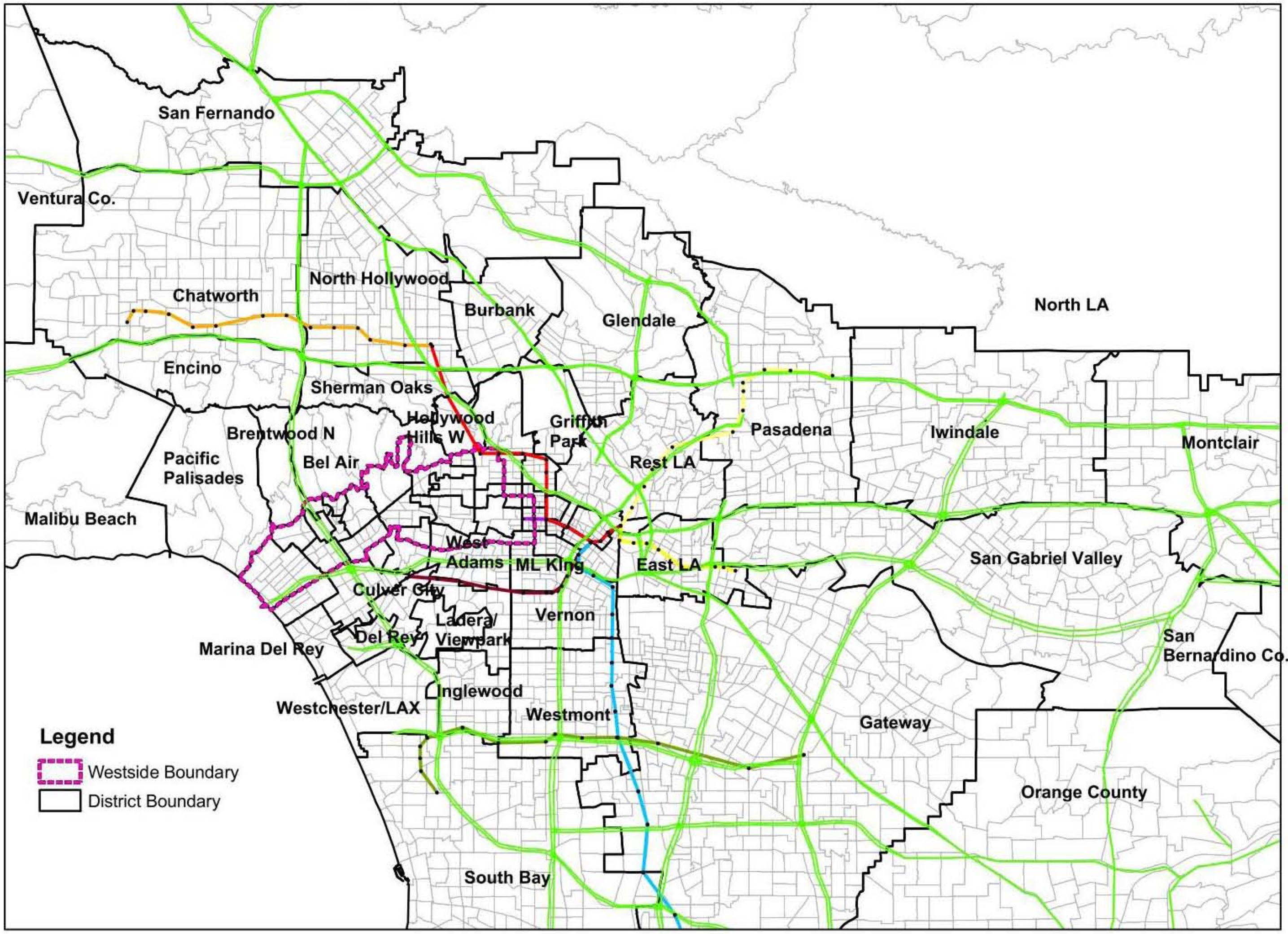


Figure 1-9. Districts within Study Area

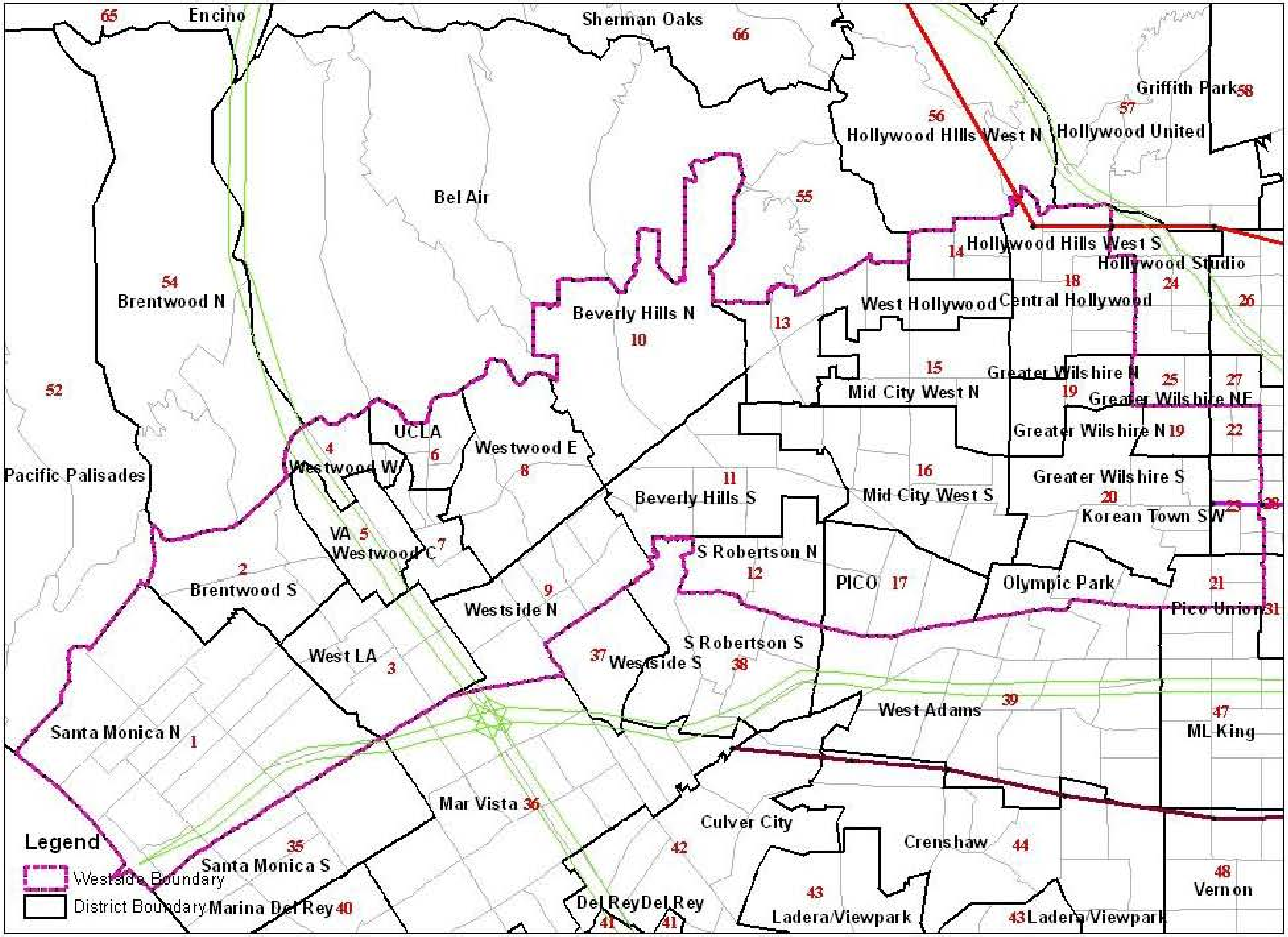
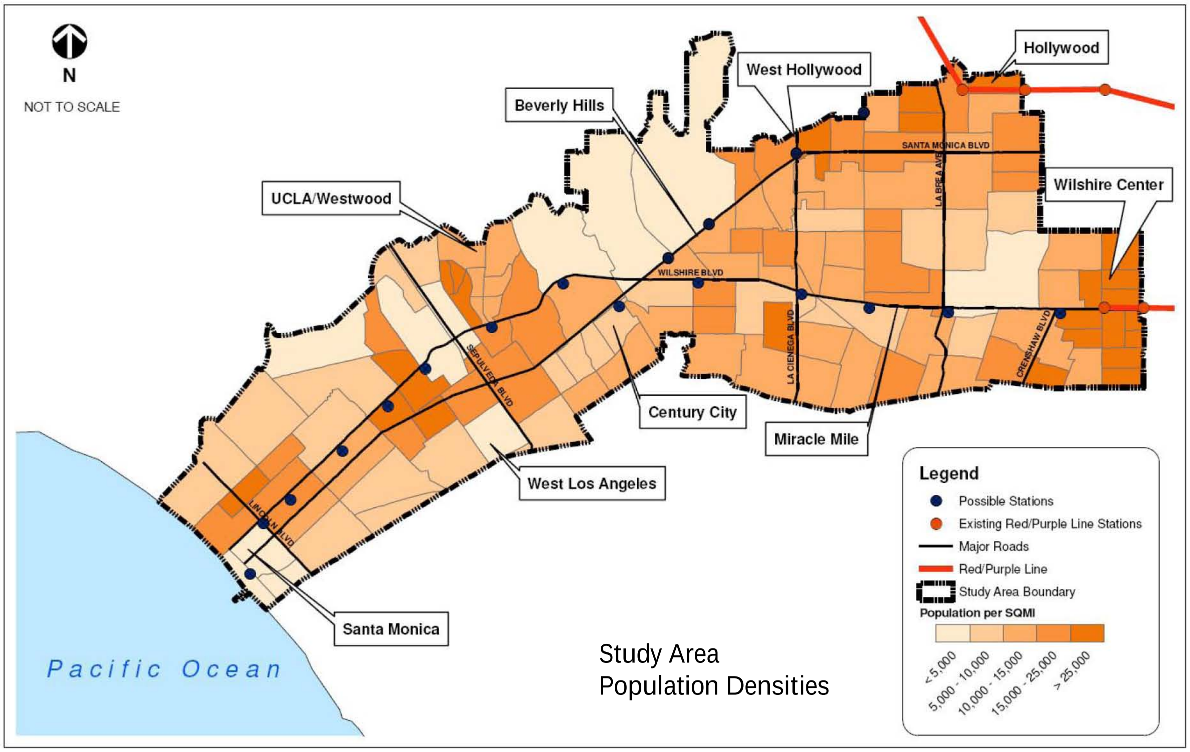


Figure 1-10. Study Area Population and Employment Densities (2006)



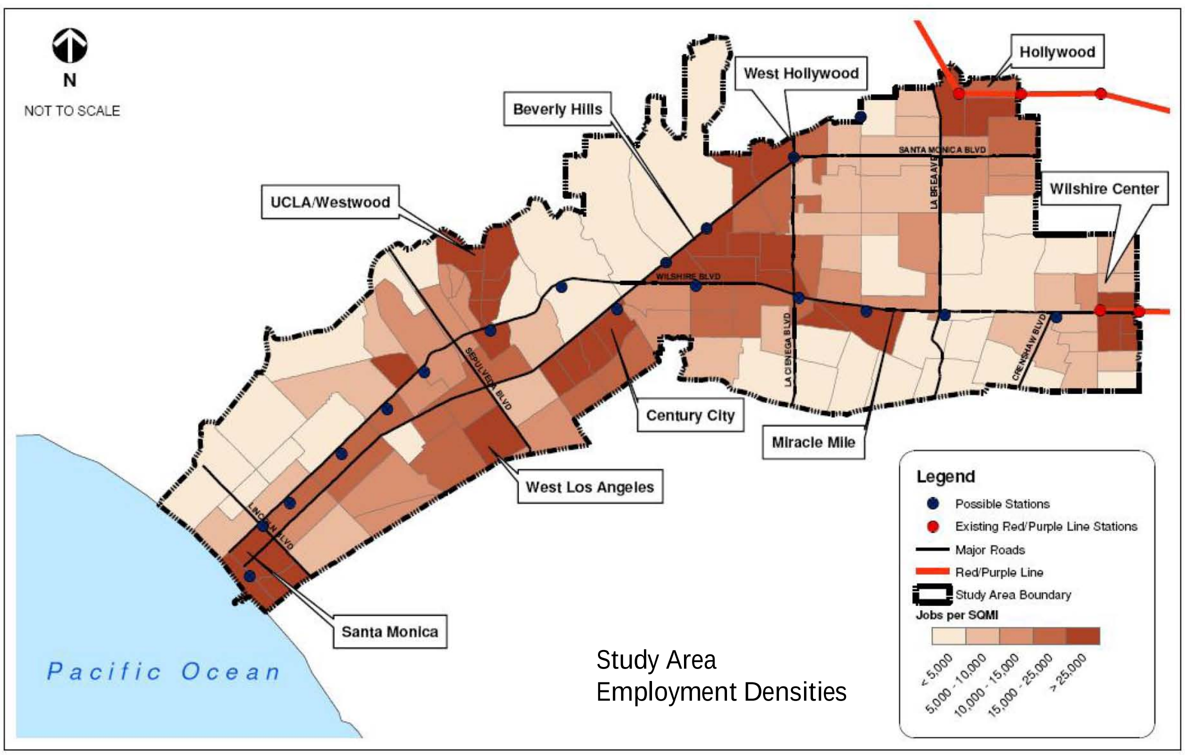
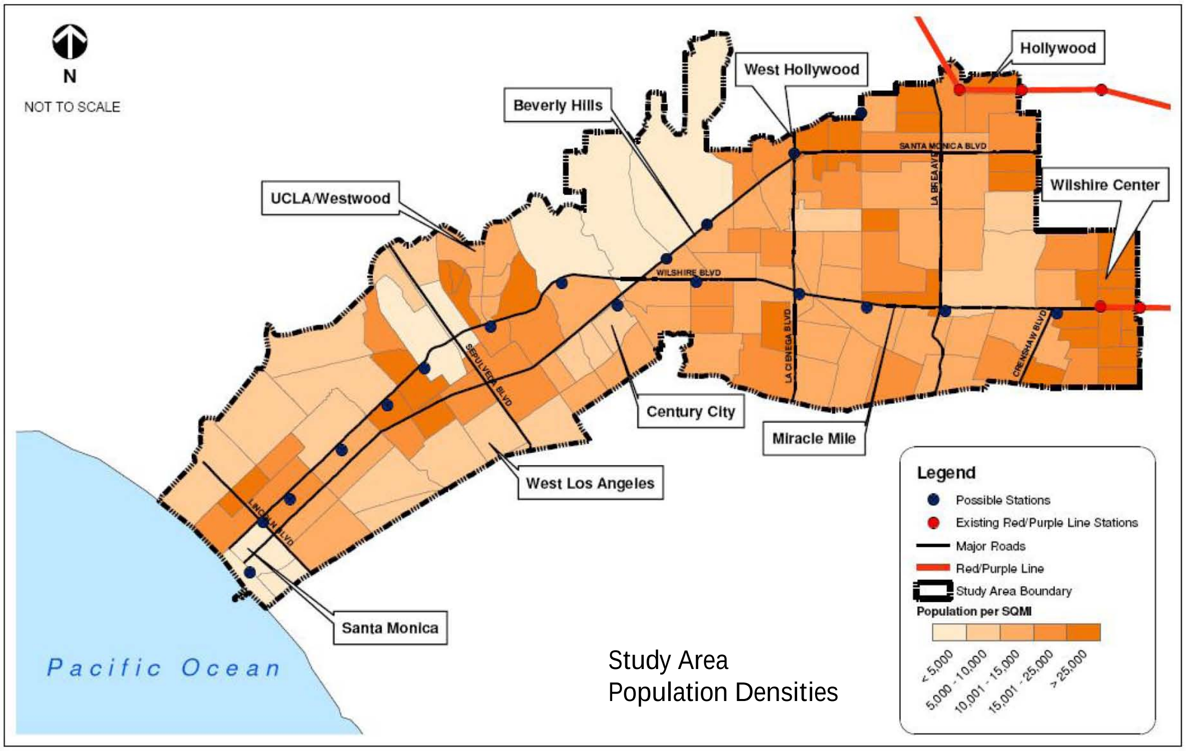
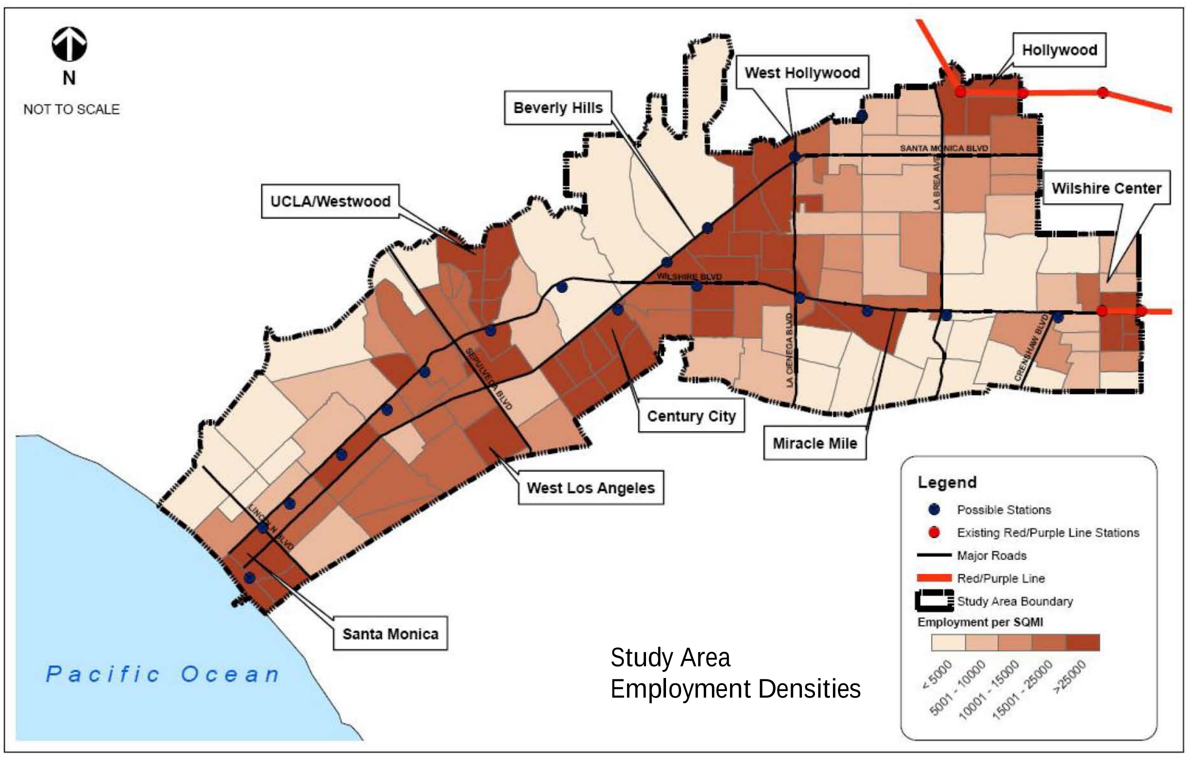


Figure 1-11. Study Area Population and Employment Densities (2030)





1.4 Transportation Facilities and Services

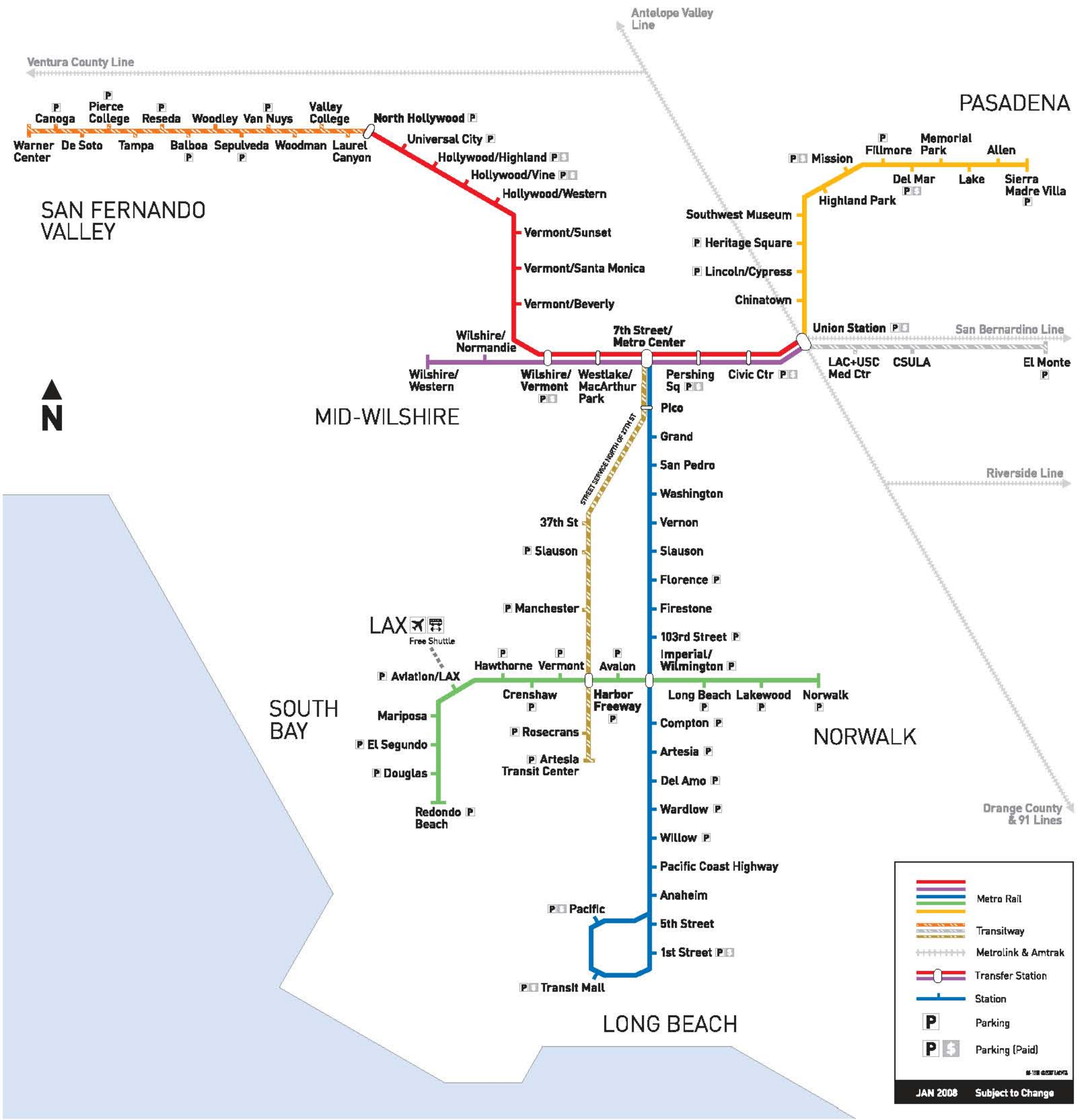
1.4.1 The Regional Transit Context

Since 1990, Los Angeles County has constructed a regional fixed-guideway transit system that consists of heavy rail transit (HRT), light rail transit (LRT), bus rapid transit (BRT), and commuter rail components. This system currently includes more than 73 miles of Metro Rail (HRT and LRT) service, 14 miles of BRT service, and more than 500 miles of Metrolink commuter rail lines. As illustrated in Figure 1-12, the existing and committed system currently includes the following components:

- Metro Red/Purple Lines - Opened in phases between 1993 and 2000, the 17.4-mile Metro Red Line heavy rail subway extends from Union Station to the west and north with two branches. Both lines run together and share six stations between Union Station and the Wilshire/Vermont Station. The Purple Line extends westward along Wilshire Boulevard for two additional stations while the Red Line extends north for eight additional stations through Hollywood and Universal City. The Metro Red/Purple Lines currently carry an estimated 150,000 average weekday daily boardings (September 2008).
- Metro Blue Line - Opened for service in 1990, the 22-mile Metro Blue Line light rail system operates between downtown Los Angeles and Long Beach and currently carries 85,000 average daily boardings (September 2008).
- Metro Green Line - Opened for service in 1995, the 20-mile Metro Green Line light rail system operates between Redondo Beach and Norwalk, primarily in the median of the Glen Anderson Century Freeway (I-105). The line carries an estimated 45,000 average weekday daily boardings (September 2008).
- Metro Gold Line - Opened for service in July 2003, the 13.8-mile Metro Gold Line light rail line operates between downtown Los Angeles and Pasadena. Ridership for this line is approximately 26,000 average weekday daily boardings (September 2008).
- Metro Orange Line - Opened for service in 2005, the 14.0-mile Metro Orange Line is an urban busway extending westward across the San Fernando Valley from the North Hollywood terminus of the Metro Red Line. This BRT line carries an estimated 28,000 average weekday daily boardings (September 2008).
- Metro Gold Line Eastside Extension - Scheduled to open for service in 2009, the six-mile Metro Gold Line Eastside Extension will connect Union Station in downtown Los Angeles with Little Tokyo, Boyle Heights and East Los Angeles. This line will operate as a through running extension of the Metro Gold Line that currently operates between downtown Los Angeles and Pasadena.
- Metro Expo Line - Scheduled to open for service in 2010, the 8.5-mile Metro Expo LRT Line will run along Flower Street and the Metro-owned Exposition right-of-way from the existing Metro Rail station at 7th Street/Metro Center in downtown Los Angeles to Washington/National in Culver City.
- El Monte Transitway – This high occupancy vehicle lane opened for service in 1974 as a busway, with 3+ HOVs allowed two years later. Daily bus ridership is approximately 18,000 on routes served by Metro and Foothill Transit.

- Harbor Transitway – This 11-mile high-occupancy vehicle roadway opened in 1996 in the median of the I-110 Freeway and carries 2+ HOVs and buses. Metro, LADOT, OCTA, Gardena Bus Lines and Torrance Transit routes use the transitway.

Figure 1-12. Existing Metro Rail, BRT, and Metrolink System Map



- Metrolink Commuter Rail - Initially opened for service in 1992, commuter rail service is provided by the Southern California Regional Rail Authority (Metrolink), a regional rail network that connects Ventura, Los Angeles, Orange, San Bernardino, Riverside, and San Diego counties using existing rail rights-of-way. This commuter service currently carries more than 48,000 average daily boardings as of September 2008 in the multi-county service area. Metrolink provides over 500 miles of service.
- Metro Rapid Arterial Bus Routes - Metro has developed a predominantly non-fixed guideway, rapid bus system in Los Angeles County that uses bus signal priority and additional features of BRT to create an arterial-based transit network. The first two lines of this network opened for service in 2000, and the network currently includes 26 lines. When completed, the Metro Rapid Program will operate a network of 28 lines covering 450 miles, complementing light and heavy rail transit throughout Los Angeles County.

In Figure 1-13 the existing fixed-guideway transit service in the region is complimented by the transit corridors currently under study. The fixed-guideway corridors under study in addition to the Westside Extension Transit Corridor include Canoga Park, Crenshaw, Regional Connector, Gold Line Eastside Phase II, and Mid-City/Exposition Phase II.

1.4.2 Transportation Facilities and Services in the Study Area

The Study Area is currently served by roadway and transit systems, parking facilities, and pedestrian and bicycle facilities. Existing development throughout the Study Area prevents the addition of new roadways and severely limits the expansion of existing facilities. The Study Area contains some of the most congested arterial streets in the County. Key east-west arterials include Wilshire, Santa Monica, Sunset, Hollywood, Olympic, and Pico Boulevards. North-south arterials, extending westward from Western Avenue, include vital streets such as Crenshaw Boulevard, La Brea Avenue, La Cienega Boulevard, Beverly Drive, Westwood Boulevard, Sepulveda Boulevard, Bundy Drive, and Lincoln Boulevard.

Two freeways traverse the Study Area. The San Diego Freeway (I-405) runs north-south through the Study Area just west of Westwood and UCLA and provides the primary access to/from the north and south. The Santa Monica Freeway (I-10) runs just outside the Study Area until Santa Monica city limits but parallels key east-west arterials and provides regional access from the east. Both freeways are widely recognized as some of the most congested in both the Los Angeles region and the nation, and experience high traffic volumes throughout the day, well beyond the traditional peak travel hours.

Metro is the principal transit provider in the Study Area, which is also served by Santa Monica's Big Blue Bus, Los Angeles Department of Transportation (LADOT) DASH, LADOT Commuter Express, Santa Clarita Transit, Culver CityBus, West Hollywood CityLine/DayLine, and Antelope Valley Transportation Authority. These transit service providers offer bus transit coverage on most major east-west and north-south arterials in the Study Area, as illustrated in Figure 1-14. All bus service is provided in mixed-flow lanes, subjecting bus transit to the congestion experienced by automobiles. Table 1-1 details the average number of weekday boardings for the ten most heavily used Metro bus routes that traverse the Study Area. With over 70,000 daily boardings, the Wilshire corridor route (Line 20/720/920) is recognized as one of the highest ridership bus route in the nation and surpasses the ridership of many LRT routes, including the Green Line and Gold Line in Los Angeles.

Figure 1-13. Fixed Guideway Transit Corridors Currently under Study

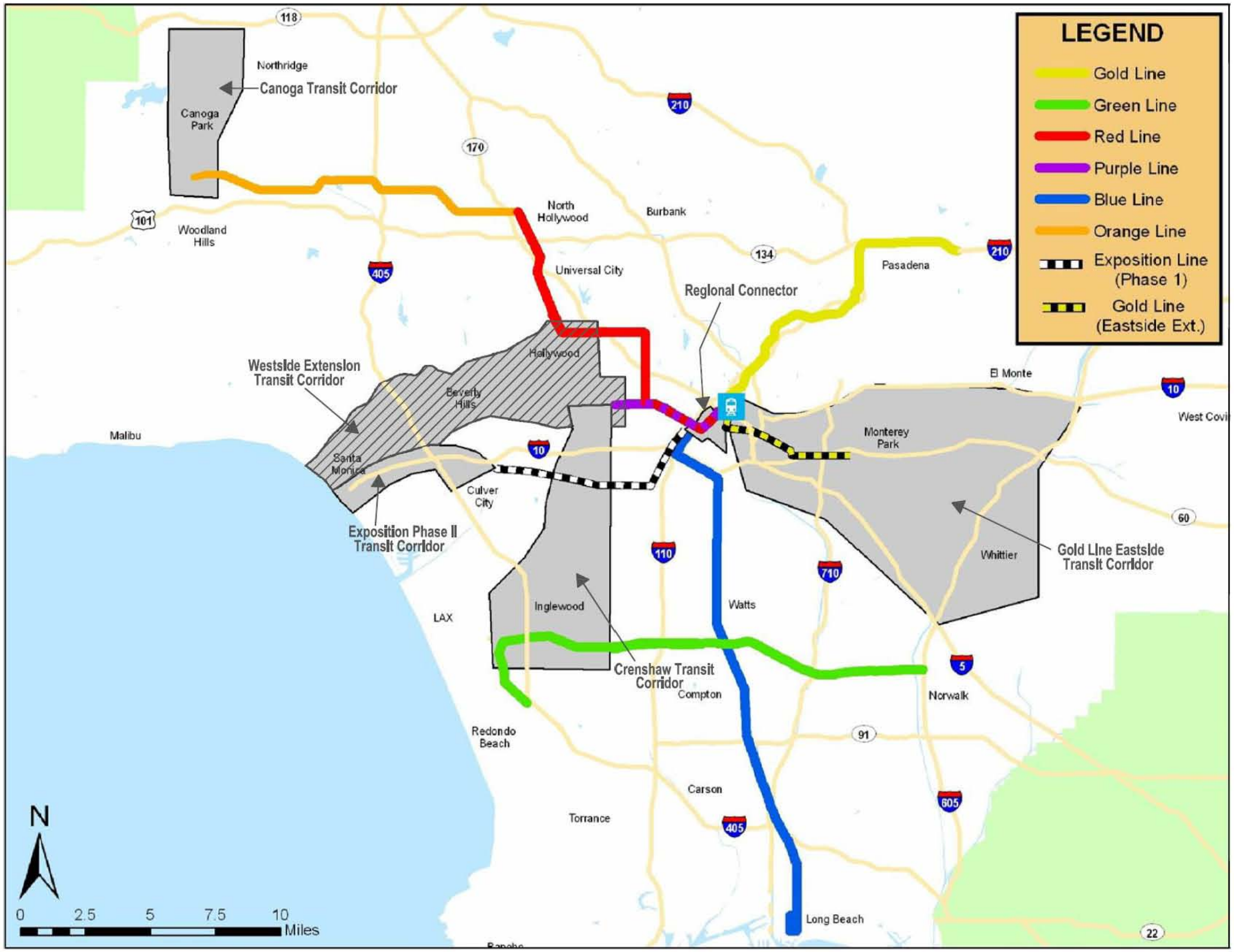


Figure 1-14. Existing Transit Service in the Study Area

Table 1-1. Boardings for High Ridership Bus Routes

Year 2007 Average Weekday Boardings			
Rank	Operator	Route	Boardings
1	Metro	20/720/920	71,800
2	Metro	4/304/704	35,340
3	Metro	28/728	36,430
4	Metro	16/316	28,900
5	Metro	66	25,900
6	Metro	2/302	23,440
7	Metro	105/305/705	21,340
8	Metro	14/714	19,800
9	Metro	10	13,930
10	Metro	212	13,780
11	Santa Monica Big Blue Bus	1 / 2	13,270

Source: Metro/SM BBB. All boardings data is from August 2007 except for Line 920 (October 2007) and Lines 1, 2, 704, and 728 (December 2007).

1.5 Performance of the Transportation System

Table 1-2 illustrates the Los Angeles' metropolitan region's unflattering distinction of being the most congested urbanized area in the nation. The Los Angeles-Long Beach-Santa Ana Metropolitan Statistical Area (MSA) ranks #1 in annual delay per traveler, travel time index, and wasted fuel per traveler based on 2005 mobility data published by the Texas Transportation Institute in the *2007 Urban Mobility Report*. Further, the Study Area has been recognized as one of the most congested areas in the greater Los Angeles region. Traffic volumes and congestion levels on the Westside arterial street network are among the highest and the Santa Monica (I-10) and San Diego (I-405) freeways are among the most congested Los Angeles area freeways.

Table 1-2. Key Mobility Measures (2005) for Urbanized Areas

	Annual Delay per Traveler		Travel Time Index		Wasted Fuel per Traveler	
	Hours	Rank	Value	Rank	Gallons	Rank
Los Angeles-LB-Santa Ana, CA	**72**	**1**	**1.5**	**1**	**57**	**1**
San Francisco-Oakland, CA	60	2	1.41	3	47	2
Washington, DC-VA-MD	60	2	1.37	7	43	5
Atlanta, GA	60	2	1.34	11	44	3
Dallas-Fort Worth-Arlington, TX	58	5	1.35	9	40	7
San Diego, CA 57	57	6	1.4	4	44	3
Houston, TX	56	7	1.36	8	42	6
Detroit, MI	54	8	1.29	21	35	10
San Jose, CA	54	8	1.34	11	38	9
Orlando, FL	54	8	1.3	17	35	10

Source: Adapted from *The 2007 Urban Mobility Report*, Table 1 (Texas Transportation Institute).

For this Alternatives Analysis, the performance of the transportation system within the Westside Extension Transit Corridor is measured by roadway traffic volume, traffic operating conditions, and transit operating conditions. These traditional measures of mobility reveal that the Study Area's oversubscribed roadway capacity and an extensive bus transit network subject to delays result in substantial peak hour congestion as travel demand continues to grow. The performance of the transportation system in the Study Area is discussed below.

1.5.1 Traffic Volumes and Operating Conditions

As noted earlier, the Westside Study Area includes portions of the I-10 freeway which runs east-west outside the Study Area until the Santa Monica city limits and the I-405 freeway, which runs north-south through the Study Area just west of Westwood. These two freeways, like most freeways in Southern California, experience high levels of congestion throughout the day, particularly during the peak commute periods. In addition, the Study Area contains some of the most congested streets in Los Angeles County. Both east-west streets, such as Wilshire Boulevard, Santa Monica Boulevard, Sunset Boulevard, Hollywood Boulevard, Olympic Boulevard, and Pico Boulevard, and north-south streets, such as Western Avenue, Crenshaw Boulevard, La Brea Avenue, Fairfax Avenue, La Cienega Boulevard, Westwood Boulevard, Sepulveda Boulevard, Bundy Drive, and Lincoln Boulevard, operate at congested conditions throughout the day. Most of the intersections between these east-west and north-south arterials operate at or near capacity during weekday peak periods with a level of service (LOS) of E or F, indicating significant levels of congestion and delay.

Based on 2006 Caltrans traffic counts, the I-10 and I-405 freeways carry an annual average daily traffic (AADT) volume of approximately 268,000 and 300,000 vehicles per day, respectively, near the intersection of these two freeways. The percentage of truck traffic on I-10 and I-405 is about 4 percent and 4.5 percent of the total traffic volumes, respectively. The peak hour volume for each facility during the peak month is 19,600 vehicles per hour for the I-10 freeway and 19,900 vehicles per hour for the I-405 freeway. During the peak period, speeds on each freeway are less than 30 miles per hour for the peak direction of travel. Consequently, several I-10 and I-405 freeway segments, near the intersection of both freeways, operate at LOS F during the AM and/or PM peak periods.

Between 2006 and 2030, peak period traffic volumes on the freeway segments within the Study Area are expected to increase substantially, and congestion is expected to occur over a longer period of the day. According to the traffic forecasts, currently congested freeway segments of the I-10 and I-405 freeways are expected to continue to operate at congested levels, with no relief for commuters in sight. In addition, mobility conditions on several freeway segments are expected to deteriorate from acceptable levels (LOS D or better) to LOS E or F during one or both peak periods.

The major east-west and north-south arterials in the Study Area currently operate at congested levels and congestion is expected to grow to such a level that it will occur over a longer period of the day. The high population and employment densities in the Westside Extension Transit Corridor have resulted in both eastbound and westbound directional travel being congested during the AM and PM peak periods. The arterials in the Study Area serve the employment centers as well as local and regional travel. In addition, they are used as alternates to the I-10 and I-405 freeways during non-recurrent delay such as accidents, breakdowns, lane closures, and other random events. As a result, the Study Area's roadway capacity is insufficient to handle the traffic volumes thus reducing travel time reliability for both motorists and transit riders. Daily traffic volumes along the Study Area arterials vary by segment. The highest daily traffic volumes for the major east-west and north-south arterials are presented in Table 1-3.

Table 1-3. Traffic Volumes for Key Arterial Segments in the Study Area

Street Name	Count Location	Total Daily Volume
East-West Arterials		
Wilshire Boulevard	west of Veteran Avenue	111,024
Santa Monica Boulevard	east of Cotner Avenue	66,269
Sunset Boulevard	at La Cienega Boulevard	72,554
Hollywood Boulevard	at Nichols Canyon Boulevard	33,873
Olympic Boulevard	at Overland Avenue	66,877
Pico Boulevard	at Motor Avenue	55,836
North-South Arterials		
Western Avenue	at Olympic Boulevard	39,708
Crenshaw Avenue	at Pico Boulevard	33,492
La Brea Avenue	at Pico Boulevard	61,281
Fairfax Avenue	south of Beverly Boulevard	41,217
La Cienega Avenue	at Pico Boulevard	57,147
Westwood Boulevard	at Ohio Avenue	32,458
Sepulveda Boulevard	at Pico Boulevard	59,081
Bundy Drive	south of Pico Boulevard	53,634

Source: Traffic counts conducted by LADOT's Traffic Survey Section

One measure of performance for traffic operations is volume-to-capacity (V/C) ratio, which evaluates the traffic volume on a roadway compared to its available capacity. V/C ratios at or above 0.90 reflect extremely unstable flow, heavy volumes and a poor comfort level. This corresponds to LOS E. V/C ratios above 1.00 reflect congested conditions, restricted traffic movements, slow speeds and increased delays. This corresponds to LOS F. Typically, LOS D or better (V/C less than 0.90) is recognized as the minimum level of service acceptable in urban areas.

Between 2006 and 2030, most of the roadway capacity will remain the same. However, traffic volumes are expected to increase, resulting in an increase in congestion levels and a deterioration of operating conditions. Figure 1-15 illustrates the roadway segments within the Study Area operating at LOS E and F during the AM peak hour for 2006 and 2030. The model projects that roadway segments currently operating at LOS E and F will degrade even further by 2030. In addition, numerous roadway segments currently operating at acceptable service levels (LOS D or better) will deteriorate to congested levels (LOS E or F) by 2030. Figure 1-16 shows the roadway segments within the Study Area operating at LOS E and F during the PM peak hour for 2006 and 2030. Similar to the AM peak, roadway segments currently operating at LOS E and F will continue to operate at congested levels in 2030 and roadway segments currently operating at acceptable service levels (LOS D or better) will deteriorate to congested levels (LOS E or F) in 2030. Most of the major arterials are congested from one end of the Study Area to the other, except in the far western segments. This

Figure 1-15. Year 2006 and Year 2030 AM Peak Hour Level of Service

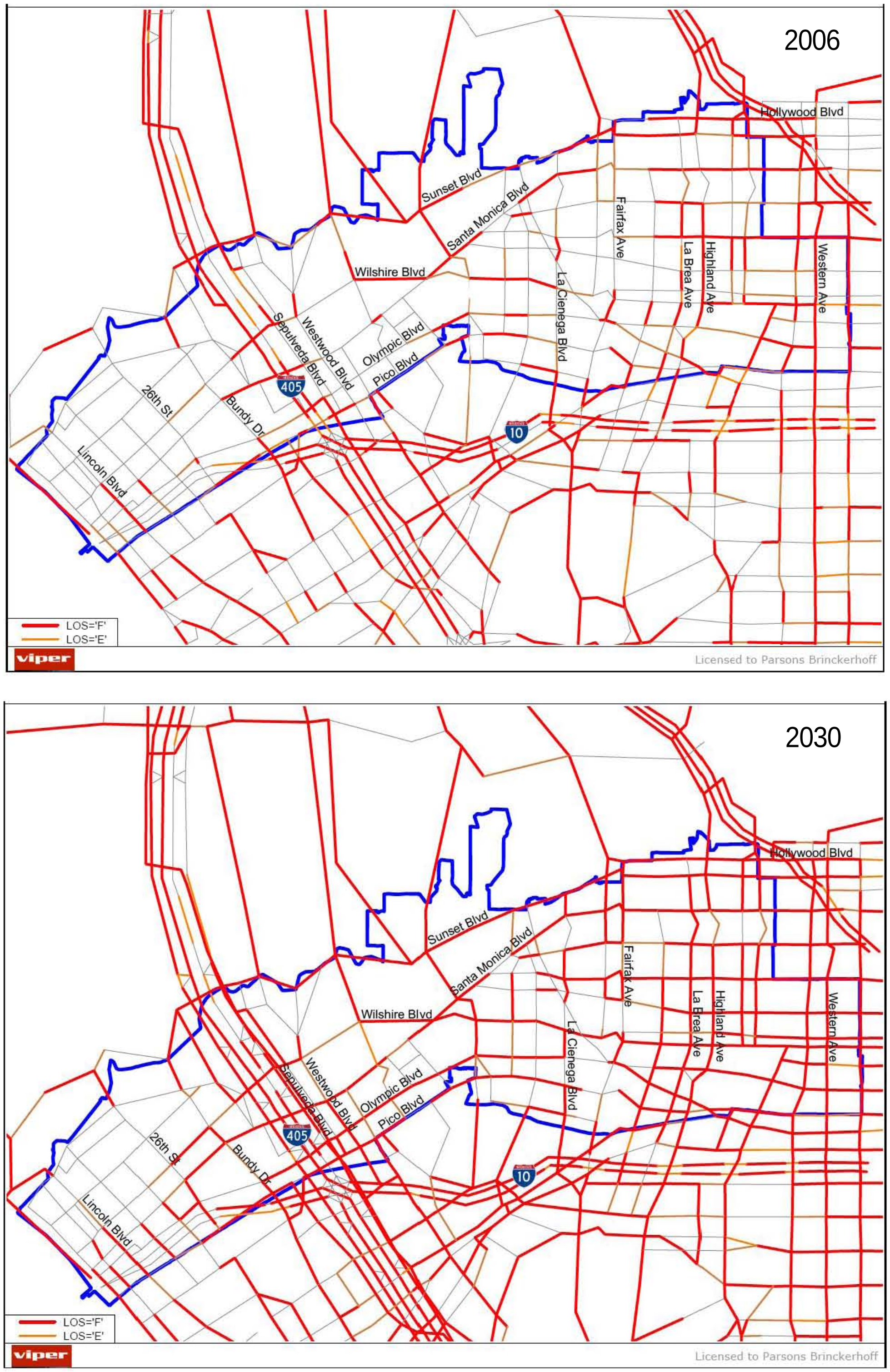
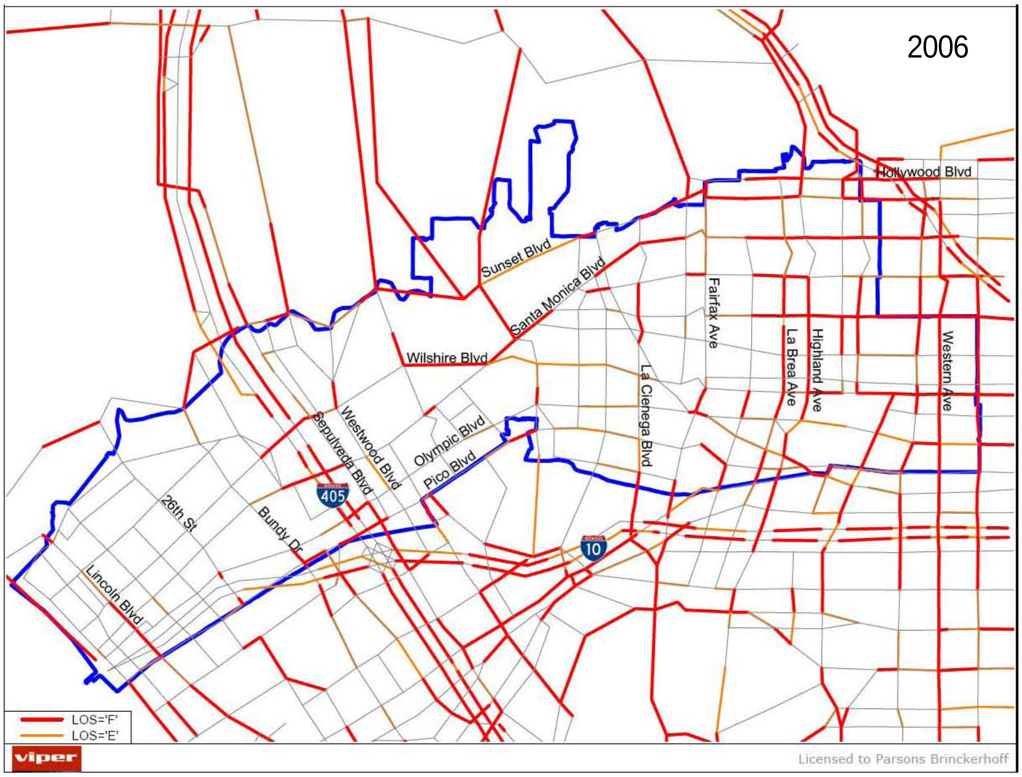
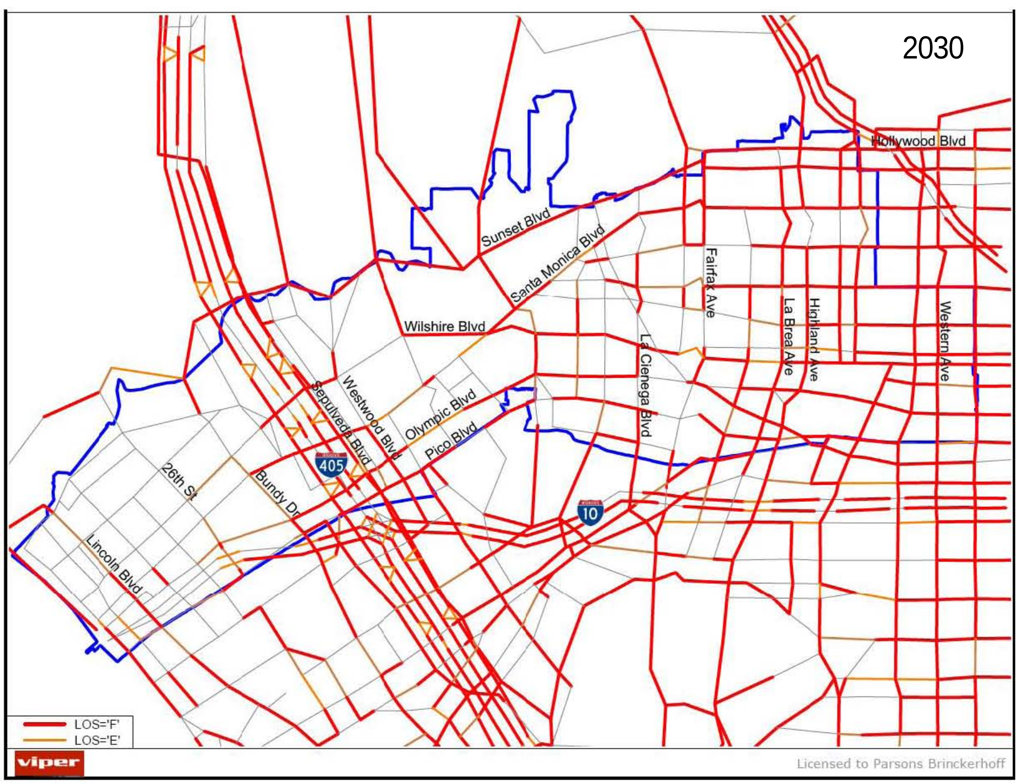


Figure 1-16. Year 2006 and Year 2030 PM Peak Hour Level of Service





increased traffic congestion will result in lower peak period travel speeds along the arterial corridors and a reduction in travel time reliability.

With little or no room to expand roadway facilities within the Study Area, plans are being envisioned that would improve capacity and average vehicle travel speeds through travel demand management (TDM) strategies that make more efficient use of existing resources. For example, the City of Los Angeles is considering an initiative to convert Pico and Olympic Boulevards into a one-way pair with a contra-flow peak period transit/van-pool lane. However, even innovative TDM projects cannot prevent the Study Area's congestion from worsening by 2030. Mobility in the Study Area is expected to decrease as the number of intersections operating at LOS E and F continues to rise.

1.5.2 Transit Operating Conditions

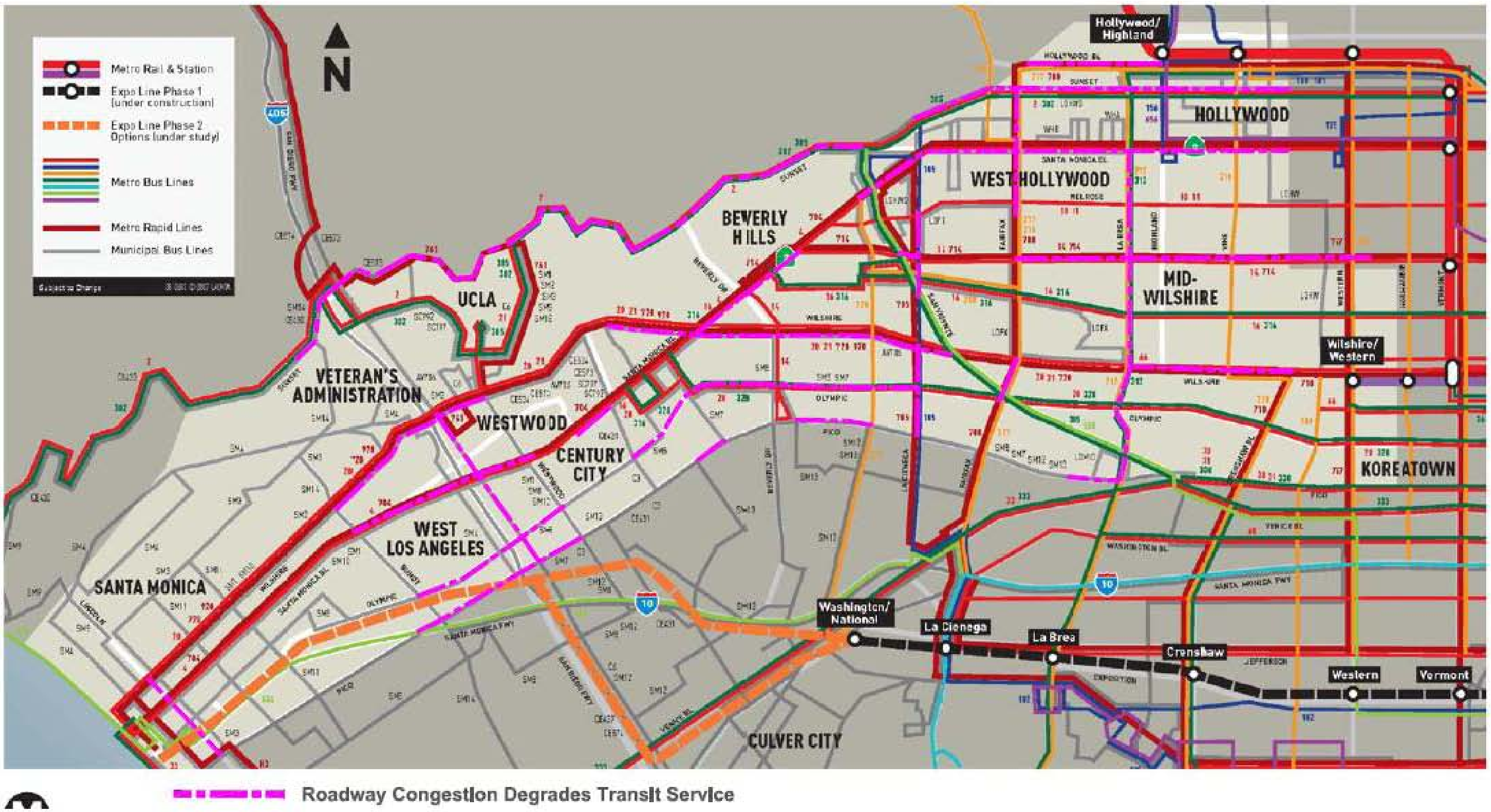
The various transit services in the Study Area use the general roadway network, with the exception of the Metro Rail Red/Purple lines in the eastern portion. The major factors influencing bus operating conditions are the traffic conditions under which the service operates, whether or not signal priority is available to buses, passenger loading time, and bus-stop spacing. The Westside Extension Transit Corridor Study Area has substantial traffic congestion, high ridership and load factors, and closely spaced bus stops. Combined, these factors result in declining bus operating speeds over recent years, which are not competitive with the private automobile.

Mixed-flow bus travel is subject to roadway congestion and increases travel time and travel time uncertainty. Although ridership on Westside buses is high, congestion on arterial streets and freeways can affect travel time and result in less than optimal service conditions. With high passenger loads, congested roads make desirable headways (frequency of service) difficult to maintain, resulting in overcrowded buses. Figure 1-17 maps the locations where roadway congestion designated as LOS E or F degrades transit service conditions on these roadways in the Study Area:

- Santa Monica Freeway (east of Bundy Drive to downtown Los Angeles)
- Wilshire Boulevard (east of Federal Avenue, through Beverly Hills, and throughout Miracle Mile)
- Santa Monica Boulevard (east of I-405 through Beverly Hills, West Hollywood, and Hollywood)
- Sepulveda Boulevard (south of Wilshire Boulevard)
- Pico Boulevard (from Bundy to La Brea Avenue)
- Fairfax Avenue (throughout West Hollywood and Miracle Mile)
- Beverly Boulevard (east of Fairfax)
- La Brea Avenue (south of Santa Monica Boulevard)

The current average speeds of the Metro Rapid buses traveling through the Study Area range between 10 and 15 miles per hour along Wilshire Boulevard and between 11 and 14 miles per hour along Santa Monica Boulevard. For Lines 720 and 920, which operate along Wilshire Boulevard, the average speeds in the westbound direction are slightly lower during the AM peak period than in the PM peak period. However, the average bus speeds in the eastbound direction are noticeably lower

Figure 1-17. Transit Service Degraded by Roadway Congestion



during the PM peak period than in the AM peak period. Speeds are generally lower near the Westwood and Santa Monica area and increase as the buses travel towards Western. For Line 704, which operates along Santa Monica Boulevard, average speeds in the AM peak period are consistently higher than in the PM peak period for both eastbound and westbound directions. Table 1-4 summarizes the bus speeds along both corridors. It should be noted that the speeds on the Wilshire Boulevard corridor were obtained from LADOT loop detectors, whereas the speeds on the Santa Monica Boulevard corridor were calculated from the bus timetable.

Table 1-4. Average Bus Speeds Along Wilshire and Santa Monica Boulevard Corridors

Segment	Eastbound Direction of Travel		Westbound Direction of Travel	
	AM Peak Period (mph)	PM Peak Period (mph)	AM Peak Period (mph)	PM Peak Period (mph)
Santa Monica Corridor – Line 704				
2nd & Westwood	12.5	10.4	13.2	11.7
Westwood & San Vicente	15.9	12.8	14.2	13.6
San Vicente & Vermont	13.9	10.6	12.3	11.6
Wilshire Corridor – Lines 720 & 920				
Centinela & Westwood	11.0	6.8	11.8	11.9
Westwood & San Vicente	15.1	10.5	12.8	13.3
San Vicente & Western	17.7	12.2	13.0	16.0

Source: Traffic counts conducted by LADOT's Traffic Survey Section, LADOT loop detector data for the Wilshire Corridor, and Metro Rapid Bus Line 704 timetable information for the Santa Monica Corridor.

Note: The AM Peak Period is 7-10 AM and the PM Peak Period is 3-7 PM.

Between 2006 and 2030, the average speeds on both local buses and the Metro Rapid Buses traveling through the Study Area are anticipated to decrease as traffic congestion increases on the roadways, with the exception of the Wilshire Corridor. Along this corridor, the Wilshire Boulevard Bus-Only Lane Project will build 12.5 miles of peak-period bus-only lanes that will expedite passenger travel times on this corridor by an average of 30 percent. From the eastern end of the Study Area the bus-only lanes would extend along Wilshire Boulevard to the intersection of Wilshire Boulevard and San Vicente Boulevard (Beverly Hills border). Project completion is expected in 2013 and current plans do not extend the bus-only lanes into the Cities of Beverly Hills or Santa Monica, which include significant portions of the route.

Another indicator of the deteriorating transit performance in the Study Area is increasing travel times between key destinations. From 2003 to 2006, average bus travel times for the routes and segments analyzed in Table 1-5 increased by six percent in the AM peak hour and by five percent in the PM peak hour. Transit speed and reliability with mixed-traffic operations will continue to diminish in the corridor as travel demand increases, putting greater pressure on the existing roadway network.

Table 1-5. Study Area Bus Travel Times (2008) and Changes (2003 to 2006)

Route Name / Direction	Route End to End Run Time, 2008 (minutes)		From / To	Percent Change in Travel Time from 2003 to 2006	
	AM Peak	PM Peak		AM Peak	PM Peak
20 Eastbound	63	73	Wilshire / La Brea to Wilshire / Western	8% increase	1% increase
20 Westbound	67	73	Wilshire / Western to Wilshire / La Brea	4% increase	3% increase
720 Eastbound	86	87	Wilshire / La Brea to Wilshire / Western	14% increase	21% increase
720 Westbound	77	103	Wilshire / Western to Wilshire / La Brea	21% increase	9% increase
217 Northbound	54	75	Fairfax / Beverly to Fairfax / Santa Monica	8% increase	5% increase
217 Southbound	58	64	Fairfax / Santa Monica to Fairfax / Beverly	8% increase	13% increase
4 Eastbound	86	100	Santa Monica / Highland to Sunset / Echo Park	6% increase	6% increase
4 Westbound	99	98	Sunset / Echo Park to Santa Monica / Highland	7% increase	5% increase
304 Eastbound	n/a	n/a	Santa Monica / Highland to Sunset / Echo Park	4% increase	6% increase
304 Westbound	n/a	n/a	Sunset / Echo Park to Santa Monica / Highland	7% increase	2% increase

Source: Metro

1.5.3 Regional Objectives

Regional transportation planning for Southern California's five-county area is the responsibility of the SCAG, which is the Metropolitan Planning Organization (MPO) for the area. In 2004, the SCAG Regional Council adopted the RTP entitled "Destination 2030" to establish the goals, objectives and policies for the transportation system and establish the implementation plan for transportation investments over the next 25 years. The RTP includes regional performance indicators with objectives against which specific transportation investments can be measured. A selection of four key performance indicators and their 2000 base year results, 2030 baseline projections, and 2030 objectives is shown in Table 1-6. Designated as one of the most congested areas in the five-county region, the Study Area will need significant improvements in these categories to meet the regional objectives for mobility, accessibility, and reliability.

1.6 Project Purpose and Need

The project purpose and need is to improve public transit service and mobility in the Westside Extension Transit Corridor. The project would provide the cities of Los Angeles, West Hollywood, Beverly Hills, and Santa Monica with improved fixed-guideway east-west transit service between the existing terminus of the Metro Red Line and Metro Purple Lines near Highland Avenue and/or Western Avenue in the City Los Angeles and Ocean Avenue in the City of Santa Monica. Possible western extensions from the Metro Purple Line would generally follow Wilshire Boulevard (from the Metro Purple Line Wilshire/Western Station). Possible extensions from the Metro Red Line would generally follow Santa Monica Boulevard (from the Metro Red Line Hollywood/Highland Station). The overall goal of the proposed project is to improve mobility in the Westside Extension Transit Corridor by extending the benefits of the existing Metro Red/Metro Purple Line rail and bus investments beyond the current terminus.

Table 1-6. SCAG 2030 Regional Transportation Plan Performance Indicators, SCAG Region

Performance Indicator	Measurement	2000 Base Year	2030 Baseline	2030 Objective
Mobility	Average daily highway speed	35.9 mph	31.9 mph	35.2 mph
	Average daily delay per capita	8.0 minutes	14.2 minutes	8.4 minutes
Accessibility	% of PM work trips within 45 minutes of residence	88% of all auto trips 33% of all transit trips	82% of all auto trips 29% of all transit trips	90% of all auto trips 37% of all transit trips
Reliability	% variation in travel time – Weekday 4 p.m. to 5 p.m.	20%	N/A	18%
Safety	Daily accident rate per million persons	18.2	18.2	17.5

Source: SCAG, Regional Transportation Plan, 2004

Given the existing travel conditions and the inability to meet regional objectives for mobility, accessibility, or reliability in the Westside Extension Transit Corridor Study Area, several themes emerge regarding specific transportation problems and the need for transportation improvements within the corridor. These are bulleted below and then described in greater detail following this list.

- Need for Transit Improvements has been Established in Previous Studies
- "Centers Concept" Land Use Policy is Transit Based
- Major Concentration of Activity Centers and Destinations in Study Area
- Local Redevelopment, Community, and Specific Plans Depend Heavily on Transit Improvements
- Study Area's High Population and Employment Densities Support Transit Use
- Land Uses in Study Area are Transit Supporting with Potential Growth for Non-Motorized Uses
- History of Transit Usage
- Decreased Mobility for Transit Dependent Residents
- Desire to Attract Choice Riders Strengthens the Need for Transit Improvements
- Study Area Share of Regional Population and Employment Growth Remains High
- Travel Demand Patterns Justify Transit Improvements
- Peak Hour Roadway Congestion Underlies the Need for Transit Improvements
- Peak Hour Congestion along Santa Monica Freeway Reveals Study Area Job and Population Growth
- Study Area includes Few Planned Transportation Improvements
- Local Policies for Dealing with Congestion are Oriented towards Transportation Demand Management and Transit Solutions
- Strategy to Respond to Climate Change as Mandated by State Law

Need for Transit Improvements has been Established in Previous Studies

The need for providing high-capacity transit service improvement has been long recognized in the Westside Extension Transit Corridor Study Area. Since the 1970s, Metro and its predecessors have conducted numerous transportation planning and environmental impact studies that described the need and feasible locations for bus, light rail, and/or heavy rail east-west service in various parts of the Study Area. Between 1989 and 2005, six studies have focused on the Westside Extension Transit Corridor Study Area, as described in Section 1.2.

"Centers Concept" Land Use Policy is Transit Based

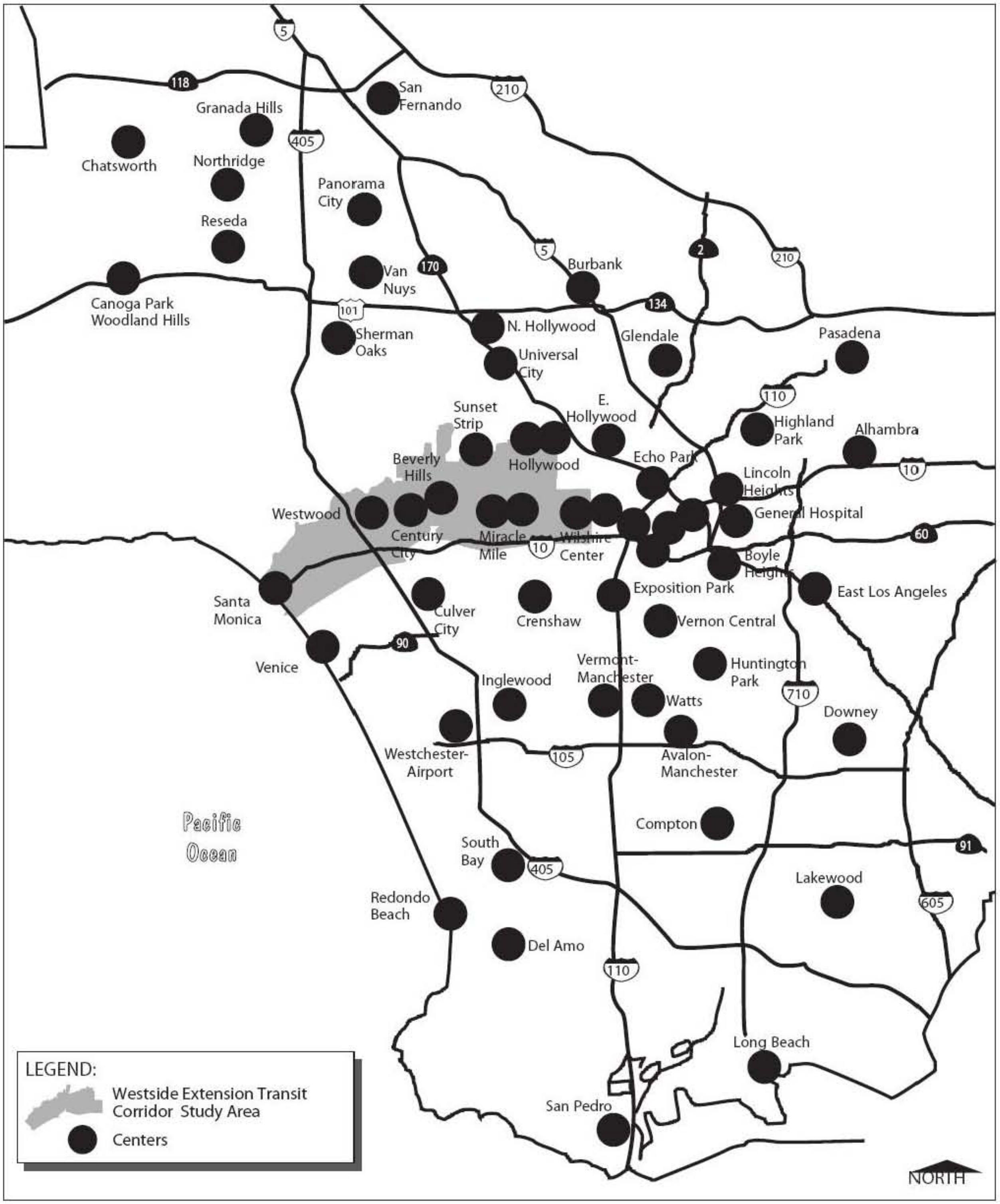
Land use planning in the Los Angeles area has traditionally viewed the urban area not as a central downtown served by adjacent areas, but rather as a collection of urban centers. These centers are "little downtowns" in and of themselves. The Centers Concept Plan, originally formulated for the Los Angeles area in the 1960s and 1970s by Calvin Hamilton (Director of the Department of Los Angeles City Planning Department) and Norman Murdock (Director of the Los Angeles County Regional Planning Department), acknowledged that there were urban centers of various types throughout the region that represented concentrations of economic activity or a mix of economic activities and higher density housing. The Centers Concept, which is shown in Figure 1-18, envisioned that the centers would be interconnected by an infrastructure of transit. The City of Los Angeles General Plan Framework revisited and reconfirmed the Centers Concept in 1995. The Framework more clearly defined targeted growth areas, mixed-use centers, and mixed-use corridors that would serve centers envisioned to be interconnected by the emerging Metro Rail transit system. The City of Los Angeles, working directly with Los Angeles Metropolitan Transportation Authority (LACMTA), developed a Land Use Transportation Policy, which specifically tied the size and intensity of centers to the supporting transit infrastructure and transit station locations.

Major Concentration of Activity Centers and Destinations in Study Area

Similar to the urban center in the Centers Concept Plan, an activity center concentrates large numbers of people, making conditions ideal for transit use. The Study Area contains a high concentration of the major activity centers and destinations within the Los Angeles metropolitan region. In addition to the well known employment centers in Santa Monica, Century City, Westwood, Beverly Hills, and the Mid-Wilshire Area, some of the most well-known entertainment, educational, and cultural activity centers are located within the region. Many of these centers are within the most congested portion of the Study Area, along the Wilshire and Santa Monica Boulevard Corridors. As shown in Figure 1-19, 15 major activity centers are located within the Study Area. From left to right, these major activity centers include Santa Monica Pier/beach, Third Street Promenade/downtown Santa Monica, Colorado Place, Brentwood, Westwood Village, UCLA, Westside Pavilion, Century City, Rodeo Drive/Beverly Hills, Beverly Center/Cedars Sinai Hospital, Sunset Strip/West Hollywood, the Grove/Farmer’s Market, Wilshire Miracle Mile, Wilshire Center, and Hollywood.

Many other desirable destinations that draw tourists and locals alike are in the Study Area. Montana Avenue in Santa Monica, Melrose Avenue in Hollywood, Beverly Boulevard in Mid-City, and Santa Monica Boulevard in West Hollywood are just a few of the major shopping and dining destinations in the Study Area. Los Angeles County Museum of Art (LACMA), Page Museum, Hammer Museum, Peterson Automotive Museum, and Gallery Row in Santa Monica offer cultural opportunities to a wide demographic. The Study Area is also dotted with theaters and playhouses that produce high-quality music, theater, and dance. The Geffen Playhouse, Wiltern Theater, and Grauman’s Chinese are just a few of these entertainment venues. For transit users, the only way to reach the Study Area’s activity centers is by bus and even Metro Rapid can travel no faster than the prevailing mixed-flow traffic. Residents, commuters, and visitors who find bus travel too slow end up driving to and around the Study Area, further aggravating traffic congestion.

Figure 1-18. Los Angeles Centers Concept



Source: Adapted from the City of Los Angeles, Department of City Planning, 1974

Figure 1-19. Major Activity Centers

Local Redevelopment, Community, and Specific Plans Depend Heavily on Transit Improvements

Three redevelopment areas (Hollywood, Mid-City, Wilshire Center/Koreatown) and four Community Plans (Hollywood, Wilshire, Westwood, West Los Angeles), which include related Specific Plans, are within the Study Area. The sustained success and revitalization of these redevelopment areas largely rests on transportation accessibility and links to transit. For the community plan areas, some of the improvements and strategies being employed focus on increasing pedestrian amenities and reducing or eliminating vehicular traffic. These changes place a growing demand on increased transit service and access to help support existing and future land use development objectives.

Study Area's High Population and Employment Densities Support Transit Use

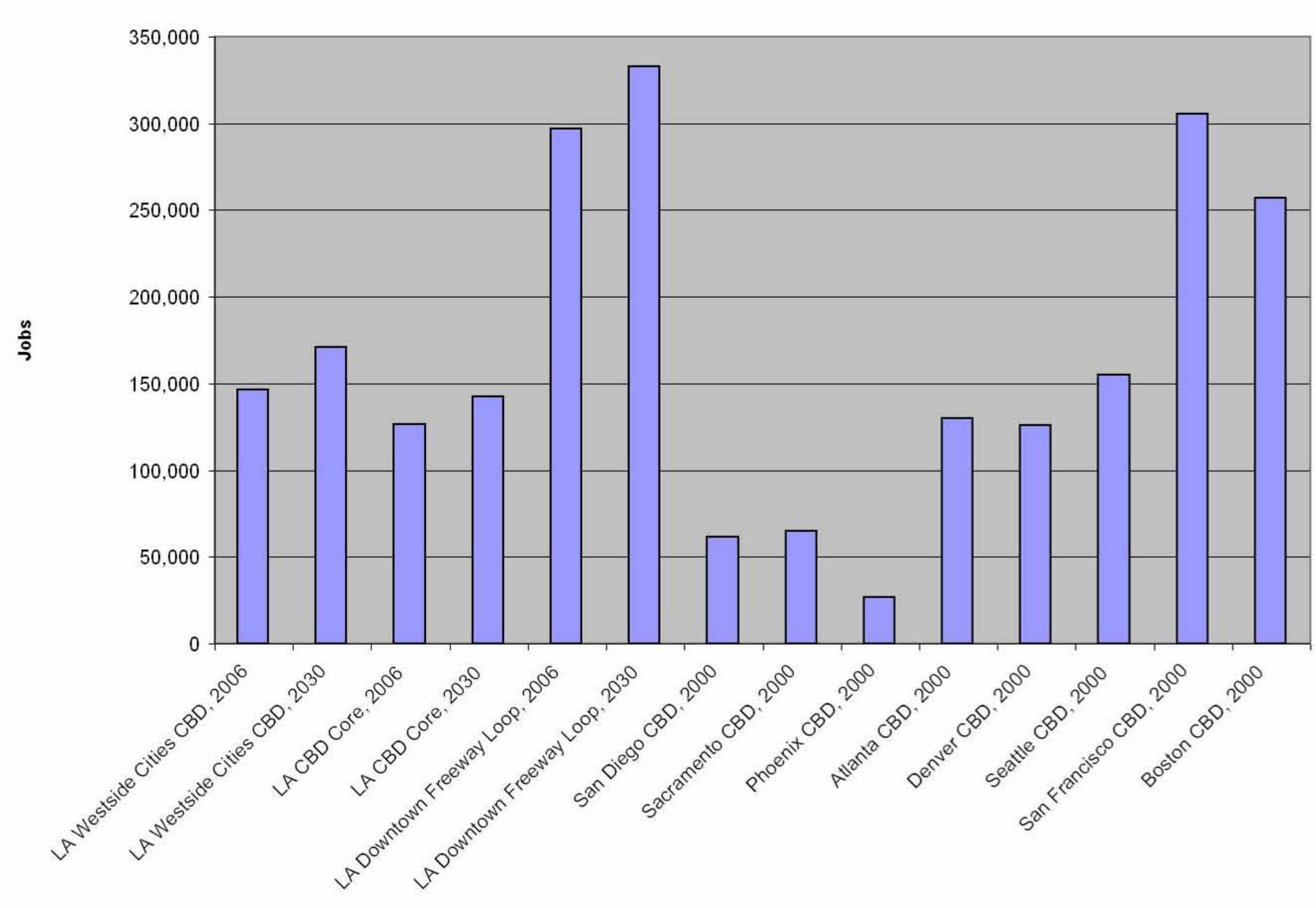
Population and employment densities are two key factors influencing transit use. As population and employment densities increase, so does transit attractiveness and demand. Population and employment densities in the Study Area are among the highest in the metropolitan region, with an overall population density of 13,000 persons per square mile and an employment density of 12,000 jobs per square mile. In comparison, population densities in Long Beach and Pasadena, two cities in Los Angeles County served by fixed guideway transit, was 9,200 and 6,900 persons per square mile, respectively. Population density for the Study Area and the corridor is higher than those two cities, as well as other West Coast cities served by fixed guideway transit: Seattle (7,000 persons per square mile), Portland (4,000 persons per square mile), and San Diego (3,900 persons per square mile). Of all major West Coast cities, only San Francisco, with a population density of 15,800 persons per square mile, is denser than the Study Area.

The Study Area is widely recognized as one of the preeminent employment generators in California. The greatest employment densities in the Study Area are found along or near the Wilshire and Santa Monica Boulevard Corridors. Job rich districts that utilize these corridors for local and regional accessibility rival the employment densities of many U.S. CBDs. Using the data in Table 1-7, Chart 1-1 compares the total employment of the Westside CBD (consisting of Westwood, UCLA, Century City, and Beverly Hills) (in 2006 and expected in 2030) to the CBDs of a range of cities, including San Diego, Sacramento, Phoenix, Denver, Los Angeles, Seattle, and San Francisco. Fixed guideway transit is a key component of worker mobility for each CBD listed. This comparison shows that Los Angeles has a second CBD that is comparable in terms of overall employment to other downtowns in mid-sized American cities. Chart 1-2 compares the employment density, shown in jobs per square mile, of the Westside CBD (in 2006 and expected in 2030) to the CBDs of the same cities discussed above plus denser cities such as London, Tokyo and New York. The areas composing the Westside CBD exhibit an employment density similar to the CBDs of San Diego, Sacramento, and Phoenix, which are all served by LRT and commuter rail. Figure 1-20 offers aerial views of Westwood and Century City. These pictures confirm the dense commercial development on the Westside. While not comparable to New York City, the Westside secondary CBD has a higher number of jobs than many mid-sized American cities and is increasing in both density and total jobs. This comparison demonstrates that the employment densities exist within the Study Area to justify a fixed guideway transit investment.

Table 1-7. Total Employment and Employment Density Data of Comparable CBDs

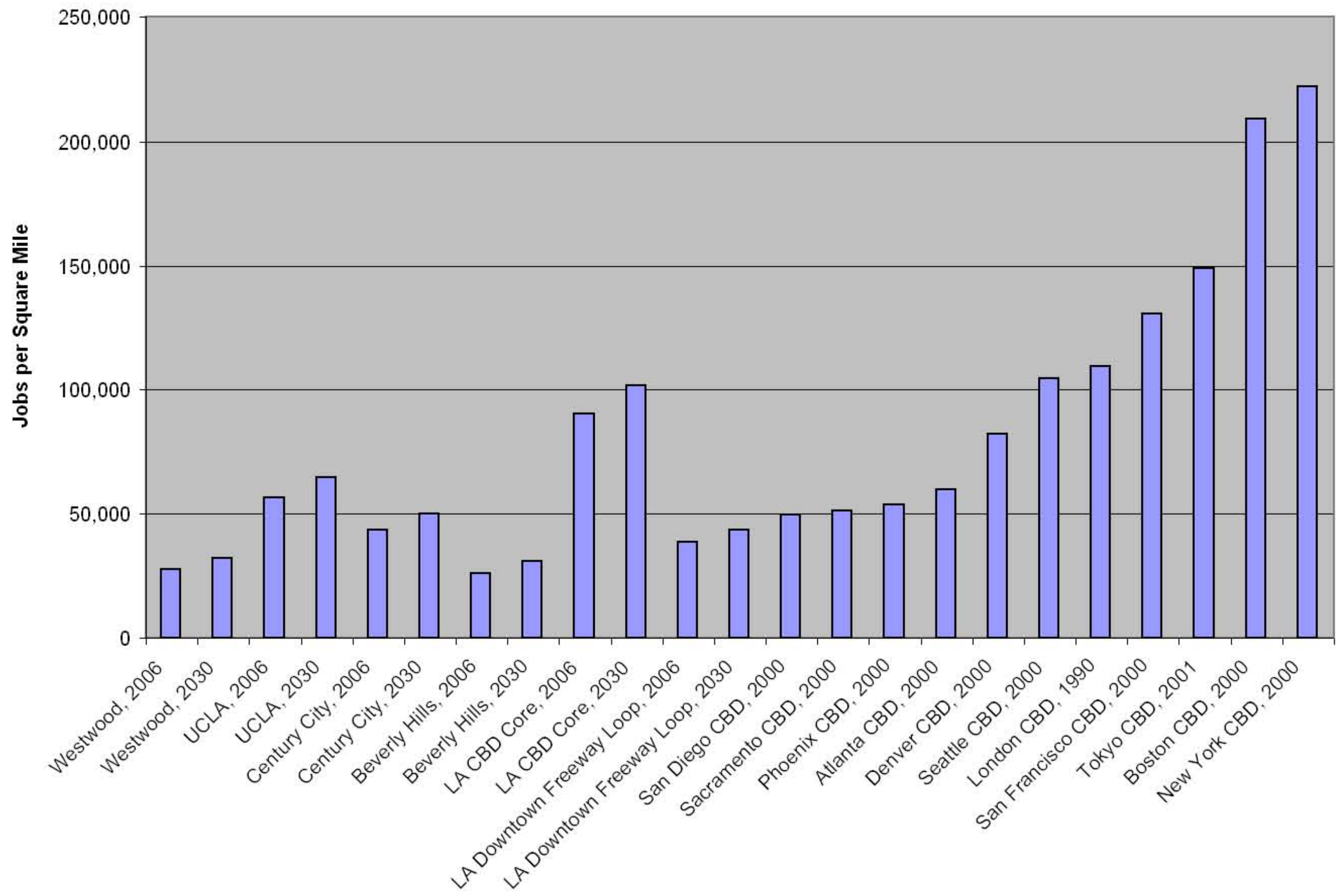
	Jobs	Area	Density	Year	Source
LA Westside Cities CBD*, 2006	146,715	4.29	34,199	2006	SCAG data
LA Westside Cities CBD*, 2030	170,797	4.29	39,813	2030	SCAG data
LA CBD Core, 2006	126,738	1.40	90,527	2006	SCAG data
LA CBD Core, 2030	142,624	1.40	101,874	2030	SCAG data
LA Downtown Freeway Loop, 2006	297,147	7.66	38,817	2006	SCAG data
LA Downtown Freeway Loop, 2030	332,760	7.66	43,470	2030	SCAG data
San Diego CBD, 2000	61,800	1.24	49,839	2000	Demographia
Sacramento CBD, 2000	64,800	1.26	51,429	2000	Demographia
Phoenix CBD, 2000	26,800	0.50	53,600	2000	Demographia
Atlanta CBD, 2000	129,800	2.17	59,800	2000	Demographia
Denver CBD, 2000	126,000	1.53	82,353	2000	Demographia
Seattle CBD, 2000	155,100	1.48	104,797	2000	Demographia
San Francisco CBD, 2000	305,600	2.34	130,600	2000	Demographia
Boston CBD, 2000	257,000	1.23	208,900	2000	Demographia
***LA Westside Cities CBD consists of:**					
Westwood, 2006	17,945	0.65	27,608	2006	SCAG data, Westwood C district
Westwood, 2030	20,979	0.65	32,275	2030	SCAG data, Westwood C district
UCLA, 2006	35,177	0.62	56,737	2006	SCAG data, UCLA district
UCLA, 2030	40,145	0.62	64,750	2030	SCAG data, UCLA district
Century City, 2006	37,399	0.86	43,487	2006	SCAG data, Zones 736, 737, 738, 741
Century City, 2030	43,105	0.86	50,122	2030	SCAG data, Zones 736, 737, 738, 741
Beverly Hills, 2006	56,194	2.16	26,016	2006	SCAG data, Beverly Hills district
Beverly Hills, 2030	66,568	2.16	30,819	2030	SCAG data, Beverly Hills district

Chart 1-1. Total Employment of CBDs and Westside



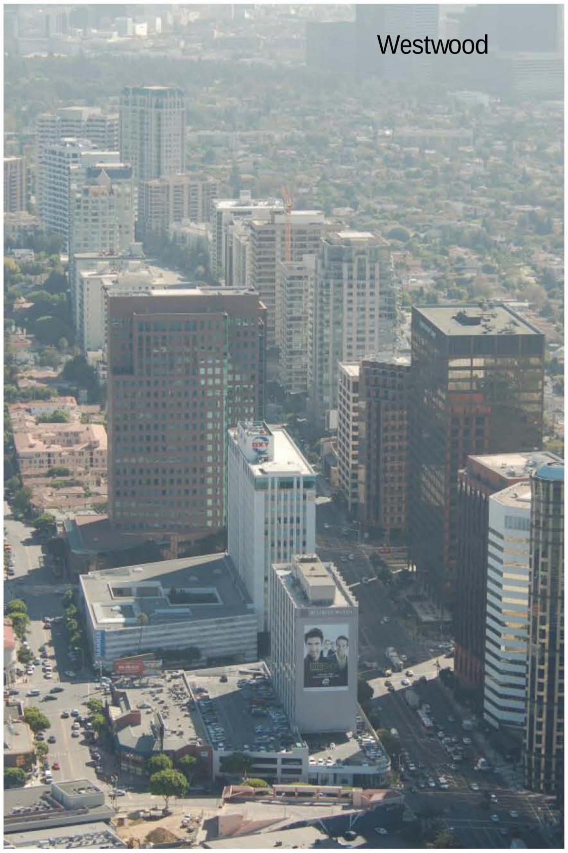
Note: Westside CBD includes Westwood, UCLA, Century City, and Beverly Hills. LA Freeway Loop includes the area bounded by the 110, 10, 101, and 5 Freeways. Source: All data from Demographia United States Central Business Districts, based upon 2000 census, except Los Angeles CBD, LA Freeway Loop & Westside CBD, from SCAG data.

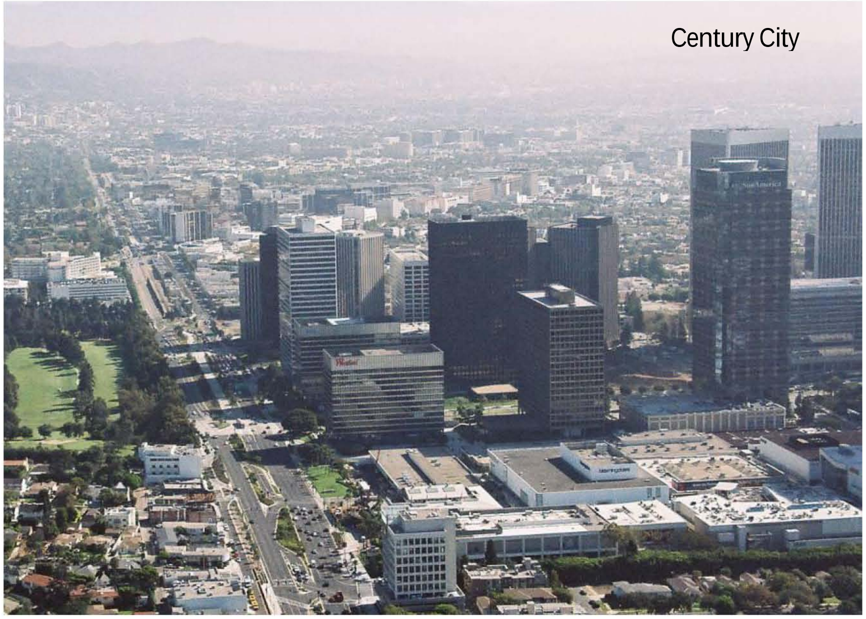
Chart 1-2. Employment Densities (Jobs per Sq. Mi) of CBDs and Westside



Note: LA Freeway Loop includes the area bounded by the 110, 10, 101, & 5 Freeways. Source: All data from Demographia United States Central Business Districts, based upon 2000 census, except London & Tokyo, from Demographia International Urbanized Area Analysis and Data Product; and Los Angeles CBD, LA Freeway Loop, UCLA, Beverly Hills, Century City & Westwood, from SCAG data.

Figure 1-20. Aerial View of Westwood and Century City Business Districts





Land Uses in Study Area are Transit Supporting

There is a widely recognized correlation between density and transit use. The existing activity centers in the Study Area include a large concentration of land uses considered to be transit supporting, such as high-density housing, commercial, and retail uses. As documented in *Commuting in America III* (Transportation Research Board, 2006), when population density is at least 15,000 persons per square mile, transit mode share starts increasing dramatically. Further, transit use also tends to increase when employment densities are high. Using this definition as a basis for analysis, the first of two maps in Figure 1-21 displays TAZs that could be considered transit supporting because their population densities exceed 15,000 persons per square mile. Since many portions of the Study Area are job rich, TAZs with a population density of less than 15,000 persons but a high employment density could also be considered transit supporting. The second map in Figure 1-21 illustrates those TAZs that exceed a combined density of 25,000 persons and/or jobs per square mile. This density measurement indicates a concentration of activity that attracts local and regional populations.

In Figure 1-22, peak transit trip attractions per 1,000 jobs are shown. The dark red TAZs specify portions of the Study Area where over 300 peak transit trips are taken for every 1,000 jobs. Land uses within these TAZs support high levels of transit use. As the figures demonstrate, transit-supporting land uses tend to be concentrated along the two major corridors in the Study Area: Santa Monica and Wilshire Boulevards. The Santa Monica Boulevard corridor generally includes medium-density commercial surrounded by medium density residential. The exceptions are in Beverly Hills, where low-density residential is typical north of Santa Monica between North Doheny Drive and Wilshire Boulevard, and in Century City where there is a concentration of high-density commercial office space. High-density commercial and residential uses line Wilshire Boulevard in certain areas within the Study Area. Major commercial centers line Wilshire Boulevard from the Wilshire/Western Station to Beverly Hills, throughout Westwood, and from Barrington Avenue to the Santa Monica City limit. Between Westwood and Beverly Hills high-density residential lines Wilshire Boulevard. The only portion of the Wilshire Corridor without significant densities is the Hancock Park neighborhood, which lies between La Brea Avenue and Crenshaw Boulevard.

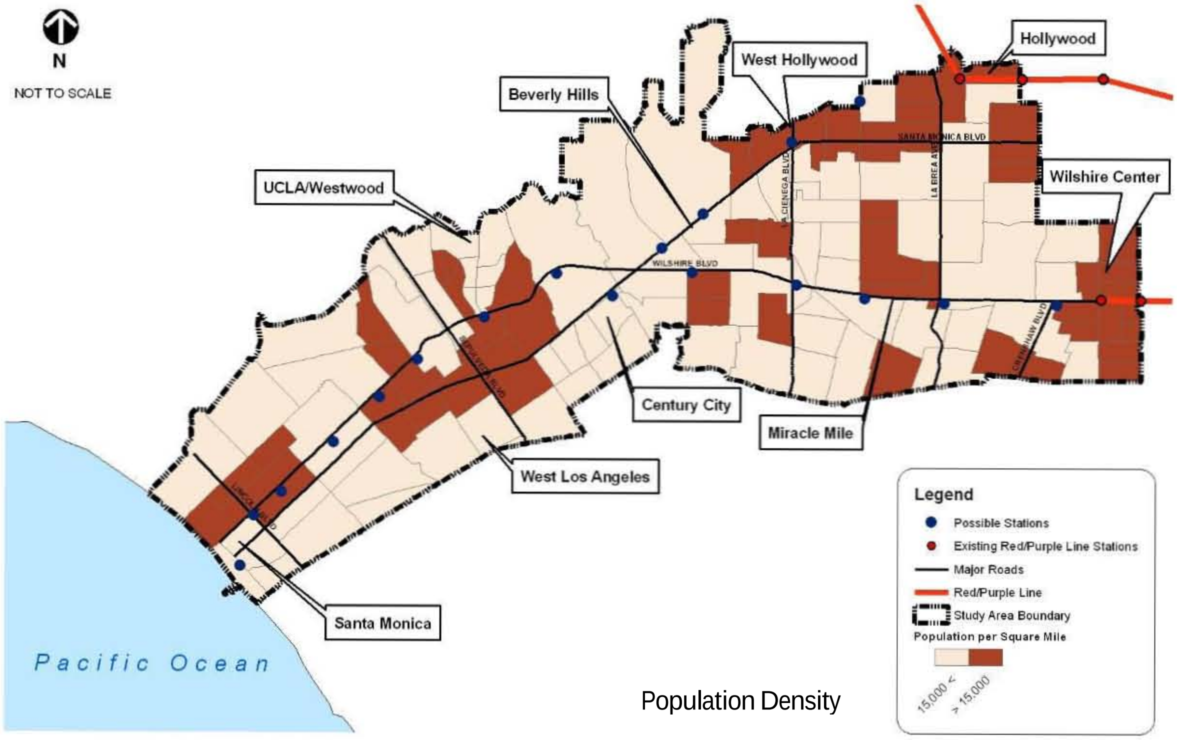
Although these corridors range from medium- to high-density in both population and employment, only the eastern portions of these land use corridors are currently served by the Metro Rail System. The remaining portions are served by buses, including Metro Local, Metro Rapid, Santa Monica's Big Blue Bus, LADOT DASH, LADOT Commuter Express, Santa Clarita Transit, Culver CityBus, West Hollywood CityLine/DayLine, and Antelope Valley Transportation Authority.

These buses operate in the same lanes as automobiles, severely restricting their effectiveness in areas of such high density land uses.

History of Transit Usage in Study Area

Existing transit usage in the Study Area for all trip purposes is proportionally higher and more than double that of Los Angeles County (6.9 percent for the Study Area as compared to 3.4 percent for the County). Because there is a large base of existing transit service and transit patrons, increasing the transit mode share through increased service would represent a natural extension of existing patterns and trends.

Figure 1-21. Transit Supporting TAZs based on Population Density (2006) and Combined Population and Employment Densities (2006)



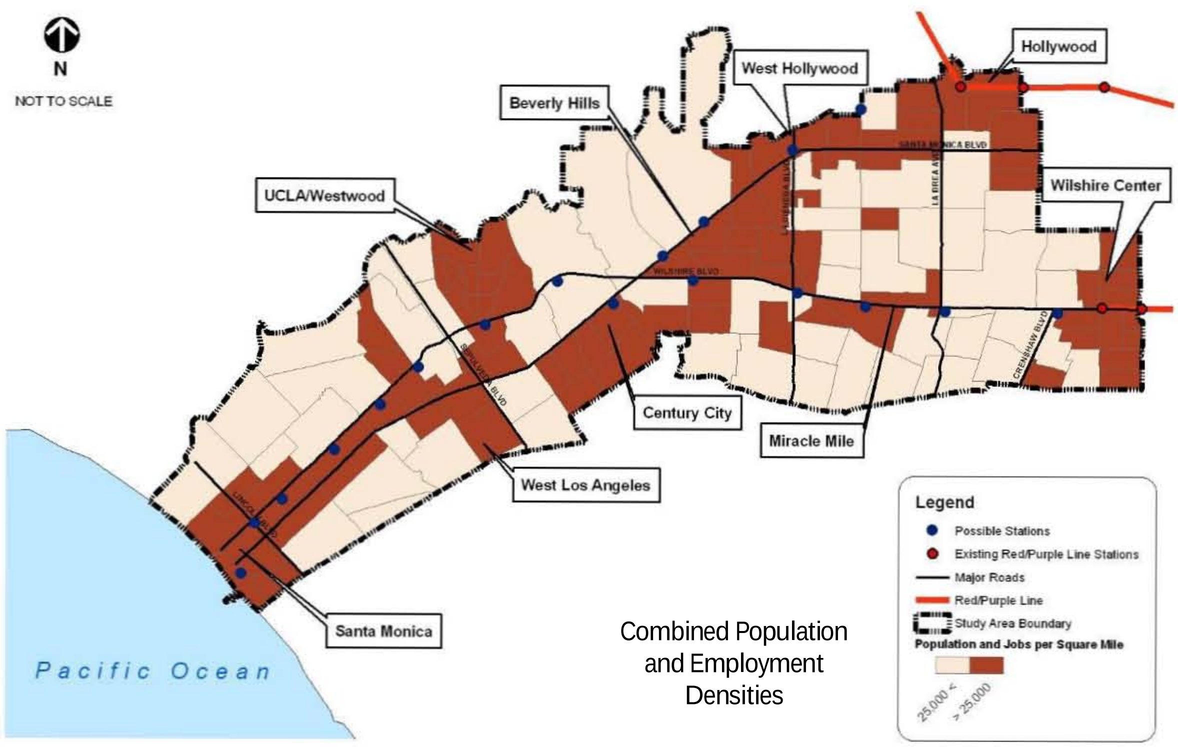
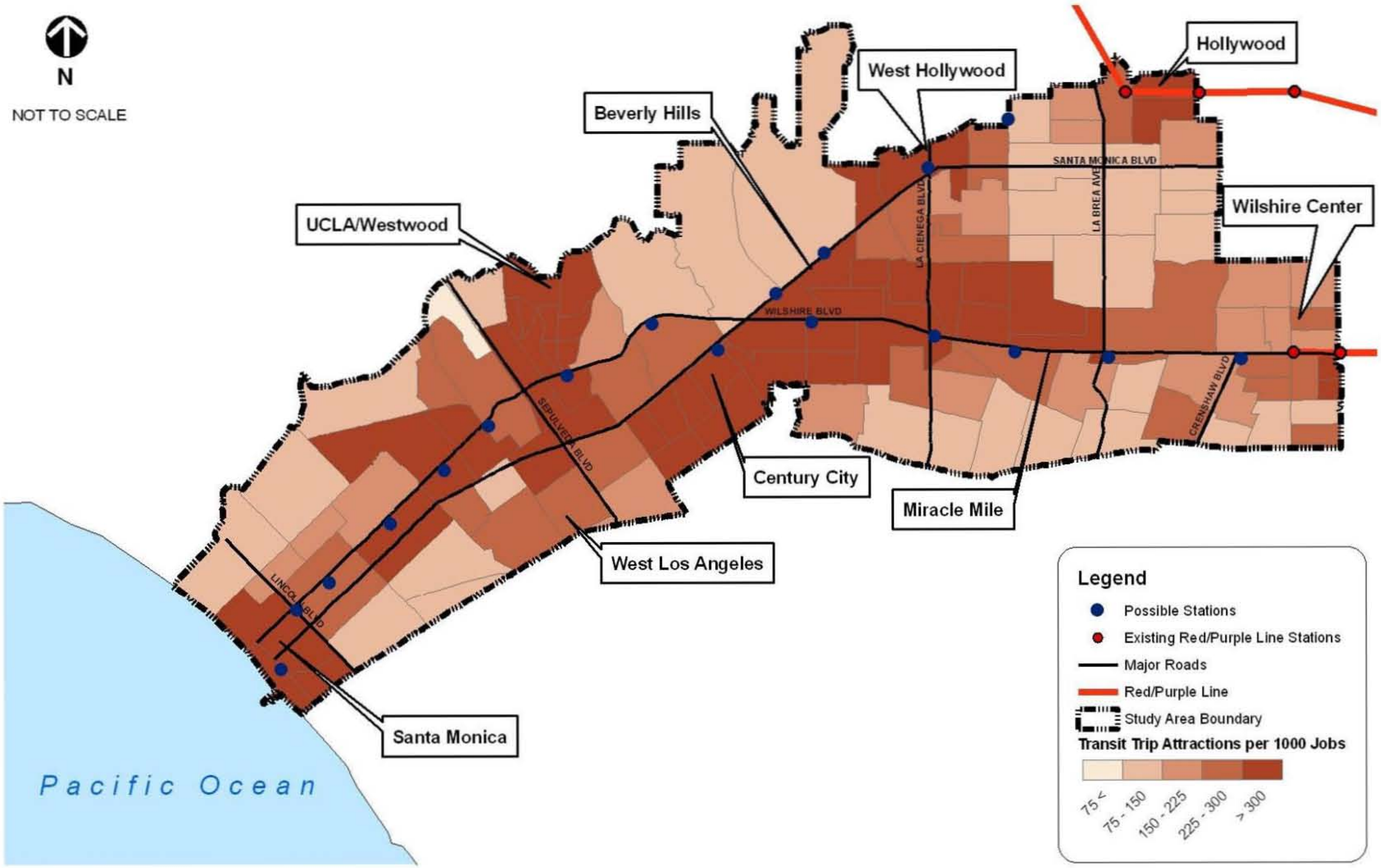


Figure 1-22. Peak Hour (Year 2006) Transit Trip Attractions per 1000 Jobs (TAZ)



In addition, because the Study Area includes a significant concentration of educational, cultural entertainment, and office centers, and because the area is one of the most densely populated areas in the region, a substantial amount of transit service and transit use has traditionally occurred. Transit ridership in the Study Area is best summarized using the Metro Travel Demand model. According to the 2006 model, the percentage of home-based work transit trips in the Study Area was more than double that of the County (16 percent for the Study Area versus 7 percent for the County).

Based on the model data, 22 percent of all peak work transit trips in Los Angeles County originate in or are attracted to the Study Area. With just 5 percent of the County's population, this high level of transit use establishes the need to serve the area with high-capacity fixed guideway service that will offer improvements in mobility and access over existing service. This demand, expressed in terms of transit trips originating in or drawn to the Study Area, warrants a higher percentage of high-capacity transit investment than it has received in the last twenty years.

Decreased Mobility for Transit Dependent Riders

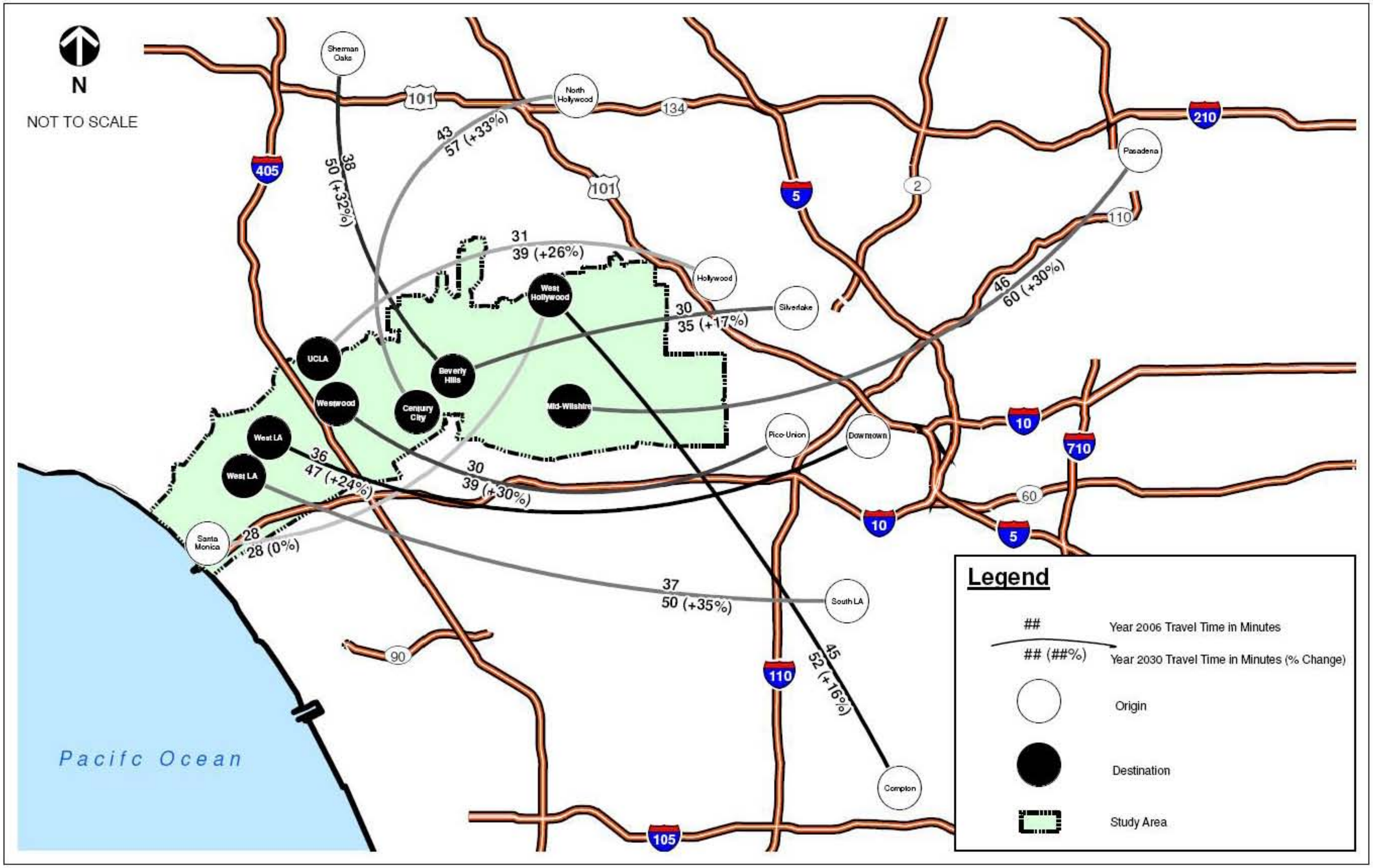
Although the far eastern portion of the Study Area is served by the Metro Red and Purple Lines, there is no significant transit infrastructure in the majority of the Study Area that allows existing service to circumvent the worsening traffic congestion. Job and population growth expected through 2030 will lead to ever-increasing vehicle trips, which affects the ability of buses operating in mixed-flow traffic to serve riders effectively. Members of transit-dependent households are faced with greater travel times as congestion increases. Thus, the lack of westward serving transit infrastructure significantly affects the job accessibility and socioeconomic mobility of lower income and transit-dependent households.

This poor accessibility is illustrated in Figure 1-23, which shows average in-vehicle travel time to work for ten typical morning work commutes in 2006 and 2030 (predicted). Each analyzed commute has a residential origin or employment destination in the Study Area. Commutes with origins and destinations such as Hollywood to UCLA, Silver Lake to Beverly Hills, and Santa Monica to West Hollywood are represented in the figure. Not surprisingly, the in-vehicle travel times are products of serious congestion, with travel speed averaging just 20.8 mph for these ten typical commutes in 2006. The average speed of these ten typical commutes will decrease to 16.5 mph by 2030. Travel time to work will increase by 26 percent between 2006 and 2030. Without major transit infrastructure improvements, travel time to work will increase in all ten analyzed commutes by 2030. By transit, these commutes would take significantly longer than by automobile implying a serious mobility problem for transit dependent riders. These typical commutes could be improved with the addition of a high-capacity east-west transit service within the Study Area.

Desire to Attract Choice Riders Strengthens the Need for Transit Improvements

The choice rider is an individual who has the resources to drive, but chooses to reach their destination by public transit instead. Choice riders are desirable because this group substitutes transit trips for vehicle trips, which offers environmental benefits and congestion relief for the region. High-speed, high-quality, and reliable transit has the greatest chance to attract the choice rider. A fixed-guideway system traveling east-west through the Study Area would offer travel time certainty and faster travel than the automobile during peak hours, an assurance that cannot be offered by existing bus service. The wealth of educational, cultural, entertainment and shopping destinations in the Study Area suggests a high latent demand for transit among many different population groups that have access to vehicles, ranging from students and visitors to workers and residents.

Figure 1-23. AM Peak Hour Travel Time to Work by Auto for 2006 and 2030



Study Area Share of Regional Population and Employment Growth Remains High

As shown in Table 1-8, population forecasts to 2030 adopted by SCAG clearly suggest that the Study Area will capture a large share of population and job growth over the next 22 years, thereby placing further demands on transit service and resulting in increased congestion on local roadways and regional highways serving the Study Area.

Table 1-8. Population and Employment Forecast

	2006	2030	Forecast Increase Between 2006-2030
Population (Persons)			
Study Area	503,802	557,665	10.7%
LA County	10,076,040	12,123,152	20.3%
Study Area – % of LA County	5.0%	4.6%	
Employment (Jobs)			
Study Area	478,770	560,488	17.1%
LA County	4,648,252	5,661,495	21.8%
Study Area – % of LA County	10.3%	9.9%	

Source: 2006 Metro Travel Demand Model

According to SCAG's forecast, the Study Area is expected to grow by 54,000 persons (10.7 percent increase) and 82,000 jobs (17.1 percent increase) between 2006 and 2030. While other regions of the county have low population and employment densities that suggest favorable growth conditions, SCAG projections show remarkable double-digit growth in both population and employment in the Study Area, which is already largely built out. The jobs-housing balance in the Study Area is predicted to continue to favor jobs over housing, resulting in greater regional transportation needs, especially from non-automobile modes to alleviate the strain on the Study Area's roadways.

Existing and Future Travel Demand Patterns Justify Transit Improvements

The Study Area attracts hundreds of thousands of trips each day from all areas of Los Angeles County. Growth levels in both population and employment will further exacerbate travel demand. Without a high-quality transit infrastructure investment, this growth in travel demand will largely be satisfied with increased vehicle travel. Travel growth projection characteristics for the Westside Extension Transit Corridor Study Area were obtained and summarized from the Metro Travel Demand Model. Three of the most meaningful categories of travel characteristics are:

- Total Daily Person Trips – the number of one-way trips made by all persons within a 24-hour period.
- Daily Home-Work Person Trips – the number of one-way trips made by all persons between home and work locations within a 24-hour period.
- Daily Transit Person Trips – the number of one-way trips made by all persons on transit within a 24-hour period.

A summary of these statistics compiled for 2006 and 2030 are presented in Table 1-9. Roughly 3.2 million daily trips are internal[2] to the Study Area which equates to 57 percent of all trips produced in or attracted to the Study Area. The Study Area attracts close to 3.3 million trips on an average weekday, signifying the area's importance as an employment generator and cultural destination. By 2030, this number is estimated to increase to nearly 3.8 million trips. Total Study Area person trips productions and attractions are expected to increase by 15 percent between 2006 and 2030. Home-based peak work and daily transit trips are expected to increase at similar rates.

Table 1-9. Summary of Study Area Person Travel Characteristics

	2006	2030	% Growth
Study Area Trip Productions and Attractions			
Total Daily Person Trips	5,631,245	6,467,913	15%
Home-Based Work Peak Person Trips	623,275	726,183	17%
Daily Transit Trips	386,728	470,432	22%
Home-Work as a Percentage of Total Trips	11.1%	11.2%	
Transit as a Percentage of Total Trips	6.9%	7.3%	
Study Area Internal Trips			
Total Daily Person Trips	3,188,902	3,605,008	13%
Home-Based Work Peak Person Trips	174,880	198,862	14%
Daily Transit Trips	149,904	178,140	16%
Home-Work as a Percentage of Total Trips	5.5%	5.5%	
Transit as a Percentage of Total Trips	4.7%	4.8%	

Source: 2006 Metro Travel Demand Model

These current and future travel characteristics demonstrate a growing demand for travel within the Study Area. By 2030, Study Area home-based peak work trip productions and attractions will increase by 17 percent. Internal home-based peak work trips are expected to increase by 14 percent, pointing to the strong desire of many Westside residents to work close to where they live. Daily Study Area transit trip productions and attractions are expected to increase at a higher rate than total daily or home-work trips between 2006 and 2030. With few transit infrastructure investments planned, this increase denotes significant and growing bus ridership in the Study Area. The Study Area's travel demand patterns illustrated in this section offer further justification for major transit infrastructure investments.

Peak Hour Roadway Congestion Underlies the Need for Transit Improvements

Los Angeles has the dubious distinction of being the most congested urban area in the country, according to the most recent survey of traffic congestion levels conducted by the Texas Transportation Institute.[3] The Westside Extension Transit Corridor Study Area in turn contains some of the most congested traffic conditions in Los Angeles. Typical rush hours on the Westside of

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[2] An internal trip is both a production and an attraction, which allows for these trips to be counted twice.

3 Texas Transportation Institute. *The 2007 Urban Mobility Report*, Table 1.

Los Angeles extend from 6:30 to 10:00 a.m. and 3:00 to 7:00 p.m. A typical automobile commute along Wilshire Boulevard from Santa Monica to Beverly Hills over a distance of eight miles can take upwards of 60 minutes on a typical weekday evening. Morning and evening peak hour speeds along Santa Monica Boulevard in Beverly Hills average less than 7 miles per hour (mph).

Investment in high-capacity fixed guideway transit service inside the Study Area will yield significant travel time benefits over mixed-flow bus service. Where congestion continues to degrade bus service, the fixed-guideway alternative improves mobility not only by offering travel times that are competitive with, if not faster than the automobile, but also by providing travel time certainty. Table 1-10 and Figure 1-24 reveal the reduction in travel time expected from a HRT transit investment in the Study Area by comparing those values to existing mixed-flow Metro Rapid Bus Service. The travel time improvement is significant for the Westside Extension Transit Corridor. In terms of percentage improvement, it is greater than the observed or expected travel times for recently completed or committed east-west fixed guideway transit corridor projects in the Los Angeles region.

Table 1-10. Travel Time Comparison – Fixed Guideway Transit Projects

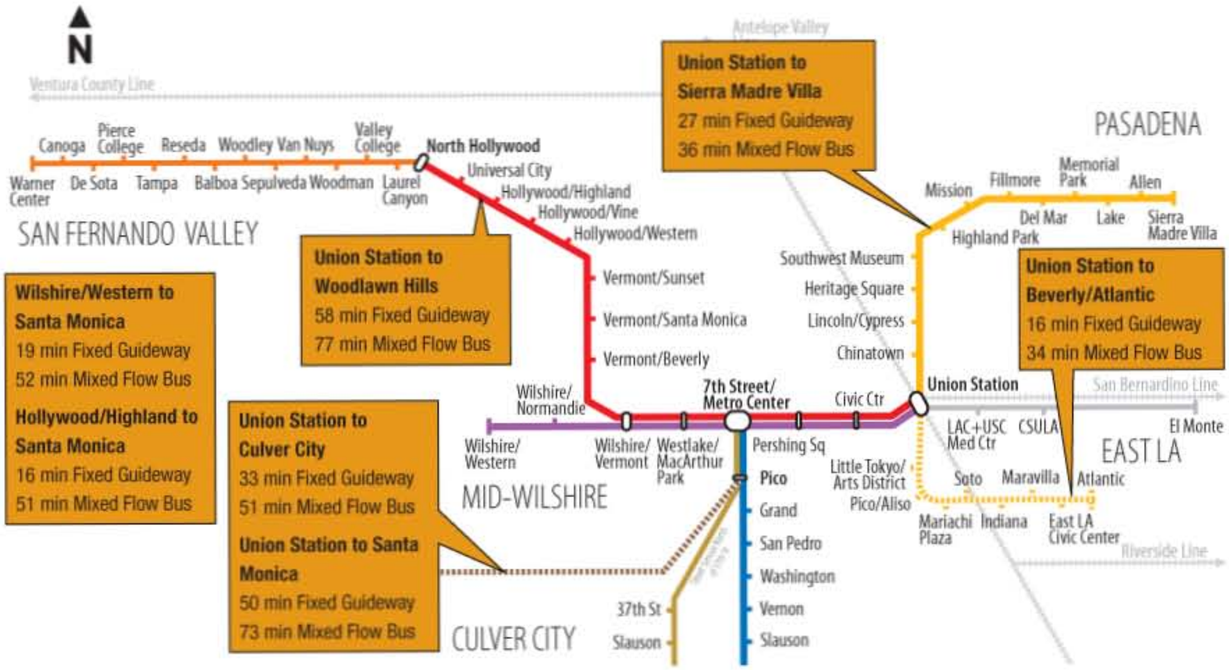
Transit Corridor	From	To	Fixed-Guideway Travel Time (Min)	Mixed Flow Bus Travel Time (Min)	Fixed-Guideway Improvement over Mixed-Flow Bus
Orange Line/Red Line	Union Station	Woodland Hills	58	77	25%
Gold Line	Union Station	Sierra Madre Villa	27	36	25%
Gold Line	Union Station	Beverly/Atlantic	16	34	53%
Expo Line	Union Station	Culver City	33	51	35%
Expo Line	Union Station	Santa Monica	50	73	32%
Westside Extension	*Wilshire/Western*	*Santa Monica*	*19*	*52*	*63%*
Westside Extension	*Hollywood/Highland*	*Santa Monica*	*16*	*51*	*69%*

Source: Travel times obtained from Metro. Mixed flow bus travel times are displayed as averages.

Peak Hour Congestion along Santa Monica Freeway Reveals Study Area Job and Population Growth

The traffic volumes along the Santa Monica Freeway serve as a primary indicator of how commuting travel patterns now include destinations other than downtown Los Angeles. This facility runs just south of the Study Area and is the primary transportation facility serving east-west travel between downtown Los Angeles and Santa Monica. In the 1970s, commute patterns were heavily oriented from the Westside toward downtown Los Angeles. The freeway was heavily congested in the eastbound direction in the morning peak hours and in the westbound direction in the afternoon peak hours. With the significant increase in jobs in the Study Area generated by the entertainment, business services, and high-tech sectors, the commute patterns have evened out; now both directions are heavily congested during both peak periods. In fact, traffic volumes are very heavy in both directions all day long.

Figure 1-24. Fixed Guideway and Mixed Flow Bus Travel Times for Transit Corridors



The Santa Monica Freeway (I-10) carries traffic volumes approaching 300,000 vehicles per day, and each direction experiences peak periods of congestion levels rated at F3, meaning that the freeway operates at LOS F conditions for more than three hours in each peak travel period. Table 1-11 provides a comparison of volumes between 1996 and 2006 on the Santa Monica Freeway in the Study Area. Anyone living east of downtown Los Angeles and working in Santa Monica is well aware of the increasing congestion west of the 405 Freeway. Eastbound traffic in the evening is gridlocked from Santa Monica to downtown Los Angeles. This change in travel patterns mirrors the entertainment, media, and high-tech business growth in the western portion of the Study Area. The analyzed freeway segments show an increase in peak hour traffic volumes between 3 and 9 percent over the ten year study period.

Study Area Lacks Planned Transportation Improvements

The Study Area, with its high population and employment densities, will receive only limited transportation infrastructure improvements through 2030. With the exception of a 12.5 mile bus-only lane project along Wilshire Boulevard, and the implementation of the Exposition LRT project south of the Study Area, all other planned improvements address north-south capacity issues. They include San Diego Freeway high occupancy vehicle (HOV) lanes and interchange improvements, as well as various north-south arterial projects along Lincoln Boulevard, Bundy Drive, Sepulveda Boulevard, Robertson Boulevard, and Western Avenue. No planned improvements will fully address the significant capacity deficiencies on east-west facilities in the Study Area. Without the development of a network of bus-only lanes, most transit service will likely remain as mixed-flow bus service, except for the planned Wilshire Bus Lanes Project.

Table 1-11. Traffic Volume Trends on the Santa Monica Freeway (I-10)

Segment	Westbound		Eastbound	
	1996	2006	1996	2006
AM Peak Hour				
Centinela to Bundy	7,540	8,140	6,920	7,470
Bundy to I-405	9,170	9,840	8,410	9,030
National to Robertson	10,950	11,230	10,050	10,310
Venice to La Brea	10,160	11,070	8,760	9,540
PM Peak Hour				
Centinela to Bundy	6,880	7,420	6,080	6,560
Bundy to I-405	8,360	8,980	7,390	7,940
National to Robertson	9,990	10,240	8,830	9,060
Venice to La Brea	9,270	10,100	8,290	9,040

Source: Caltrans.

In addition to these specific projects, several categories of countywide funding could be allocated to projects through the Metro Call for Projects process: Non-Motorized, Operations & Maintenance, Signal Synchronization and Intelligent Transportation Systems (ITS), Regional Surface Transportation Improvements, Travel Demand Management (TDM), Transit Centers/Park-and-Ride, and Traveler Information. Local jurisdictions, including those in the Study Area, will propose projects and compete for funding in these categories over the course of the next two decades, but none are likely to be of such regional significance as to address the east-west traffic congestion problems endemic throughout the Study Area.

Local Policies for Dealing with Congestion are Oriented towards Transportation Demand Management and Transit Solutions

Because of the level of build-out and density in the Study Area, local jurisdictions have generally determined through their local policies that congestion relief improvements should focus on travel demand management and increased ride sharing and transit usage, rather than highway/arterial physical improvements, such as road widening or new roadways. In a number of cases, local communities that desire to eliminate cut-through and neighborhood traffic to support more livable downtown or commercial areas are supporting initiatives to limit roadway capacity or to slow traffic flow, leaving transit improvements as the only viable alternative to reduce traffic volumes and congestion related delays and improve mobility.

To assist in the implementation of the Regional Comprehensive Plan and the associated Regional Transportation Plan, SCAG has decentralized local jurisdiction participation into specific subregions. The Westside Extension Transit Corridor is encompassed by the Westside Cities Subregion[4] and by the Los Angeles Subregion.

[4] The Westside Cities Subregion includes Beverly Hills, Culver City, Santa Monica, and West Hollywood. Culver City municipal boundaries are located outside the Westside Extension Transit Corridor Study Area.

In the cities on the Westside, policy-makers have taken strong positions against the wholesale widening of streets and narrowing of sidewalks to accommodate more travel lanes. Localized Transportation System Management (TSM) improvements, such as additional turn lanes or signal phasing changes, have been supported, but the arterial network in the Westside is essentially built out. In this highly urbanized area, the types of transportation improvements that have the support of the policy makers are intelligent transportation systems projects and livable communities programs. Future increases in travel demand will have to be accommodated by making the existing highway network work better where possible, in conjunction with increased usage of transit and other (i.e., non-motorized) modes of transportation. Throughout the Westside, efforts are also underway in all jurisdictions to make it harder for automobile traffic to seek alternate routes through residential neighborhoods. These traffic calming programs will further concentrate commuter traffic on already congested arterial streets and highways.

In October 2003, the Westside Cities Council of Governments (COG) published the *Westside Mobility Study*, a report that focused on practical short- and long-term transportation solutions in the Study Area. The report concluded that major regional transit improvements are warranted based on the Westside's traffic congestion, high employment and population densities, economic contribution, and inequity of past regional investments on the Westside compared to other subregions in the county.

Strategy to respond to Climate Change as mandated by State Law

The Westside Extension Transit Corridor is fully contained within the South Coast Air Basin, which has some of the worst air quality in the nation (United States Environmental Protection Agency, USEPA). Mobile source emissions from vehicles are the single largest contributor to air quality problems in the basin. Therefore, a complete description of transportation issues in the corridor must address air quality concerns. Agencies that have jurisdiction over the air quality of the Study Area include the USEPA, the California Air Resources Board (CARB), and the South Coast Air Quality Management District (SCAQMD).

On September 27, 2006, Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, was enacted by the State of California. The legislation states that "global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California." AB 32 caps California's greenhouse gas (GHG) emissions at 1990 levels by 2020. AB 32 defines greenhouse gas emissions as all of the following gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydro fluorocarbons, per fluorocarbons and sulfur hexafluoride. This bill represents the first enforceable statewide program in the United States to cap all GHG emissions from major industries and include penalties for non-compliance. While acknowledging that national and international actions will be necessary to fully address the issue of global warming, AB 32 lays out a program to inventory and reduce GHG emissions in both California and from power generation facilities located outside the State that serve California residents and businesses.

AB 32 charges the CARB with the responsibility of monitoring and regulating sources of GHG emissions in order to reduce those emissions. The CARB has adopted a list of discrete early action measures that can be implemented before January 1, 2010 to reduce GHG emissions. By January 1, 2008, the CARB must define the 1990 baseline emissions for California and adopt that baseline as the 2020 statewide emissions cap. The CARB is then tasked to establish a set of rules that is scheduled for adoption by January 1, 2011 for reducing greenhouse gas emissions to achieve the emissions cap by 2020. These rules must take effect no later than 2012. In designing emission reduction measures, the CARB must aim to minimize costs, maximize benefits, improve and modernize California's energy infrastructure, maintain electric system reliability, maximize additional environmental and economic benefits for California, and complement the State's efforts to improve air quality.

At this time, the USEPA does not regulate GHG emissions. In April 2007, the USEPA issued an important ruling in its first case on global warning. In the case of Massachusetts v. USEPA, the United States Supreme Court reviewed a USEPA decision not to regulate greenhouse gas emissions from cars and trucks under the Clean Air Act. The Court found that Massachusetts was injured by global warming. The lawsuit focused on Section 202 of the Clean Air Act. The case resolved the following legal issues: (1) the Clean Air Act grants the USEPA authority to regulate GHG, and (2) USEPA did not properly exercise its lawful discretion in deciding not to promulgate regulations.

Global warming and climate change have received substantial public attention for more than 15 years. For example, the United States Global Change Research Program was established by the Global Change Research Act of 1990 to enhance the understanding of natural and human-induced changes in the Earth's global environmental system, to monitor, understand, and predict global change, and to provide a sound scientific basis for national and international decision making.

The Westside Extension Transit Corridor Project would provide transit infrastructure improvements potentially including BRT, LRT, and/or HRT. Each of these transit modes would provide the Study Area with an energy efficient way of reducing the number of vehicles on roadways and freeways. Therefore, the project would contribute to the improvement of Southern California's regional and local air quality. Development of high-capacity transit service that provides an alternative to the automobile is a key factor in advancing the region's environmental sustainability goals and assists in the fight against global warming.

1.7 Potential Transit Market

This section identifies the travel markets for the Westside Extension of the Metro Purple Line/Red Line. The travel markets were determined based on the identification of activity centers, review of population and employment distribution, and analysis of travel-making patterns in the Westside Extension Transit Corridor Study Area and the Southern California region. The purpose of the market analysis is to help determine the potential level of ridership resulting from the Westside Extension, the types of trips that could be served (e.g., work, school, entertainment, etc.), and areas of trip origins and/or destinations that would likely receive the highest benefit from the Westside Extension.

1.7.1 Activity Centers

The Westside Study Area has a high concentration of activity centers and major attractions. In addition to the countless local metropolitan and neighborhood centers, many regional and world-famous commercial, business, cultural, entertainment and education facilities are in the Study Area. Figure 1-18 in Section 1.7 shows the "centers" from the Centers Concept Plan for the Los Angeles Area. Many of these centers are located in the Westside Corridor and have been growing in number over the past 40 years. Those activity centers recognized as regional employment, educational and cultural draws are illustrated in Figure 1-19. These centers, along with other major destinations, are discussed below.

Business: Businesses and office buildings are clustered throughout the 16-mile Wilshire Boulevard corridor from downtown Los Angeles to the Pacific Ocean. In the Westside Study Area, the major business districts are: Koreatown (Wilshire/Vermont to Wilshire/Western), Century City (Santa Monica/Avenue of the Stars), Beverly Hills, Westwood, UCLA, I-405/Olympic Boulevard area, and downtown Santa Monica.

Commercial: Rodeo Drive, Hollywood/Highland and Sunset Strip are world famous retail destinations in the Study Area. Rodeo Drive generally refers to a three-block stretch of boutiques and shops in Beverly Hills (near Wilshire/Beverly Drive), known as one of the most expensive shopping districts in the world. Hollywood/Highland, which is more popularly known as the Hollywood Walk of Fame area, attracts millions of domestic and international tourists every year. This area encompasses the Walk of Fame, Kodak Theater (and its attached shopping mall), Grauman's Chinese Theater, Hollywood Wax Museum, and other nearby tourist sites. Sunset Strip is a mile and a half stretch of Sunset Boulevard that passes through the City of West Hollywood. The strip embraces a premier collection of rock clubs and nightclubs, boutiques, and restaurants on the cutting edge of the entertainment business.

There are also many regional shopping/entertaining attractions in the Study Area, including The Grove/Farmers Market (3rd Street/ Fairfax), the Santa Monica 3rd Street Promenade, Beverly Center Shopping Mall (Beverly/La Cienega), Century City Westfield Shopping Mall, and Westside Pavilion Shopping Center (Westwood/Pico).

Institutional: UCLA is a world-class research university near Wilshire/Westwood in the Study Area. It currently enrolls more than 36,000 students. Including its medical center and hospital, UCLA has more than 36,000 employees and is the 5th largest employer in the City of Los Angeles. The Veteran's Administration, sandwiched between UCLA and West LA, provides medical services to veterans from all over Southern California. The Cedars-Sinai Medical Center, a nationally-recognized medical facilities and one of the largest hospitals in Los Angeles, is located along Beverly Boulevard near Fairfax Avenue. In addition, both Santa Monica College and Saint John's Health Center are located within the Study Area.

Cultural: The LACMA is a world-renowned art museum on the "Miracle Mile", a stretch of Wilshire Boulevard between Fairfax and Curson Avenues – midway between downtown Los Angeles and Santa Monica. It lies within the Miracle Mile, one of the city's most densely populated areas that is notorious for heavy traffic congestion even by Los Angeles standards. It is also adjacent to the Grove/Farmers Market shopping area. UCLA's Hammer Museum, the Pacific Design Center, Peterson Automotive Museum, and many other cultural draws are located within the Study Area.

Figure 1-19 shows that most of the major trip generators in the Westside are along or in close proximity to the Wilshire Corridor. There are three Metro buses serving the length of Wilshire Boulevard: Route 20/21 (Metro Local), Route 720 (Metro Rapid), and Route 920 (Metro Rapid Express). Combined, these three routes generate over 70,000 boardings per day. Route 720 has the highest ridership among the Metro bus network. Santa Monica's Big Blue Bus, Commuter Express, and the Antelope Valley Transportation Authority (AVTA) also provide service on Wilshire Boulevard. The Big Blue Bus averages approximately 69,000 daily boardings throughout the system, and Lines 1 and 2 on Wilshire Boulevard have combined daily boardings of approximately 13,000 boardings. AVTA averages approximately 10,000 daily boardings. LADOT Commuter Express averages over 1,000 daily boardings, and LADOT DASH averages over 7,600 daily boardings.

Table 1-12 shows the transit usage of fifteen activity centers in the Westside. All the high activity TAZs have a transit trip density over 6,700 trips per square mile, which is more than 100 times of that of the region and 20 times that of Los Angeles County. For Century City, UCLA, Beverly Center, and Koreatown, more than 8 percent of the person trips were taken on transit in 2006. They are among the top transit trip attracting centers in the Study Area, as well as the entire region.

Table 1-12. Year 2006 Transit Trips of Activity Centers in the Westside Study Area

Activity Center	Area (Sq. Mile)	Transit Trips	Transit Trips Density	Person Trips	Person Trips Density	% Transit Trips of Person Trips
Santa Monica Pier/Beach	0.17	1,578	9,085	26,068	150,075	6.1%
Downtown Santa Monica/3rd Street	0.49	4,755	9,780	75,100	154,463	6.3%
Colorado Place	0.52	1,237	2,382	27,848	53,626	4.4%
Brentwood	0.66	1,322	1,995	24,649	37,189	5.4%
Westside Pavilion	0.35	2,377	6,791	35,723	102,066	6.7%
Westwood	0.53	7,527	14,288	86,102	163,443	8.7%
UCLA	0.62	15,392	24,850	175,421	283,211	8.8%
Century City	1.17	21,725	18,646	190,920	163,866	11.4%
Beverly Hill/Rodeo Drive	0.22	3,570	16,543	41,555	192,563	8.6%
Beverly Center/Cedars Sinai	0.95	10,344	10,891	125,855	132,507	8.2%
Sunset Strip	0.71	5,105	7,239	86,980	123,341	5.9%
Grove/Farmer's Market	0.48	1,791	3,710	26,820	55,551	6.7%
Miracle Mile	0.99	6,321	6,362	90,497	91,080	7.0%
Wilshire Center	0.38	5,997	15,832	72,856	192,334	8.2%
Hollywood	0.94	8,477	8,998	129,705	137,676	6.5%
Westside Study Area	**38.42**	**194,698**	**5,068**	**2,815,623**	**73,285**	**6.9%**
Region	**38,502**	**1,390,919**	**36**	**58,988,100**	**1,532**	**2.4%**

1.7.2 Districts

The Study Area is diverse in land use and socioeconomic characteristics. To better summarize the socioeconomic features and identify major travel patterns, the Study Area and the surrounding region is divided into districts. Figure 1-25 shows the district divisions of the whole region and Figure 1-26 focuses on the district definition of the Study Area.

The Study Area is divided into 23 districts and the entire region is divided into 76 districts. In the Study Area, the cities of Santa Monica, Beverly Hills, and West Hollywood were separated into individual districts. Each neighborhood council in the City of Los Angeles was defined as a single district. If the city or neighborhood council was divided by the boundary of the Study Area, it was split into two or three smaller districts. Outside the Study Area there are 53 districts, composed of

Figure 1-25. Districts for Study Area and Region

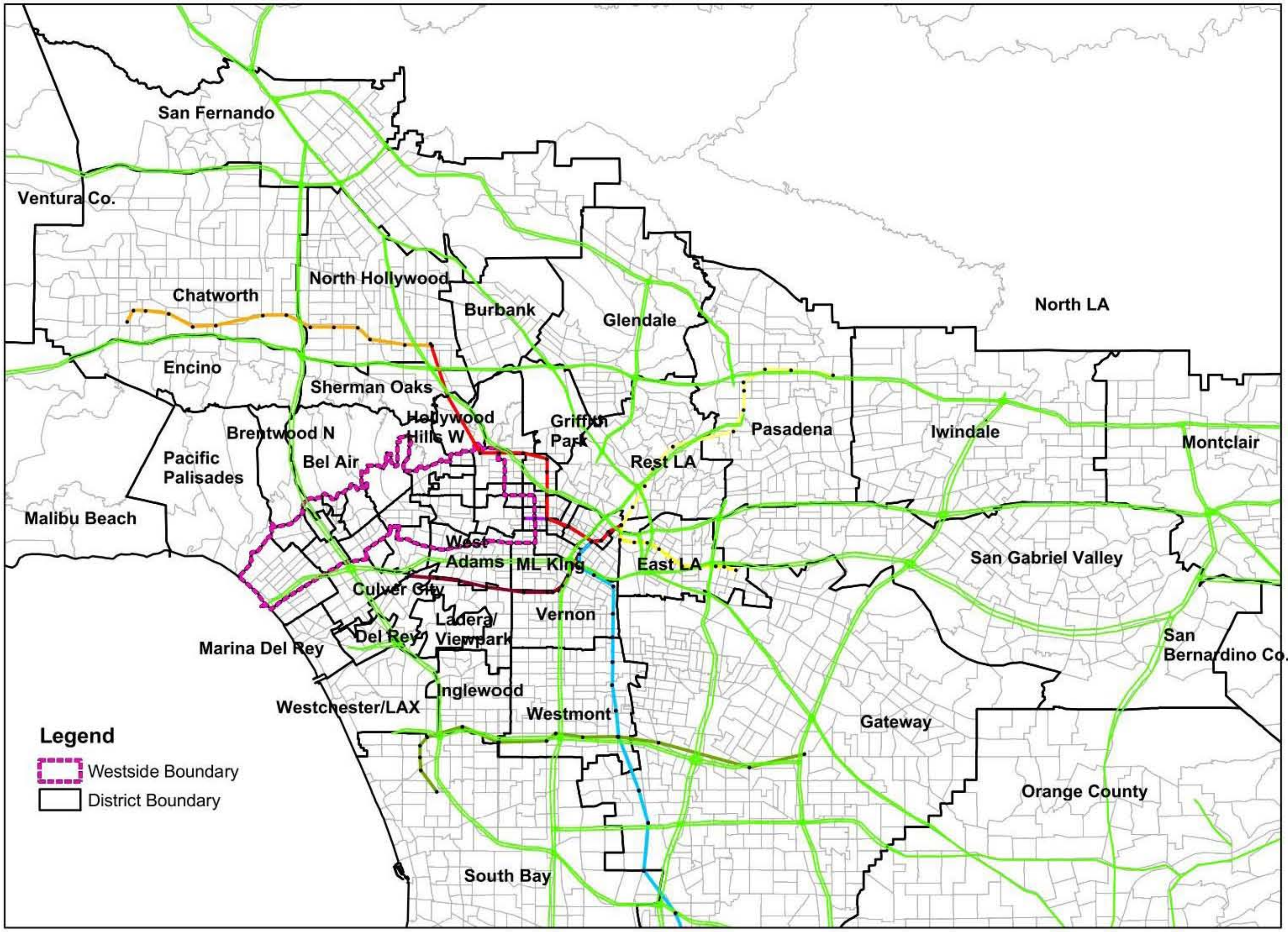
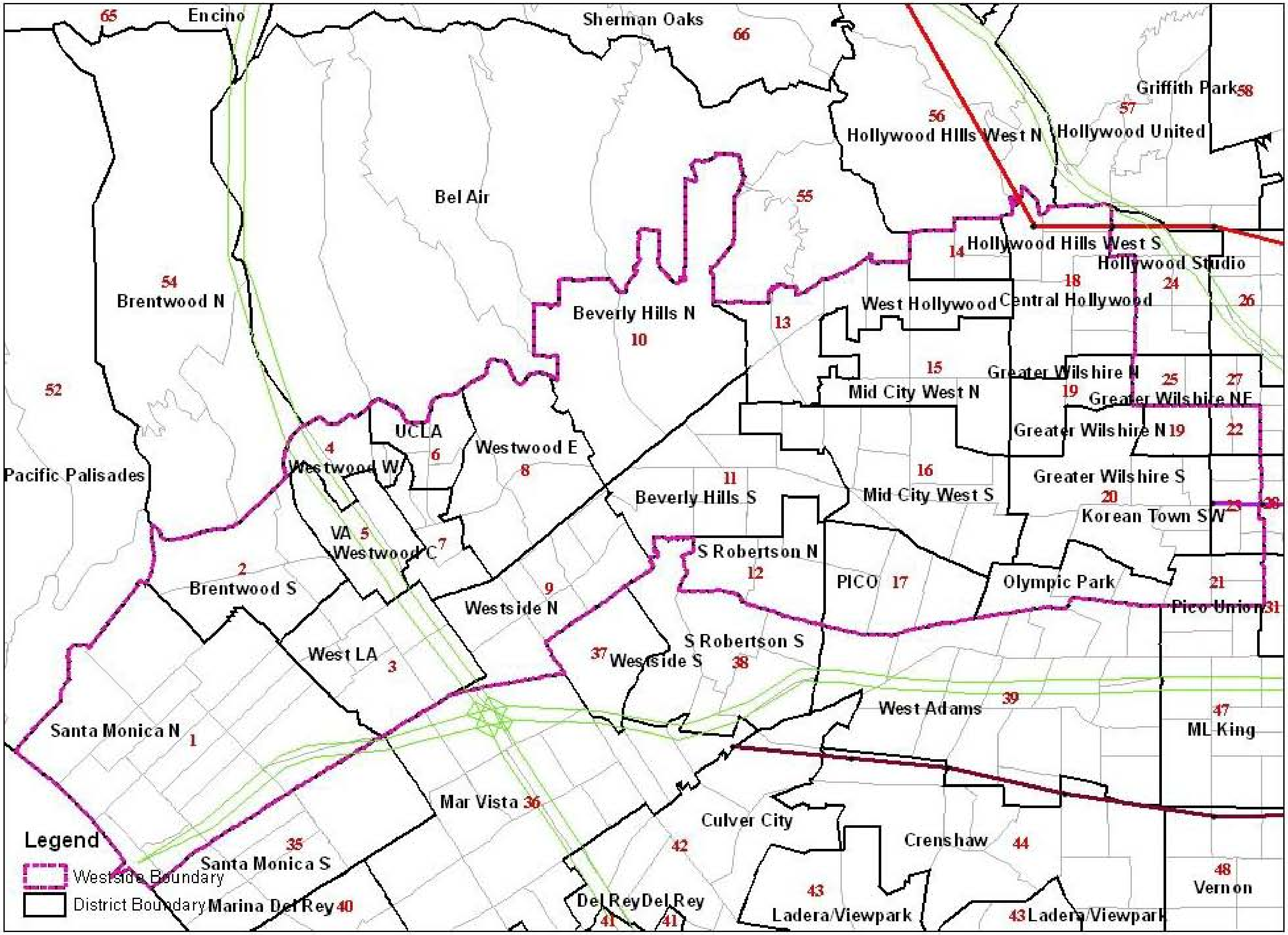


Figure 1-26. Districts within Study Area



counties outside of Los Angeles County, and other sub-regions and communities within Los Angeles County. The San Fernando Valley area was divided into several districts by using major freeway facilities as boundaries. Since previous studies show that there are substantial person and transit trips between the valley and the Westside Study Area, the subdivision of the valley could help to better delineate the travel pattern between the Valley and Westside. The counties outside Los Angeles, Orange County, Ventura County, San Bernardino County and Riverside County (including Imperial County), are each represented by a district.

Table 1-13 summarizes the main land uses of the 23 districts in the Study Area. The activity centers discussed previously are also identified for each district. This information is useful in understanding the population, employment and trip making patterns discussed later in the chapter.

1.7.3 Population

In 2006, the population of the Study Area was 504,000, about 5 percent of the Los Angeles County population. According to SCAG population projections, there will be 558,000 people in the Study Area by 2030, a 10.7 percent growth rate over 2006.

Table 1-14 lists the population and population density by district in the Study Area. In both 2006 and 2030, the Santa Monica North District has the highest population and the Koreatown Southwest District has the highest population density, with over 53,000 people per square mile. The population density of the Study Area is about five times that of Los Angeles County and about 25 times that of the entire region. It is also higher than that of City of Long Beach and City of Pasadena.

Figure 1-27 and Figure 1-28 illustrate the population density by TAZ in 2006 and 2030, respectively. In general, the population density of the Study Area is much higher than outside the area. In addition to Koreatown, districts in the Study Area that currently have a high population density (above 15,000 people per square mile) include South Robertson North, Olympic Park, the West LA and Westwood districts along Wilshire Boulevard, and the Hollywood districts along Sunset/Santa Monica Boulevards. By 2030, the population density of the Hollywood Hills West South District is expected to reach the range above 30,000 people per square mile, and over half of the districts will have a population density above 15,000 people per square mile. As discussed earlier, TAZs with a population density of exceeding 1,500 people per square mile are considered transit supportive.

Outside the Study Area, the districts with the highest population densities are MacArthur, Rampart, West Lake, East Hollywood, and Pico Union, all of which are close to the eastern boundary of the Study Area.

1.7.4 Employment

The total number of jobs in the Study Area was 479,000 in 2006 and is projected to be 560,000 in 2030 according to SCAG. The anticipated employment growth rate is approximately 17 percent, higher than the population growth rate during the same period. The Westside area is a very job-rich area, accounting for about 10 percent of employment in Los Angeles County.

Table 1-13. Land Use and Activity Centers in Each District of the Study Area

District #	District Name	Main Land Use	Activity Centers
1	Santa Monica N	Commercial, Business, Medium to High Density Residential, Institutions	Santa Monica Pier/Beach, 3rd Street, Downtown, Colorado Place
2	Brentwood S	Commercial, Business, Low Density Residential, Open Space	Brentwood
3	West LA	Commercial, Business, Medium to High Density Residential	
4	Westwood W	Low to Medium Density Residential	
5	VA	Institutional (Government, Hospital), Open Space	
6	UCLA	Institutional (Education), Business, Medical	UCLA, Westwood
7	Westwood C	Commercial, Institutional, Business	UCLA, Westwood
8	Westwood E	Low to Medium Density Residential, Open Space	
9	Westside N	Low to Medium Density Residential, Commercial, Business	Century City, Westside Pavilion
10	Beverly Hills N	Low Density Residential	
11	Beverly Hills S	Commercial, Business, Institutional, Low to Medium Density Residential	Beverly Hills/Rodeo Drive
12	S Robertson N	Residential	
13	West Hollywood	Commercial, Medium to High Density Residential	Sunset Strip
14	Hollywood Hills West S	Commercial, Medium to High Density Residential	
15	Mid City West N	Residential, Institutional	
16	Mid City West S	Commercial, Institutional (Culture & Medical), Residential	Grove/Farmer's Market, Beverly Center/Cedars Sinai, Miracle Mile
17	Pico	Low Density Residential	
18	Central Hollywood	Commercial, Institutional, Industry, Medium to High Density Residential	Hollywood
19	Greater Wilshire N	Low to Medium Density Residential	
20	Greater Wilshire S	Low Density Residential, Commercial, Institutional	
21	Olympic Park	Low Density Residential	
22	Koreatown NE	Low to Medium Density Residential, Commercial	
23	Koreatown SW	Commercial, Business, Medium to High Density Residential, Institutional	Wilshire Center/Koreatown

Table 1-14. Population and Population Density by District in Westside Study Area, Year 2006 and Year 2030

District #	District Name	Area, Sq. Mi.	2006 Population	2006 Pop Density per sq mi	2030 Population	2030 Pop Density per sq mi
1	Santa Monica N	5.68	60,195	10,590	64,176	11,291
2	Brentwood S	1.77	18,774	10,583	20,864	11,761
3	West LA	1.83	29,249	15,992	32,541	17,792
4	Westwood W	0.60	8,741	14,617	10,111	16,908
5	VA	0.97	1,060	1,089	1,255	1,290
6	UCLA	0.62	6,448	10,417	6,855	11,074
7	Westwood C	0.65	15,355	23,806	17,406	26,986
8	Westwood E	2.04	19,736	9,698	21,846	10,735
9	Westside N	1.94	19,838	10,252	22,020	11,380
10	Beverly Hills N	3.51	9,683	2,757	10,818	3,080
11	Beverly Hills S	2.16	25,502	11,806	28,510	13,199
12	S Robertson N	1.09	18,628	17,043	20,645	18,888
13	West Hollywood	1.88	36,400	19,362	39,094	20,795
14	Hollywood Hills West S	0.55	16,061	29,149	17,819	32,339
15	Mid City West N	1.74	20,648	11,894	23,123	13,320
16	Mid City West S	2.59	37,460	14,491	41,941	16,225
17	PICO	1.36	19,140	14,125	21,326	15,739
18	Central Hollywood	1.89	36,086	19,113	40,063	21,220
19	Greater Wilshire N	1.11	11,254	10,102	12,667	11,371
20	Greater Wilshire S	2.44	34,612	14,209	38,756	15,910
21	Olympic Park	1.27	24,610	19,455	27,550	21,779
22	Koreatown NW	0.25	7,787	31,148	8,656	34,624
23	Koreatown SW	0.50	26,535	53,176	29,623	59,365
Study Area Subtotal		38.42	503,802	13,114	557,665	14,516
Downtown Los Angeles		1.8	20,997	11,562	23,969	13,199
City of Long Beach		52.5	481,437	9,178	564,082	10,753
City of Pasadena		19.8	136,472	6,894	167,401	8,456
Los Angeles County		3,977	10,010,315	2,517	12,193,030	3,066
Southern California Region		38,503	17,437,191	453	22,531,039	585

Data Source: Metro

Figure 1-27. Year 2006 Population Density

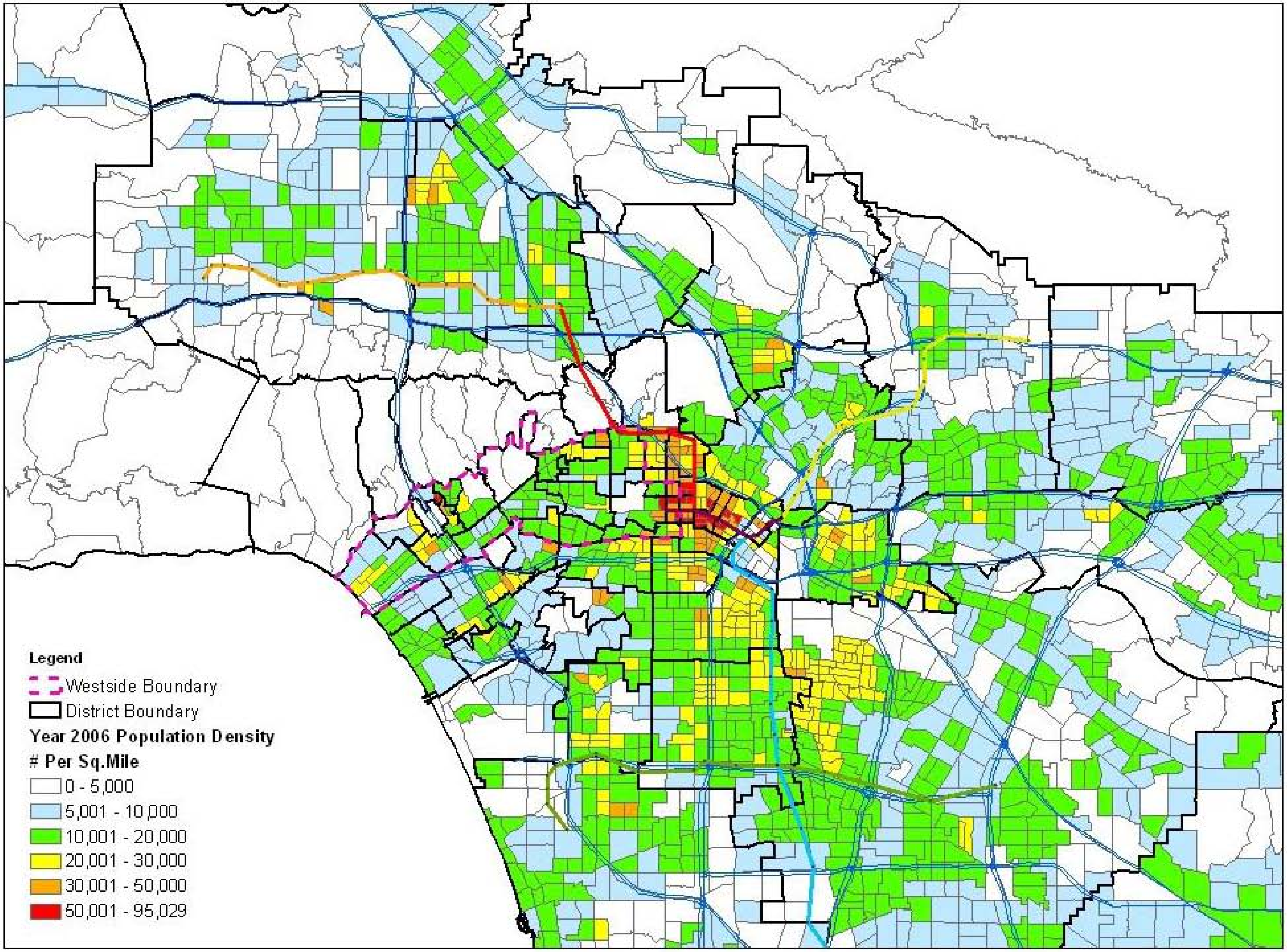


Figure 1-28. Year 2030 Population Density

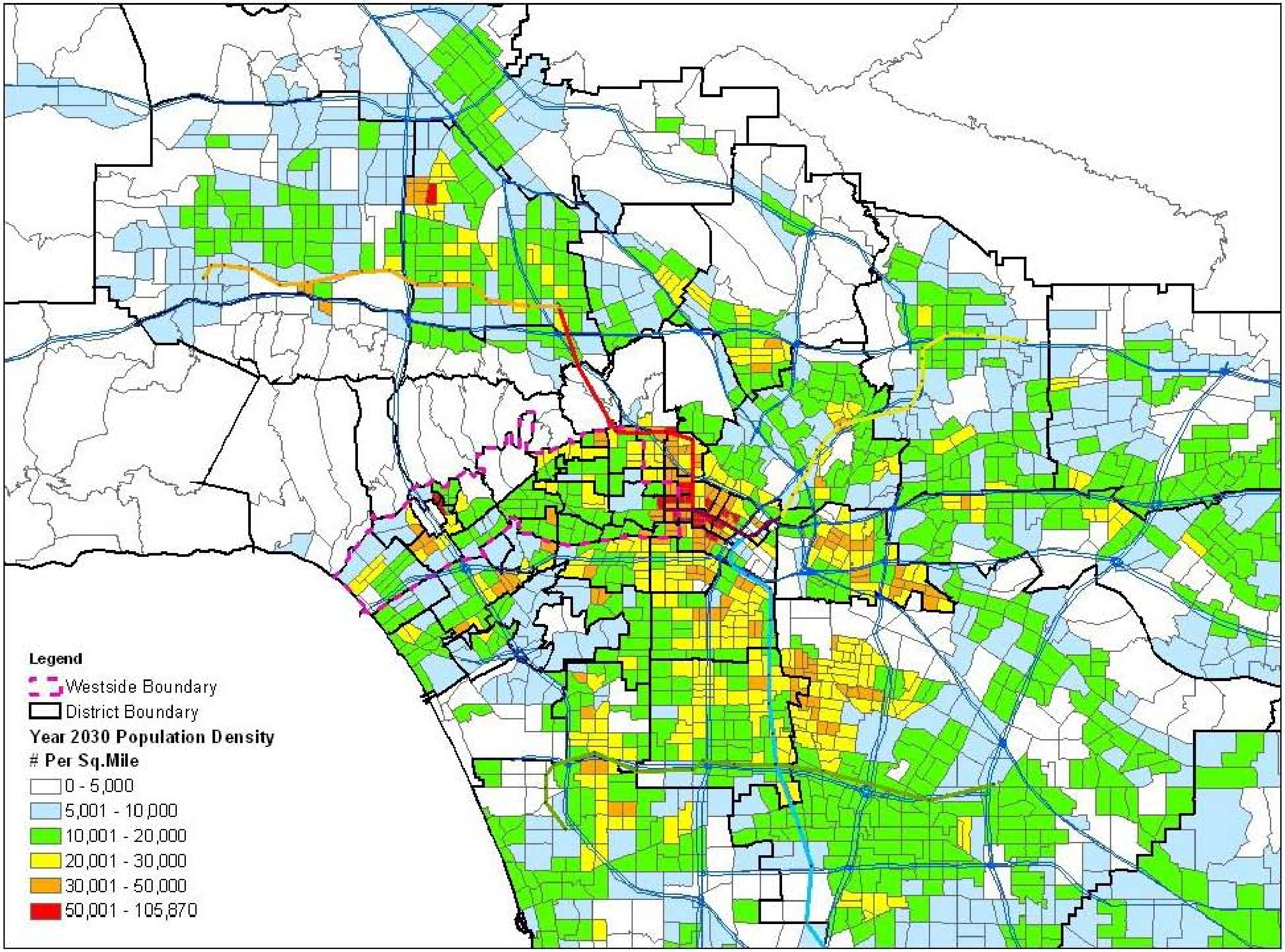


Table 1-15 lists the employment and employment density of each district in the Study Area. In 2006, the Santa Monica North District had the highest number of jobs (62,683), and the UCLA District had the highest employment density of more than 56,000 jobs per square mile. In 2030, the employment density of the UCLA district will be almost 65,000 per square mile.

Table 1-15. Employment and Employment Density by District in Westside Study Area, Year 2006 and Year 2030

District #	District Name	Area, Sq. Mi.	2006 Employment	2006 Employ Density per sq mi	2030 Employment	2030 Employ Density per sq mi
1	Santa Monica N	5.68	62,683	11,028	72,994	12,842
2	Brentwood S	1.77	11,029	6,217	12,795	7,213
3	West LA	1.83	32,169	17,588	36,628	20,026
4	Westwood W	0.60	1,949	3,259	2,611	4,366
5	VA	0.97	13,415	13,787	17,143	17,619
6	UCLA	0.62	35,177	56,829	40,145	64,855
7	Westwood C	0.65	17,945	27,822	20,979	32,526
8	Westwood E	2.04	6,438	3,164	7,909	3,886
9	Westside N	1.94	55,660	28,765	64,306	33,233
10	Beverly Hills N	3.51	3,308	942	5,208	1,483
11	Beverly Hills S	2.16	56,194	26,016	66,568	30,819
12	S Robertson N	1.09	6,112	5,592	7,374	6,747
13	West Hollywood	1.88	31,023	16,502	36,895	19,625
14	Hollywood Hills West S	0.55	2,830	5,136	3,506	6,363
15	Mid City West N	1.74	14,124	8,136	16,665	9,600
16	Mid City West S	2.59	49,289	19,067	56,098	21,701
17	PICO	1.36	4,085	3,015	5,029	3,711
18	Central Hollywood	1.89	33,856	17,932	38,443	20,362
19	Greater Wilshire N	1.11	3,203	2,875	3,910	3,510
20	Greater Wilshire S	2.44	14,798	6,075	17,405	7,145
21	Olympic Park	1.27	5,636	4,455	7,025	5,553
22	Koreatown NW	0.25	1,710	6,840	2,105	8,420
23	Koreatown SW	0.50	16,137	32,339	18,747	37,569
Study Area Subtotal		38.42	478,770	12,463	560,488	14,590
Downtown Los Angeles		1.8	126,738	69,790	142,624	78,537
City of Long Beach		52.4	190,909	3,639	234,976	4,479
City of Pasadena		19.8	96,559	4,877	116,175	5,868
Los Angeles County		3,977	4,644,010	1,168	5,651,043	1,421
Southern California Region		38,503	7,896,942	205	10,387,830	270

Data Source: Metro

The employment density of the Study Area is about 11 times that of Los Angeles County and about 54 times that of the entire region. It is lower than that of Downtown Los Angeles, but it is much higher than that of Long Beach and Pasadena.

Figure 1-29 and Figure 1-30 illustrate the employment density of the whole region by TAZ in 2006 and 2030, respectively. The districts in the Study Area have much higher employment densities than other areas, except downtown Los Angeles and its immediate vicinity. The maps show that the Koreatown area, the Beverly Hills South/Westside area and the UCLA/Westwood area have the highest density of jobs, followed by the Hollywood area, Mid City West district, and the West LA district. Like the areas of concentrated population density, all these areas are along Wilshire, Santa Monica, and Sunset Boulevards. This pattern matches the location of activity centers and land use features discussed previously. Wilshire Boulevard and Santa Monica/Sunset Boulevards have large clusters of both jobs and people. The Study Area is substantially more populous and job rich than other areas in the region except for downtown Los Angeles and the immediate vicinity.

1.7.5 Travel Demand and Patterns

After locating the activity centers and most populous and job rich areas in the Study Area, the next step in the travel market analysis is to identify the major trip-making districts and travel patterns for different trip purposes and time periods. The basic method used is to compress person and transit trips based on TAZs into a district-by-district matrix and then use “Desire Line” diagrams and Geographic Information System (GIS) maps to illustrate the potential markets to be served by the Westside Extension Transit Corridor.

1.7.5.1 Person Trips

In 2006, the Study Area produced about 2.35 million person trips and attracted about 3.28 million person trips daily. These account for about 8.4 percent of all the person trips generated by Los Angeles County as a whole. Table 1-16 shows that, in 2006, 67.8 percent of the trips produced by the Study Area stay within the area, 51.4 percent of trips attracted to the Study Area are from outside, and 56.6 percent of trips start and end within the Study Area. The same trend is observed in 2030 trip tables shown in Table 1-17. As discussed, business, commercial, education and cultural centers are clustered in the Study Area. Not only a high percentage of trips generated from the Study Area stay in the area, but also a substantial number of trips outside are attracted into the Study Area. This pattern is illustrated in Chart 1-3 and Chart 1-4.

Figure 1-31 and Figure 1-32 show the person trips density for those trips classified as “Home-Based Work Peak” in 2006 and 2030, respectively. Figure 1-33 and Figure 1-34 illustrate the person trips density of “All Trip Purposes” for 2006 and 2030. Not surprisingly, the patterns shown in these maps are similar to those indicated for population and employment. In 2006, UCLA leads the Study Area with more than 25,000 person trips per square mile in the Home-Based Work Peak category and more than 280,000 person trips per square mile daily. Outside the Study Area, Los Angeles Downtown has the highest trip density, followed by the vicinity west of Downtown and South of Downtown. In 2030, these districts are expected to continue experiencing the highest trip densities. In the following sections, the potential markets outside the Study Area are discussed first, and then the markets in the Study Area are analyzed.

Figure 1-29. Year 2006 Employment Density

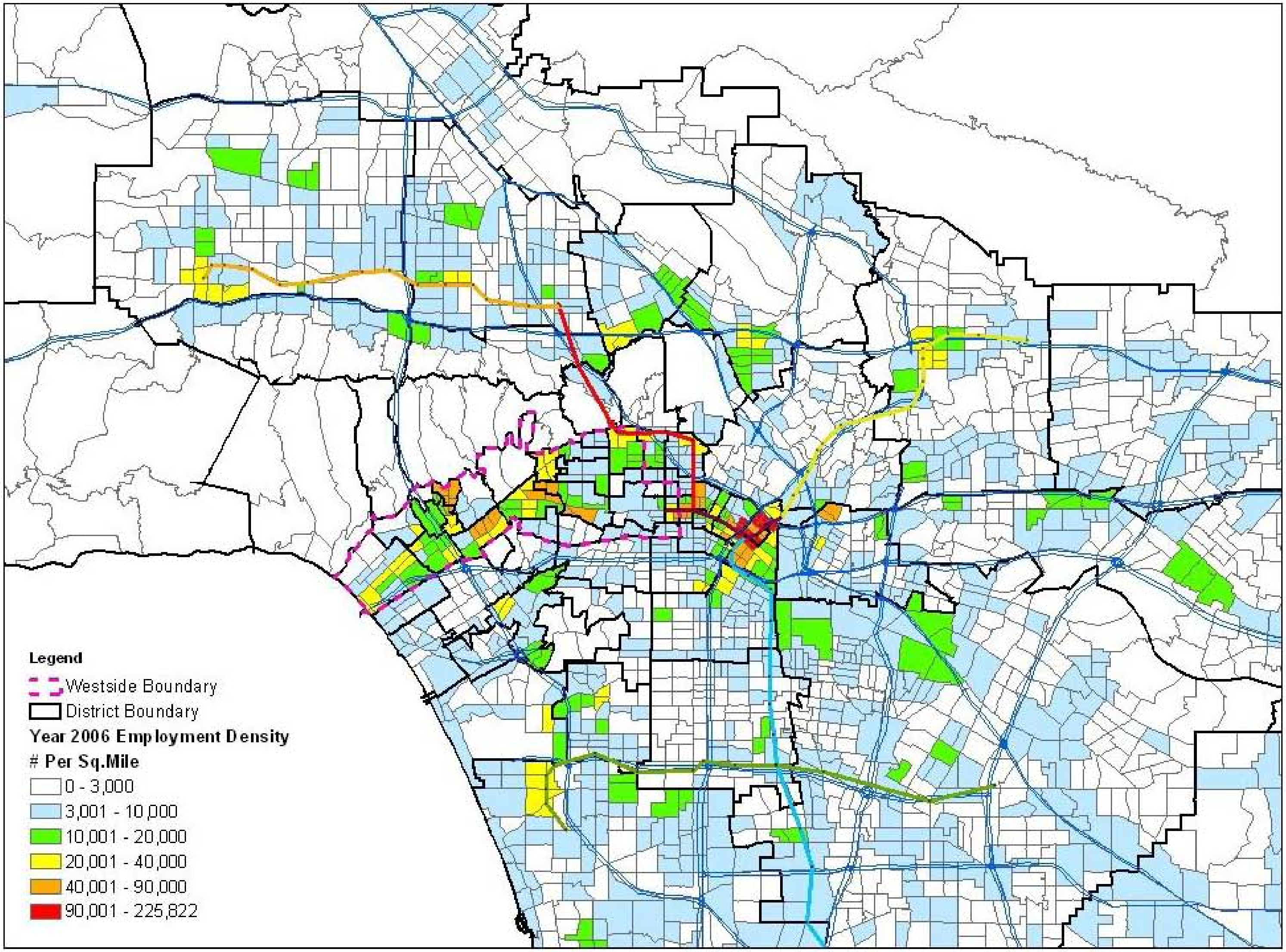


Figure 1-30. Year 2030 Employment Density

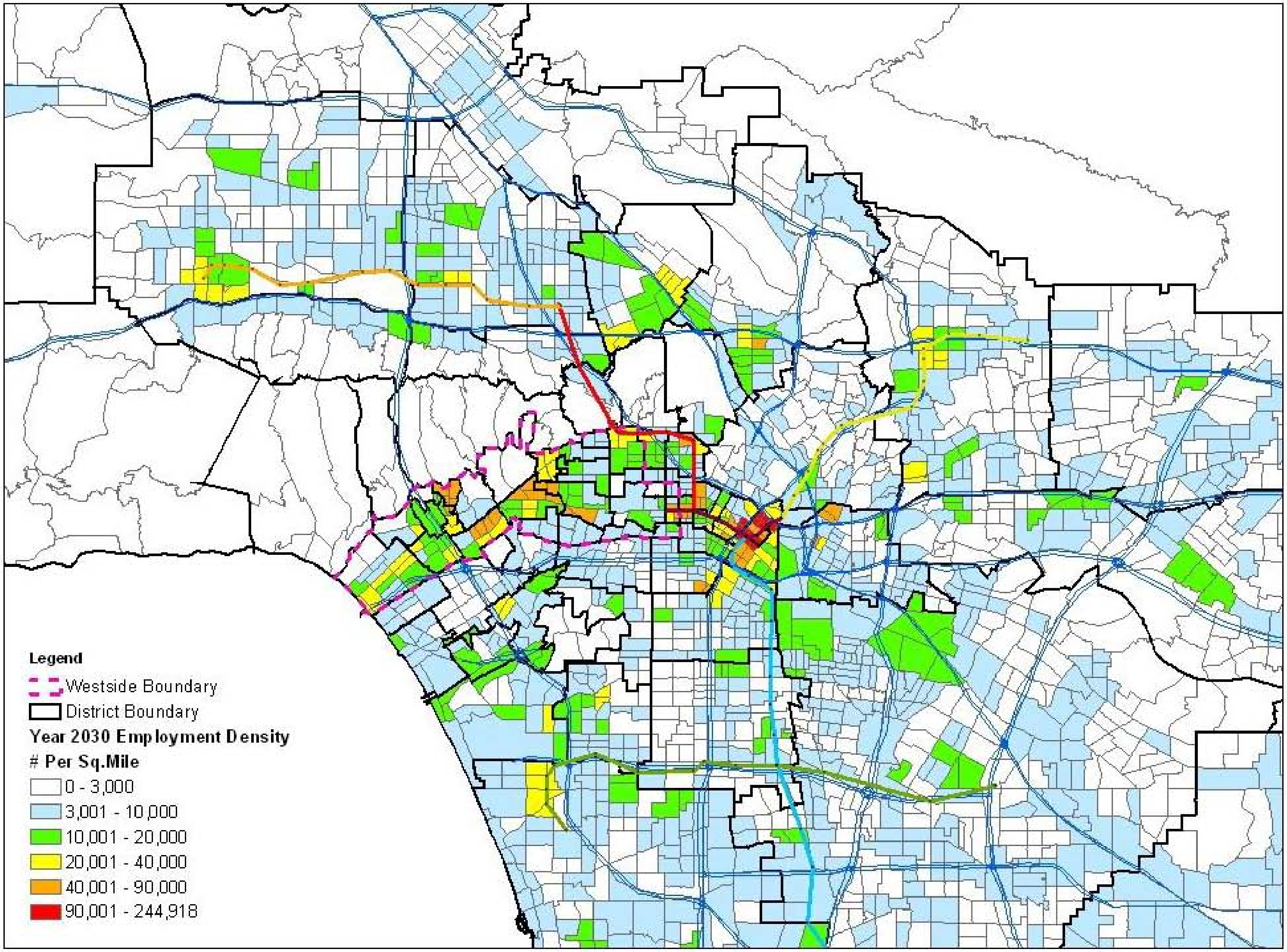


Table 1-16. Year 2006 Person Trips Summary

	Home-Based Work Peak	Home-Based University Peak	Home-Based Other Peak	Non Home-Based Peak	All Purposes Peak	Home Base Work Off-Peak	Home-Based University Off-Peak	Home-Based Other Off-Peak	Non Home-Based Off-Peak	All Purposes Off-Peak	All Purposes Daily
Regional Total Number of Trips	6,655,129	926,546	14,481,535	8,465,947	30,529,157	3,018,680	850,126	14,163,157	10,426,251	28,458,214	58,987,371
Number of Trips Produced by the Study Area	224,615	19,508	403,455	513,088	1,160,666	101,599	17,871	436,859	633,518	1,189,847	2,350,513
Number of Trips Attracted to the Study Area	398,660	34,262	694,564	518,965	1,646,451	179,871	31,548	781,501	641,361	1,634,281	3,280,732
Number of Trips Start and End within the Study Area	87,440	10,589	306,390	333,581	738,000	45,835	8,882	352,543	449,191	856,451	1,594,451
% of Production Trips Stay in the Study Area	38.9%	54.3%	75.9%	65.0%	63.6%	45.1%	49.7%	80.7%	70.9%	72.0%	67.8%
% of Attraction Trips from the Study Area	21.9%	30.9%	44.1%	64.3%	44.8%	25.5%	28.2%	45.1%	70.0%	52.4%	48.6%
% of Trips Start and End within the Study Area	28.1%	39.4%	55.8%	64.6%	52.6%	32.6%	35.9%	57.9%	70.5%	60.7%	56.6%

Data Source: 2006/2030 Metro Person Trip Tables.

Table 1-17. Year 2030 Person Trips Summary

	Home Base Work Peak	Home-Based University Peak	Home-Based Other Peak	Non Home-Based Peak	All Purposes Peak	Home Base Work Off-Peak	Home-Based University Off-Peak	Home-Based Other Off-Peak	Non Home-Based Off-Peak	All Purposes Off-Peak	All Purposes Daily
Regional Total Number of Trips	8,613,660	1,263,951	18,933,680	11,113,744	39,925,035	3,873,908	1,159,597	18,649,212	13,695,078	37,377,795	77,302,830
Number of Trips Produced by the Study Area	258,315	20,970	449,881	590,756	1,319,922	116,740	19,210	491,362	730,793	1,358,105	2,678,027
Number of Trips Attracted to the Study Area	467,868	42,968	794,166	600,522	1,905,524	210,942	39,458	889,859	744,103	1,884,362	3,789,886
Number of Trips Start and End within the Study Area	99,431	11,359	338,973	384,259	834,022	52,265	9,539	389,657	517,021	968,482	1,802,504
% of Production Trips Stay in the Study Area	38.5%	54.2%	75.3%	65.0%	63.2%	44.8%	49.7%	79.3%	70.7%	71.3%	67.3%
% of Attraction Trips from the Study Area	21.3%	26.4%	42.7%	64.0%	43.8%	24.8%	24.2%	43.8%	69.5%	51.4%	47.6%
% of Trips Start and End within the Study Area	27.4%	35.5%	54.5%	64.5%	51.7%	31.9%	32.5%	56.4%	70.1%	59.7%	55.7%

Data Source: 2006/2030 Metro Person Trip Tables.

Chart 1-3. Person Trips Produced by the Westside Study Area, Year 2006 and Year 2030

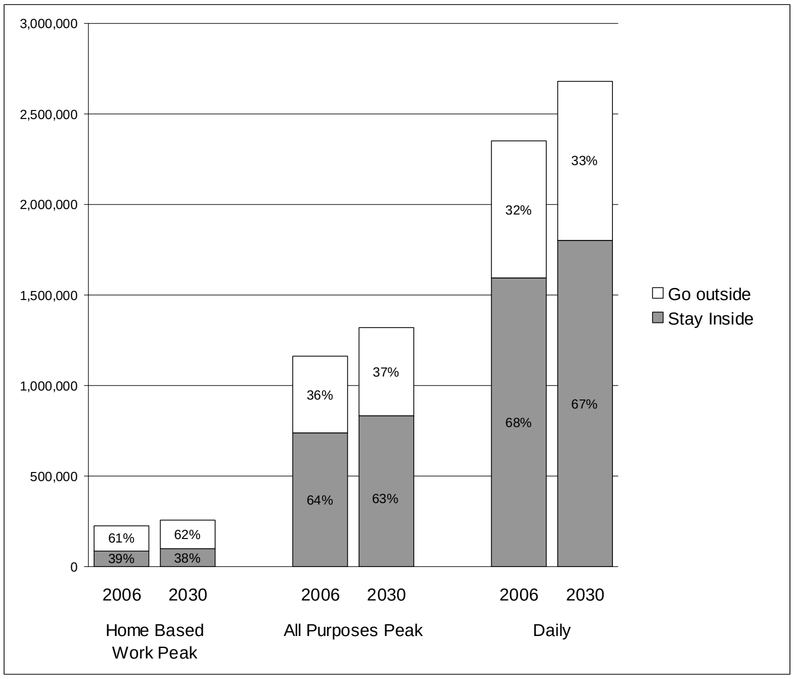


Chart 1-4. Person Trips Attracted by the Westside Study Area, Year 2006 and Year 2030

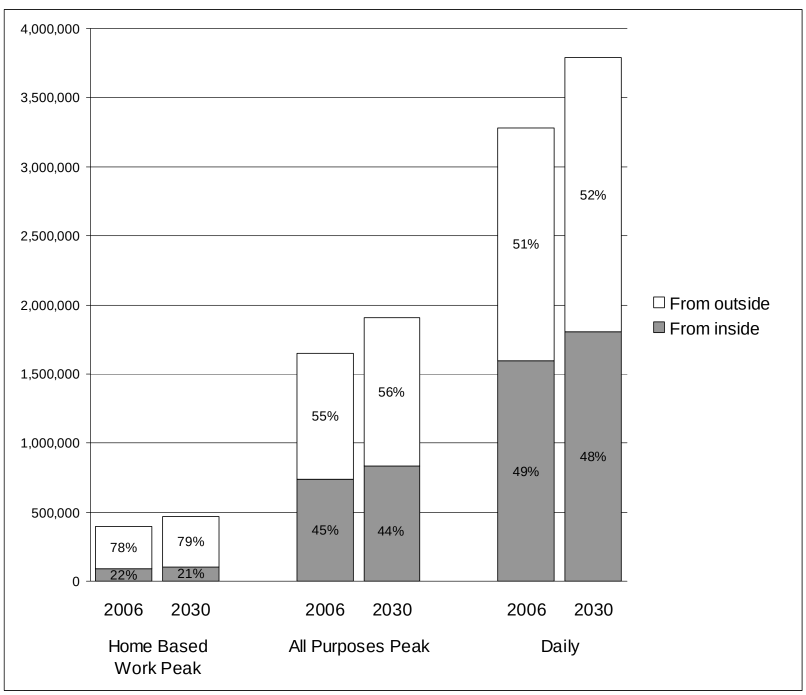


Figure 1-31. Person Trips Density – Home-Based Work Peak Year 2006

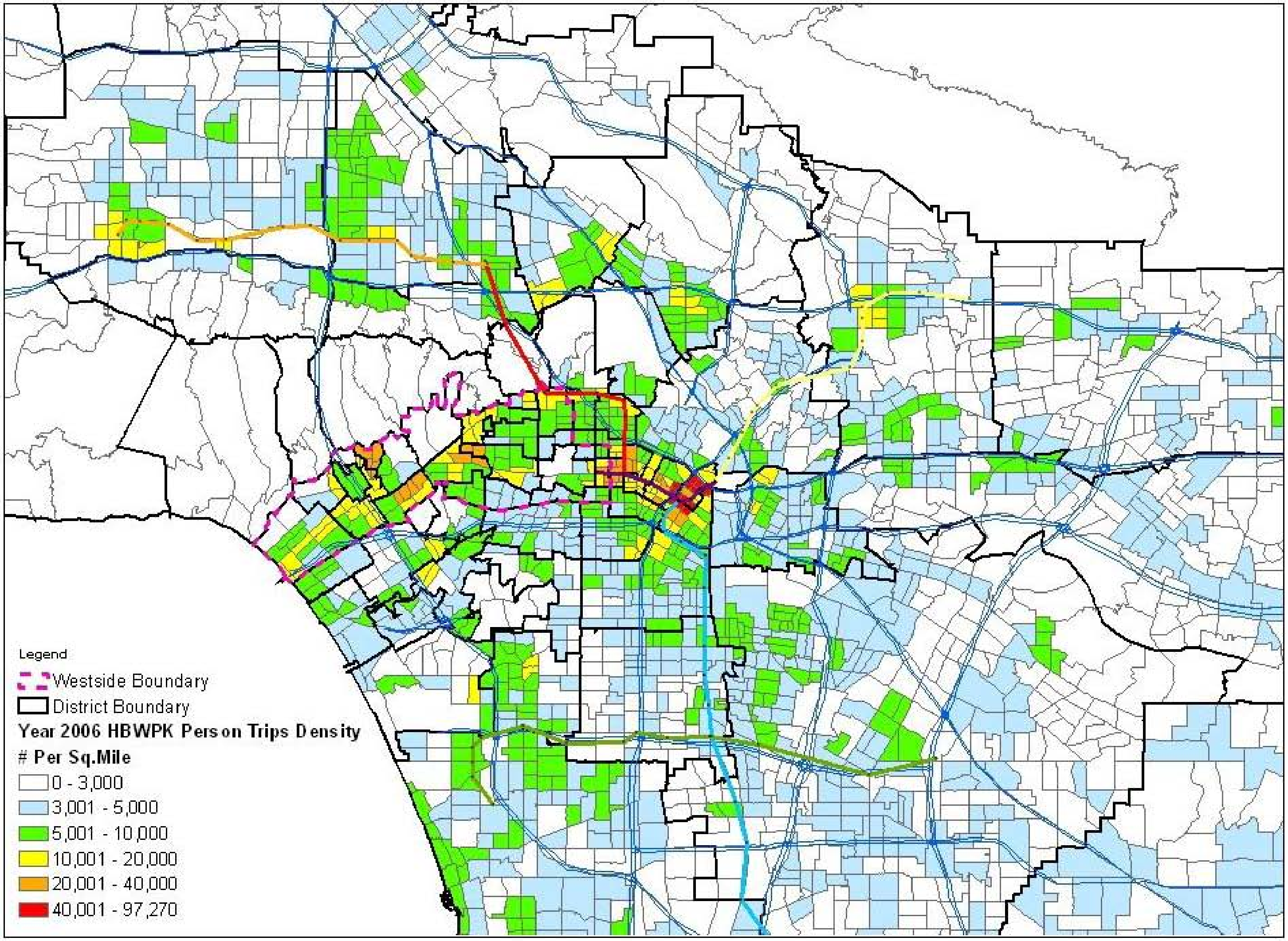


Figure 1-32. Person Trips Density – Home-Based Work Peak Trip Purpose Year 2030

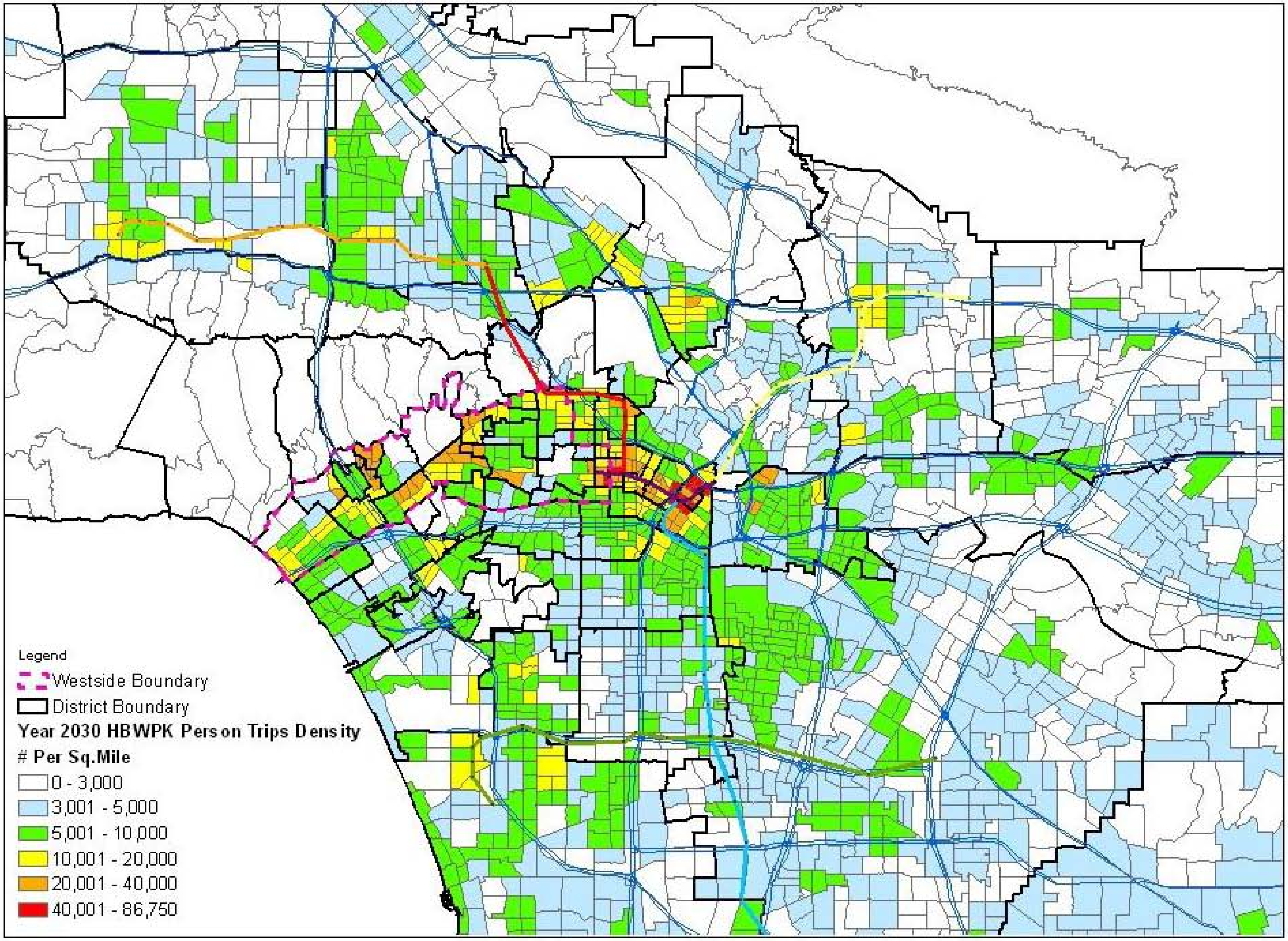


Figure 1-33. Person Trips Density – All Purposes Daily Year 2006

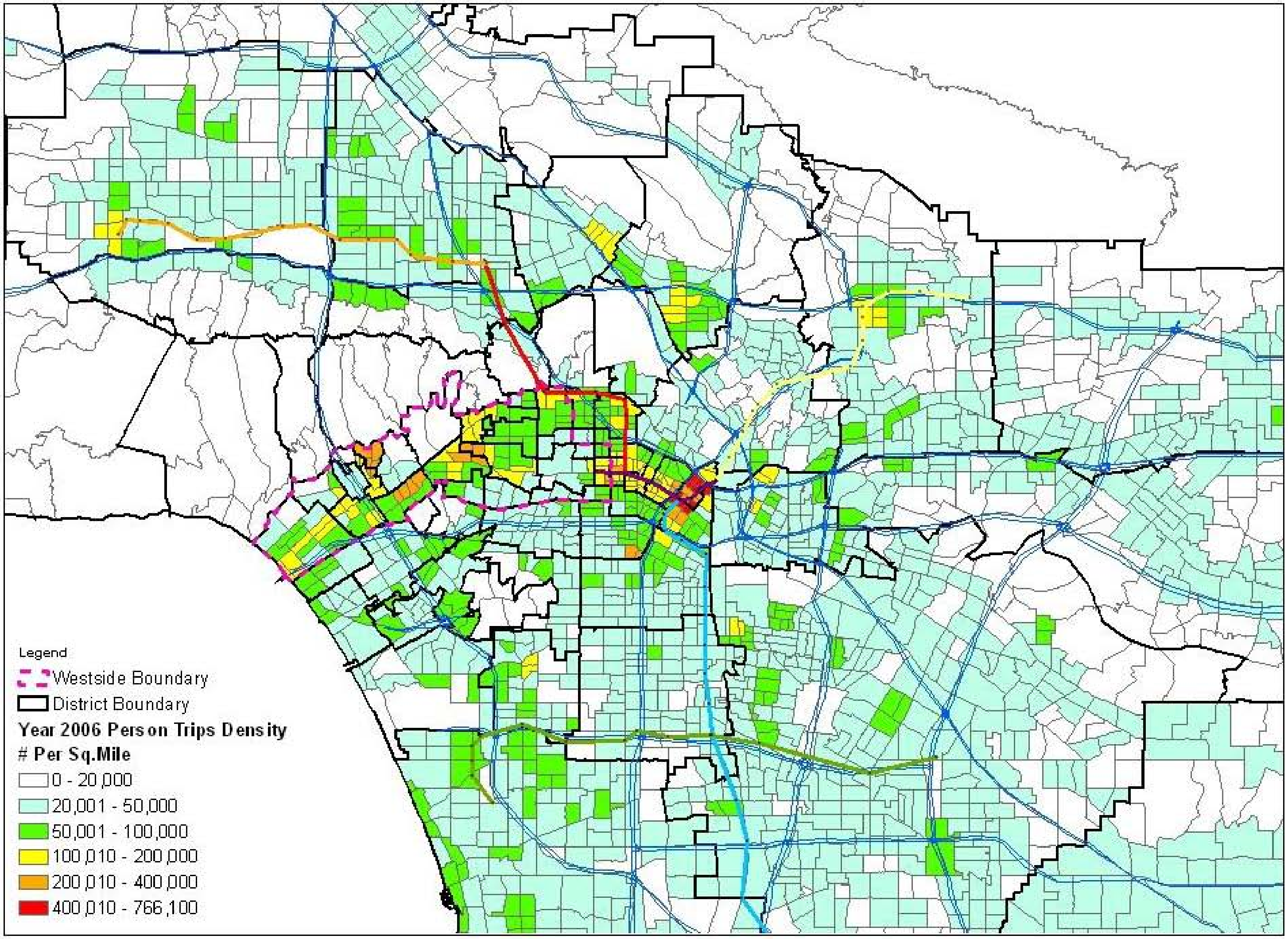
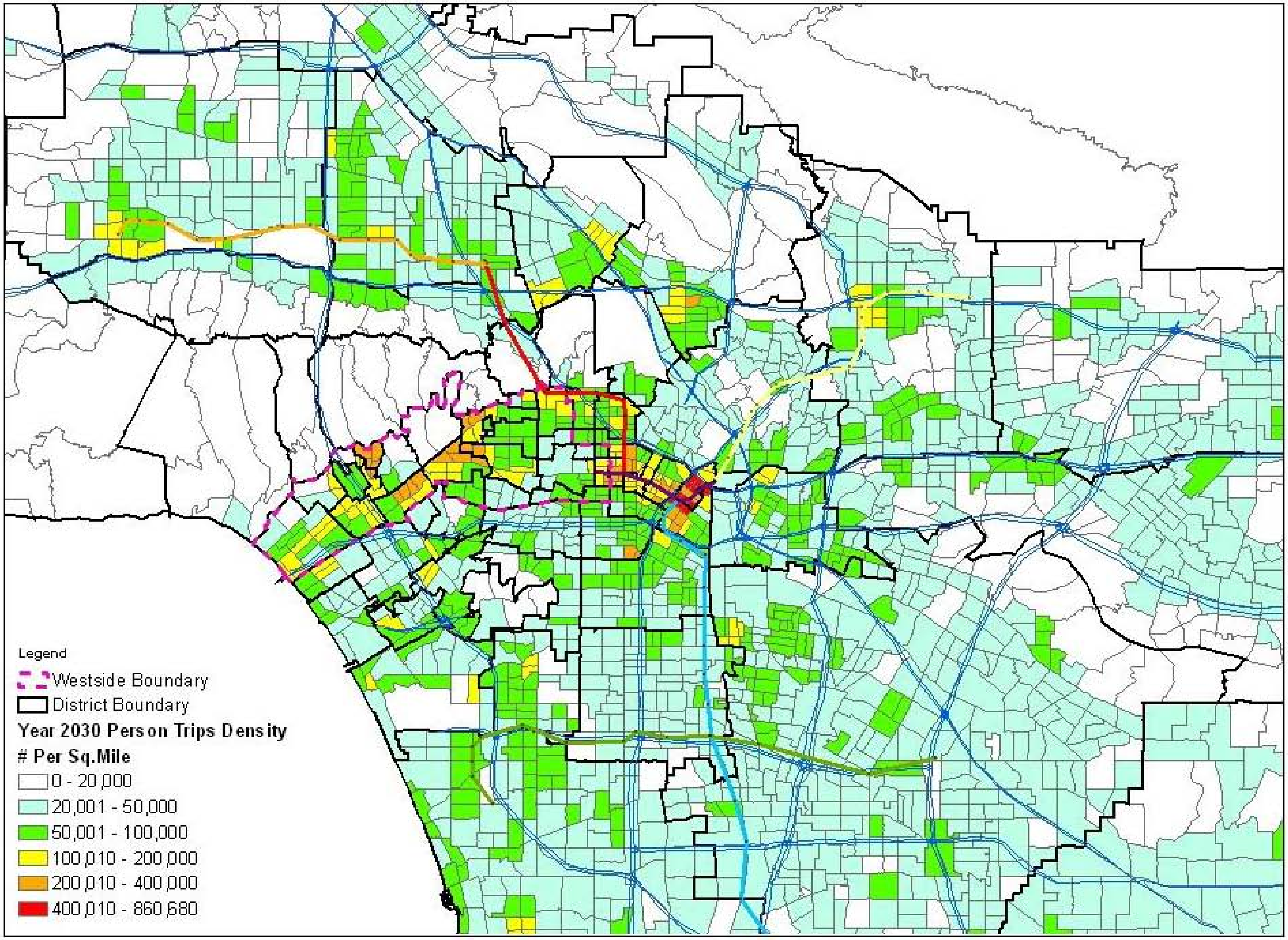


Figure 1-34. Person Trips Density – All Trip Purposes Year 2030



1.7.5.2 Markets Outside the Study Area

The top destination districts outside the Study Area are South Bay, Santa Monica South, Gateway, and Culver City. But as shown in Table 1-18 and Table 1-19 below, each district receives only a small share of trips produced by the Study Area, no more than 2 percent each. Figure 1-35 shows the volume of trips from the Study Area to the districts outside for 2006. Of the 3.28 million trips attracted to the Study Area in 2006, 51 percent or 1.69 million trips originate from outside. The top outside origin districts are South Bay (98,000 trips), Gateway (97,000 trips), North Hollywood (88,000 trips), and Mar Vista (81,000 trips). However, none of these districts have more than a 3 percent share of the total 3.28 million trips.

Table 1-18. Top Destination/Origin Districts for Study Area, Year 2006 Daily Person Trips

Daily	Rank	1	2	3	4	5
Top Districts to Attract Trips Produced by the Study Area	Pct	68%	1.6%	1.5%	1.5%	1.5%
	Trips	1,594,451	37,362	35,318	34,392	34,354
	District Number	1	28	13	29	20
	District Name	Study Area	South Bay	Santa Monica S	Gateway	Culver City
Top Districts to Produce Trips attracted to the Study Area	Pct	49%	3.0%	3.0%	2.7%	2.5%
	Trips	1,594,451	98,021	97,452	88,068	81,125
	District Number	1	28	29	46	14
	District Name	Study Area	South Bay	Gateway	North Hollywood	Mar Vista

Data Source: 2006 Metro Person Trip Tables.

Table 1-19. Top Destination/Origin Districts for Study Area, Year 2030 Daily Person Purposes

Daily	Rank	1	2	3	4	5
Top Districts to Attract Trips Produced by the Study Area	Pct	67%	1.6%	1.6%	1.5%	1.4%
	Trips	1,802,504	43,766	41,552	39,695	38,682
	District Number	1	28	20	29	13
	District Name	Study Area	South Bay	Culver City	Gateway	Santa Monica S
Top Districts to Produce Trips Attracted by the Study Area	Pct	48%	3.0%	2.9%	2.6%	2.5%
	Trips	1,802,504	113,614	110,331	97,048	95,948
	District Number	1	29	28	46	50
	District Name	Study Area	Gateway	South Bay	North Hollywood	North LA

Data Source: 2030 Metro Person Trip Tables.

Figure 1-35. Westside 2006 Daily Person Trips Making Pattern, From the Study Area to Outside Districts

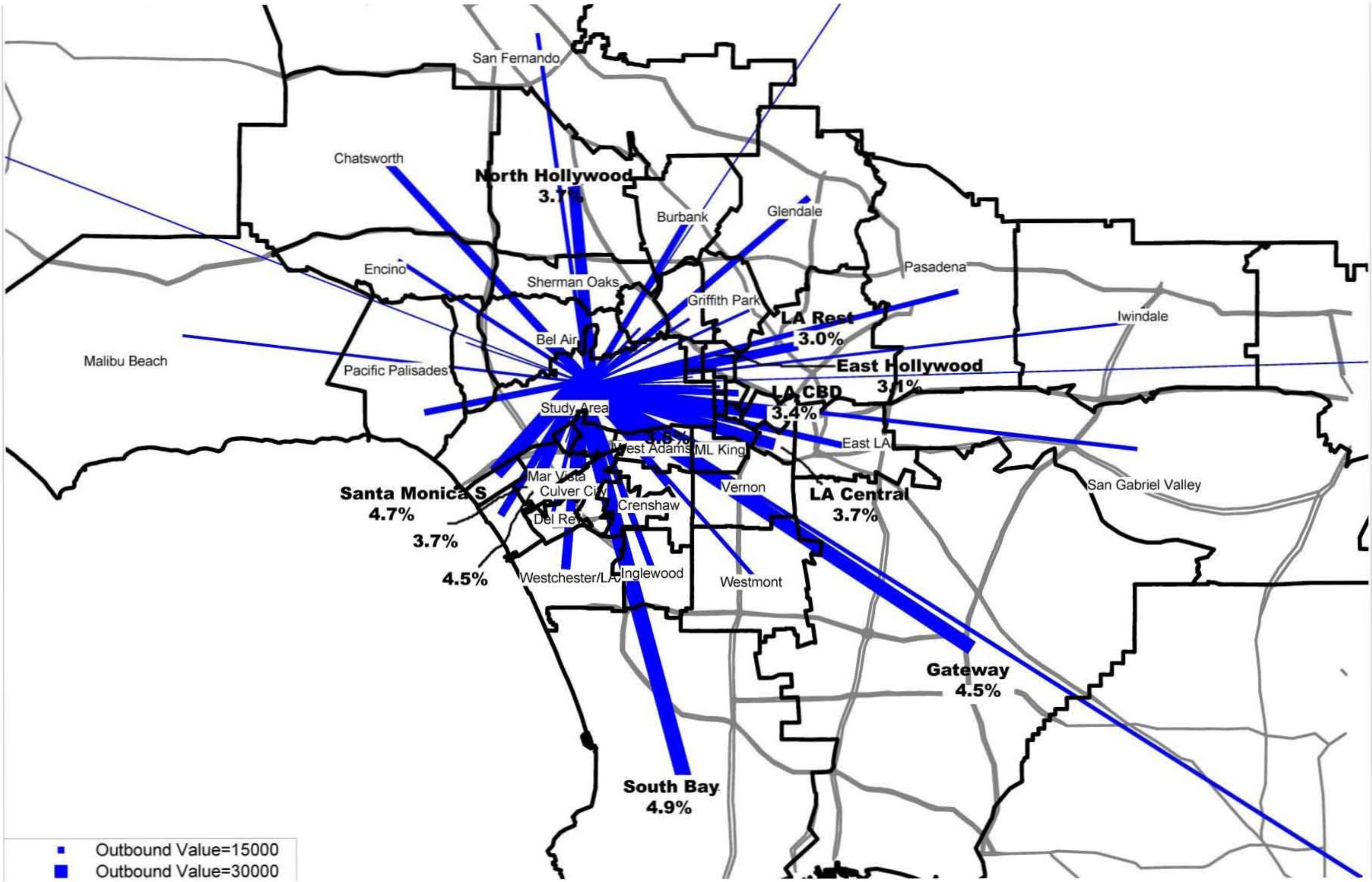


Figure 1-36 shows the 2030 trips from each outside district to the Study Area. The percentage shows each district's share of all the trips from outside to the Study Area. Between 2006 and 2030, the total number of trips to the Study Area is forecasted to increase by 17 percent to 1.98 million outside trips. By the year 2030, 11.3 percent or 224,000 trips will originate in the South Bay and Gateway districts. The trip making between the Study Area and outside districts are concentrated in Home-Based Work and Home-Based University trip purposes. In the east-west direction, Los Angeles CBD, LA Central, North Hollywood, East Hollywood, Culver City, and Santa Monica South attract the most trips from and produce the most trips to the Study Area. In the North-South direction, Gateway, South Bay, North Hollywood, Chatsworth, San Fernando, and North LA districts have the largest interaction with the Study Area accounting for approximately 27 percent or 530,000 of the daily trips destined for the Study Area. For the Home-Based Other and Non Home-Based purposes, most trips remain within the Study Area.

In 2006, the Study Area produced more than 224,000 Home-Based Work Peak purpose trips and attracted almost 400,000 trips. For all the work trips produced by the Study Area, 39 percent stayed in the Study Area. Outside the Study Area, the top work trip destinations are South Bay, Gateway, Los Angeles CBD, and Los Angeles Central, as shown in Table 1-20.

Table 1-20. Top Person Trips Destination/Origin Districts for Study Area, Year 2006 Home-Based Work Peak Trip Purpose

	Rank	1	2	3	4	5
Top Districts to Attract the Trips Produced by the Study Area	Pct	39%	4.8%	4.3%	3.2%	3.2%
	Trips	87,440	10,768	9,633	7,262	7,205
	District Number	1	28	29	11	12
	District Name	Study Area	South Bay	Gateway	LA CBD	LA Central
Top Districts to Produce the Trips Attracted to the Study Area	Pct	22%	5.5%	5.4%	4.8%	3.6%
	Trips	87,440	21,974	21,352	19,246	14,227
	District Number	1	28	29	46	45
	District Name	Study Area	South Bay	Gateway	North Hollywood	Chatsworth

Data Source: 2006 Metro Person Trip Tables

For all the work purpose trips attracted to the Study Area, only 22 percent are from inside the area. This means that many people from outside come to the Study Area for work. The top origin districts in order are South Bay, Gateway, North Hollywood, and Chatsworth.

Changes to Home-Based Work Peak purpose trip patterns are anticipated in 2030 (See Table 1-21). Culver City will replace Los Angeles CBD as the fourth top outside work destination for trips produced by the Study Area. The North Los Angeles district will become the fourth highest origin district producing trips to jobs in the Study Area.

Figure 1-36. Westside 2030 Daily Person Trips Making Pattern, From Outside Districts to the Study Area

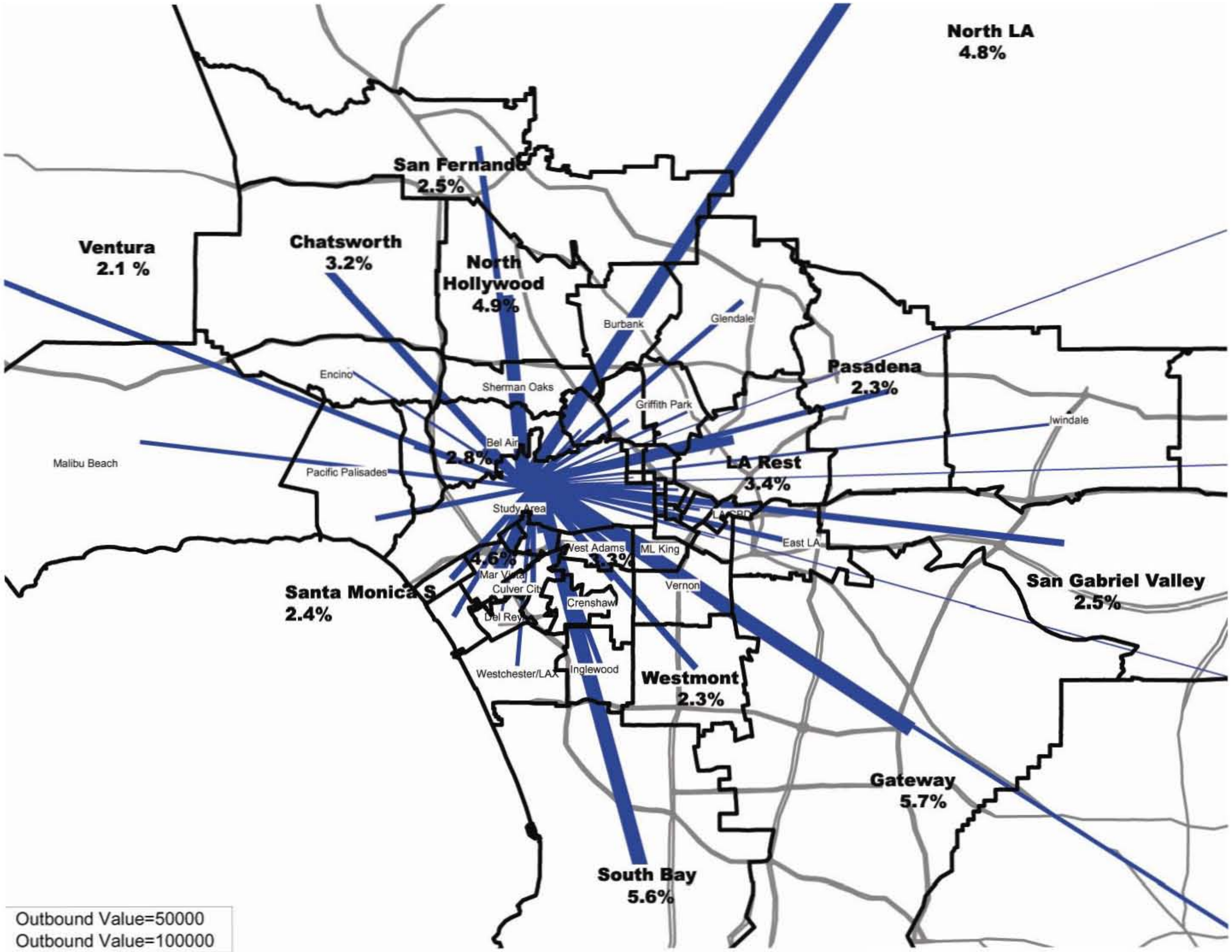


Table 1-21. Top Person Trips Destination/Origin Districts for Study Area, Year 2030 Home-Based Work Peak Trip Purpose

	Rank	1	2	3	4	5
Top Districts to Attract the Trips Produced by the Study Area	Pct	38%	5.0%	4.5%	3.0%	2.6%
	Trips	99,431	12,972	11,538	7,627	6,828
	District No.	1	28	29	20	12
	District Name	Study Area	South Bay	Gateway	Culver City	LA Central
Top Districts to Produce the Trips Attracted by the Study Area	Pct	21%	5.4%	5.3%	5.2%	4.5%
	Trips	99,431	25,426	24,818	24,444	21,232
	District No.	1	28	29	50	46
	District Name	Study Area	South Bay	Gateway	North LA	North Hollywood

Data Source: 2030 Metro Person Trip Tables

Most residential neighborhoods in the Study Area are affluent communities with very high housing or renting costs. Although job opportunities are plentiful, many individuals cannot afford to live in the Study Area and need to commute from other areas such as South Bay, Gateway, Chatsworth, and North Los Angeles.

1.7.5.3 Markets Inside the Study Area

In 2006, almost 1.6 million person trips started and ended inside the Study Area. The four top districts to produce and attract trips are Santa Monica North, Beverly Hills South, Mid City South and Westside North. These four districts have a 38 percent share of all the trips produced by the Study Area and 44 percent share of all the trips attracted to the Study Area. For more details, see Table 1-22 below:

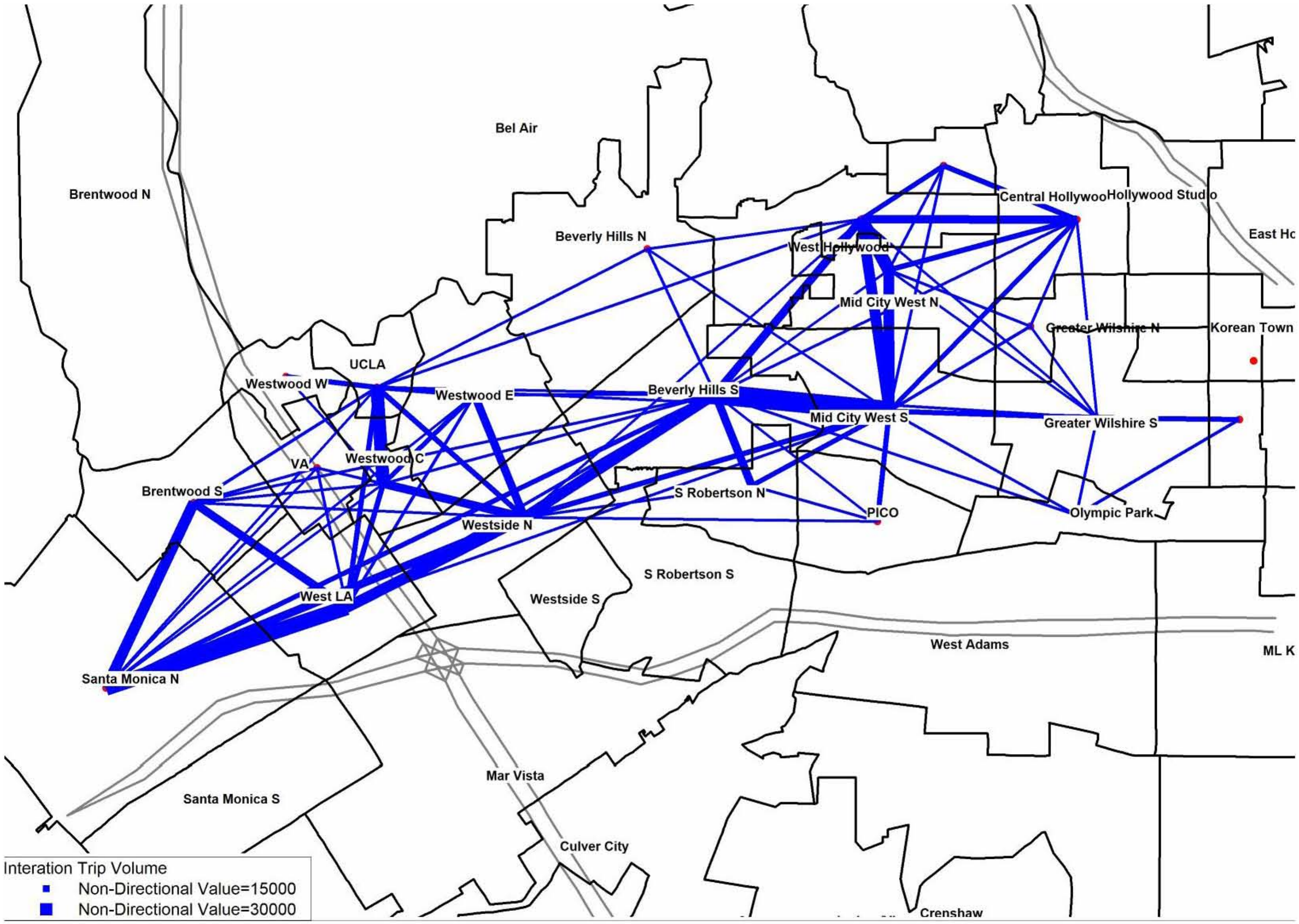
Table 1-22. Top Production and Attraction Districts within the Study Area, All Trip Purposes

	2006 Production	2006 Attraction	2030 Production	2030 Attraction
Santa Monica N	310,996	431,223	345,415	491,704
Beverly Hills S	201,020	364,504	233,915	428,853
Mid City S	210,128	315,239	240,504	358,089
Westside N	175,432	323,968	202,523	376,887
Study Area	2,350,513	3,280,732	2,678,027	3,789,886
% of the Top 4 districts	38.1%	43.7%	38.2%	43.7%

Data Source: 2006 and 2030 Metro Person Trip Tables.

Figure 1-37 shows the daily trip-making patterns within the Study Area for all trip purposes in 2006. It illustrates the major trip-making corridor in the Study Area is: Santa Monica N – West LA – Westside N – Beverly Hills S – Mid City West S. Two shorter corridors with high trip activities are: West Hollywood – Mid City West S and UCLA – Westwood C. The trip-making in 2030 has a very similar pattern as shown in 2006. The major person trip markets for the Home-Based Work trip

Figure 1-37. 2006 Person Trips Making Pattern within the Study Area for All Trip Purposes



purpose are Santa Monica N, West Hollywood, Mid City West S, Westside N, and Beverly Hills S. For the Home-Based University Purposes, the major markets are UCLA, Westwood C, Santa Monica N and Greater Wilshire S. For the Home-Based Other purpose, the major markets are Santa Monica, Mid City West S, West Hollywood, Greater Wilshire S, Beverly Hills S, and Mid City West S. The major markets for the Non Home-Based purpose are: Santa Monica N, Beverly Hills S, Westside N and Mid City West S. All these major markets are located somewhere along the Wilshire Boulevard Corridor except West Hollywood. The “Desire Line” trip making pattern diagrams also show the Wilshire corridor is the dominant trip-making corridor in the Study Area.

For the Home-Based Work Peak trip purpose, in 2006, Santa Monica N produced the most trips with more than 28,000 trips, followed by West Hollywood with more than 19,000 trips and Mid City West S with 18,750 trips. On the attraction side, Santa Monica N is the leading attraction district with more than 51,000 trips. Other districts that attracted more than 40,000 trips are (in order): Beverly Hills S, Westside N and Mid City West S. Figure 1-38 shows the 2006 Home-Based Work Peak purpose trip-making patterns in the Study Area. The most trip-intensive corridor is Santa Monica N – West LA – Westside N – Beverly Hills S – Mid City West S, which is generally along Wilshire Boulevard. Trip making between West Hollywood and Mid City West S and between West Hollywood and Beverly Hills S are also significant.

In 2030, the leading production and attraction districts are the same as those of 2006. The most trip-intensive corridor is Santa Monica N – West LA – Westside N – Beverly Hills S – Mid City West S, along Wilshire Boulevard. Other notable origin/destination pairs with high trip activity are between Brentwood S and Santa Monica N, between West Hollywood and Central Hollywood, and between West Hollywood and Mid City West S.

1.7.5.4 Transit Trips

The Westside Study Area is one of the largest transit markets in the region. Its population is 5 percent of Los Angeles County, its employment is 10 percent of the county, and its person trips are 8 percent of the county. A large share of LA County transit trips, 17 percent, are taken within the Study Area. Figure 1-39 and Figure 1-40 show the transit trip density for the Home-Based Work Peak trip purpose in 2006 and 2030, respectively. Figure 1-41 and Figure 1-42 illustrate the transit trip density for all trip purposes in 2006 and 2030, respectively. These maps indicate that the districts in the Study Area have a much higher transit trip density than the other areas in the region except downtown Los Angeles and its immediate vicinity.

As discussed in this chapter, the Study Area has a higher population and employment density than most other areas in Los Angeles County and the region. Transit is also more accessible in the Study Area than most other areas in the region. Thus, the utilization of transit services is much higher in the Study Area than in the remaining parts of the region, except Downtown and the Central Los Angeles area. Table 1-23 lists the transit share of person trips by district in the Study Area. For all trip purposes, the Study Area has a 6.9 percent transit share of all person trips in 2006 and an expected 7.3 percent transit share in 2030, which is more than double the percentages of Los Angeles County and the region. For the Home-Based Work Peak trip purpose, the transit share of person trips in the Study Area is 16.4 percent in 2006 and is expected to reach 17.4 percent in 2030, both of which are much higher than those of Los Angeles County and the region.

Figure 1-38. Year 2006 Person Trips Making Pattern within the Study Area for Home-Based Work Peak Trips

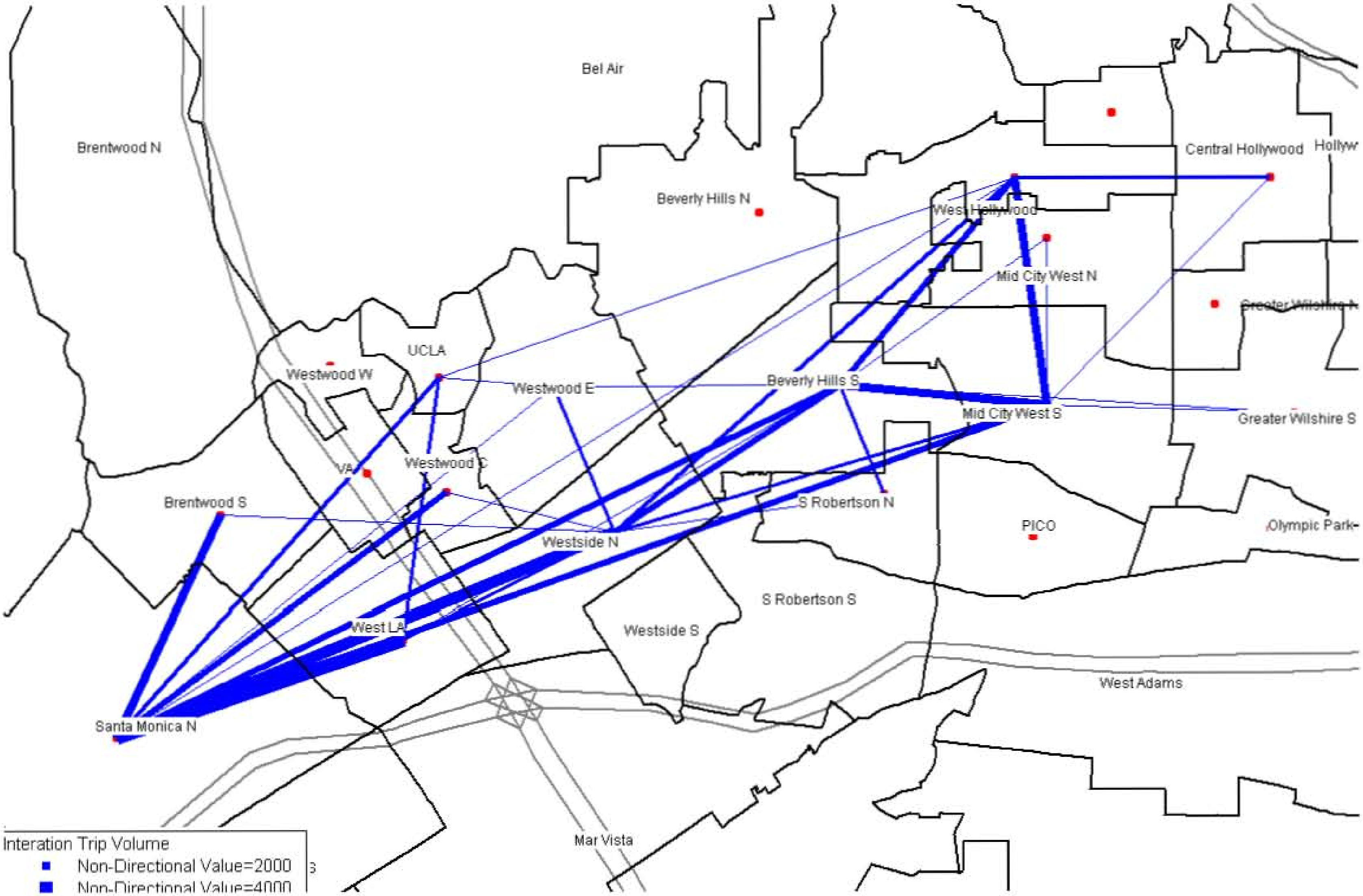


Figure 1-39. Transit Trips Density – Home-Based Work Peak Trips Year 2006

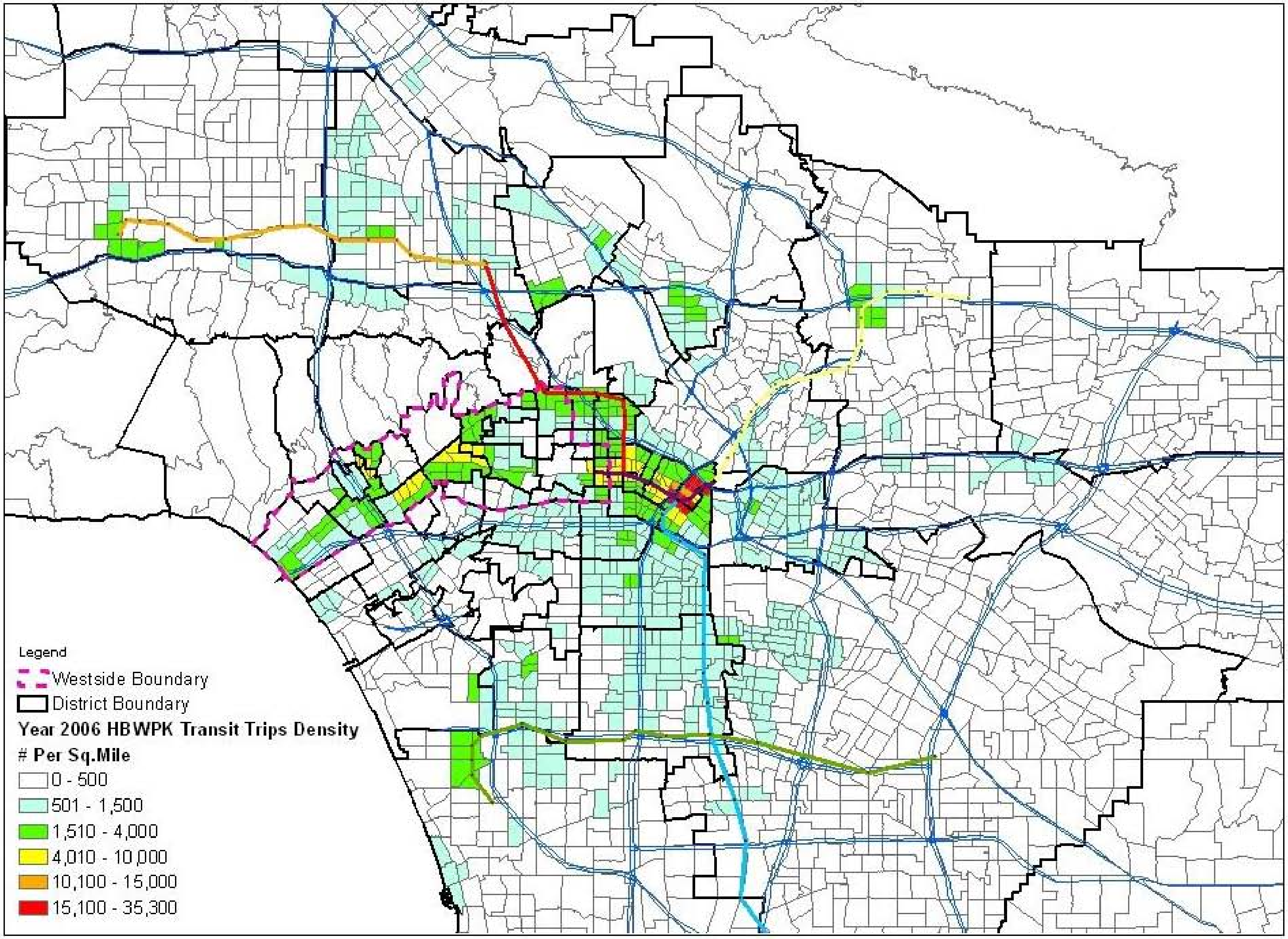


Figure 1-40. Transit Trips Density – Home-Based Work Peak Trips Year 2030

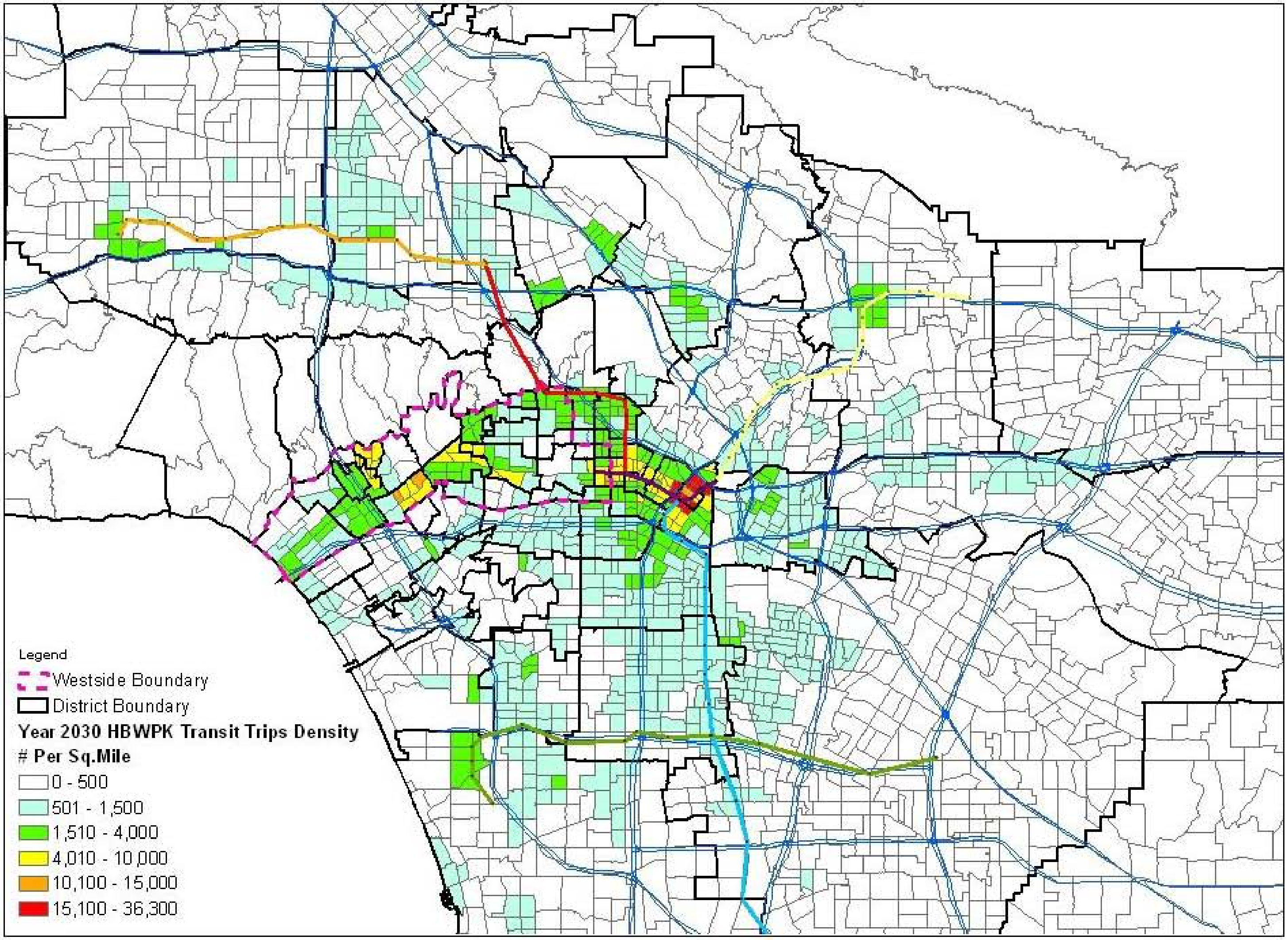


Figure 1-41. Transit Trips Density – All Purposes Daily Year 2006

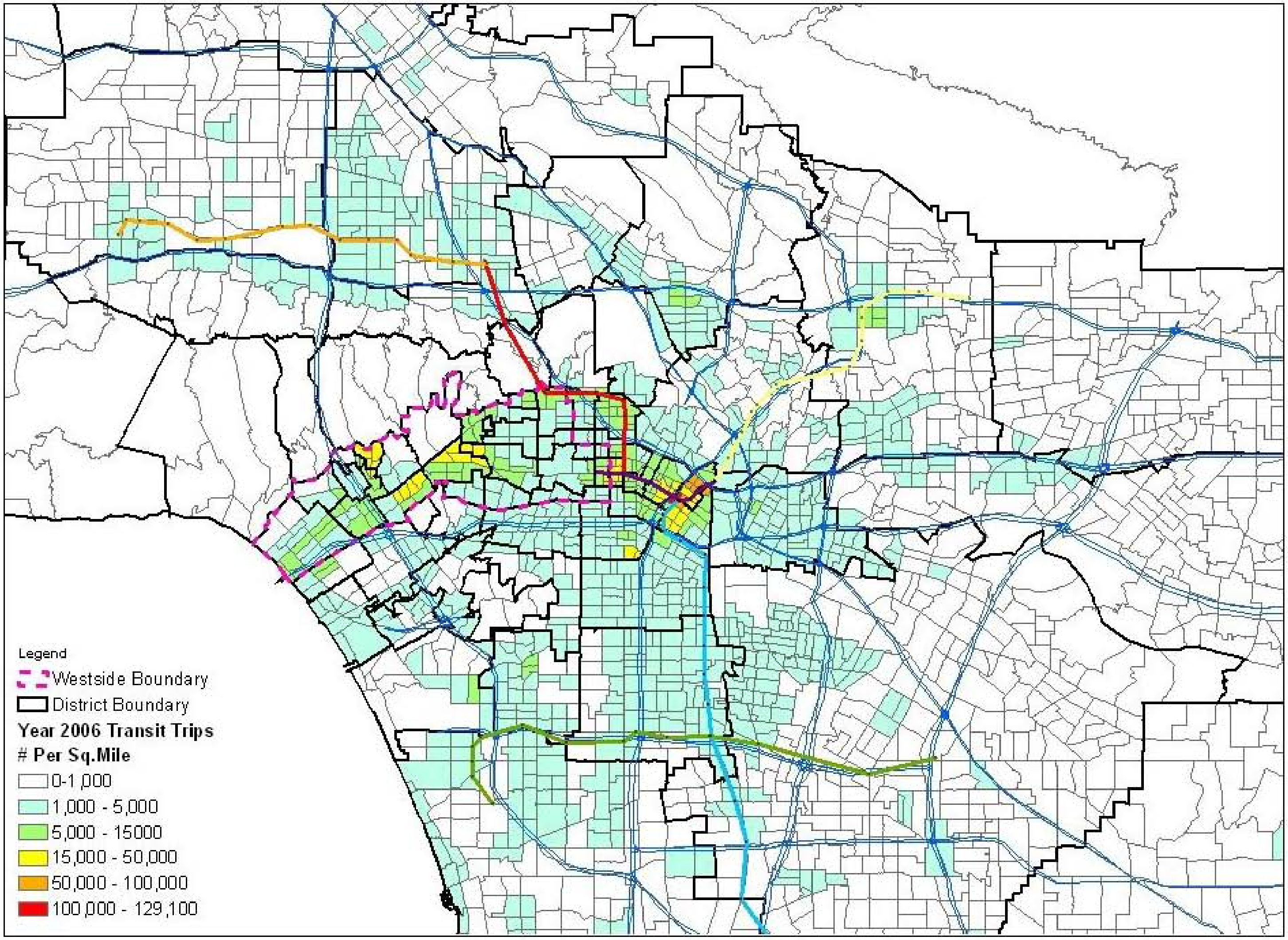


Figure 1-42. Transit Trips Density – All Purposes Daily Year 2030

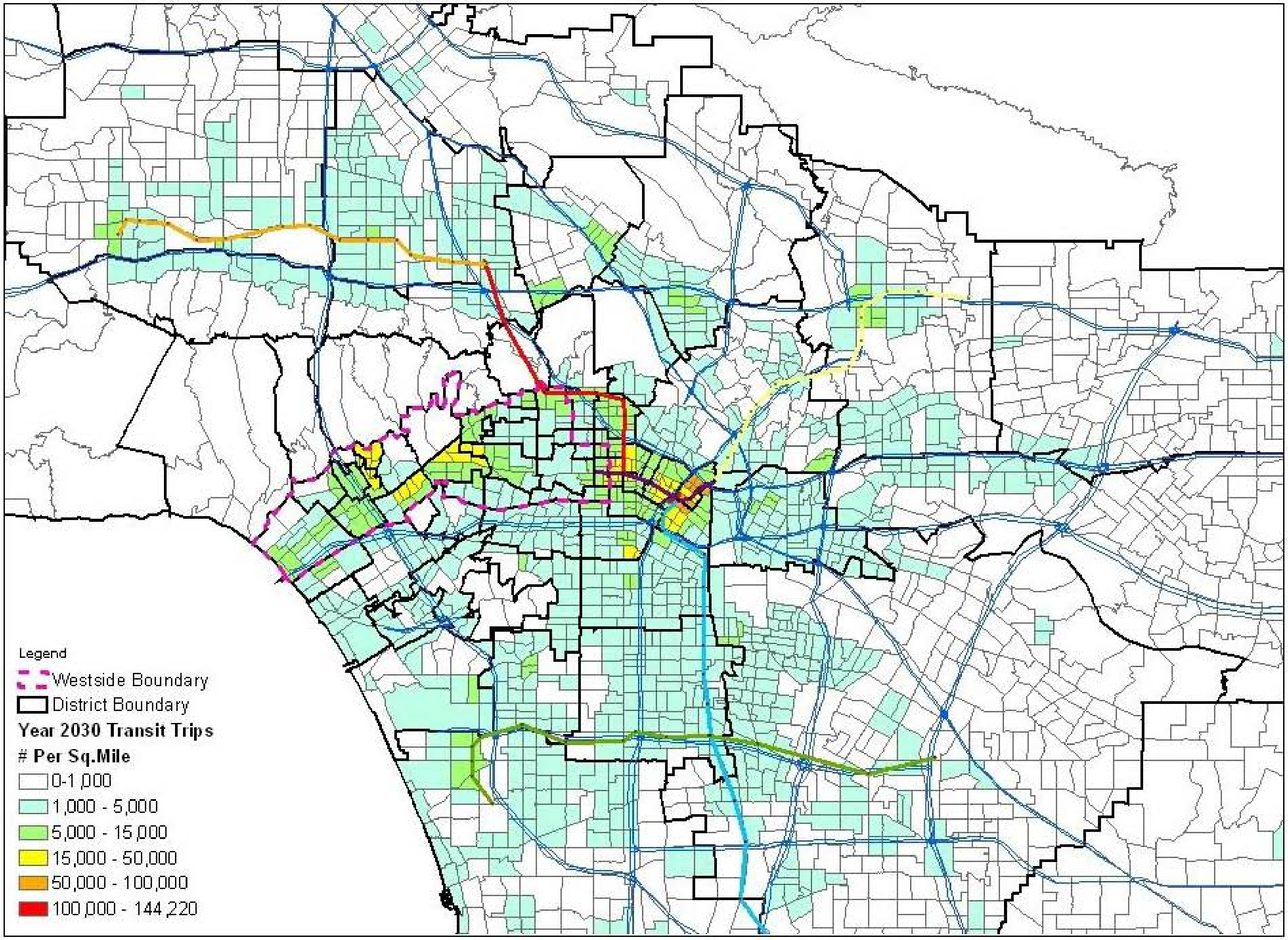


Table 1-23. Transit Share of Person Trips by District, Year 2006 and Year 2030

District#	District Name	All Purposes 2006	All Purposes 2030	Home-Based Work Peak 2006	Home-Based Work Peak 2030
1	Santa Monica N	5.3%	5.8%	13.2%	14.3%
2	Brentwood S	5.3%	6.0%	11.3%	12.0%
3	West LA	6.5%	7.1%	15.4%	16.5%
4	Westwood W	8.0%	8.6%	21.5%	22.2%
5	VA	8.4%	9.2%	22.9%	25.2%
6	UCLA	8.8%	9.0%	15.1%	15.7%
7	Westwood C	9.1%	9.5%	19.6%	20.5%
8	Westwood E	5.2%	5.5%	8.7%	9.3%
9	Westside N	9.7%	10.7%	25.0%	28.4%
10	Beverly Hills N	1.8%	1.8%	4.0%	3.8%
11	Beverly Hills S	8.9%	9.3%	21.9%	22.9%
12	S Robertson N	4.8%	5.1%	9.2%	9.5%
13	West Hollywood	6.0%	6.3%	14.9%	15.9%
14	Hollywood Hills West S	5.6%	5.5%	12.9%	11.8%
15	Mid City West N	3.6%	3.7%	9.0%	9.0%
16	Mid City West S	8.1%	8.4%	18.3%	18.8%
17	PICO	4.8%	5.1%	9.8%	10.0%
18	Central Hollywood	5.7%	5.7%	16.4%	16.4%
19	Greater Wilshire N	3.6%	3.8%	7.2%	7.0%
20	Greater Wilshire S	6.3%	6.6%	15.3%	15.0%
21	Olympic Park	5.6%	5.9%	15.7%	15.7%
22	Koreatown NW	5.8%	5.7%	17.6%	16.4%
23	Koreatown SW	8.3%	8.5%	20.8%	21.0%
	Study Area	**6.9%**	**7.3%**	**16.4%**	**17.4%**
	Los Angeles County	**3.5%**	**3.4%**	**9.6%**	**9.4%**
	Whole Region	**2.4%**	**2.2%**	**6.9%**	**6.4%**

Data Source: 2006 Model Refinement (8/22/2007) and 2030 No Build (10/18/2007)

However, transit usage in the Westside Study Area is still restricted by the limited capacity of the transit system. As discussed previously, the bus routes serving the Study Area are heavily loaded and the vehicle speed of these buses are declining as traffic congestion increases.

Figure 1-43 and Figure 1-44 demonstrate the transit share of person trips by district for the Home-Based Work Peak trip purpose and All Trip Purposes in 2006, respectively. These maps show that transit utilization is higher in the Study Area, especially along Wilshire Boulevard and Santa Monica Boulevard, than in most other areas of the region. Other districts with high transit utilization are along the Metro Rail Lines and Harbor Freeway which has exclusive bus lanes. This trend will continue through 2030.

Figure 1-43. Transit Share of Person Trips - Home-Based Work Peak Trip Purpose Year 2006

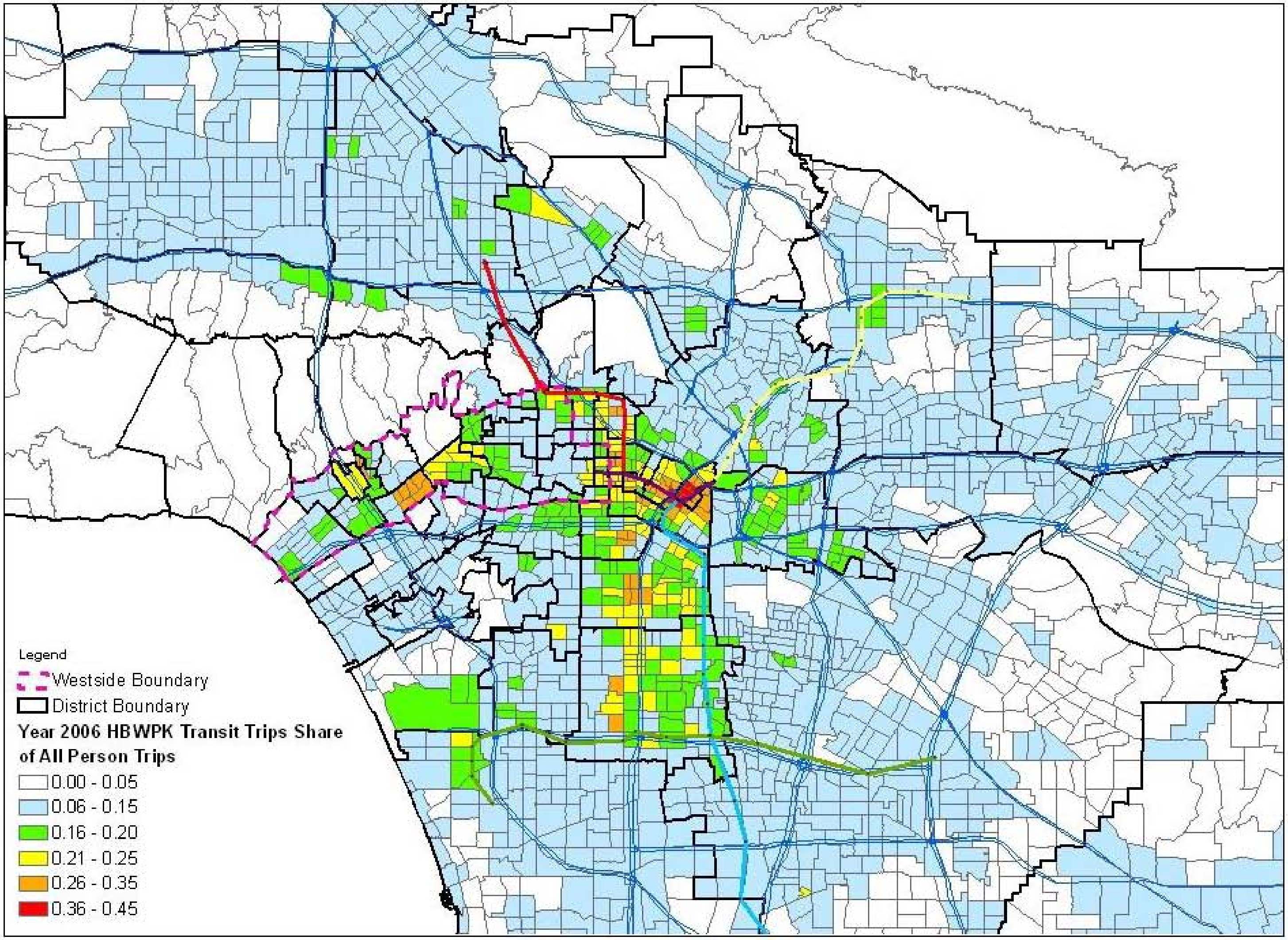
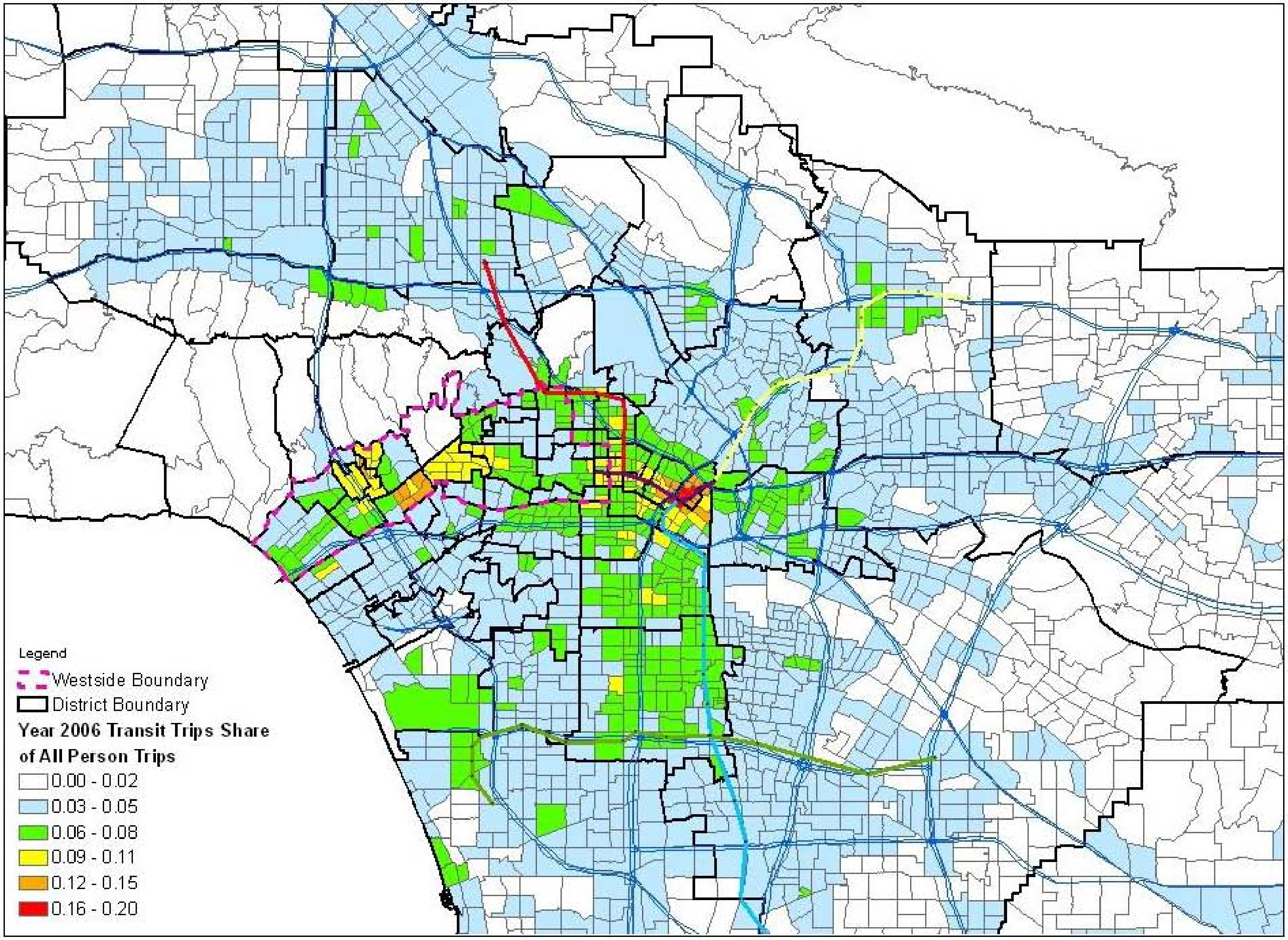


Figure 1-44. Transit Share of Person Trips – All Trip Purposes Year 2006



In 2006, the Study Area produced approximately 116,000 daily transit trips and attracted about 270,000 transit daily trips. Approximately 64.4 percent of transit trips produced by the Study Area stayed inside and 27.7 percent of transit trips attracted to the Study Area were from outside (See Table 1-24). Like the person trips, most transit trips produced by the Study Area had destinations inside the Study Area and at the same time, the Study Area was also the destination for many transit trips from other areas. In 2030, the Study Area is expected to produce about 137,000 transit trips and attract approximately 333,000 trips to the Study Area (See Table 1-25).

Among all trip purposes in the Study Area, Home-Based Work and Home-Based University trip purposes exhibit the two highest transit shares. As shown in the tables below, for the Home-Based Work purpose, the transit share is about 10 percent of total person trips on the production side and about 20 percent on the attraction side for the Study Area. The transit share for Home-Based University person trips is even higher in the Study Area with the data indicating about 20 percent of the production and almost 30 percent of the attraction trips in the peak period. The Home-Based Other trip purpose also has significant market share within the Study Area. Compared with the 2 percent transit share in the region, 5 to 8 percent of person trips in the Study Area are taken on transit for this purpose.

The following sections discuss and analyze the transit markets outside and inside the Study Area.

1.7.5.5 Markets Outside the Study Area - Transit

Los Angeles CBD and Los Angeles Central are the top outside destination districts with about 5,900 (5 percent) and 5,000 (4 percent) transit trips daily, respectively, in 2006. They are the top destinations for Home-Based Work, Home-Based Other and Non Home-Based trip purposes. For Home-Based University trips, the top destinations outside the Study Area are Santa Monica South and East Hollywood, where Santa Monica College and Los Angeles Community College are located, respectively. Gateway and South Bay are the top origin districts outside the Study Area for most purposes. In 2006, Gateway produced about 18,000 daily transit trips (7 percent) to the Study Area and South Bay produced about 12,000 daily transit trips (5 percent) to the Study Area. 2030 is anticipated to have similar transit trip-making patterns as 2006 for top production/attraction districts outside the Study Area.

1.7.5.6 Markets Inside the Study Area - Transit

Chart 1-5 to Chart 1-8 below indicate that in both 2006 and 2030, Santa Monica N, Mid City West S, and Central Hollywood are the top districts in the Study Area for producing transit trips, while Westside N, Beverly Hills S, and Mid City West S are the leading districts in attracting transit trips.

In 2006, for the Home-Based Work Peak trip purpose, the top districts producing transit trips are Central Hollywood, Greater Wilshire S and Koreatown SW. The top districts attracting transit trips are Westside N, Beverly Hills S and Mid City West. In 2030, it is estimated that the top districts to produce the trips inside the Study Area will be Central Hollywood, Santa Monica N, Greater Wilshire S, Koreatown, and UCLA. The top destination districts for this trip purpose will be Westside N, Beverly Hills S and Mid City West S. Table 1-26 and Table 1-27 display the number of trips produced and attracted by these top districts.

Table 1-24. Transit Trips by Purpose, Year 2006

	Home-Based Work Peak	Home-Based University Peak	Home-Based Other Peak	Non Home-Based Peak	All Purposes Peak	Home-Based Work Off-peak	Home-Based University Off-peak	Home-Based Other Off-Peak	Non Home-Based Off-peak	All purposes Off-peak	All Purposes Daily
Total Number of Trips	461,309	66,823	247,351	81,436	856,919	187,618	54,380	231,435	59,825	533,258	1,390,177
Number of Trips Produced by the Study Area	25,580	3,930	19,977	12,627	62,114	11,644	4,015	27,046	11,275	53,980	116,094
Number of Trips Attracted to the Study Area	76,882	10,485	51,675	18,164	157,206	30,800	8,104	58,966	15,558	113,428	270,634
Number of Trips Start and End within the Study Area	10,263	2,595	15,035	8,351	36,244	5,076	2,628	22,659	8,345	38,708	74,952
% of Production Trips Stay in the Study Area	40.1%	66.0%	75.3%	66.1%	58.4%	43.6%	65.5%	83.8%	74.0%	71.7%	64.6%
% of Attraction Trips from the Study Area	13.3%	24.7%	29.1%	46.0%	23.1%	16.5%	32.4%	38.4%	53.6%	34.1%	27.7%
% of Trips Start and End within the Study Area	20.0%	36.0%	42.0%	54.2%	33.1%	23.9%	43.4%	52.7%	62.2%	46.2%	38.8%
Transit Share of Person Trips by Purpose											
Regional Trips	7%	7%	2%	1%	3%	6%	6%	2%	1%	2%	2%
Trips Produced by the Study Area	11%	20%	5%	2%	5%	11%	22%	6%	2%	5%	5%
Trips Attracted to the Study Area	19%	31%	7%	4%	10%	17%	26%	8%	2%	7%	8%

Data Source: 2006 Model Refinement (8/22/2007)

Table 1-25. Transit Trips by Purpose, Year 2030

	Home-Based Work Peak	Home-Based University Peak	Home-Based Other Peak	Non Home-Based Peak	All Purposes Peak	Home-Based Work Off-peak	Home-Based University Off-peak	Home-Based Other Off-Peak	Non Home-Based Off-peak	All purposes Off-peak	All Purposes Daily
Total Number of Trips	549,326	84,052	295,836	99,963	1,029,177	226,617	69,791	279,428	76,909	652,745	1,681,922
Number of Trips Produced by the Study Area	28,801	4,236	24,097	16,034	73,167	13,250	4,581	31,949	14,256	64,036	137,203
Number of Trips Attracted to the Study Area	97,357	12,575	62,173	23,088	195,193	38,891	9,953	68,982	20,220	138,045	333,239
Number of Trips Start and End within the Study Area	11,950	2,706	17,951	10,708	43,315	5,953	2,915	26,360	10,527	45,755	89,070
% of Production Trips Stay in the Study Area	41.5%	63.9%	74.5%	66.8%	59.2%	44.9%	63.6%	82.5%	73.8%	71.5%	64.9%
% of Attraction Trips from the Study Area	12.3%	21.5%	28.9%	46.4%	22.2%	15.3%	29.3%	38.2%	52.1%	33.1%	26.7%
% of Trips Start and End within the Study Area	18.9%	32.2%	41.6%	54.7%	32.3%	22.8%	40.1%	52.2%	61.1%	45.3%	37.9%
Transit Share of Person Trips by Purpose											
Regional Trips	6%	7%	2%	1%	3%	6%	6%	1%	1%	2%	2%
Trips Produced by the Study Area	11%	20%	5%	3%	6%	11%	24%	7%	2%	5%	5%
Trips Attracted to the Study Area	21%	29%	8%	4%	10%	18%	25%	8%	3%	7%	9%

Data Source: 2030 No Build (10/18/20)

Chart 1-5. Top Production Districts within the Study Area, Year 2006 Daily Transit Trips (All Purposes)

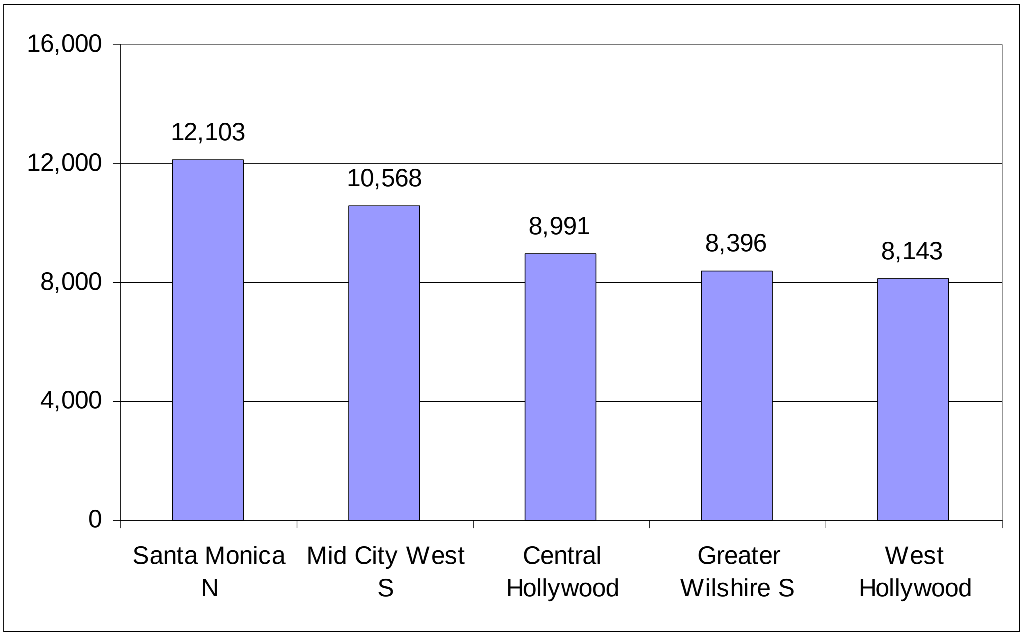


Chart 1-6. Top Attraction Districts within the Study Area, Year 2006 Daily Transit Trips (All Purposes)

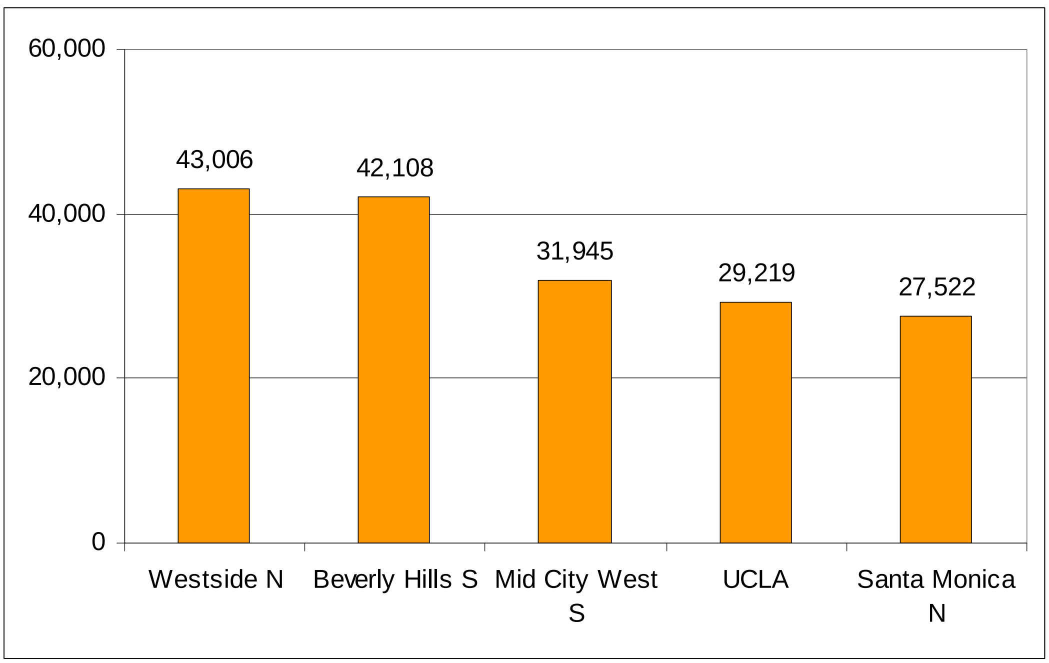


Chart 1-7. Top Production Districts within the Study Area, Year 2030 Daily Transit Trips (All Purposes)

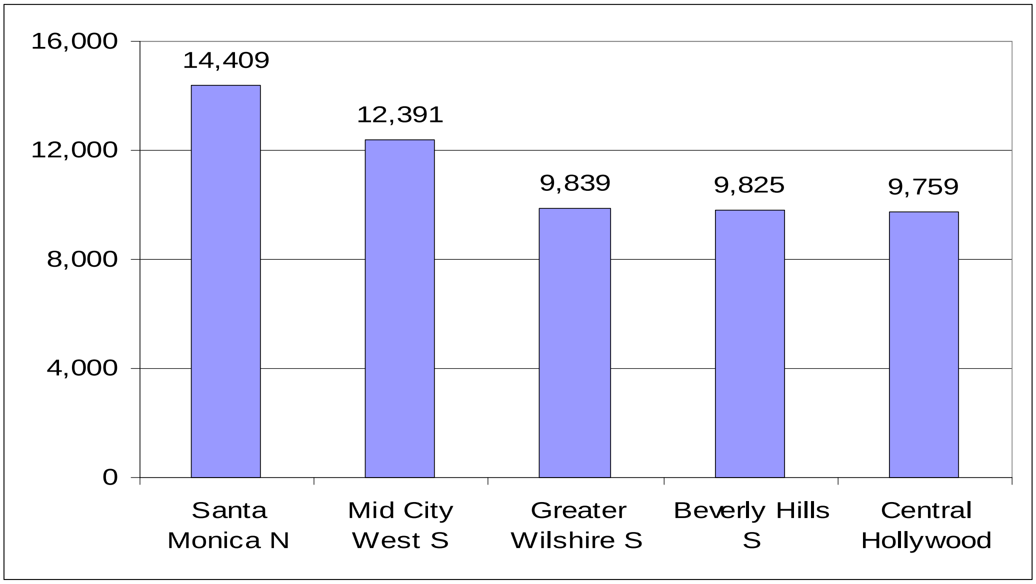


Chart 1-8. Top Attraction Districts within the Study Area, Year 2030 Daily Transit Trips (All Purposes)

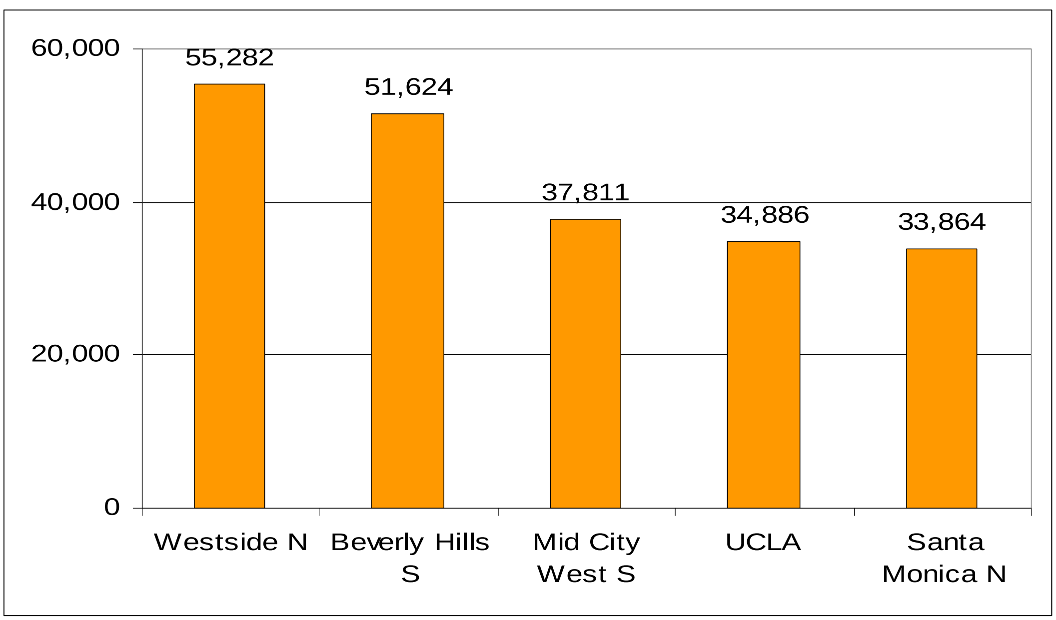


Table 1-26. Top Production/Attraction Districts within the Study Area, Year 2006 Home-Based Work Peak Transit Trips

	Rank	1	2	3	4	5
HBWPK	Top Production Districts	Central Hollywood	Greater Wilshire S	Koreatown SW	Santa Monica N	West Hollywood
	Number of Trips	3,069	2,386	2,346	2,160	1,869
	Top Attraction Districts	Westside N	Beverly Hills S	Mid City West S	Santa Monica N	West LA
	Number of Trips	13,497	11,868	9,150	8,409	5,046

Table 1-27. Top Production/Attraction Districts within the Study Area, Year 2030 Home-Based Work Peak Transit Trips

	Rank	1	2	3	4	5
HBWPK	Top Production Districts	Central Hollywood	Santa Monica N	Greater Wilshire S Koreatown	Koreatown SW	West Hollywood
	Number of Trips	3,224	2,569	2,515	2,514	2,273
	Top Attraction Districts	Westside N	Beverly Hills S	Mid City West S	Santa Monica N	West LA
	Number of Trips	18,198	14,892	11,075	10,513	6,318

Figure 1-45 shows the daily transit trip making pattern in the Study Area for 2030, which is an magnification of the transit trips pattern of today. The two major transit trip corridors will be:

- Santa Monica N – West LA – Westside N – Beverly Hills S – Mid Wilshire S – Greater Wilshire S
- UCLA – Westwood C - Beverly Hills S – Mid Wilshire S – Greater Wilshire S

Figure 1-46 demonstrates the trip making pattern within the Study Area for the Home-Based Work Peak purpose in 2030. The most important transit trip corridor is Santa Monica N – West LA – Westside N – Beverly Hills S – Mid City West S – Greater Wilshire S – Koreatown SW. Similar to the analysis of person trips, the corridor is also along the Wilshire Boulevard.

The Home-Based Work Off-peak trip purpose has transit trip markets similar to the Home-Based Work peak trip purpose. For the Home-Based University purpose, there are no major transit markets from the production perspective. But on the attraction side, UCLA and Westwood C are the dominant transit markets with about 18,000 transit trips in 2006 and more than 21,000 transit trips in 2030. For the Home-Based Other and Non Home-Based trip purposes, the major transit markets are Santa Monica N, West LA, Westside N, Beverly Hills S, Mid City West S, Greater Wilshire S and West Hollywood. All of these districts are along Wilshire Boulevard except West Hollywood.

Figure 1-45. Year 2030 Transit Trips Making Pattern within the Study Area for All Trips

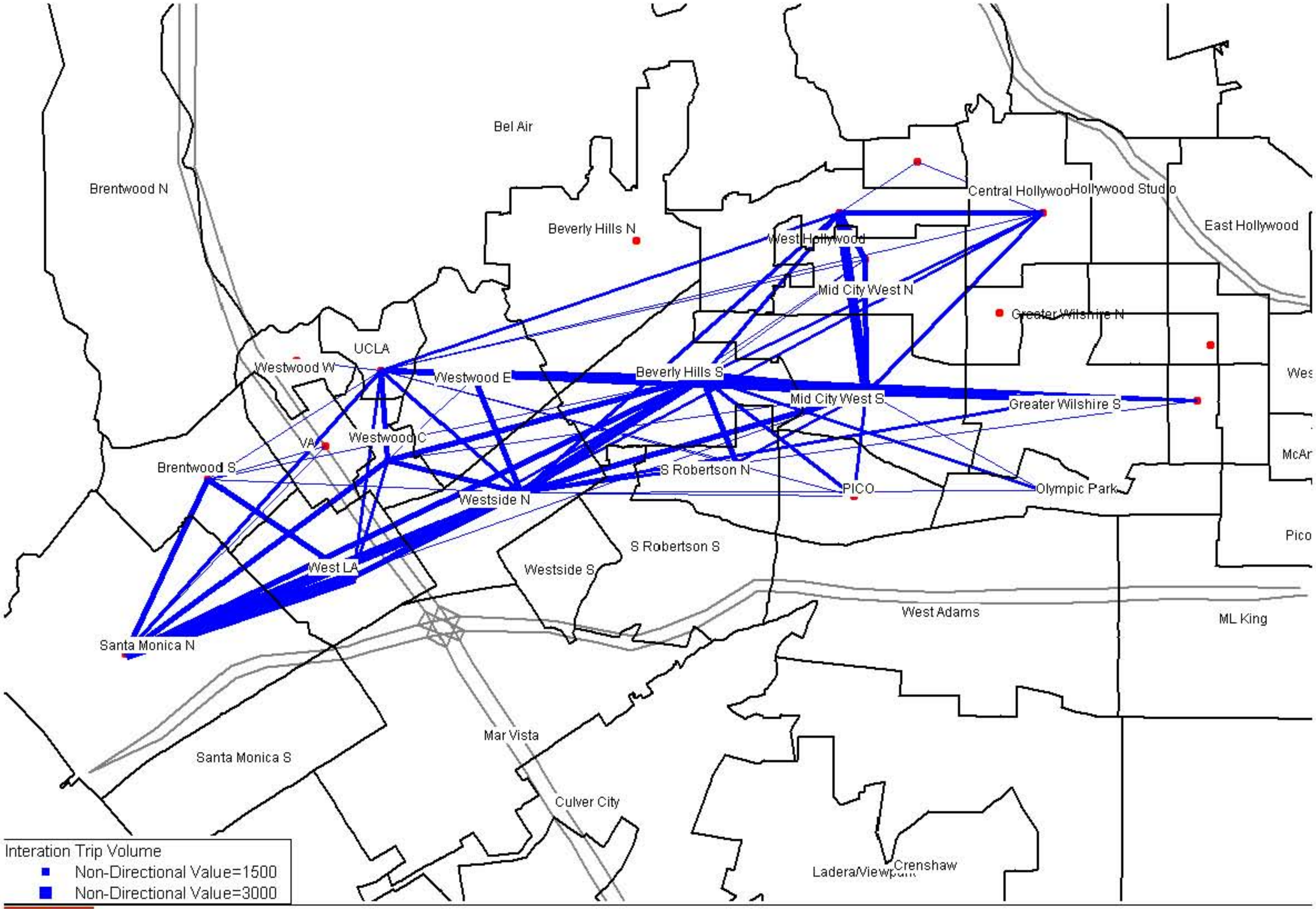
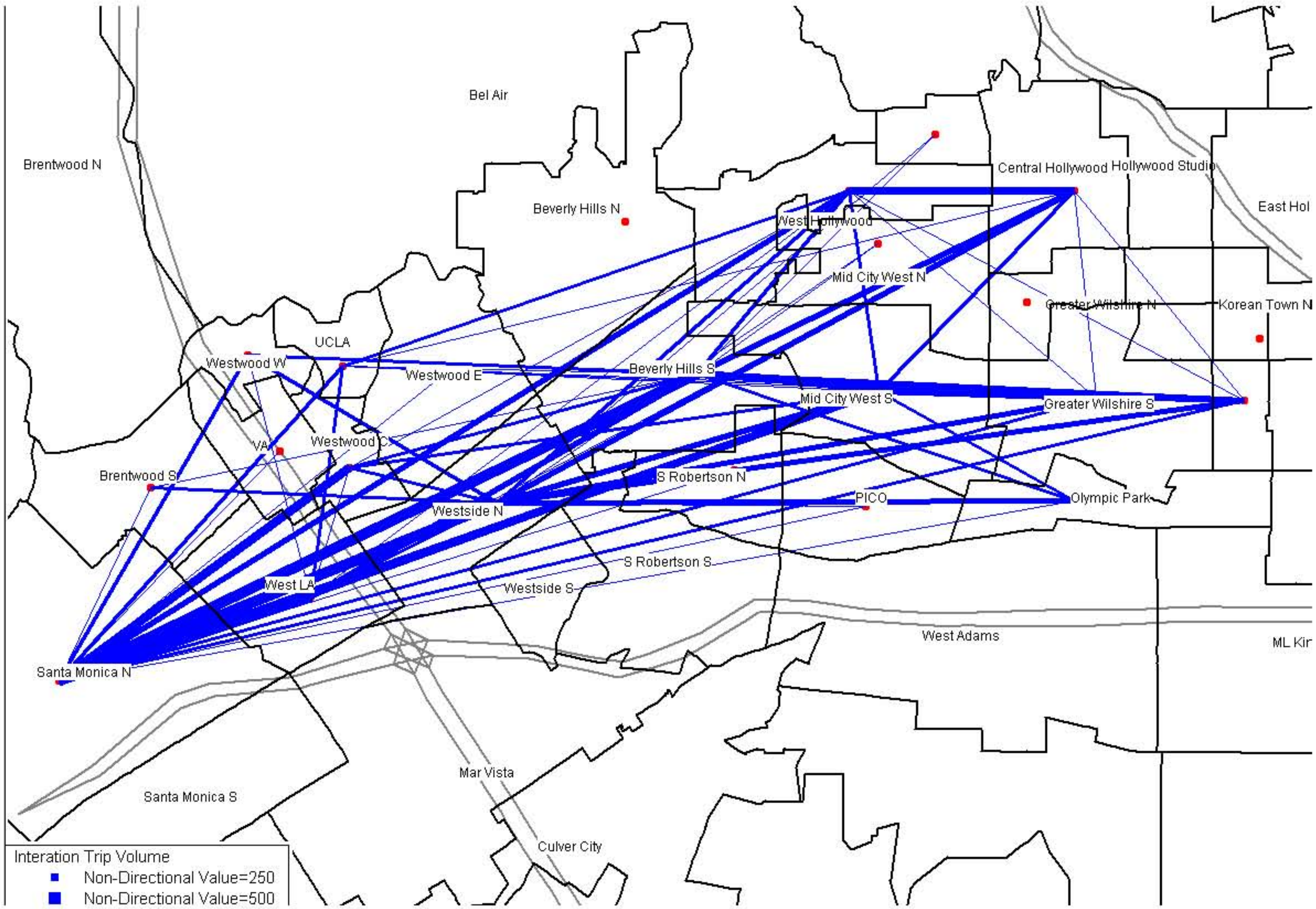


Figure 1-46. Year 2030 Transit Trips Making Pattern within the Study Area for Home-Based Work Peak Trips



1.8 Goals and Objectives

The primary purpose of the proposed action is to improve public transit service and mobility in the Westside Extension Transit Corridor. A set of goals was established at the project outset to determine the ability of each alternative to meet the primary purpose, as well as secondary purposes and related issues. Objectives associated with each goal were identified, and criteria for measuring the achievement of each objective were specified.

The goals and associated objectives and criteria are illustrated in Figure 1-47, Goals, Objectives, and Criteria for the Westside Extension Transit Corridor Study.

These goals and objectives are structured to capture the priorities for mobility improvement and transit performance that have been raised and discussed by transportation planning agencies, community leaders, and concerned citizens and stakeholders for the past several years.

Goals and objectives for the Westside Extension Transit Corridor address the major considerations related to making choices among different transportation alternatives such as effectiveness, impacts, cost-effectiveness, financial feasibility, and equity. For the Westside Extension Transit Corridor, seven goals have been identified and are described as follows:

Goal A – Mobility Improvement: The primary purpose of the project is to improve public transit service and mobility in the Westside Extension Transit Corridor. To evaluate the goal of Mobility Improvement, the analysis will examine how well each alternative improves the ability of residents and employees to reach desired destinations through the provision of high quality, convenient, and reliable east-west transit service throughout the Corridor.

Goal B – Transit Supportive Land Use Policies and Conditions: A major aspect of this goal is to locate transit alignments and stations in areas with existing land uses conducive to transit use or in those areas which have the greatest potential to develop transit supportive land uses.

Goal C – Cost Effectiveness: This goal ensures that both the capital and operating costs of the project are commensurate with its benefits.

Goal D – Project Feasibility: The fourth goal is that the project be financially feasible, in other words, that funds for the construction and operation of the alternative be readily available in the sense that they do not place undue burdens on the sources of those funds.

Goal E – Equity: This goal evaluates project solutions based on how well costs and benefits are distributed fairly across different population groups, with particular emphasis on serving transit dependent communities.

Goal F – Environmental Considerations: The sixth goal, Environmental Benefits, is to develop solutions which minimize impacts to environmental resources and communities within the study area.

Goal G – Public Acceptance: This goal aims to develop solutions that are acceptable to a reasonable portion of the public with special emphasis on residents and businesses within the study area.

Figure 1-47. Goals, Objectives and Evaluation Criteria

GOALS	OBJECTIVES	CRITERIA
MOBILITY IMPROVEMENT (Effectiveness)	Reduce transit travel times.	Travel time savings.
	Improve trip reliability.	Trip reliability.
	Provide sufficient transit capacity to meet 2030 transit demand and beyond (expandability).	Transit capacity.
	Maximize potential transit ridership.	Ridership.
	Enhance linkages to the transportation system as well as major trip attractors/generators within the corridor.	System connectivity.
TRANSIT SUPPORTIVE LAND USE POLICIES AND CONDITIONS	Provide transit service to areas with transit supportive land uses and policies.	Transit supportive land uses.
	Integrate with local redevelopment plans and policies.	Economic benefit.
COST EFFECTIVENESS	Provide solutions with benefits commensurate with their costs.	Cost-effectiveness (e.g. "bang for the buck") to enhance project competitiveness for federal transit funds.
PROJECT FEASIBILITY	Provide transportation solutions that are financially feasible.	Financial feasibility.
	Minimize risk associated with project construction.	Constructability/construction impacts.
EQUITY	Improve transit service available to transit dependent communities, especially access to job opportunities.	Mobility for transit dependents.
	Provide solutions that distribute both economic and environmental costs and benefits fairly across different population groups.	Equity.
ENVIRONMENTAL CONSIDERATIONS (IMPACTS)	Minimize the displacement of homes and businesses.	Right-of-way impacts.
	Minimize impacts to the traffic and circulation system.	Traffic and circulation.
	Minimize impacts to the character of the community.	Visual / noise and vibration.
	Provide for the safety and security of pedestrians and transit users.	Safety and security.
	Minimize impacts on sensitive and protected environmental resources.	Natural and cultural resources.
	Reduce, not add to, tailpipe emissions / non-renewable fuel consumption.	Air quality / sustainability.
PUBLIC ACCEPTANCE	Develop public support of private and public stakeholders.	Public support.
	Attain support of elected officials representing participating jurisdictions.	Local support.
	Develop solutions which enhance and are sensitive to quality of life issues for communities in the study area.	Community acceptance.

Performance measures will be used to measure the achievement of the goals, objectives according to the evaluation criteria shown in Figure 2-2. The specific evaluation criteria proposed for each step in the study's evaluation process are further described in Section 3.3 and 3.4 of this report. The evaluation criteria and performance measures are developed in consultation with elected officials and participating public agencies. It is anticipated that the number and character of the performance measures will vary at each stage of the analytical process depending on the number of alternatives under consideration and the types of choices that are being made.

A comprehensive list of potential performance measures has been identified for the Westside Extension Transit Corridor Study for each phase of analysis and is presented in Section 3.6 of this report.

1.9 Role of this Alternatives Analysis

The purpose of this Alternatives Analysis is to provide a more detailed and thorough examination of the top proposals identified in the earlier screening process, concluding with recommendations of which alternative would best serve the transportation needs of the Westside. This report first reviews the entire set of alternatives originally considered for the early scoping process, and the seventeen alternatives advanced for additional screening. Those seventeen alternatives were then narrowed down to the set of detailed alternatives, which are evaluated in this report. These detailed alternatives include No Build, TSM, Alternative 1, Alternative 14, Alternative 11 (A and B), Alternative 16, and Alternative 17.

In order to determine which of these remaining options would result in the best transit service for the Westside, this report first considers the transportation impacts and benefits of the various alternatives. The analysis then covers the environmental and financial implications of each alternative. The plans are then compared to each other based on a set of criteria, including effectiveness, efficiency, environmental, financial feasibility, equity, and the community's response. Finally, the report concludes with an overview of the public involvement process and agency coordination and consultation.

The intention of this report is to provide a clear, straight-forward analysis of the various transportation plans that are currently on the table for the Westside.

2.0 ALTERNATIVES CONSIDERED FOR EARLY SCOPING

2.1 Planning Context

This section presents the planning context for the conceptual definition of the No-Build, Transportation Systems Management (TSM), and Build alternatives developed for early scoping review and comment. In accordance with Federal Transit Administration (FTA) New Starts procedures, the Build alternatives were evaluated against the No-Build alternative which includes all committed transportation improvements programmed through 2030. The Build alternatives were also compared against a TSM alternative, which includes low cost improvements to the committed system to improve conditions in the study area and still address the study purpose and need.

The study and development of major transit investments in the Westside Corridor have a considerable history. That study history was summarized previously in Section 1.2 and served as a basis for the alternatives suggested for public scoping review. The alternatives represent a range of capital investment choices for addressing the future travel needs of transit users in the Study Area. The alternatives were developed based on a review of transit technologies and alignment locations from previous studies, current knowledge of the identified transit markets, community input and suggestions, and the study purpose and need. This chapter includes a brief overview of the scoping process, as well as a discussion of the comments received during scoping on transit technologies, alignments and station locations. These comments along with additional technical information gained from previous studies and the mobility needs analysis form the basis for the alternatives developed for advancement to the alternatives screening step. These resulting alternatives are described in more detail in Section 2.11. During the alternative screening step, the 17 alternatives were screened down to five alternatives by answering key questions/concerns that differentiated the choices from one another. These five alternatives are described in Section 2.11 and are the focus of the remainder of the report.

2.2 Technology Alternatives Presented at Early Scoping

The existing Metro Fixed Guideway system is comprised of Heavy Rail Transit or HRT (Metro Red Line and Metro Purple Line), Light Rail Transit or LRT (Metro Blue Line, Metro Green Line, Metro Gold Line and Metro Expo Line), and Bus Rapid Transit or BRT (Metro Orange Line). As such, these transit modes were presented at Early Scoping meetings as representing a range of fixed guideway transit modes that could be considered for the Westside Extension Alternatives Analysis Study. These technologies have proven over time to be practical transit technologies that meet purpose and need, minimize environmental impacts, and are cost effective. These transit technologies were selected to carry forward into scoping for the Alternatives Analysis for evaluation against Rapid Bus under the No-Build and TSM Alternatives.

2.2.1 Heavy Rail Transit

HRT systems are at the upper end of the urban transit spectrum in terms of speed, capacity and service predictability. Also referred to as rapid rail, metro or subway, HRT operates in an exclusive grade separated right-of-way. Power is collected from a third rail located adjacent to and parallel with the running rail. No crossings of the right-of-way are permitted in the same plane with HRT operations.

In Los Angeles currently, HRT is characterized by:

- very high passenger carrying capacity, up to 800 passengers per 6-car train
- maximum speed of 70 miles per hour (mph)
- capable of operations on gradients up to 4 percent
- can traverse an absolute minimum 750-foot horizontal radius curve up to a design minimum of 1,400 feet
- operates in multiple unit trains with up to six cars per train
- stations are up to 450 feet in length
- best suited for service in long high density corridors to connect the central city with major activity centers and dense residential communities
- local examples of this technology are the Metro Red and Purple Lines

Figure 2-1. Example Heavy Rail Vehicle in Subway

2.2.2 Light Rail Transit

LRT is a flexible rail transportation mode which can operate in a variety of physical settings. LRT uses dual rails for both support and guidance. As the modern technology descendent of the trolley or streetcar, a distinctive feature of LRT is that vehicles draw power from an overhead contact system. This is in contrast to heavy rail vehicles that usually are powered from a track level third rail. This overhead power collection feature allows LRT systems to be integrated with other at-grade transportation modes. With overhead power collection and the availability of articulated vehicles operating up to three car 'trains,' LRT can operate in mixed traffic on tracks embedded in the street, on its own at-grade right of way with street and pedestrian crossings, or on a fully separated right-of-way, at grade, elevated, or underground.

In Los Angeles currently, LRT is characterized by:

- exclusive track in previous traffic lane operations or separate right-of-way
- high floor vehicles and station platforms
- center of street at-grade running unless grade separations are justified
- preservation of the number of existing traffic and parking lanes
- speeds up to 55 mph
- up to 425 passengers per 3-car train

Figure 2-2. Example Light Rail Vehicles

- an average of one mile station spacing
- stations are approximately 270 ft long
- local examples of this technology are the Metro Blue, Green, and Gold Lines

2.2.3 Bus Rapid Transit

BRT is a bus based "rapid" transit system typically utilizing highly flexible service and advanced technologies to improve customer convenience and reduce delays compared to more traditional bus operations. The goal of BRT is to combine some of the qualities of light rail with the flexibility and lower cost of buses.

Key attributes for this mode alternative in the Westside Extension Transit Corridor Study Area include:

- exclusive bus lane operations during peak periods
- BRT lanes:
  - provide through use of existing parking lanes with parking restrictions during peak periods
  - shared with right turn traffic
  - no major street widening for BRT lanes
- low floor compressed natural gas (CNG) vehicles with loading from all doors
- off vehicle fare collection
- articulated buses up to 65 feet long
- capacity of up to 100 passengers
- travel speeds up to prevailing traffic speeds, with some enhanced speed capacity when operated during peak periods in dedicated lanes
- average station spacing at one mile apart

Figure 2-3. Example Bus Rapid Transit Vehicles

The Metro Orange Line is an example of this technology utilizing an exclusive guideway. Metro currently does not operate exclusive bus lanes in an arterial street right-of-way, such as would be required in the Westside Extension Transit Corridor to achieve effective travel speeds.

2.2.4 Metro Rapid

Metro Rapid is a high level express bus operation in mixed flow traffic but with fewer stops than standard local bus service. Speeds are a function of street traffic conditions. Metro can operate rapid bus service with 'priority' along most segments of Wilshire Boulevard. For Metro applications, the vehicles are fueled by CNG and are articulated vehicles 60 feet in length with a capacity of 84 passengers. Station spacing is approximately ¾ of a mile and station length varies based on physical opportunities along the corridor. Examples of this technology are Metro Rapid Bus Lines 720 and 704 operating on Wilshire and Santa Monica Boulevards, respectively.

For purposes of the Westside Extension Alternatives Analysis Study, Metro Rapid technology would not qualify as an eligible mode for New Starts fixed guideway grant funding because it operates in mixed-flow traffic and would not utilize a dedicated lane. Metro Rapid service currently exists along many routes in the Westside and is included in the No Build and TSM Alternatives.

Figure 2-4. Example Rapid Bus Vehicles

2.3 Alignment Alternatives Presented at Early Scoping

Three primary build alternatives were identified for consideration during the public scoping meetings based on all the previous planning activity in the Westside Extension Corridor study area. These alignments are depicted in Figure 2-5 and included a Wilshire Boulevard alignment, a Santa Monica Boulevard alignment and a combined Wilshire/Santa Monica Boulevards alignment. These three corridor alignments represented street rights-of-way that could reasonably be used in a subway, at-grade or elevated configuration and that could connect existing transit service to new activity centers with demonstrated strong transit usage. As shown in Figure 2-5, the termini of the alternatives are the Wilshire/Western station at the end of the Metro Purple Line, the Hollywood/Highland station along the Metro Red Line before it turns north to the Universal City station, and downtown Santa Monica, near 4th Street and Santa Monica Boulevard.

2.3.1 Wilshire Boulevard Alignment

The Wilshire Boulevard alignment begins at the current Metro Purple Line terminus at Wilshire/Western in Wilshire Center and continues west along Wilshire Boulevard through Mid-Wilshire and Beverly Hills to Santa Monica Boulevard. At Santa Monica Boulevard, the alignment turns southwest to serve Century City, before returning to Wilshire Boulevard to serve Westwood, West Los Angeles, and finally Santa Monica, terminating near 4th Street. The entire Wilshire route is approximately 12.5 miles in length and, as shown at the scoping meetings, has 13 stations.

2.3.2 Santa Monica Boulevard Alignment

The Santa Monica Boulevard alignment begins at the current Metro Red Line Hollywood/Highland Station in Hollywood and generally continues in a southwesterly direction serving West Hollywood, Beverly Hills, and Century City along Santa Monica Boulevard. This alignment returns to Wilshire Boulevard to serve Westwood, West Los Angeles, and finally Santa Monica, terminating near 4th Street. The entire Santa Monica Boulevard alignment is approximately 12.2 miles in length and as shown has 12 stations.

2.3.3 Wilshire/Santa Monica Combined

The Wilshire/Santa Monica Combined corridor concept reflects that transit usage may be strong enough to serve both the Wilshire and Santa Monica Boulevards alignments. The combined concept as shown has 17 stations over a combined segment length of approximately 19 miles. Operationally, the service levels would be comparable on all segments.

2.4 Suggested Refinements from Early Scoping

Based on an extensive set of scoping comments received, a variety of alternative modes and alignments were suggested for consideration in addition to those presented at the public scoping meetings. The comments received during scoping, including verbal, written and electronic are available in detail in the ***Final Project Scoping Report (November 9, 2007).*** Comments directly relevant to the team's decision to add or refine the mode/alignment alternatives are presented below.

Figure 2-5. Possible Alignment Alternatives Presented at Early Scoping

2.4.1 Technologies (Modes) Suggested

The comments provided by the speakers, from the written comments of attendees, email comments, and letter comments at the early scoping meetings and during the official comment period strongly supported the subway (HRT) mode (a total of 262 comments). Several commenters expressed favor for a potential elevated monorail alternative (a total of 22 comments). Several other commenters expressed support for light rail transit (a total of 18 comments). Other commenters expressed a preference for additional bus rapid transit service (a total of 14 comments).

Based on these comments, aerial monorail transit technology was added to the evaluation. A description of this technology is in Section 2.8.4. All other modes presented by Metro at the scoping meetings remained for screening.

2.4.2 Alignments Suggested

Speakers at the early scoping meetings were supportive of the Wilshire alignment (107 comments), although Santa Monica Boulevard also received support (49 comments), and many supported the combined Wilshire-Santa Monica Project (52 comments). Almost an equal number were in support of both alignments (Wilshire and Santa Monica).

A number of speakers suggested route alignment deviations from either Wilshire or Santa Monica Boulevards to serve major activity centers not located directly on those routes. These included route deviations to serve Farmers Market/The Grove, Cedars-Sinai/Beverly Center, the Sunset Strip, University of California Los Angeles (UCLA) and others.

Speakers also suggested several north-south alignments. These included an alignment from the San Fernando Valley to Los Angeles International Airport (LAX), a connection from Hollywood/Highland to the Exposition Corridor, and Burbank Airport to LAX via Hollywood/Highland. There were also comments suggesting an alignment under Burton Way, continuing east below Santa Monica Boulevard to Downtown, following Sunset Boulevard to La Cienega Boulevard, and connections to the Exposition Line either via the Third Street Promenade or near the Water Garden on 26th Street in Santa Monica. A group of speakers from the Spaulding Square community just east of Fairfax Avenue, between Hollywood and Sunset Boulevards, advocated an alignment that would avoid their area as they were concerned that potential tunneling would damage their 1920s era homes.

These comments suggest a number of possible alignment configurations which are further described in Section 2.8. Suggested alignments to serve north-south travel were not carried into screening, however, as these did not reflect the principal east-west orientation of the study scope and many extended well outside of the study corridor.

2.4.3 Stations Suggested

People who spoke at the Early Scoping Meetings generally supported the potential station locations that were presented and are shown on Figure 2-5. However, some attendees suggested some additional stations as well. Some speakers suggested that a station in the vicinity of Cedars-Sinai Hospital and the Beverly Center was needed. Others commented that the station in Century City should be south of Santa Monica Boulevard, closer to the center of Century City. There was interest for a station on the UCLA campus and a station at The Grove/Farmers Market. There were also comments to include a station on Wilshire Boulevard at Bundy Drive and on Wilshire Boulevard between 17th and 20th Streets near the UCLA/Santa Monica Hospital. Concern was also expressed by several speakers regarding a station on Wilshire Boulevard at Crenshaw Boulevard or elsewhere in the Park Mile Specific Plan segment of Wilshire Boulevard.

These comments suggested a variety of station location options that were tested further as part of the alternatives screening and detailed evaluation.

2.5 Relationship to Purpose and Need

The purpose of the Westside Extension Transit Corridor Project is to improve public transit service and mobility in the Westside Corridor between Mid-Wilshire and Santa Monica. The overall goal of the proposed project is to improve mobility in the Westside Corridor by connecting with or extending existing lines, such as the Metro Red Line or the Metro Purple Line. The alternatives developed and presented in Section 2.8 were subject to analysis screening based on goals and objectives which relate to the defined purpose and need for the project. All alternatives proposed for screening addressed the study purpose and need. Subsequent screening and detailed analysis of the alternatives described in later sections of this document will show how well the alternatives met the goals stated in the purpose and need.

2.6 Early Scoping Process

The Early Scoping process followed for the Westside Transit Extension Corridor study included both early identification of prospective participants and early notification for all meetings. The intention was to both inform and solicit feedback on what transit improvements should be studied and how transit improvements should be evaluated. The official notification process began with an early scoping notice published in Federal Register Volume 72 No. 189 on Monday October 1, 2007. The official scoping comment period was initially scheduled to extend until November 1, 2007, but was extended until November 7, 2007, at the request of several stakeholders. The general public and agency representatives were given opportunities to attend public meetings and provide verbal plus written comments. In addition, those wishing to provide comments could view project information on Metro's website and respond in writing or by email. All means of public notification, meeting schedules, and feedback that were made available are included in ***Final Project Scoping Report (November 9, 2007)***. Section 8.0 includes the substantive comments received.

This section summarizes the activities completed to make the community aware and provide opportunities for participation in the early scoping for the Westside Transit Extension Corridor Alternatives Analysis. These notification and outreach activities included:

- Publishing the Early Scoping notice in the *Federal Register*
  - Federal Register Volume 72 No. 189 on Monday October 1, 2007
- Conducting Early Scoping meetings with agencies and jurisdictions
  - Meeting with Metro Board Deputies – August 30, 2007
  - Meeting with Metro Chief Planning Officer and Westside Consultants' team – September 4, 2007

- Meeting with City of Los Angeles Mayor's office to brief representatives – September 6, 2007
- Meeting with elected officials at West Hollywood City Hall – September 10, 2007

- Identifying public scoping meeting stakeholders
  - Elected officials on the local, state and federal level
  - Neighborhood Councils and other elected groups
  - Homeowners Associations and Neighborhood Organizations
  - Chambers of Commerce and business leaders
  - Community based and civic organizations
  - Key destinations and employers
  - Transportation advocates and interest groups
  - Print and broadcast Media, including community-based publications and blogs
  - Memberships of these groups (via proprietary mailing lists)
  - Other interested groups and persons
- Preparing and distributing public notices of meetings
  - Email notices
  - US mail
  - Online at www.metro.net/westside
  - Posters
- Performing media and blog outreach
  - 83 media outlets
  - Press releases
  - Advertisements
  - Inclusion in community calendars
  - 34 key website blogs
- Conducting follow-up with community groups and agencies
  - Multiple organizations (such as transportation advocacy groups, neighborhood and business organizations, civic groups, and academic institutions) were contacted requesting that they forward invitations to the Scoping Meetings to their memberships or constituents.
  - Follow-up calls were also made to agencies inviting them to attend the Agency Scoping Meeting. Calls were made to approximately 70 agencies between October 5 and 10, 2007.

- Hosting Agency scoping meetings
  - Thursday, October 10, 2007 from 3:00 - 4:30 p.m. at the Los Angeles County Sheriff's Substation Briefing Room in West Hollywood
  - Attended by 18 representatives from nine jurisdictions
- Hosting public scoping meetings
  - Five Early Scoping Meetings were held in October 2007
  - Format included an open house, a presentation, and a public comment period
  - Meetings were held in Century City/Westwood (77 attendees), West Hollywood (58 attendees), Mid-Wilshire (73 attendees), Beverly Hills (69 attendees), and Santa Monica (81 attendees)
- Hosting other community meetings
  - A supplemental community meeting was held in West Hollywood in October 2007 (111 attendees)
  - Metro also attended meetings as a part of the regular course of business or by request:
  - Beverly Hills and Greater Los Angeles Association of Realtors
  - Century City Chamber of Commerce
  - Hollywood Chamber of Commerce Legislative Committee
  - Metro Westside/Central Governance Council
  - Outpost Estates Homeowners Association
  - Southern California Transit Advocates
  - Traffic Committee, West Los Angeles Community Police Advisory Board
  - Westside Cities Council of Governments (COG) and COG Transportation Committee
  - Westside Transportation Partners

2.6.1 Summary of Scoping Comments

The public comment period for the Westside Extension Transit Corridor Study commenced October 1, 2007 with the publication of the Early Scoping Notice and closed on November 1, 2007. At the request of several stakeholders, the comment period was extended until November 7, 2007. As discussed in Section 2.4, 452 comments received in five different ways were submitted prior to the close of the comment period:

- 105 Verbal comments at Public Scoping Meetings
- 82 Written comments at Public Scoping Meetings
- 152 Written comments and 1 digital audio comment via email
- 108 Written comments via US mail and hand delivered
- 4 Verbal comments on the Telephone Information Line

2.6.2 Summary of Substantive Comment

This section summarizes the comments received in verbal testimony at the Early Scoping meetings, written comment forms turned in at the Early Scoping meetings, via emails, in letters mailed to Metro and received on the Telephone Information Line. Table 2-1 through Table 2-4, summarize the comments from each of these input sources.

The overwhelming majority of comments received supported the need for a transit improvement in the Westside Extension Transit Corridor Study Area. The Wilshire subway alignment was the most favored route and mode, with nearly as many people advocating for subways on both the Wilshire and Santa Monica alignments. In many cases, where the public supported both the Wilshire and the Santa Monica alignments, most thought that the Wilshire alignment should take precedence. Limited support was voiced for aerial/monorail, LRT, or BRT modes, with opposition to each of these modes expressed as well.

The public input in the Early Scoping process strongly favored a subway extension along Wilshire Boulevard.

Comments Related to Purpose and Need

Public comments were provided by 105 speakers at the five Early Scoping meetings and are summarized in Table 4.1. The types of comments made with regard to the Purpose and Need for transit improvements in the Westside Extension Transit Corridor Study Area focused on the difficulty associated with traveling by car or bus on the Westside due to extreme and often day-long congestion, and the growing recognition of the need for a mass transit alternative. There was also discussion of the need for local connections and shuttles to make the transit system more accessible to a wider range of residential and employment areas. The need for enhanced nighttime service, given the entertainment venues on the Westside was also mentioned by several speakers. The need for north-south connections and improvements was also a common comment.

Table 2-1. Summary of Comments of 134 Speakers at Five Public Early Scoping Meetings

<table>
<tr><th rowspan="3">Mode</th><th colspan="2">Subway</th><th colspan="2">Aerial/Monorail</th><th colspan="2">LRT</th><th colspan="2">BRT</th><th rowspan="2">Other</th></tr>
<tr><th>Yes</th><th>No</th><th>Yes</th><th>No</th><th>Yes</th><th>No</th><th>Yes</th><th>No</th></tr>
<tr><td>59</td><td>2</td><td>11</td><td>1</td><td>4</td><td>3</td><td>4</td><td>11</td><td>Underground BRT
High Speed Rail
At-grade</td></tr>
<tr><th>Stations</th><td colspan="9">Le Conte/Westwood (2), Beverly Center/Cedars-Sinai (7), VA (2), Wilshire/Gayley/Lot 32, Center of Century City (4), LaBrea/Fairfax, LaBrea/Santa Monica, Santa Monica/Fairfax, San Vicente/Santa Monica, North/South Connections, Sunset/Fairfax (2), On UCLA Campus (1, The Grove (3), Plummer Park, Beverly Glen, La Cienega, Beverly Drive, Sunset./Highland, Rodeo Drive, West Hollywood, Santa Monica Pier, Bundy, 17th-20th Streets, No Station at Crenshaw or Irving or Windsor, No Station at Sunset/Fairfax</td></tr>
<tr><th rowspan="3">Alignments</th><th colspan="2">Wilshire</th><th colspan="2">Santa Monica</th><th colspan="2">Both[1]</th><th colspan="3" rowspan="2">Other</th></tr>
<tr><th>Yes</th><th>No</th><th>Yes</th><th>No</th><th>Yes</th><th>No</th></tr>
<tr><td>23</td><td>2</td><td>14</td><td></td><td>19</td><td></td><td colspan="3">Burton Way
N-S Route to Valley & LAX
Rapid Bus on Olympic
N-S H&H to Expo (2)
Santa Monica Blvd Straight to DT
Must go to the Sea (4)
Not all the way to Santa Monica
Don't zig-zag
H&H to La Brea to Santa Monica
H&H follow red car diagonal to Santa Monica
Hollywood/Vine to Sunset to La Cienega
Under LA County Club
Burbank Airport to LAX via Hollywood
Provide for express trains
3rd St Promenade connection to Expo
Wilshire to Expo via Water Garden</td></tr>
<tr><th>Issues</th><td colspan="6">Parking at stations (4)
Consider parallel arterial capacity
Tunneling under historic homes, vibration (7)
Don't let funding drive schedule
Connection to LAX
Need Local Connectors/Shuttles (4)
Need nighttime service (4)
Traffic Diversion associated w/ BRT (5)
If Purple to sea, Expo on Venice
Repair curb lanes used by buses
Articulated buses cause congestion
Incorporate bicycles in planning (3)
Joint development potential of Division (7)
Expand community outreach (outside study area, different formats, wider demographics(3)</td><td colspan="3">Include Olympic/Pico one-way
Need N-S Connections (5)
Drilling in methane area (3)
Joint development can help pay
Affect on green house gasses (2)
Segment project to address funding (3)
Speak w/ one voice in Washington (3)
Questions ridership and user demographics
Preserve pedestrian amenities on Wilshire
Accidents on 6th Street
Study benefits of electric vehicles
External costs of driving (accidents, health)
Shadows and visual impacts associated with elevated trains (2)
Earthquake safety
Safety at stations (2)</td></tr>
<tr><th>Evaluation Criteria</th><td colspan="9">Benefits to community, including young people
Ability to absorb growth, accommodate pedestrians, affect on green house gases, ability to generate riders on other systems
Bicycle Safety, Travel Speed (2), Ability to Serve Job Centers, Overall Capacity
Construction Safety in earthquake zones , System improvements</td></tr>
</table>

[1] If they expressed support for both alignments, but also said "If only one can be built, I prefer X" they were counted under "Both" as well as under the corridor they supported if only one could be built.

Comment forms were completed by 82 people and submitted at the Early Scoping meetings or returned to Metro after the meetings and summarized in Table 2-2. The types of comments made with regard to the Purpose and Need for transit improvements in the Westside Extension Transit Corridor Study Area focused on traffic congestion and extended travel times on existing bus transit routes including Rapid and Rapid Express lines.

Table 2-2. Summary of 82 Written Early Scoping Meeting Comments

	Subway		Aerial/Monorail		LRT		BRT		Other
	Yes	No	Yes	No	Yes	No	Yes	No	
Mode	59	3	6	0	1	3	3	8	Increase local service

Stations	Wilshire/Westholm (1) Connection to Expo (4) Santa Monica (6) Beverly Hills (5) Wilshire/Westwood (3) UCLA (6) Wilshire/Doheny (1) Grove/Farmers Market (1) Century City (7)	405 (2) Valley (1) Crenshaw (1) Wilshire/La Cienega (1) North/South (3) Downtown (1) San Vicente/Santa Monica (2) Wilshire/Santa Monica (1) Le Conte (1) West Hollywood (2)	Lincoln Boulevard (2) Rodeo/Beverly (1) Beverly Center (1) Wilshire/Fairfax (3) Hospitals (2) LAX and BUR (5) AVOID: La Brea Fairfax

	Wilshire		Santa Monica		Both[2]		Other
Alignments	Yes	No	Yes	No	Yes	No	
	22	0	8	0	17	0	

Issues	Bike access and amenities (3) Traffic light synchronization Property values Signage and wayfinding (3) Ease of transfer Congestion caused by buses Connection with employment centers GPS Tracking Parking at station, Park/Ride options Increase in taxes	Line naming Station amenities Use of solar power Don't complete in phases Concerned about noise and vibration at the Spaulding and Sunset Squares, and Sunset Flats
Evaluation Criteria	Express and rush hour services Noise/Vibration during construction and use Tunneling through residential neighborhoods (3) Density at stations Economic development opportunities Station power Station accessibility for bikes, strollers, and ADA	

Misc: questions/concerns regarding Exposition Phase 2 (6)

[2] If they expressed support for both alignments, but also said “If only one can be built, I prefer X” they were counted under “Both” as well as under the corridor they supported if only one could be built.

Email comments were received from 152 people during the Early Scoping period and summarized in Table 2-3. The types of comments made with regard to the Purpose and Need for transit improvements in the Westside Extension Transit Corridor Study Area focused on existing traffic congestion and the need for system connectivity.

Table 2-3. Summary of 152 Email Submissions

	Subway		Aerial/Monorail		LRT		BRT		Other
	Yes	No	Yes	No	Yes	No	Yes	No	
Mode	73	3	1	0	10	2	5	3	Increase local bus service Increase DASH service Moving sidewalks Auto expressway under Wilshire Boulevard
Stations	VA hospital (2) Century City (5) UCLA (5) Cedar-Sinai Hospital West Hollywood (3) Hollywood (1) 20th/Santa Monica Boulevard Veteran/Wilshire Connection with Expo Pico/Fairfax (1) Sunset/Fairfax (2) NOT Sunset/Fairfax (1)				Beverly Center (2) Grove/Farmers Market (2) Santa Monica (1) Santa Monica Community College (1) Pacific Coast Highway (1) LAX (2) Hollywood Bowl (1) Sepulveda Boulevard (1) 405 (1) Echo Park (1)				Westwood/Wilshire (5) Beverly Hills (4) 3rd/Fairfax Wilshire/Fairfax
Alignments	**Wilshire**		**Santa Monica**		**Both**[3]		**Other**		
	Yes	**No**	**Yes**	**No**	**Yes**	**No**			
	34	1	15	1	8	9	La Brea to LAX (1) Olympic Boulevard (2) 405 (2) Hollywood/Highland (1) Connections to N/S Routes (3)		
Issues	Congestion Service availability (3) Noise and Vibration (8) Signage Sunset/Fairfax station location is a business (2) Economic Development opportunities (2) Timeliness of service System connectivity (6) Bike amenities (2) Express service Bus Lanes Increase taxes/Fees (5)								
Evaluation Criteria	Environmental concerns Noise and vibration under sunset/Spaulding square								

Misc: questions/concerns regarding Exposition Phase 2 (6)

[3] If they expressed support for both alignments, but also said "If only one can be built, I prefer X" they were counted under "Both" as well as under the corridor they supported if only one could be built.

Letters were received from 108 persons and/or agencies, of which 98 letters were related to the purpose and need. Table 2-4 provides a summary of the letters and the complete set of letters is contained in the ***Final Project Scoping Report (November 9, 2007)***. The letters focused on the alternatives to be studied and issues of concern to the authors, with little comment on the Purpose and Need for the project. The fact that the majority of the letter writers supported one or more of the alignments and modes, however, indicates that they perceive a need to provide a transit improvement in the Westside Extension Transit Corridor Study Area.

Table 2-4. Summary of 108 Written Letters and Comments

	Subway		Aerial/Monorail		LRT		BRT		Other
	Yes	No	Yes	No	Yes	No	Yes	No	
Mode	71	0	4	0	3	0	2	0	More buses (8) Just bus (1) Circulator Street Car (2)

Stations	Fairfax (5) La Brea (7) Western (1) Beverly Triangle (6) UCLA (10) Westwood (7) Constellation (7) Avenue of the Stars (7) Santa Monica Boulevard (11) Century City (19) 3rd Street (5) 4th Street (1) 20th St (1)	Connection to Expo (9) Bundy (3) San Vicente (4) Grove/Farmers' Market (2) Crenshaw (6) Sunset (1) Santa Monica (4) LAX (4) Beverly Drive (4) La Cienega (4) Rodeo (1) North/South (8)	Beverly Hills (4) Museum Row (1) Century City Mall (1) Robertson (1) West Hollywood (4) Crescent Heights (1) San Fernando Valley (1) Dodger Stadium (1) Red line (1) Hollywood Bowl (1) VA (2) West of 405 (1)

	Wilshire		Santa Monica		Both[4]		Other
	Yes	No	Yes	No	Yes	No	
Alignments	28	0	12	0	8	0	San Vicente (1) Sunset (3) Highland (2) Lincoln Boulevard (1) Olympic Boulevard (1)

Issues	Serving higher density Pedestrian access Congestion Crime Noise and Vibration (8) Service Century City after 5:30 p.m. (8)	Bike access and amenities (2) Express service Construction impacts (3) Street closures/impacts on community events (marathon, filming, parades) Parking
Evaluation Criteria	Area serviced Noise and Vibration (8) Environmental factors (additional people on the road, train and power station exhaust) Additional congestion to streets near stations System connectivity	Land use Additional land use opportunities (3) Fire/life/safety access (what happens if a fire truck is caught at a crossing gate?) Underground utilities Impacts to geologic and water table

[4] If they expressed support for both alignments, but also said "If only one can be built, I prefer X" they were counted under "Both" as well as under the corridor they supported if only one could be built.

Messages left on the telephone information line did not reflect comments about the study's Purpose and Need.

2.6.3 Comments Related to Alternatives

Suggested refinements resulting from Early Scoping were identified in Section 2.3.2. This section further describes the comments leading to these alternatives refinements including preferred modes, potential station locations, and possible route alignments.

2.6.3.1 Modes

The comments provided by speakers at the Early Scoping meetings strongly supported the subway mode. Fifty speakers expressed a preference for the subway, with only two opposed. Eleven speakers spoke in favor of a potential monorail elevated alternative and one person was opposed to the monorail. Four people mentioned support for light rail transit and three were opposed to it, largely due to concerns about traffic congestion with an at-grade mode. Several of the people speaking in favor of either monorail or LRT indicated they felt these were less expensive alternatives and could, therefore, be built more quickly. Four people expressed a preference for additional BRT service, but ten people were opposed to dedicated bus lanes.

Comment forms submitted by meeting attendees indicated a strong preference for the subway mode. Of those who expressed a mode preference, 85 percent (59 people) supported the subway mode, while three people were opposed to the subway. Six expressed a preference for the aerial/monorail mode, one person suggested LRT, and three supported BRT. LRT was opposed by three people and BRT was opposed by eight.

Comments received via email were overwhelmingly in favor of the subway mode. Seventy-three people expressed support for the subway and only three were opposed to the subway mode. Support was expressed for LRT in 10 emails, with two people opposing LRT. The BRT mode with dedicated lanes was supported in five and opposed in three emails. Only one person emailed in support of a monorail alternative.

Almost 90 percent of the letter writers who expressed a preference for a mode supported the subway alternative. Seventy-one letters supported the subway mode, with only four supporting aerial/monorail, three in favor of LRT and two advocating BRT. Letter writers did not offer opinions in opposition to modes, rather only support for their preferred mode, which was overwhelmingly subway.

2.6.3.2 Stations

People who spoke at the Early Scoping Meetings generally supported the potential station locations that were shown on the Potential Alignments and Stations board and on the PowerPoint presentation slide. However, some attendees suggested some additional stations as well. Five speakers suggested that a station near Cedars-Sinai Hospital and the Beverly Center was needed. Three people commented that the station in Century City should be south of Santa Monica Boulevard, closer to the center of Century City. There was support from two speakers for a station on the UCLA campus, or located close to campus at Westwood and LeConte. Two submitted comments supporting placement of a station by the I-405 overpass, or close to the Veterans' Administration Hospital. Two others supported a station located at The Grove/Farmers Market. There were also comments in favor of a station on Wilshire at Bundy and on Wilshire between 17th and 20th Streets near the UCLA/Santa Monica Hospital. Opposition was also expressed by several speakers to a station on Wilshire at Crenshaw or elsewhere in the Park Mile Specific Plan segment of Wilshire Boulevard.

The comment forms included a map on the reverse side of the form and suggested that commenters sketch their preferred alignment and station locations. The comment forms can be viewed in the ***Final Scoping Report (November 9, 2007)***. The station areas most frequently indicated on the comment forms included Century City (7), UCLA (6), Santa Monica (6) Beverly Hills (5), LAX or Burbank Airports (5), and a connection to the Expo LRT line (4). The only station area for which opposition was expressed was a station at Sunset/Fairfax.

Comments received via email mentioned many potential station locations. Those locations that were mentioned in more than one email included: Century City (5), UCLA (5), Westwood/Wilshire (5), Beverly Hills (4), West Hollywood (3), VA Hospital (2), Sunset/Fairfax (2), Beverly Center (2), The Grove/Farmers Market (2), and LAX (2). One email expressed opposition to a station at Sunset/Fairfax.

The station location most frequently mentioned in letters received by Metro was a Century City station. Nineteen letters mentioned the need for a station in Century City. The next most-mentioned station location was UCLA (10 comments), followed by the need for a connection to the Exposition LRT Corridor.

2.6.3.3 Alignments

Speakers at the Early Scoping meetings were strongly in favor of the Wilshire alignment, although almost an equal number were in support of both alignments, (Wilshire and Santa Monica) being built eventually.

Speakers also suggested several north-south alignments. These included an alignment from the San Fernando Valley to LAX, a connection from Hollywood and Highland to the Exposition Corridor, and Burbank Airport to LAX via Hollywood and Highland. There were also comments suggesting an alignment under Burton Way, continuing east below Santa Monica Boulevard to Downtown, following Sunset Boulevard to La Cienega, and connections to the Exposition Line either via the Third Street Promenade or near the Water Garden on 26th Street in Santa Monica. A group of speakers from the community just east of Fairfax Avenue, between Hollywood and Sunset Boulevards, advocated an alignment under Fairfax as they were concerned potential tunneling would damage their 1920s era homes.

Persons who completed comment forms preferred the Wilshire alignment. Twenty-two comments supported Wilshire, but almost as many (17) expressed support for both the Wilshire and Santa Monica alignments. Eight comment cards indicated Santa Monica Boulevard as the preferred alignment. Some comments indicated the need for north-south connections.

The Wilshire Boulevard alignment was the preference of the majority of persons who commented by email. Thirty-four people expressed a preference for the Wilshire alignment and only one person was opposed to that alignment. Fifteen emails supported the Santa Monica Boulevard alignment and one opposed the Santa Monica alignment. Support was expressed for both alignments in eight emails and nine opposed building both. Several emails suggested the need for north-south connections, including an alignment on La Brea to serve LAX and in the I-405 corridor. Two emails suggested an alignment along Olympic Boulevard.

Letter writers strongly supported the Wilshire alignment as their first choice. Twenty-eight letters supported the Wilshire alignment. Twelve were received in support of studying the Santa Monica alignment. Eight letters suggested that both alignments were appropriate for inclusion in this alternatives analysis. Other corridors that were mentioned included an alignment under Sunset Boulevard, Highland Avenue, San Vicente Boulevard, Lincoln, and Olympic Boulevards.

2.6.4 Comments Related to Evaluation Criteria

There were not many speakers at the Early Scoping meetings who addressed specific evaluation criteria that they felt should be used to assess the alternatives. Those that did mention evaluation criteria mentioned the need to assess community benefits, particularly for young people, and the ability of the alternatives to absorb the growth from additional demand over time, accommodate pedestrians, affect green house gas emissions, and generate ridership on other parts of the transit system. The overall capacity of the alternatives and the speed of the alternatives were also mentioned. The impacts of alternatives on bicycle safety were suggested as evaluation criteria, as was construction safety in earthquake zones.

Persons who completed comment cards suggested the need to evaluate noise and vibration of alternatives during construction and operations. Some also suggested that economic development opportunities and density around stations be considered.

Comments that were received in emails suggested that environmental concerns be key evaluation criteria. They also suggested that noise and vibration be considered in evaluating alternatives.

Evaluation criteria mentioned in letters included assessments of the area served by the alternative, noise and vibration (mentioned in eight letters), station area congestion, system connectivity, and opportunities for additional land use.

Comments Related to Scope of the Analysis

Some of the issues that commenters during the Early Scoping process said need to be addressed in the alternatives analysis included:

- Parking at stations
- Park-and-ride lots
- Street Closures and impacts on community events
- Parallel arterials – their capacity and the effect of diverting traffic to them with dedicated bus lanes
- Effect on congestion, including around stations
- Need for system connectivity
- Availability and timeliness of transit service
- Potential for express service
- Need for late night service
- Ease of transfers
- Congestion caused by buses

- Pedestrian and bicycle accessibility and amenities
- Americans with Disabilities Act (ADA) accessibility
- The affect of tunneling under homes, particularly older/historic homes
- Safety of drilling in the methane gas zones
- Seismic safety
- Impacts on geology and ground water
- Impacts on underground utilities
- Noise and vibration impacts
- Joint development potential and impacts of joint development
- Economic development opportunities
- Effects on property values
- Shadow and visual impacts associated with elevated structures
- Power/energy requirements
- Crime (safety issues)
- Construction impacts
- Possible segmentation due to funding constraints
- External costs (accidents, health) associated with the No Project Alternative

2.7 Universe of Alternatives Identified for Evaluation

A universe of alternatives evolved based on the mobility problem definition, the study purpose and need, previous studies and the scoping comments received. This universe of alternatives is illustrated in Figure 2-6. A wide range of potential options were brought into the initial screening.

2.8 Alternatives Advanced to Additional Screening

Based on scoping and the supportive investigations for the Westside Corridor study, a range of reasonable build alternatives were identified for a screening level evaluation. The alignments, stations, and transit technologies, including HRT, LRT, Monorail, and BRT proposed for alternative screening, are summarized below. In all, 17 build alternatives were developed in addition to the No Build and TSM alternatives.

2.8.1 No Build

The No Build Alternative (Figure 2-7) includes all existing highway and transit services and facilities and the committed highway and transit projects in the current Metro Long-Range Transportation Plan that are under construction and environmentally cleared, and the current Southern California Association of Governments' 2004 Regional Transportation Plan (RTP).

Proposed major highway improvements impacting the Westside Transit corridor between now and 2030 only include completing high occupancy vehicle (HOV) lanes on the I-405 Freeway between US 101 and the I-105 Freeway.

Figure 2-6. Universe of Alignments and Station Alternatives

Figure 2-7. No Build Alternative

From a rail transit perspective, the Westside study area will continue to be served by the Purple and Red Metro Rail Lines along the eastern and northeastern edges of the study area. Additional rail service committed in 2030 (2001 Metro Long Range Transportation Plan, Baseline) includes:

1. Metro Gold Line Eastside Extension from Union Station to East LA;
2. Exposition LRT Line: from 7th/Metro to Culver City; and
3. LAX People Mover: from the Aviation/LAX station of the Green Line to the LAX main terminal (to be funded by others).

A rich network of local, express and Metro Rapid bus routes will also continue to be provided. Of particular note are the Metro Rapid bus route additions and modifications for:

- Santa Monica Boulevard Metro Rapid Bus (Line 704)
- Culver City Bus Rapid 6 (operated by Culver City Bus)
- Torrance Transit Rapid 3 (operated by Torrance Transit)
- Manchester Avenue Metro Rapid Bus (Line 715)
- San Fernando - Lankershim Metro Rapid Bus (Line 724)
- Olympic Boulevard Metro Rapid Bus (Line 728)
- Pico Boulevard Metro Rapid Bus (Line 730)
- Santa Monica Big Blue Bus Rapid 7 (operated by Santa Monica Big Blue Bus)
- Reseda Metro Rapid Bus (Line 741)
- Central Avenue Metro Rapid Bus (Line 753)
- Long Beach Boulevard Metro Rapid Bus (Line 760)
- Atlantic Boulevard Metro Rapid Bus (Line 762)
- Garvey Avenue – Chavez Metro Rapid Bus (Line 770)
- San Fernando South Metro Rapid Bus (Line 794)
- Wilshire Boulevard Metro Rapid Express Bus (Line 920)

These routes will offer an increased high quality of service in 2030 for purposes of alternative comparison.

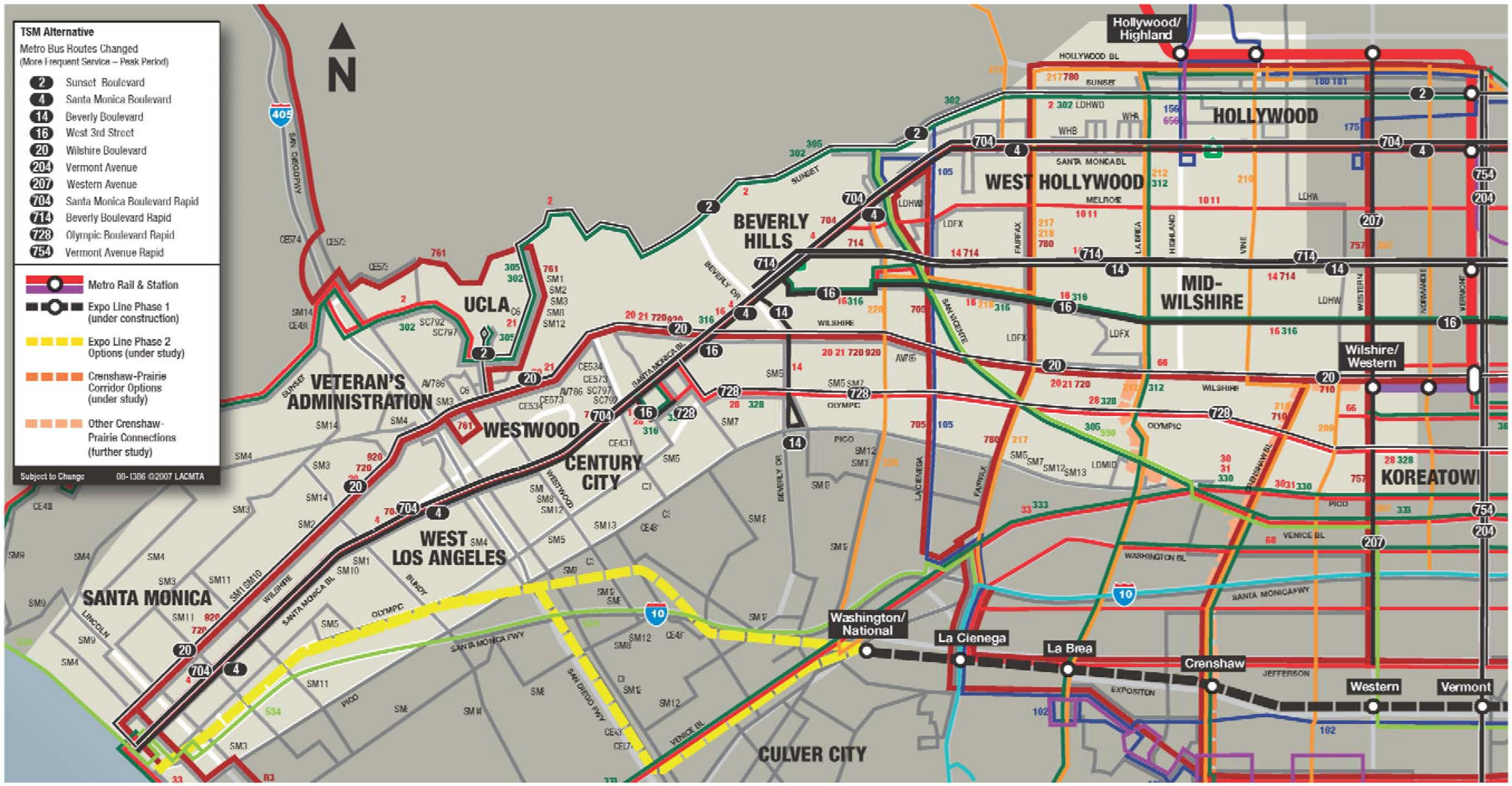
Relation to Other Ongoing Metro Studies

For purposes of this study and comparison of alternatives, the major fixed-guideway investments under study for the Exposition Phase 2 and Crenshaw-Prairie Transit corridors are not included in the No Build Alternative. The completion of the Metro Rapid Bus Program is included.

2.8.2 Transportation Systems Management

The TSM Alternative (Figure 2-8) enhances the No Build Alternative and improves upon the existing Metro Rapid Bus service and local bus service in the Westside study area. This alternative emphasizes more frequent service to reduce delay and enhance mobility. Although the frequency of

Figure 2-8. TSM Alternative



service is already very good, service frequency is proposed to be improved between 2 and 10 minutes during peak periods on selected routes.

A number of local bus routes will see frequency enhancements over the No Build during the peak period. These routes include:

- Sunset Boulevard (short line (SL) Westwood) (Line 2)
- Santa Monica Boulevard SL (Line 4)
- Beverly Boulevard SL (Line 14)
- West Third Street Limited (Line 16)
- Wilshire Boulevard-Westwood (Line 20)
- Vermont Avenue SL (Line 204)
- Western Avenue SL (Line 207)

In addition to the local bus routes described above, a series of Metro Rapid Bus routes will also be enhanced as part of the TSM Alternative. These routes include:

- Santa Monica Boulevard Metro Rapid Bus (Line 704)
- Beverly Boulevard Metro Rapid Bus (Line 714)
- Olympic Boulevard Metro Rapid Bus (Line 728)
- Vermont Avenue Metro Rapid Bus (Line 754)

The TSM Alternative is further described and illustrated in Section 2.11.3.

2.8.3 Heavy Rail Transit in Subway Alternatives

This section contains descriptions of the HRT alternatives proposed for screening that are subway based. Of the 17 build alternatives proposed, 13 fall into the category of HRT in subway. Information on each alignment (separated into three main groupings), station configurations, termini, operating plans and operating support facilities are described below.

2.8.3.1 Alignment Descriptions

Alignment descriptions and mapping to show all HRT subway alternatives for screening are described below. In order to reduce some redundancy in describing these alternatives, they have been subdivided into three main groups: 1) Wilshire Boulevard based alignment alternatives, 2) Santa Monica Boulevard alignment based alternatives and 3) combined or 'maximum' service alternatives that include both the Wilshire and Santa Monica Boulevards alignments. A key map for each of the 13 alternatives that involve HRT subway and a brief description of each one is also provided below.

Wilshire Boulevard based alignments: Of the 13 alternatives in the HRT subway major category, three are focused primarily along Wilshire Boulevard. They are Alternatives 1, 12, and 14, and they are depicted in Figure 2-9 and described following the map.

Figure 2-9. Wilshire Boulevard HRT Subway Alternatives

Alternative 1 – Wilshire Boulevard Alignment HRT Subway

- This alternative extends from the Metro Purple Line Wilshire/Western Station to 4th Street and Wilshire Boulevard in Santa Monica underground with 11 new stations in addition to the existing Wilshire/Western Metro Purple Line Station.
- The alignment is generally under Wilshire Boulevard with a direct connection at the Wilshire/Western Station.
- Refer to Figure 2-10.

Figure 2-10. Alternative 1 – Wilshire Boulevard Alignment HRT Subway

Alternative 12 – Wilshire Boulevard/Beverly Boulevard Centers HRT Subway

- This alternative extends via a direct connection from the Metro Purple Line Wilshire/Western Station to 4th Street and Wilshire Boulevard in Santa Monica underground with 11 new stations in addition to the existing Wilshire/Western Metro Purple Line Station.
- This alignment is generally under Wilshire Boulevard to La Brea Avenue, continues under La Brea Avenue to Beverly Boulevard, stays under Beverly Boulevard to Santa Monica Boulevard, continues under Santa Monica Boulevard to Century City, transitions to Wilshire Boulevard to serve Westwood and continues under Wilshire Boulevard to 4th Street in Santa Monica.
- Refer to Figure 2-11.

Figure 2-11. Alternative 12 – Wilshire Boulevard/Beverly Boulevard Centers HRT Subway

Alternative 14 – Wilshire Boulevard/Fairfax Avenue Centers HRT Subway

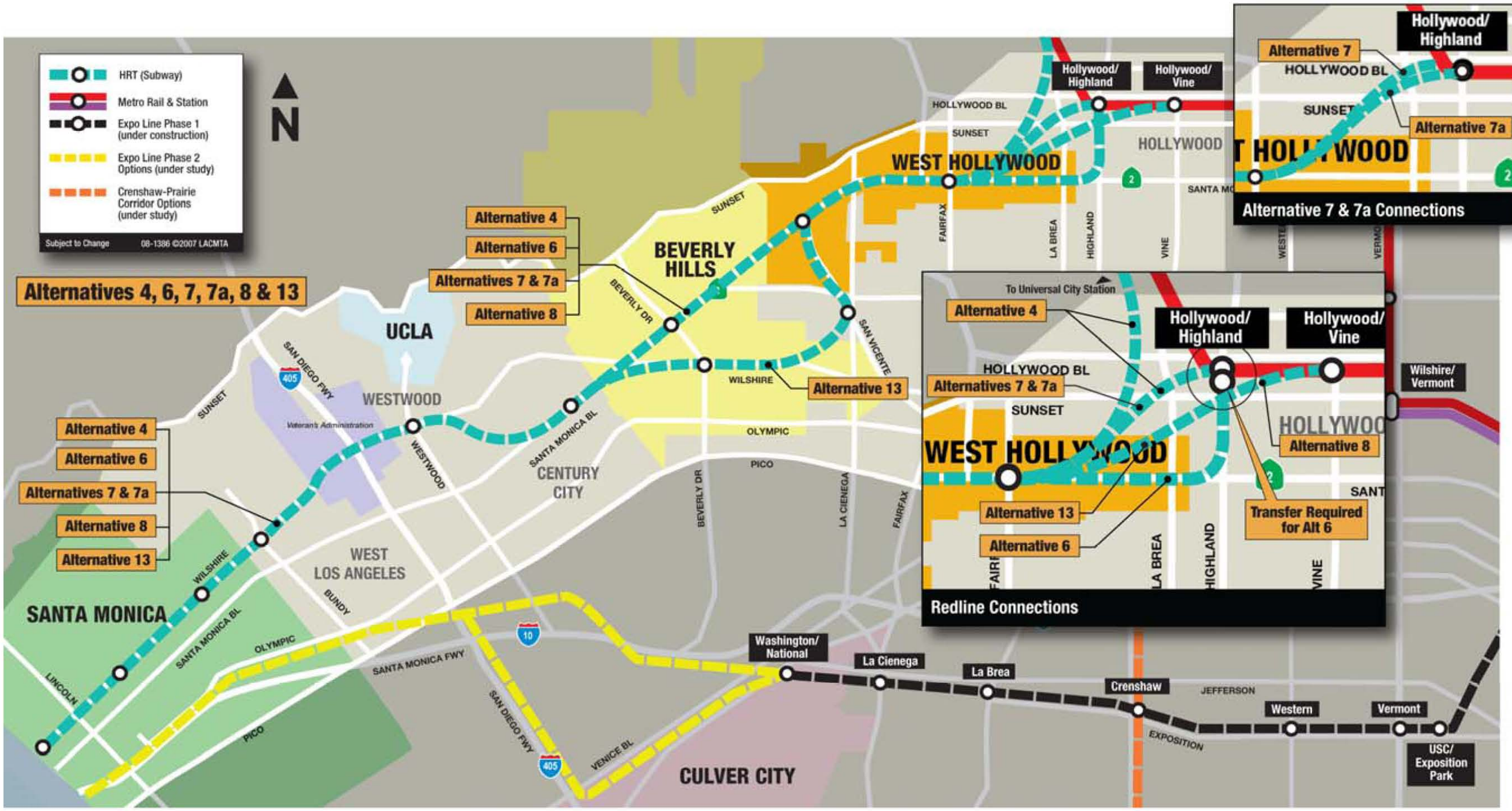
- This alternative extends via a direct connection from the Metro Purple Line Wilshire/ Western Station to 4th Street and Wilshire Boulevard in Santa Monica underground with 12 new stations in addition to the existing Wilshire/Western Metro Purple Line Station.
- This alignment is generally under Wilshire Boulevard to Fairfax Avenue, continues under Fairfax Avenue to 3rd Street stays underground to 3rd Street/La Cienega Boulevard to serve Beverly Center/ Cedars Sinai Medical Center, transitions to Wilshire Boulevard at Beverly Boulevard, turns onto Santa Monica Boulevard to Century Boulevard, and returns to Wilshire Boulevard at Westwood where it continues under Wilshire Boulevard to 4th Street in Santa Monica.
- Refer to Figure 2-12.

Figure 2-12. Alternative 14 – Wilshire Boulevard/Fairfax Avenue Centers HRT Subway

Key comparisons between these three alternatives were ridership, cost, and impacts of serving the Wilshire Boulevard corridor exclusively as opposed to serving a portion of the Beverly Boulevard corridor between La Brea Avenue/Fairfax Avenue and Century City.

Santa Monica Boulevard based alignments: Of the 13 alternatives in the HRT subway major category, five (plus a station approach option) are focused primarily along Santa Monica Boulevard. They are Alternatives 4, 6, 7 (and 7A), 8 and 13 and they are depicted in Figure 2-13.

Figure 2-13. Santa Monica Boulevard HRT Subway Alternatives



Alternative 4 – Santa Monica Boulevard Alignment HRT Subway with Universal City and Hollywood/Highland Red Line Connections

- This alternative extends from the Metro Red Line at both the Universal City and Hollywood/ Highland Stations to 4th Street, and Wilshire Boulevard in Santa Monica, with nine new stations in addition to the existing Metro Red Line Stations at Universal City and Hollywood/Highland.
- This underground alignment transitions from the Metro Red Line to West Hollywood at Fairfax Avenue and Santa Monica Boulevard continues under Santa Monica Boulevard to Century City, transitions to Wilshire Boulevard in Westwood and continues under Wilshire Boulevard to 4th Street in Santa Monica.
- Refer to Figure 2-14.

Figure 2-14. Alternative 4 – Santa Monica Boulevard Alignment HRT Subway

Alternative 6 - Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Red Line Connection

- This alternative extends from the Metro Red Line at the Hollywood/ Highland Station to 4th Street and Wilshire Boulevard in Santa Monica with 10 new stations.
- A transfer underground to a new station in the vicinity of Hollywood/Highland is included to transfer to/from the Red Line.
- This underground alignment transitions from the Metro Red Line at Hollywood/Highland, continues under Highland Boulevard to Santa Monica Boulevard, under Santa Monica Boulevard to Century City, transitions to Wilshire Boulevard and continues under Wilshire Boulevard to 4th Street in Santa Monica.
- Refer to Figure 2-15.

Figure 2-15. Alternative 6 – Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Red Line Connection

Alternative 7 - Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Red Line Connection/ Galaxy North

- This alternative extends from the Metro Red Line at the Hollywood/Highland Station to 4th Street and Wilshire Boulevard in Santa Monica with nine new stations in addition to the existing Hollywood/Highland Station.
- This underground alignment transitions from the Metro Red Line at Hollywood/Highland, to Santa Monica Boulevard at Fairfax Avenue north of the Galaxy shopping center, continues under Santa Monica Boulevard to Century City, transitions to Wilshire Boulevard and continues under Wilshire Boulevard to 4th Street in Santa Monica.
- Alternatives 7 and 7a differ in approaches to the area adjacent to the Metro Red Line Hollywood/Highland Station. There are potential impacts to the Galaxy shopping center in that area under Alternative 7. Alternative 7A represents a slight shift to avoid the shopping center impacts.
- Continuing east-west service between Santa Monica and the existing Metro Red Line is provided by a direct connection at Hollywood/Highland.
- Refer to Figure 2-16.

Figure 2-16. Alternative 7 – Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Red Line Connection/Galaxy North

Alternative 7A - Santa Monica Boulevard Alignment HRT Subway with Hollywood/ Highland Red Line Connection/ Galaxy South

- This alternative extends from the Metro Red Line at the Hollywood/ Highland Station to 4th Street and Wilshire Boulevard in Santa Monica with nine new stations in addition to the existing Hollywood/Highland Station.
- This underground alignment transitions from the Metro Red Line at Hollywood/Highland, to Santa Monica Boulevard at Fairfax Avenue south of the Galaxy shopping center, continues under Santa Monica Boulevard to Century City, transitions to Wilshire Boulevard and continues under Wilshire Boulevard to 4th Street in Santa Monica.
- Alternatives 7 and 7A differ in approaches to the area adjacent to the Metro Red Line Hollywood/Highland Station. There are potential impacts to the Galaxy shopping center in that area under Alternative 7. Alternative 7A represents a slight shift to avoid the shopping center impacts.
- Continuing east-west service to Santa Monica to/from the existing Metro Red Line is provided by a direct connection.
- Refer to Figure 2-17.

Figure 2-17. Alternative 7A – Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Red Line Connection/Galaxy South

Alternative 8 - Santa Monica Boulevard Alignment HRT Subway with Hollywood/Vine Red Line Connection

- This alternative extends from the Metro Red Line at the Hollywood/ Vine Station to 4th Street and Wilshire Boulevard in Santa Monica with nine new stations in addition to the existing Hollywood/Highland Station.
- This underground alignment transitions from the Metro Red Line at Hollywood/Vine to Santa Monica Boulevard at Fairfax Avenue, continues under Santa Monica Boulevard to Century City, transitions to Wilshire Boulevard and continues under Wilshire Boulevard to 4th Street in Santa Monica.
- Continuing east-west service to Santa Monica to/from the existing Metro Red Line is provided by a direct connection.
- Refer to Figure 2-18.

Figure 2-18. Alternative 8 – Santa Monica Boulevard Alignment HRT Subway with Hollywood/Vine Red Line Connection

Alternative 13 – Santa Monica/San Vicente/Wilshire Boulevards HRT Subway

- This alternative extends from the Metro Red Line at the Hollywood/ Highland Station to 4th Street and Wilshire Boulevard in Santa Monica with 10 new stations in addition to the existing Hollywood/Highland Station.
- The alignment extends from the Hollywood/Highland Metro Red Line Station under Santa Monica Boulevard, San Vicente Boulevard, and Wilshire Boulevard to 4th Street in Santa Monica.
- Continuing east-west service to Santa Monica to/from the existing Metro Red Line is provided by a direct connection.
- Refer to Figure 2-19.

Figure 2-19. Alternative 13 – Santa Monica/San Vicente/Wilshire Boulevards HRT Subway

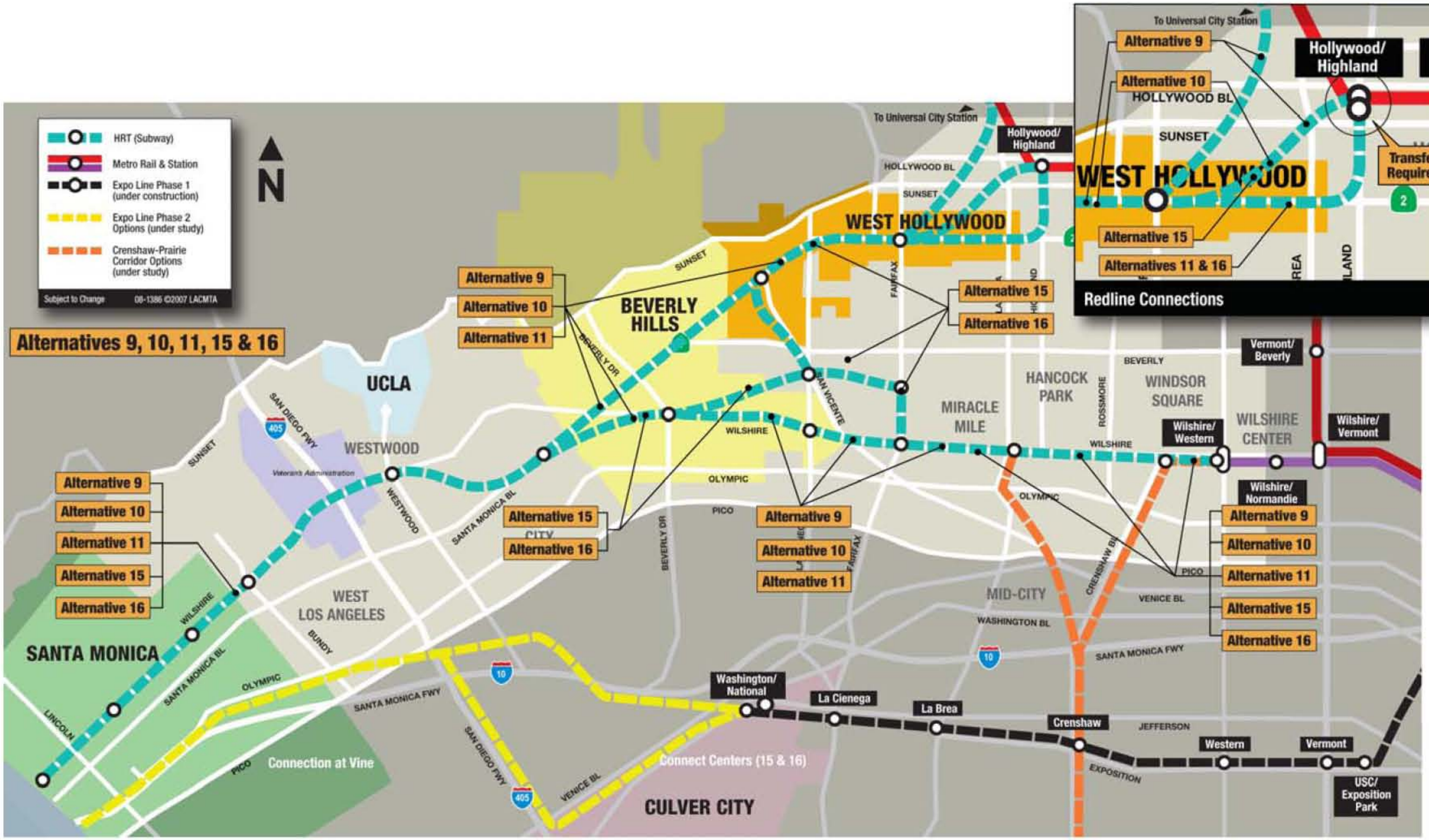
Of the five primary alternatives in the Santa Monica Boulevard based group, four vary with regard to the alignment approach as connections are made to and from the existing Metro Red Line in the vicinity of the Hollywood/Highland Station. Alternative 4 has an eastbound leg approaching the Hollywood/Highland Station from a new station at Fairfax Avenue and Santa Monica Boulevard. The westbound leg transitions from the Universal City Metro Red Line Station and, as shown, also connects at the new station at Fairfax Avenue and Santa Monica Boulevard. Alternative 6 enters the existing Red Line from the south near the Hollywood/Highland Station but because of engineering constraints does not physically connect at that location, thereby requiring a transfer. Alternative 7 (plus its approach option 7A) assumes the eastbound approach leg from Alternative 4 operates in both directions. At issue is the potential impact on the Galaxy shopping center in that area so Alternative 7A represents a slight shift to avoid the shopping center impacts. Alternative 8 moves the connection to and from the existing Metro Red Line to the Hollywood/Vine Station to analyze the advantages and disadvantages of this shift. Alternatives 4, 6, 7 (and 7A) and 8 all include nine new stations.

These four alternatives share a common alignment from the proposed station at Fairfax Avenue and Santa Monica Boulevard to a western terminus at Wilshire Boulevard and 4th Street in downtown Santa Monica. The evaluation of these alternatives helped decide the best way to connect to the existing Metro Red Line at Hollywood/Highland.

The fifth alternative in the Santa Monica Boulevard based group, Alternative 13, shares the same approach to and from the existing Metro Red Line as Alternative 7, as well as the same alignment from the Santa Monica at Century City station to the western terminus as the other four alternatives. Alternative 13 differs where it serves Beverly Hills between San Vicente Boulevard and Wilshire Boulevard. At San Vicente Boulevard, the alternative turns southeast to La Cienega Boulevard, heads southwest under Wilshire Boulevard and Beverly Drive, and then rejoins the common segment under Santa Monica Boulevard at Century City. This alternative helped evaluate the merits of serving Cedars-Sinai Medical Center, Beverly Center and portions of Beverly Hills closer to Wilshire Boulevard as compared to Santa Monica Boulevard.

<u>Combined Wilshire and Santa Monica based alignments:</u> Of the 13 alternatives in the HRT subway major category, five represent maximum coverage alternatives utilizing both the Wilshire and Santa Monica corridors. The five are Alternatives 9, 10, 11, 15 and 16. They are shown on Figure 2-20.

Figure 2-20. Combined Wilshire/Santa Monica HRT Subway Alternatives



Alternative 9 – Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt 1 + Alt 4)

- This alternative extends from the Metro Purple Line Wilshire/ Western Station and from the Metro Red Line at both the Universal City and Hollywood/Highland Stations to 4th Street and Wilshire Boulevard in Santa Monica underground with 13 new stations in addition to the three existing Metro Stations.
- See Alternatives 1 and 4 bulleted summaries and refer to Figure 2-21.

Figure 2-21. Alternative 9 – Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt 1 + Alt 4)

Alternative 10 - Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt 1 + Alt 7)

- This alternative extends from the Metro Purple Line Wilshire/ Western Station and from the Metro Red Line at the Hollywood/ Highland Station to 4th Street and Wilshire Boulevard in Santa Monica underground with 13 new stations in addition to the two existing Metro Stations.
- See Alternatives 1 and 7 bulleted summaries above refer to Figure 2-22.

Figure 2-22. Alternative 10 – Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt 1 + Alt 7)

Alternative 11 – Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt 1 + Alt 6)

- This alternative extends from the Metro Purple Line Wilshire/ Western Station and from the Metro Red Line at the Hollywood/ Highland Station without a Red Line direct connection to 4th Street and Wilshire Boulevard in Santa Monica underground with 14 new stations in addition to the existing Wilshire/Western Metro Purple Line Station.
- See Alternatives 1 and 6 bulleted summaries above and refer to Figure 2-23.

Figure 2-23. Alternative 11 – Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt 1 + Alt 6)

Alternative 15 – Wilshire/Santa Monica Boulevards Combined Centers HRT Subway (Alt 13 + Alt 14)

- This alternative extends from the Metro Purple Line Wilshire/ Western Station and from the Metro Red Line Hollywood/ Highland Station to 4th Street and Wilshire Boulevard in Santa Monica underground with 14 new stations in addition to the existing Metro Stations..
- See Alternatives 13 and 14 bulleted summaries above and refer to Figure 2-24.

Figure 2-24. Alternative 15 – Wilshire/Santa Monica Boulevards Combined Centers HRT Subway (Alt 13 + Alt 14)

Alternative 16 - Wilshire/Santa Monica Boulevards Combined Centers HRT Subway (Alt 13 + Alt 14) with transfer at Hollywood/Highland

- This alternative extends from the Metro Purple Line Wilshire/ Western Station and from the Metro Red Line Hollywood/ Highland Station to 4th Street and Wilshire Boulevard in Santa Monica underground with 15 new stations including transfer station at the Hollywood/Highland Metro Red Station.
- See Alternatives 13 and 14 bulleted summaries above and refer to Figure 2-25.

Figure 2-25. Alternative 16 – Wilshire/Santa Monica Boulevards Combined Centers HRT Subway (Alt 13 + Alt 14) with transfer at Hollywood/Highland

The primary differences in the five maximum coverage alternatives include various ways to connect with the existing Metro Red Line in the vicinity of the Hollywood/Highland Station as well as various ways to serve the 'land use centers' in an area bounded by Fairfax Avenue, Beverly Drive, Santa Monica Boulevard, and Wilshire Boulevard. Alternative 9 has an eastbound leg approaching the Hollywood/Highland Station from a new station at Fairfax Avenue and Santa Monica Boulevard. The westbound leg transitions from the Metro Red Line Universal City Station and, as shown, also connects at the new station at Fairfax Avenue and Santa Monica Boulevard. In addition, Alternative 9 extends from the current Metro Purple Line at Wilshire/Western and continues under Wilshire Boulevard to Beverly Drive, then joins with the Santa Monica branch that extends southwest from the Fairfax Station and continues to the Westwood Boulevard Station at Wilshire Boulevard, continuing under Wilshire Boulevard to 4th Street in downtown Santa Monica. Alternative 10 follows the same path as Alternative 9, except for its connection with the existing Metro Red Line.

Alternative 10 assumes the eastbound approach leg from Alternative 9 operates in both directions. Likewise, Alternative 11 follows the same path as Alternative 9, except for its connection with the existing Metro Red Line. Alternative 11 enters the existing Metro Red Line from the south near the

Hollywood/Highland Station, but because of engineering constraints does not physically connect at that location, thereby requiring a physical transfer. Regarding number of stations, Alternatives 9, 10 and 11 have 13 new stations.

Alternatives 15 and 16 are designed to test the effectiveness of serving different 'land use centers' near the middle of the study area, assuming both the Santa Monica and Wilshire corridors are served by high capacity transit. Alternative 15 transitions from the Metro Red Line and the Metro Purple Line just like Alternative 10; however, it differs in key two respects. First, it leaves the Santa Monica alignment at San Vicente Boulevard, heads southeast to La Cienega Boulevard, then southwest to Beverly Drive and Wilshire Boulevard before joining the common segment to all alternatives in this group at the Century City station under Santa Monica Boulevard. Second, it leaves the Wilshire Boulevard alignment at Fairfax Avenue, turns north toward Beverly Boulevard, west to San Vicente Boulevard, and then transitions southwest to Beverly Drive and Wilshire Boulevard. The only difference between Alternatives 15 and 16 is that Alternative 16 transitions to and from the existing Metro Red Line similar to Alternative 11, requiring a physical transfer because of engineering constraints.

2.8.3.2 Stations

All subway stations are proposed to have street-level entrances comprised of vertical circulation elements that bring patrons to a mezzanine level where the ticketing functions are located. The platforms are one level below the mezzanine level. The platform widths and the widths of the stairs, escalators and emergency exits are to be determined by the patronage data and ADA required clearances.

The station platforms will be approximately 450 feet long and will allow level-boarding for full accessibility. The stations will consist of either center or side platforms. Center platform stations have a single platform that allows passengers to access trains from either direction from the same platform. This configuration makes it easier for passengers to make cross-platform transfers and improves the ease of use by passengers using the system. Side-platform stations have platforms on either side of the tracks with separate entrances to each platform. A side platform configuration requires that patrons transfer to a separate and different platform to access trains going in opposite directions.

All platforms will be fully accessible and will comply with the ADA. Platforms will be well-lighted and include amenities such as seating, trash receptacles, artwork, signage and safety and security equipment, including closed circuit television (CCTV), public announcement (PA) system, passenger assistance telephones (PTEL), and a transit passenger information system (TPIS) that will provide real-time information as currently being installed by Metro. The fare collection area includes ticket vending machines (TVM) and information cases.

2.8.3.3 Termini

All HRT subway alternatives for screening have a common western terminus at the vicinity of 4th Street and Wilshire Boulevard underground. At the current western terminus of the Metro Purple Line at Wilshire/Western Station, all HRT subway alternatives assume a continuation underground along Wilshire Boulevard.

There are a number of alternative termini being considered to solve the transition to and from the existing Metro Red Line in the vicinity of the Hollywood/ Highland Station. These options (as shown in previous figures) assume an extension from the Hollywood/Highland Station, the Hollywood/Vine Station or a split configuration using both the Hollywood/Highland and the

Universal City Stations. The screening analysis provides additional information on which of these termini makes the most sense considering ridership, costs and other impacts.

2.8.3.4 Operations Plans

Conceptual operating plans for the subway HRT alternatives were developed for ridership forecasting and capital and operating cost estimating purposes. All lines would operate seven days per week, including holidays. Hours of service would be similar to those operated on the existing Metro Orange, Purple, Red, Blue, and Gold Lines. Service would be provided from approximately 4:30 a.m. to 1:30 a.m., seven days a week. Weekday service in 2030 for new line segments would operate during peak periods of 6:00 to 9:00 a.m. and 3:00 to 7:00 p.m. during the off-peak midday period between 9:00 a.m. to 3:00 p.m. Off peak service early morning and late night periods would occur from 5:00 to 6:00 a.m. and 7:00 p.m. to 1:00 a.m.

For the Wilshire Boulevard Alternatives 1, 12, and 14, beginning at the Wilshire/Vermont transfer station, in the peak periods Metro Red Line trains would run every 5 minutes to/from North Hollywood. The proposed Metro Purple Line extension to Santa Monica will have 3 and 1/3 minute headways in the peak periods. All segments would operate with 10 minute headways in off peak periods.

For the Santa Monica Boulevard Alternatives, the operating plan is devised such that a comparable peak and off peak service is provided for Alternatives 4, 6, 7, 7A, 8, and 13 as for Wilshire: 3 and 1/3 minute peak period service and 10 minute off peak service.

Finally, for the combined or maximum service group involving both Wilshire and Santa Monica Boulevards Alternatives 9, 10, 11, 15, and 16, the operating plans become more complex. All Wilshire segments before the merge with the Santa Monica segments at Century City/Beverly Hills have a 10 minute peak period and 20 minute off peak period frequency.

The Santa Monica Boulevard segments to/from Century City/Beverly Hills vary with peak period headways for Alternative 9 at 3 and 1/3 minutes, off peak of 10 minutes; peak period headways for Alternatives 10 and 15 at 10 minutes, off peak of 20 minutes; and peak period headways for Alternatives 11 and 16 at 5 minutes, off peak of 10 minutes.

These frequencies directly impact the service levels on the common segments from Century City/Beverly Hills to downtown Santa Monica. In that segment the peak period headways for Alternative 9 is 2 minutes, off peak of 10 minutes; peak period headways for Alternatives 10 and 15 is 3 and 1/3 minutes, off peak of 10 minutes; and peak period headways for Alternatives 11 and 16 is 2 and 1/2 minutes, off peak 10 minutes.

Select modifications to existing bus routes are also proposed to provide enhanced service for bus to rail transfers for all HRT subway alternatives. These route and frequency changes will be reflected in the ridership and cost analysis as part of the screening and subsequent detailed evaluation of the alternatives.

2.8.3.5 Operations Support Facilities

The HRT alternatives will not require a new maintenance and storage facility to support the required fleet as there is sufficient capacity and expansion capability at Metro's existing rail maintenance facility except for Alternative 6, which does not connect directly to the Metro Red Line/Metro Purple Line system and would therefore not be able to access the existing HRT storage yard in Downtown Los Angeles.

2.8.4 Light Rail, Monorail and Heavy Rail Elevated Alternatives

This section provides a description of the elevated alternatives proposed for alternative screening. Information is provided to describe the basic alignments, types of stations, variations in termini (if any), proposed operating plans, and operating support facility needs. The characteristics of the elevated alternatives predominantly vary only by technology application: heavy rail, light rail, or monorail. The salient characteristics of the HRT and LRT technologies were presented in Section 2.2. It is noted that even though LRT can operate in at-grade configuration and often does, LRT at-grade is not included in the analysis because it cannot operate effectively enough in this corridor to provide a travel time advantage over BRT and will be much more expensive.

As the Monorail mode was introduced during the public scoping process, it is worth noting some basic assumptions for this technology for purposes of this analysis.

Monorail is a fixed guideway transit mode in which a series of electrically propelled vehicles straddle atop a single guideway beam or straddle bent structure. The trains generally consist of permanently coupled cars having suspension, propulsion and control equipment in common. Electric power is generally picked up by carbon collectors on the bottom of the vehicle in contact with a bus bar mounted on the side of the guideway beam. Vehicles can be operated with drivers or in totally automated mode.

The guideway for monorail is typically elevated, since it must be totally grade separated from all other traffic. Emergency egress from monorail vehicles has historically been a problem without the addition of emergency access walkways added to the guideway or onboard inflatable slides and emergency hatches that permit passenger movement from a disabled vehicle to adjacent vehicles or to ground level.

A disadvantage of Monorail systems has been their inability to switch tracks efficiently. Switching operations are often slow and maintenance intensive. As a result Monorail systems have been limited to simple loop and shuttle systems. An example application is pictured in Figure 2-26 from the resort corridor in Las Vegas. Additional key features are speeds up to 45 mph, train lengths up to six cars, and high level platform stations. Often, the vehicle and guideway designs are proprietary in nature limiting procurement opportunities.

Figure 2-26. Example Las Vegas Monorail Application

2.8.4.1 Alignment Descriptions

A total of three elevated configurations (Alternatives 2, 3, and 5) are proposed for screening and are illustrated graphically in Figure 2-27. For each alternative, three modes are common: HRT, LRT, and Monorail. A key map is provided next with a brief description of the three alternatives followed by more descriptive information.

Figure 2-27. HRT, LRT and Monorail Elevated Alternatives

Alternative 2 – Wilshire Boulevard Alignment HRT Elevated

- This alternative extends from the Metro Purple Line Wilshire/Western Station to 4th Street and Wilshire Boulevard in Santa Monica elevated with 11 new stations in addition to a connection with the existing Wilshire/Western Metro Purple Line Station.
- The alignment is elevated above Wilshire Boulevard to Santa Monica Boulevard, above Santa Monica Boulevard to Westwood Boulevard, above Westwood Boulevard to Wilshire Boulevard and above Wilshire Boulevard to 4th Street in Santa Monica.
- To transition from subway to elevated, the alignment requires a major portal between the existing Wilshire/Western Metro Purple Line Station and the proposed Wilshire/Crenshaw Station.
- Refer to Figure 2-28

Figure 2-28. Alternative 2 – Wilshire Boulevard Alignment HRT Elevated

Alternative 3 – Wilshire Boulevard Alignment LRT/Monorail Elevated

- This alternative extends from the Metro Purple Line Wilshire/ Western Station to 4th Street and Wilshire Boulevard in Santa Monica elevated with 12 new stations.
- The alignment is elevated above Wilshire Boulevard to Santa Monica Boulevard, above Santa Monica Boulevard to Westwood Boulevard, above Westwood Boulevard to Wilshire Boulevard and above Wilshire Boulevard to 4th Street in Santa Monica.
- To transition from subway to elevated, the alignment requires a physical transfer between the existing Wilshire/Western Metro Purple Line Station and the proposed Wilshire/Western elevated station.
- Refer to Figure 2-29

Figure 2-29. Alternative 3 – Wilshire Boulevard Alignment LRT/Monorail Elevated

Alternative 5 – Santa Monica Boulevard Alignment HRT, LRT, Monorail Elevated

- This alternative extends from the Metro Red Line Hollywood/ Highland Station elevated to Wilshire Boulevard and 4th Street in Santa Monica with 10 new stations.
- The alignment heads south from the Hollywood/Highland Station above Highland Avenue to Santa Monica Boulevard, above Santa Monica Boulevard to Westwood Boulevard, above Westwood Boulevard to Wilshire Boulevard and then above Wilshire Boulevard to 4th Street in Santa Monica.
- To transition from any of the mode choices (HRT, LRT or Monorail Elevated), the alignment requires a physical transfer between the existing Hollywood/Highland Metro Red Line Station and the proposed Hollywood/Highland station.
- This alternative assumes HRT, LRT or Monorail modes.
- Refer to Figure 2-30.

Figure 2-30. Alternative 5 – Santa Monica Boulevard Alignment HRT, LRT, Monorail Elevated

As shown in Figure 2-27, all alternatives share a common alignment between the intersection of Wilshire and Santa Monica Boulevards and the western terminus at 4th Street in downtown Santa Monica. Separate alternatives are proposed which use Wilshire Boulevard east of Santa Monica Boulevard (Alternatives 2 and 3) and which use Highland Avenue and Santa Monica Boulevard (Alternative 5) northeast of the Wilshire/Santa Monica Boulevards intersection. The elevated alignments will be either in the center or on one side of the roadway. Station location, building access, traffic considerations, and opportunities for column placement to support the elevated structure, among other considerations will ultimately help decide the final horizontal location.

The portion of Wilshire Boulevard utilized by Alternatives 2 and 3 to the east of the Wilshire/Santa Monica Boulevards intersection begins at the Wilshire/Western Metro Purple Line Station. Alternative 2 assumes HRT and in this case the alignment transitions out of the subway to an elevated configuration and continues west toward Santa Monica Boulevard, then turns southwest on Santa Monica Boulevard to Westwood Boulevard, heads northwest on Westwood Boulevard back to Wilshire Boulevard and then southwest to 4th Street in downtown Santa Monica. The only difference between Alternatives 2 and 3 is that Alternative 3 assumes either LRT or Monorail which requires a transfer from the end of the Metro Purple Line at the Wilshire/Western Station to connect with Alternative 3. Alternative 2 assumes 11 elevated stations and Alternative 3 assumes 12 elevated stations.

The portion of Highland Avenue and Santa Monica Boulevard used by Alternative 5 to the northeast of the Wilshire/Santa Monica Boulevards intersection begins in the vicinity of the Hollywood/Highland Metro Red Line Station. Due to engineering constraints, it is not possible to seamlessly transition from a subway to an elevated configuration in this area. Therefore, all modes (HRT, LRT, and Monorail) require a physical transfer. This transfer would take place along Highland Avenue north of Sunset Boulevard as close to the Hollywood/Highland Station entrances as possible. The alignment would then continue south on Highland Avenue to Santa Monica Boulevard, continue west and then southwest along Santa Monica Boulevard to Wilshire Boulevard, and then continue on the elevated alignments' common segment to downtown Santa Monica.

2.8.4.2 Stations

The station configurations will vary slightly by technology primarily because of the various vehicle dimensions and possible train lengths. The amount of station amenities, such as seating, trash receptacles, and signage, should only vary as a result of the platform lengths required. HRT systems contain more vehicles in a trainset, which requires a longer platform and, thus, a greater number of station amenities. Comparatively, LRT trains contain fewer cars and require shorter platforms, so fewer amenities are needed.

The elevated stations are comprised of platforms that will vary in length by transit technology and will allow level-boarding for full accessibility. The stations will consist of either center or side platforms. Center platform stations have a single platform that allows passengers to access trains from either direction from the same platform. This configuration makes it easier for passengers to make cross-platform transfers and improves the ease of use by passengers using the system. Side-platform stations could have platforms on either side of the tracks with separate entrances to each platform or have access from an intermediate concourse level above grade. A side platform configuration requires that patrons transfer to a separate and different platform to access trains going in opposite directions.

All platforms would be fully accessible and will comply with the ADA. Outdoor platforms would be well-lighted and include amenities such as canopies that cover a minimum of 30 percent of the platform area, seating, bike lockers and bike racks, trash receptacles, artwork, signage and safety and security equipment, including CCTV, a PA system, PTEL, and a TPIS similar to what is being installed now on the Metro Gold Line Eastside Extension. The fare collection area includes TVM and information cases.

The elevated station structures will be supported by columns spaced approximately 80 to 120 feet depending on the transit technology employed. The platforms will be accessed either directly at grade or from an intermediate concourse above grade through vertical circulation elements (i.e., stairs, escalators, or elevator). Platform sizes are determined by ADA clearances at the stairs, escalators or elevator structures, and exiting requirements in compliance with Metro Design Criteria based on patronage data and car dimensions.

2.8.4.3 Termini

For all elevated alternatives only slight variations in alignment termini exist. For Alternatives 2 (HRT) and 3 (LRT and Monorail), the alignments begin at the Wilshire/Western Metro Purple Line Station and end at Wilshire Boulevard at 4th Street in downtown Santa Monica. Alternative 2 (HRT) assumes that the Metro Purple Line will transition from below grade to above grade thereby providing a smooth transition without requiring a transfer. Because of the need to transfer to a different technology, Alternative 3 begins in an elevated configuration near the Wilshire/Western Station, thereby requiring a physical transfer from the end of the Metro Purple Line in subway to either an elevated light rail or monorail train.

Alternative 5 (HRT, LRT, and Monorail) begins in the vicinity of the Hollywood/Highland Metro Red Line Station and, like Alternatives 2 and 3, terminates at Wilshire Boulevard and 4th Street in downtown Santa Monica. Because of space and geometry constraints it is not practical to transition HRT from below grade to elevated and continue along Highland Avenue. Therefore, all technologies in this alternative assume a physical transfer between the Hollywood/Highland subway station to a new elevated station in the immediate vicinity.

2.8.4.4 Operations Plans

Conceptual operating plans for the elevated HRT, LRT and Monorail alternatives have been developed for ridership forecasting and capital and operating cost estimating purposes. All lines would operate seven days per week, including holidays. Hours of service would be similar to those operated on the existing Metro Orange, Purple, Red, Blue, and Gold Lines. Service would be provided from approximately 4:30 a.m. to 1:30 a.m., Monday through Sunday. Weekday service in 2030 for new line segments would operate during peak periods (i.e., 6:00 to 9:00 a.m. and 3:00 to 7:00 p.m.) and during the off-peak midday period (i.e., 9:00 a.m. to 3:00 p.m.). Service would be offered during the early morning and late night periods (i.e., 4:30 to 6:00 a.m. and 7:00 p.m. to 1:30 a.m.).

Several different LRT operating plans were developed based on the proposed eastern termini at Wilshire/Western (Alternatives 2 and 3) or Hollywood/Highland (Alternative 5). The alternative with a direct connection to the Metro Purple Line at Wilshire/Western (Alternative 2) would allow the proposed Westside Extension Transit Corridor HRT option to interline with the existing Metro Purple Line and operate to downtown Santa Monica. All other elevated alternatives cannot connect to the Metro Purple or Red Lines, except by transfer.

The operating plans for the Wilshire Boulevard Alignment (Alternatives 2 and 3) provide for the operation of a single line operating from end to end and stopping at all intermediate stations between Western Avenue and 4th Street in downtown Santa Monica. The line would operate at 3 and 1/3-minute and 10-minute frequencies during the peak and off-peak periods, respectively. The HRT mode affords a seamless transition from subway to an elevated configuration.

The operating plan for the Santa Monica Boulevard Alignment (Alternative 5) provides for the operation of a single line operating from end to end and stopping at all intermediate stations between Hollywood/Highland and 4th Street in downtown Santa Monica. The frequencies of service would be 3 and 1/3 minutes and 10 minutes during peak and off-peak periods, respectively. All mode alternatives (HRT, LRT and Monorail) require a physical transfer in the vicinity of the Hollywood/Highland Metro Red Line Station.

Select modifications to existing bus routes are also proposed to provide enhanced service for bus to rail transfers for all elevated alternatives. These route and frequency changes will be reflected in the ridership and cost analysis as part of the screening and subsequent detailed evaluation of the alternatives.

2.8.4.5 Operations Support Facilities

Most of the HRT elevated alternatives will not require a new maintenance and storage facility to support the required fleet, but the LRT and Monorail Alternatives (Alternative 5) will. A new proposed vehicle maintenance and storage facility, either for LRT or Monorail, would be used for service and maintenance of the vehicles and as a storage area for vehicles that are not in service. Metro is very familiar with LRT maintenance requirements, but not familiar with such requirements for Monorail. Potential sites for the proposed facility and their unique requirements will be identified for consideration during the detailed definition of the alternatives, as necessary.

2.8.5 BRT Alternative

The BRT Alternative provides for new transit services in the Westside Transit Corridor traveling in exclusive curb lanes during peak periods. The BRT services would be operated by low-floor, compressed natural gas powered articulated vehicles with multi-door boarding. Enhanced BRT stops and stations would be constructed for passenger access to the system. The stations for access to the BRT services would be located approximately 1-mile apart. Figure 2-31 illustrates the BRT Alternative to be tested during screening. The sections below provide a more detailed discussion of this alternative. BRT in the median of Wilshire Boulevard was considered and rejected in the 2002 Wilshire BRT EIR.

Figure 2-31. Alternative 17 – BRT Alternative

2.8.5.1 Alignment Description

The BRT alternative consists of a specially operated dedicated peak period curb lane predominantly along Santa Monica Boulevard with two branches, one to 4th Street in downtown Santa Monica with 13 stations and the second along Santa Monica Boulevard to Westwood Boulevard with nine stations. The BRT alternative also includes a similarly operated Wilshire Line from the end of the Metro Purple Line along Wilshire Boulevard to Ocean Avenue, with a turn-around along Ocean Avenue back to 5th Street and Colorado Avenue in downtown Santa Monica with 15 stations. A summary map with a brief description of the BRT alternative is provided below before a more detailed description of the BRT alternative is provided.

Alternative 17 – Wilshire/Santa Monica Boulevards BRT At Grade

- This alternative predominantly uses Wilshire and Santa Monica Boulevards on street with physical transfers at the Wilshire/Western Metro Purple Line Station and Hollywood/Highland Metro Red Line Station providing service to downtown Santa Monica on both Wilshire and Santa Monica Boulevards.
- This alternative operates with three separate lines: Wilshire Boulevard to downtown Santa Monica (Line 1), Santa Monica Boulevard to downtown Santa Monica (Line 2) and Santa Monica Boulevard to Westwood Boulevard and Wilshire Boulevard (Line 3).
- Line 1 has 15 stops, Line 2 has 13 stops, and Line 3 has nine stops.
- Refer to Figure 2-31.

Both branches of the Santa Monica BRT Line begin with a street level transfer above the Hollywood/Highland Metro Red Line Station. The BRT Line continues south on Highland Avenue toward Santa Monica Boulevard. Once on Santa Monica Boulevard, the main line continues to 4th Street in downtown Santa Monica. The branch line turns northwest on Westwood Boulevard and terminates at Westwood and Wilshire Boulevards.

The third section of the BRT alternative starts as a street level transfer above the Wilshire/Western Metro Purple Line Station and continues along Wilshire Boulevard, crosses Santa Monica Boulevard, and continues on Wilshire Boulevard to Ocean Drive, with a turn back along Ocean Drive to Colorado Avenue and 5th Street in downtown Santa Monica.

2.8.5.2 Stations

BRT stations would be located at frequent locations along the alignment, approximately 1 mile apart. The BRT stations would be at-grade stations that are comprised of two separate platforms along the alignment, one for each direction of travel. The station platforms would be of sufficient length to accommodate three conventional (40 feet and 45 feet) buses or two articulated (60 feet) buses. The BRT platforms would accommodate low floor vehicles to improve the boarding and alighting process and help reduce vehicle travel and dwell times.

Fare collection equipment, consisting of ticket vending machines and Stand Alone Validators (SAV) would be provided at each platform where boarding occurs. Canopies would partially cover portions of the platforms, including the fare collection area. Platforms would be well-lighted and include amenities such as seating, bike lockers and bike racks, trash receptacles, artwork, signage and safety and security equipment, including CCTV, PA system, PTEL, and Variable Message Signs (VMS) that would provide real-time information.

2.8.5.3 Termini

The BRT Alternative provides for the operation of two lines operating from end to end stopping at all intermediate stations (Lines 1 and 3) and one branch line serving Westwood (Line 2). The two lines going end to end serve the Wilshire corridor and the Santa Monica corridor respectively. The Wilshire Line (Line 1) would begin with a street level transfer at the Wilshire/Western Metro Purple Line Station and end at 4th Street in downtown Santa Monica. The Santa Monica Line (Line 3) would begin with a street level transfer at the Hollywood/Highland Metro Red Line Station and follow Santa Monica Boulevard to 4th Street in downtown Santa Monica. The branch line (Line 2) serving Westwood would begin like the Santa Monica Line and at Westwood Boulevard turn northwest to Wilshire Boulevard.

2.8.5.4 Operations Plans

A conceptual operating plan has been developed for the BRT Alternative for ridership forecasting and capital and operating cost estimating purposes. The BRT Lines would operate seven days per week, including holidays. Hours of service would be similar to those operated on the existing Metro Orange, Purple, Red, Blue, and Gold Lines. Service would be provided from approximately 4:30 a.m. to 1:30 a.m., Monday through Sunday. Weekday BRT service in 2030 for the Wilshire Line BRT segment would operate approximately every 2.5 minutes during peak periods in an exclusive curb lane (i.e., 6:00 to 9:00 a.m. and 3:00 to 7:00 p.m.) and every 5 minutes during the off-peak periods, but non exclusive similar to the 720 Metro Rapid bus service today. For both the Santa Monica Boulevard alignment BRT Line segments, service is to be provided every 5 minutes in an exclusive curb lane during peak periods only. Service will operate like the 704 Metro Rapid bus service in off peak periods.

2.8.5.5 Operations Support Facilities

No new vehicle maintenance and storage facilities would be required to support the expanded vehicle fleet required by the BRT Alternatives. The vehicles would be maintained and stored at existing Metro facilities, which may need some expansion. Capital and operating costs associated with operations support facilities will be estimated as part of the evaluation of alternatives later in the project.

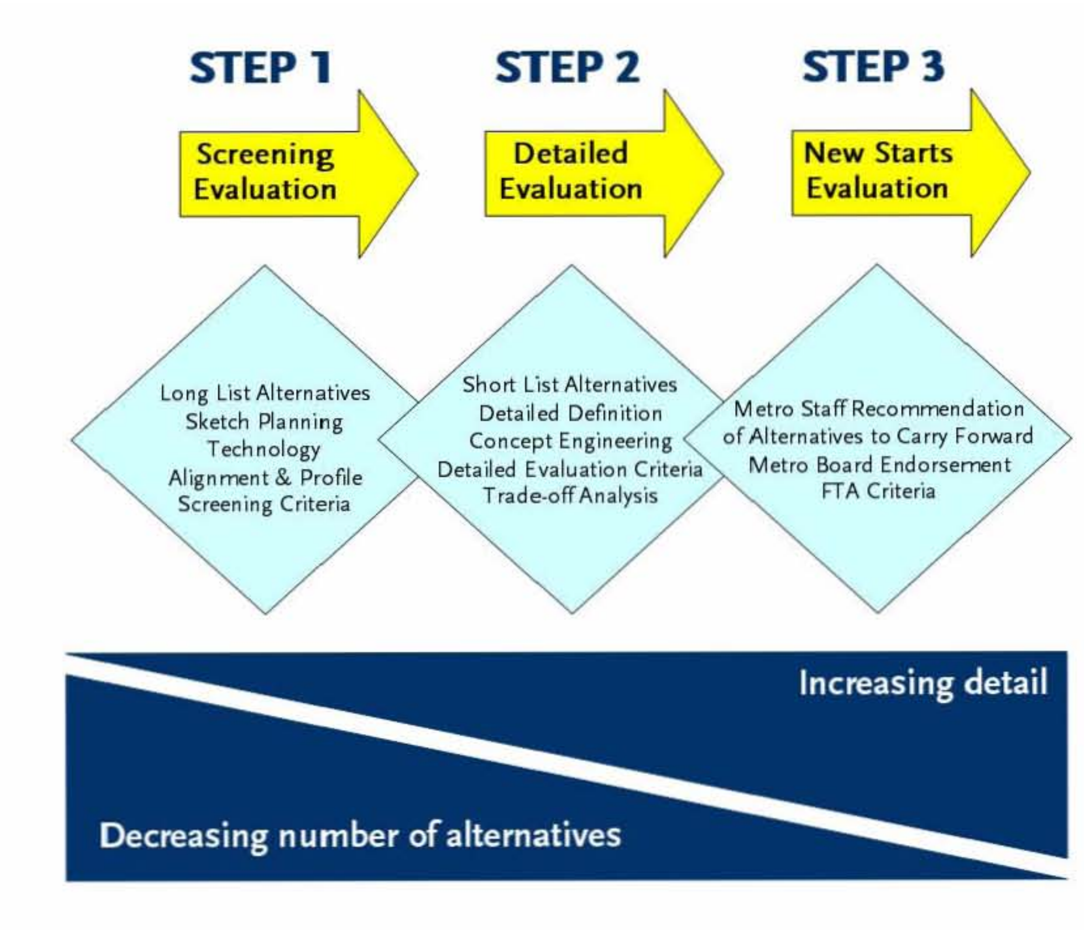
2.9 Screening and Selection Process for the Detailed Alternatives

This section contains an overview of the screening process for the alternatives evaluation plus the performance measures used and their relationship to the prescribed study Goals and Objectives as described in the ***Final Analysis Methodology Report (September 7, 2007)***. In addition, this section presents the screening measure results for each of the seven major Goals as reported in the ***Final Initial Alternatives Screening Report (December 20, 2007)***.

The universe of alternatives for the Westside Extension Transit Corridor were identified, evaluated, and narrowed to the most promising few in three steps as illustrated in Figure 2-32.

- Step 1 Screening: The screening process started with a broad set of alternatives covering a range of alignment and modal alternatives and reduces it to a reasonable set of No Build, TSM, and Build alternatives to carry forward into more detailed definition, travel demand modeling, conceptual engineering and comparative assessment. During the screening step, alternatives were analyzed at a planning level of detail.

Figure 2-32. Evaluation Framework



- Step 2 Detailed Evaluation of Alternatives: The alternatives evaluation step involved a more detailed definition, assessment, and comparison of the shortlist of alternatives emerging from the screening analysis. The detailed evaluation of alternatives was conducted at a conceptual engineering level of analysis, relying on more specific performance measures as well as FTA guidance to support the Metro staff recommendation and Metro Board endorsement.
- Step 3 New Starts Evaluation and Project Recommendation: Final refinement and recommendation, evaluation and documentation of the rationale used to select the project(s), using required templates for submission to FTA.

The first step (screening) involved an evaluation of a large number of possible transit corridors, alignments and modes at a conceptual level. Each of the subsequent steps considered a smaller number of alternatives at a greater level of detail. As the number and range of alternatives narrowed through the course of the study, the level of detail increased. This first step began with 17 alternatives resulting from the Early Scoping process.

The screening analysis focused on answering key questions or concerns that prove to be distinguishers among major choices. Evaluation factors associated with each of these key questions are identified in Section 1.9. Table 2-5 presents some of the key questions, including:

- Vertical Alignment/Degree of Right-of-Way Separation
- Transit Mode/Technology
- Horizontal Alignment

Table 2-5. Three Key Issues to Address in Screening Analysis

Vertical Alignment / Degree of Right-of-Way	Transit Mode / Technology	Horizontal Alignment
▪ Travel Times ▪ Trip Reliability ▪ Transit Capacity ▪ Safety and Security ▪ Right-of-Way Impacts ▪ Natural and Cultural Resources ▪ Traffic and Circulation ▪ Available Right-of-Way sufficient to prevent undue noise and visual impacts on adjacent structures ▪ Local Support ▪ Community Acceptance ▪ Constructability/Construction Impacts ▪ Cost-Effectiveness	▪ Transit Capacity ▪ System Connectivity ▪ Trip Reliability ▪ Ridership ▪ Cost-Effectiveness ▪ Safety and Security ▪ Travel Times	▪ Ridership Potential ▪ System Connectivity ▪ Constructability / Construction Impacts ▪ Transit Supportive Land Uses ▪ Economic Benefit ▪ Local Support ▪ Community Acceptance

This ensured that the bulk of the study effort as well as public scrutiny and review were devoted to the most promising alternatives and transportation improvements. In this manner, the various transportation proposals under consideration continue to evolve as the Westside Extension Transit Corridor Study progresses. The alternatives not carried forward at the conclusion of each step were carefully documented in terms of the reasons for why they were not considered further.

In concert with these three key issues, specific goals and objectives were structured to capture the priorities for mobility improvement and transit performance that have been raised and discussed by transportation planning agencies, community leaders, and concerned citizens and stakeholders for the past several years. As discussed in Chapter 1, seven goals and their corresponding objectives were identified. The Initial Alternatives Screening report discusses, in depth, the analysis related to each of these goals and objectives. The results are discussed briefly below.

- Mobility Improvement
  - Reduce transit travel times
  - Improve trip reliability
  - Provide sufficient transit capacity to meet transit demand in 2030 and beyond (expandability)
  - Maximize potential transit ridership
  - Enhance linkages to the transportation system as well as to major trip attractors/generators within the corridor
- Transit Supportive Land Use Policies and Conditions
  - Provide transit service to areas with transit-supportive land uses and policies
  - Integrate with local redevelopment plans and policies
- Cost-Effectiveness
  - Provide solutions with benefits commensurate with their costs
- Project Feasibility
  - Provide transportation solutions that are financially feasible
  - Minimize risk associated with project construction
- Equity
  - Improve transit services available to transit dependent communities
  - Provide solutions that distribute both economic and environmental costs and benefits fairly across different population groups
- Environmental Considerations
  - Minimize the displacement of homes and businesses.
  - Minimize impacts to the traffic and circulation system.
  - Minimize impacts to the character of the community.
  - Provide for the safety and security of pedestrians and transit users.
  - Minimize impacts on sensitive and protected environmental resources.
  - Reduce, not add to, tailpipe emissions / non-renewable fuel consumption.

- Public Acceptance
  - Develop public support of private and public stakeholders;
  - Attain support of elected officials representing participating jurisdictions;
  - Develop solutions which enhance and are sensitive to quality of life issues for communities in the study area

Performance measures were identified to measure the achievement of the goals and objectives according to a set of evaluation criteria as documented in the ***Final Analysis Methodology Report (September 7, 2007)***. The screening results by Goal and Objective within each Goal using the specific evaluation criteria and performance measures are available in full in the ***Final Initial Alternatives Screening Report (December 20, 2007)***.

The results are touched upon in Section 2.10.

2.10 Alternatives Dropped from Further Consideration

Following technical analysis, public input, and data analysis, five Build alternatives in addition to the No Build and TSM alternatives were identified for further study. As shown in Table 2-6, 13 alternatives were dropped from consideration based upon a number of factors, including transit modes, alignment issues, and alternative specific issues. These factors, including why each alternative was dropped, are discussed below.

Table 2-6. Alternatives Dropped from Further Consideration

Alternatives Dropped	Screened List of Alternatives
2	No Build
3	TSM
4	1
5	11
6	14
7	16
7a	17
8	
9	
10	
12	
13	
15	

2.10.1 Transit Modes

Travel demand identified in the ridership analysis justifies selection of the highest capacity system. Systems must be sized for the high capacity peak period loading along the Wilshire and Santa

Monica alignments. The detailed ridership capacity analysis can be found in the ***Final Initial Alternatives Screening Report (December 20, 2007)***.

LRT, monorail, and BRT technologies provide less capacity than HRT, and cannot accommodate the forecasted demand. Figure 2-33 illustrates the operating characteristics of these modes. This figure assumes a common number of vehicles or trains per hour. The ridership analysis consistently demonstrated a need for a mode that could provide a capacity of more than 700 passengers per train set.

HRT

Los Angeles is familiar with the technology behind the Metro Red and Purple Lines, and the HRT alternatives continue the use of this technology. HRT would require the expansion of the existing Metro HRT Yard, or development of a new yard somewhere along the existing or proposed alignment. As HRT would be a continuation of the existing system, no transfer would be needed at the Metro Purple Line Wilshire/Western station.

A direct connection at the Hollywood/Highland station would be convenient for passengers from the San Fernando Valley, however it may impact train operations throughout the system. A transfer station at this location may result in a minor drop in ridership; however, train operations in a push-pull configuration would be superior in that a higher number of trains could operate on the Santa Monica Boulevard alignment. As described previously, HRT is the highest capacity system of those studied, and has most potential for future capacity expansion.

LRT

With three existing systems in operation in Los Angeles, LRT is a familiar technology. However, with several LRT lines under construction and others being studied, existing maintenance yards are reaching capacity. A new maintenance yard would be needed on the Westside to support an elevated LRT on Wilshire Boulevard.

Because this technology differs from the HRT currently terminating at the Wilshire/Western Metro Purple Line station, a transfer is needed at this location, which may impact ridership and travel times. LRT capacity is not as high as HRT, and may be unable to accommodate the forecasted ridership within the Westside Transit Corridor.

Figure 2-33. Carrying Capacity by Mode

Mode		Actual Operating Characteristics Normalized to 18 vehicles/hour/direction	Systems Sampled
HRT		Up to 800 passengers/train (6 cars) Top Speed of 70 mph (32 mph average) Up to **14,000** passenger/hour/direction	Metro Red Line Metro Purple Line
LRT		Up to 425 passengers/train (3 cars) Top Speed of 55-65 mph (24-35 mph average) Up to **7,600** passengers/hour/direction	Metro Blue Line Metro Green Line Metro Gold Line
Monorail		Up to 350 passengers/ train (6 cars) Top Speed of 40-50 mph (18-30 mph average) Up to **6,300** passengers/hour/direction	Las Vegas Monorail Seattle Monorail Disneyland Monorail Disneyworld Monorail
BRT		Up to 100 passengers/bus (articulated) To Speed of 35 mph (13-22 mph average) Up to **1,800** passengers/hour/direction	Metro Orange Line Wilshire Metro Rapid

Monorail

While new to the Los Angeles region, monorails are in operation in Las Vegas and overseas. This completely new technology requires the construction of a dedicated maintenance facility (estimated to be approximately 15 acres in size) on the Westside. The unfamiliar technology would require additional training and less cross-utilization of Metro train operators.

Because this technology differs from the HRT currently terminating at the Wilshire/Western Metro Purple Line station, a transfer is needed at this location, which may impact ridership and travel times. The capacity of a monorail system is similar to that of LRT.

BRT

BRT is the lowest cost mode studied; however, it is not on an exclusive right-of-way. Therefore, the ridership and travel time savings are lower than the rail alternatives.

Because this technology differs from the HRT currently terminating at the Wilshire/Western Metro Purple Line station, a transfer is needed at this location, which may impact ridership and travel times. The system capacity of BRT is significantly lower than that of HRT, LRT, or monorail systems. BRT systems typically have lower capital costs than fixed rail guideways.

Summary
HRT was identified as the preferred mode for further study because it has the capacity to meet the anticipated ridership demand, as well as limiting the number of transfers. BRT was selected for further study due to its comparatively lower cost.

2.10.2 Transit Alignments

2.10.2.1 Vertical Alignment Issues
Elevated Alignments
While aerial structures can be less costly to build than subway tunnels in low density areas with available right-of-way, there are a number of factors within the Westside Extension Transit Corridor which make aerial alignment alternatives undesirable for this study area:

- Column placement would require the removal of 2-3 traffic lanes. This results in major traffic impacts and runs counter to the project objective to add capacity to the corridor.
- In order to mitigate the traffic impacts associated with the removal of 2-3 traffic lanes, right-of-way would need to be purchased on one or both sides of the alignment. This cost is prohibitive; additionally, existing buildings and land uses would be impacted.
- Land use impacts are high in station areas (for stations and ancillary operations structures) and for traffic mitigation.
- There are visual, noise & vibration, and shadow impacts along with potential impacts to sightlines of historic structures.

An engineering analysis developed several conclusions regarding aerial alignments and the three proposed technologies. Aerial guideways and stations for HRT, LRT and monorail are very similar. There are no significant differences in sizes or costs when designing a system using similar aerial US systems as guidance. Typical cross sections of elevated LRT and HRT systems are shown in Figure 2-34 and Figure 2-35. A typical cross section of an elevated monorail platform and station area is shown in Figure 2-36.

Figure 2-34. Typical Cross Section: Elevated LRT

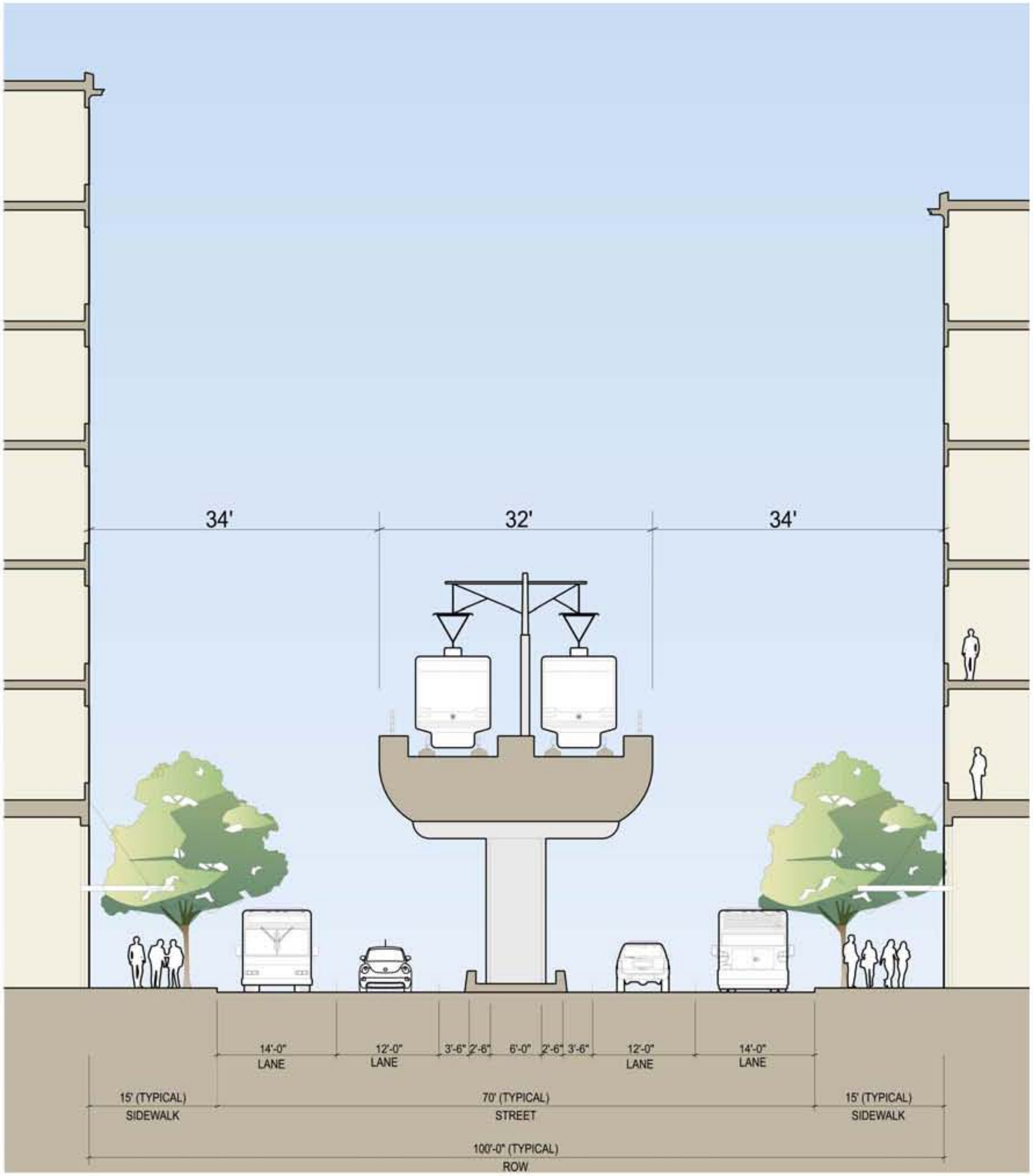


Figure 2-35. Typical Cross Section: Elevated HRT

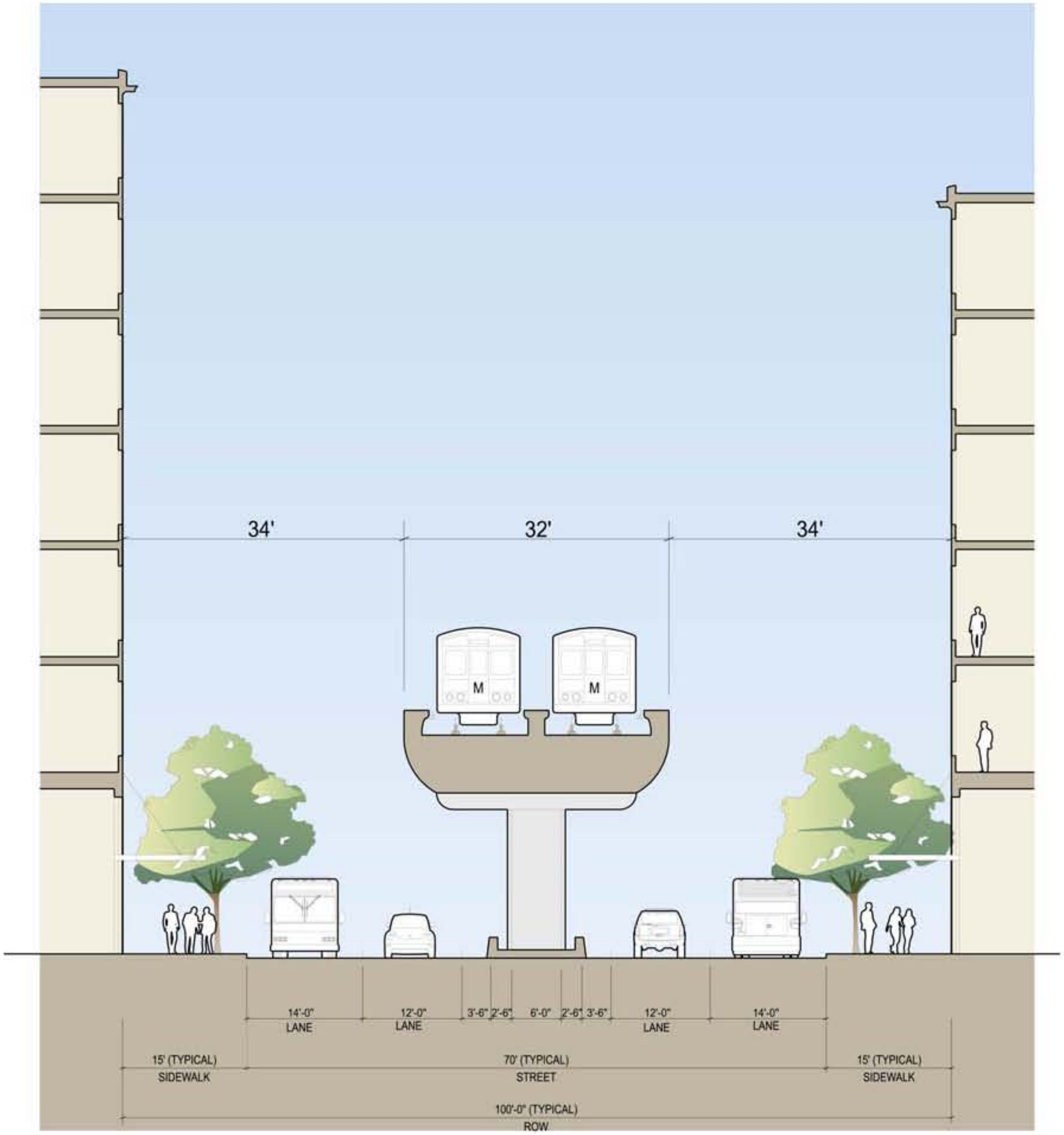
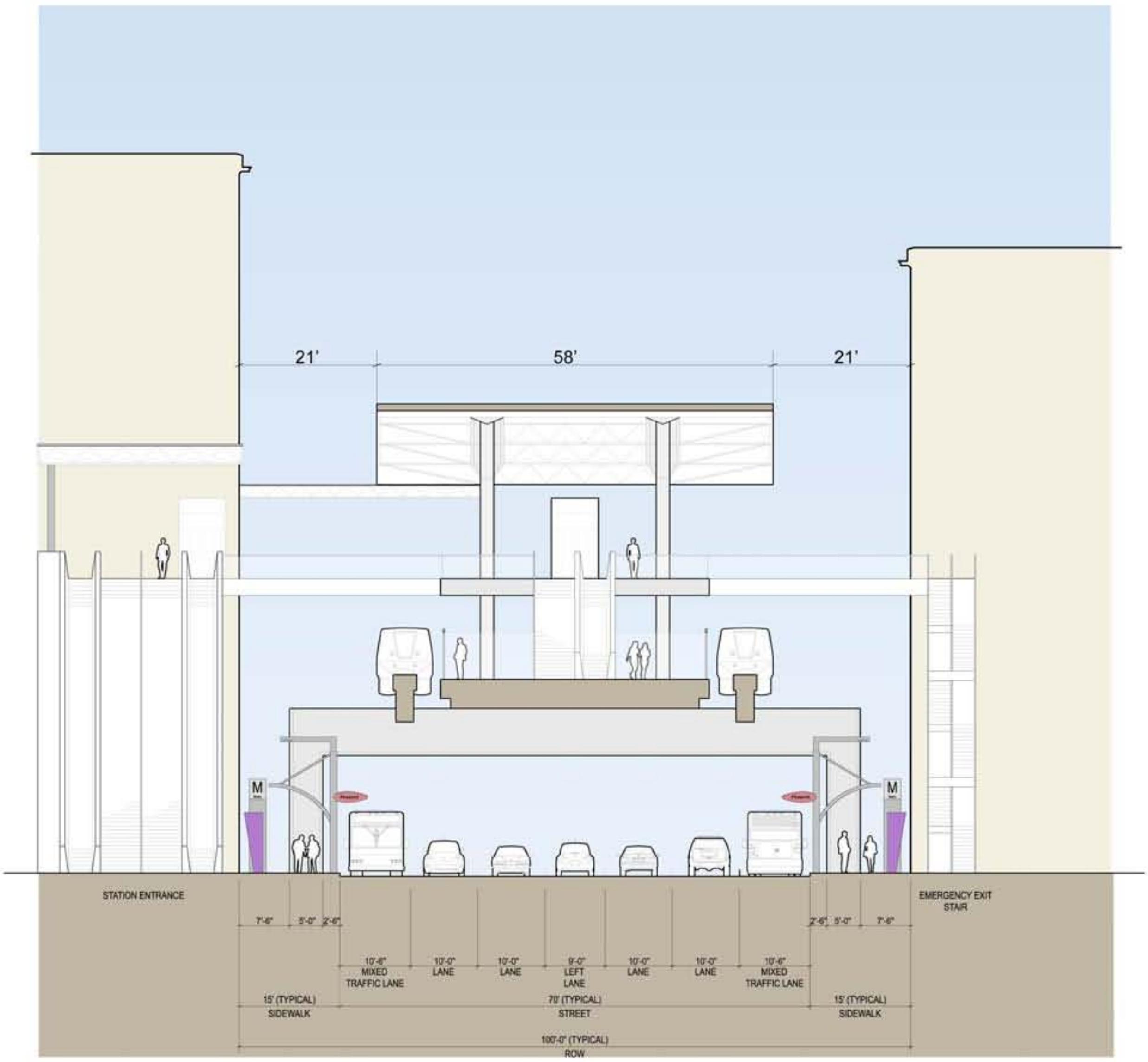


Figure 2-36. Typical Cross Section: Monorail Station Platform



Cities that have fully aerial systems or systems with aerial segments include Los Angeles (the western portion of the Metro Green Line LRT and the Chinatown portion of the Metro Gold Line LRT), Las Vegas (fully aerial Monorail system), and the San Francisco Bay Area (portions of the BART HRT system). The aerial LRT segments in Los Angeles are located in medium density commercial areas. The aerial Monorail system in Las Vegas is located approximately one block off the "Strip," maintaining a separation between pedestrian environments and the elevated structure. Land use adjacent to the Las Vegas Monorail is commercial/industrial. Aerial portions of BART are primarily located in the East Bay and south of downtown San Francisco along freeway corridors.

Analysis of the aerial portions of these systems does not recommend their use in the dense, highly urban corridors such as Wilshire or Santa Monica Boulevards. A photo simulation, shown in Figure 2-37, illustrates a potential elevated monorail station at the densely developed intersection of Wilshire Boulevard and Fairfax Avenue.

Figure 2-37. Wilshire/Fairfax Elevated Station Photo Simulation

Subway Alignments

- In suburban and low density urban areas, subway alignments are less cost-effective than at-grade or elevated alignments; however, in higher density, high land price areas, tunneling can often be the most cost-effective option.
- Land use impacts are high in station areas (for stations and ancillary operations structures).

- While Metro endeavors to tunnel under public streets, the nature of the City's layout and of train system design requiring wide radius curves means that tunneling occasionally occurs under private property.

Summary

In this corridor, an underground alignment is recommended as it has fewer land use, visual, community, economic, historical, and noise impacts over an elevated alignment. This is due to the impacts an elevated alignment would have on adjacent buildings (some historical), including visual, shadow and noise impacts, as well as excessive land acquisition, traffic, and mitigations that would be needed.

2.10.2.2 Horizontal Alignment Issues

Santa Monica Boulevard Alignments

- Stand alone Santa Monica Boulevard subway alternatives (Alternatives 4, 6, 7, 7a, 8, and 13) do not perform as well as stand alone Wilshire Boulevard and the combined Wilshire/Santa Monica subway alternatives.
- The transfer station at Hollywood/Highland provides superior connections to existing rail lines, resulting in improved train frequencies. It allows the option of adding a station at Santa Monica/La Brea, and it avoids most of the tunneling under sensitive and historic residential areas. This applies to the combined Wilshire/Santa Monica alternatives as well.
- To support cost-effectiveness, Santa Monica HRT subway alignments may need to serve the Cedars Sinai/Beverly Center area instead of following a lower density alignment through Beverly Hills along Santa Monica Boulevard. This required some modifications to Alternatives 9, 10, and 11.

Wilshire Boulevard Alignments

- High ridership and travel time savings offsets relatively high costs resulting in an overall good cost-effectiveness performance. High costs may require phased development of this alternative due to funding limitations.
- Alternative 1 does not provide direct service to Farmer's Market/The Grove or Cedars Sinai/Beverly Center, but generally minimizes tunneling beneath private property. These centers are within approximately ½ mile of Wilshire Boulevard.
- Alternative 12 does not serve major activity centers, including the Los Angeles County Museum of Art (LACMA) and Farmer's Market/The Grove, and misses the preferred City of Beverly Hills station located at the intersection of Wilshire Boulevard and Beverly Drive.
- Alternative 14 requires reconfiguration due to an inability to locate stations at LACMA and Farmer's Market/The Grove on tight turns. This can be designed but requires some alignments under residential and commercial properties on large radius turns.
- The Greater Wilshire Neighborhood Council requested, during the public comment period, that the Wilshire/Crenshaw station be reconsidered. After reviewing ridership forecasts, population and employment density forecasts, and area land uses, this station will be shown as an optional station pending further planning.

Combination Santa Monica / Wilshire Boulevards Alignments

- High ridership and travel time savings offsets relatively high costs resulting in an overall good cost-effectiveness performance. High costs may require phased development of a combination alternative due to funding limitations.
- The transfer station at Hollywood/Highland provides superior connections to existing rail lines, resulting in improved train frequencies. It allows the option of adding a station at Santa Monica/La Brea, and it avoids most of the tunneling under residential areas. This applies to the Santa Monica Boulevard alternatives as well.
- To support cost-effectiveness, combined Santa Monica/Wilshire HRT subway alignments need to serve Cedars Sinai/Beverly Center area instead of following a lower density alignment through Beverly Hills on Santa Monica Boulevard. This required some modifications to Alternatives 9, 10, and 11.
- Alternatives 9, 10, and 11 do not serve the major activity centers of LACMA and Farmer's Market/The Grove, and require slightly more tunneling under residential areas.
- Alternatives 15 and 16 require reconfiguration due to an inability to locate stations at LACMA and Farmer's Market/The Grove on tight turns. This can be resolved but requires some alignments under residential and commercial properties on large radius turns.
- The Greater Wilshire Neighborhood Council requested, during the public comment period, that the Wilshire/Crenshaw station be reconsidered. After reviewing ridership forecasts, population and employment density forecasts, and area land uses, this station will be shown as an optional station pending further planning.

Westwood

Westwood Homeowners have requested that additional alignments be considered between Century City and Westwood. This affects all HRT subway alignments.

Summary

Overall, the Wilshire Boulevard alternatives performed better than the Santa Monica Boulevard alternatives in nearly every category. The majority of public input also supported the Wilshire Boulevard alternatives over a stand-alone Santa Monica Boulevard alignment. The Combined Santa Monica/Wilshire Boulevards alignment also performed well and was supported by the community. As such, the preferred horizontal alignments for further study were the Wilshire Boulevard alignments and the Combined Santa Monica/Wilshire Boulevards alignments.

2.10.3 Alternative-Specific Issues

This section identifies specific issues discussed in the previous sections, which led to the elimination of each dropped alternative.

Alternative 2: Wilshire Boulevard Alignment HRT Elevated

This alternative was dropped from consideration based on the following:

- Elevated alternatives have substantive environmental and land use impacts.
- This alternative has good ridership but is not as cost-effective because of the potential for extensive land acquisition.

Alternative 3: Wilshire Boulevard Alignment LRT/Monorail Elevated
This alternative was dropped from consideration based on the following:

- Elevated alternatives have substantive environmental and land use impacts.
- LRT/Monorail alternatives lack required capacity and expansion capability.

Alternative 4: Santa Monica Boulevard Alignment HRT Subway with Universal City and Hollywood/Highland Red Line Connections
This alternative was dropped from consideration based on the following:

- Direct connections at the Universal City and Hollywood/Highland stations create branching of HRT lines and may negatively impact train operations throughout the system.
- Santa Monica Boulevard stand alone alignments have lower ridership and are less cost-effective.

Alternative 5: Santa Monica Boulevard Alignment HRT, LRT, Monorail Elevated
This alternative was dropped from consideration based on the following:

- Elevated alternatives have substantive environmental and land use impacts.
- LRT/Monorail alternatives lack required capacity and expansion capabilities.
- Santa Monica Boulevard stand alone alignments have lower ridership and are less cost-effective.

Alternative 6: Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Red Line Connection
This alternative was dropped from consideration based on the following:

- A direct connection at the Hollywood/Highland station creates branching of HRT lines and may negatively impact train operations throughout the system.
- Santa Monica Boulevard stand alone alignments have lower ridership and are less cost-effective.

Alternative 7: Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Red Line Connection/Galaxy North
This alternative was dropped from consideration based on the following:

- A direct connection at the Hollywood/Highland station creates branching of HRT lines and may negatively impact train operations throughout the system.
- Santa Monica Boulevard stand alone alignments have lower ridership and are less cost-effective.

Alternative 7a: Santa Monica Boulevard Alignment HRT Subway with Hollywood/Highland Red Line Connection/Galaxy South

This alternative was dropped from consideration based on the following:

- A direct connection at the Hollywood/Highland station creates branching of HRT lines and may negatively impact train operations throughout the system.
- Santa Monica Boulevard stand alone alignments have lower ridership and are less cost-effective.

Alternative 8: Santa Monica Boulevard Alignment HRT Subway with Hollywood/Vine Red Line Connection

This alternative was dropped from consideration based on the following:

- A direct connection at the Hollywood/Vine station creates branching of HRT lines and may negatively impact train operations throughout the system.
- Santa Monica Boulevard stand alone alignments have lower ridership and are less cost-effective.

Alternative 9: Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt. 1 + Alt. 4)

This alternative was dropped from consideration based on the following:

- Direct connections at the Universal City and Hollywood/Highland stations create branching of HRT lines and may negatively impact train operations throughout the system.
- This alternative has good ridership but is not as cost-effective as other combined alternatives.

Alternative 10: Wilshire/Santa Monica Boulevards Combined HRT Subway (Alt. 1 + Alt. 7)

This alternative was dropped from consideration based on the following:

- A direct connection at the Hollywood/Highland station creates branching of HRT lines and may negatively impact train operations throughout the system.
- The Santa Monica Boulevard portion of this alternative travels through a lower density part of Beverly Hills, resulting in lower ridership than other combined alternatives.

Alternative 12: Wilshire/Beverly Boulevards Centers HRT Subway

This alternative was dropped from consideration based on the following:

- Key elements from this alignment (specifically an adaptation of the routing off Wilshire to serve the Grove/Farmer's Market and Cedars Sinai) are part of the modified Alternative 14, which was deemed to be a better alternative to carry forward for further study.

Alternative 13: Santa Monica/San Vicente/Wilshire Boulevards HRT Subway

This alternative was dropped from consideration based on the following:

- A direct connection at the Hollywood/Highland station creates branching of HRT lines and may negatively impact train operations throughout the system.
- Santa Monica Boulevard stand alone alignments have lower ridership and are less cost-effective.

Alternative 15: Wilshire/Santa Monica Boulevards Combined Centers HRT Subway (Alt. 13 + Alt. 14)

This alternative was dropped from consideration based on the following:

- A direct connection at the Hollywood/Highland station creates branching of HRT lines and may negatively impact train operations throughout the system.
- Key elements from this alignment (specifically an adaptation of the routing off Wilshire to serve the Grove/Farmer's Market, Beverly Center and Cedars Sinai) are part of the modified Alternative 16, which was deemed to be a better alternative to carry forward for further study.

Table 2-7. Summary of Reasons Alternatives were Dropped from Consideration

Alt.	Operations (Branching)	Environmental Issues	Land Use Issues	Low Capacity	Low Ridership/ New Transit Trips	Less Cost Effective
2		X	X	X		X
3		X	X	X	X	X
4	X				X	X
5		X	X	X	X	X
6	X				X	X
7	X				X	X
7a	X				X	X
8	X				X	X
9	X					X
10	X				X	X
12*						
13	X				X	X
15*	X					

*Key elements of Alternatives 12 and 15 are found in Alternatives 14 and 16, respectively.

2.11 Definition of the Detailed Alternatives Evaluated in this Alternatives Analysis

2.11.1 Use of FTA Project Justification Criteria

The Westside Extension Corridor Study is the first step in a multi-step process to implement a major transit improvement for this part of the Los Angeles region. This first step, also known as Alternatives Analysis, is being conducted following strict guidelines established by the FTA. The basic steps being followed include:

- Alternatives Analysis
- EIS/EIR and Preliminary Engineering
- Final Engineering
- Construction
- Revenue Service

The successful completion of the Westside AA will allow Metro to evaluate a range of alternative transit improvements for the Westside Extension Transit Corridor and to select a Locally Preferred Alternative (LPA) that can best accommodate population growth and transit demand and be compatible with land use and future development opportunities.

2.11.2 No Build

As stated in Section 2.8.1, the No Build Alternative includes all existing highway and transit services and facilities and the committed highway and transit projects in the current Metro Long-Range Transportation Plan and the current Southern California Association of Governments' 2004 RTP. There were no changes made to the No Build Alternative as originally defined.

Proposed major highway improvements impacting the Westside Transit corridor between now and 2030 only include the addition of a new HOV lane on I-405 Freeway between US 101 and I-105 Freeway.

From a rail transit perspective, the Westside study area will continue to be served by the Purple and Red Metro Rail Lines along the eastern and northeastern edges of the study area. Additional rail service committed in 2030 (2001 Metro Long Range Transportation Plan, Baseline) includes:

- Metro Gold Line Eastside Extension: from Union Station to East LA;
- Exposition LRT Line: from 7th/Metro to Culver City; and
- LAX People Mover: from the Aviation/LAX station of the Green Line to the LAX main terminal (to be funded by others).

A rich network of local, express and Metro Rapid bus routes will also continue to be provided. Of particular note are the Metro Rapid bus route additions and modifications for:

- Santa Monica Boulevard Metro Rapid Bus (Line 704)
- Culver City Bus Rapid 6 (operated by Culver City Bus)

- Torrance Transit Rapid 3 (operated by Torrance Transit)
- Manchester Avenue Metro Rapid Bus (Line 715)
- San Fernando - Lankershim Metro Rapid Bus (Line 724)
- Olympic Boulevard Metro Rapid Bus (Line 728)
- Pico Boulevard Metro Rapid Bus (Line 730)
- Santa Monica Big Blue Bus Rapid 7 (operated by Santa Monica Big Blue Bus)
- Reseda Metro Rapid Bus (Line 741)
- Central Avenue Metro Rapid Bus (Line 753)
- Long Beach Boulevard Metro Rapid Bus (Line 760)
- Atlantic Boulevard Metro Rapid Bus (Line 762)
- Garvey Avenue – Chavez Metro Rapid Bus (Line 770)
- San Fernando South Metro Rapid Bus (Line 794)
- Wilshire Boulevard Metro Rapid Express Bus (Line 920)

These routes will offer an increased quality of service by 2030 for purposes of alternative comparison. Refer to Figure 2-38.

2.11.3 TSM

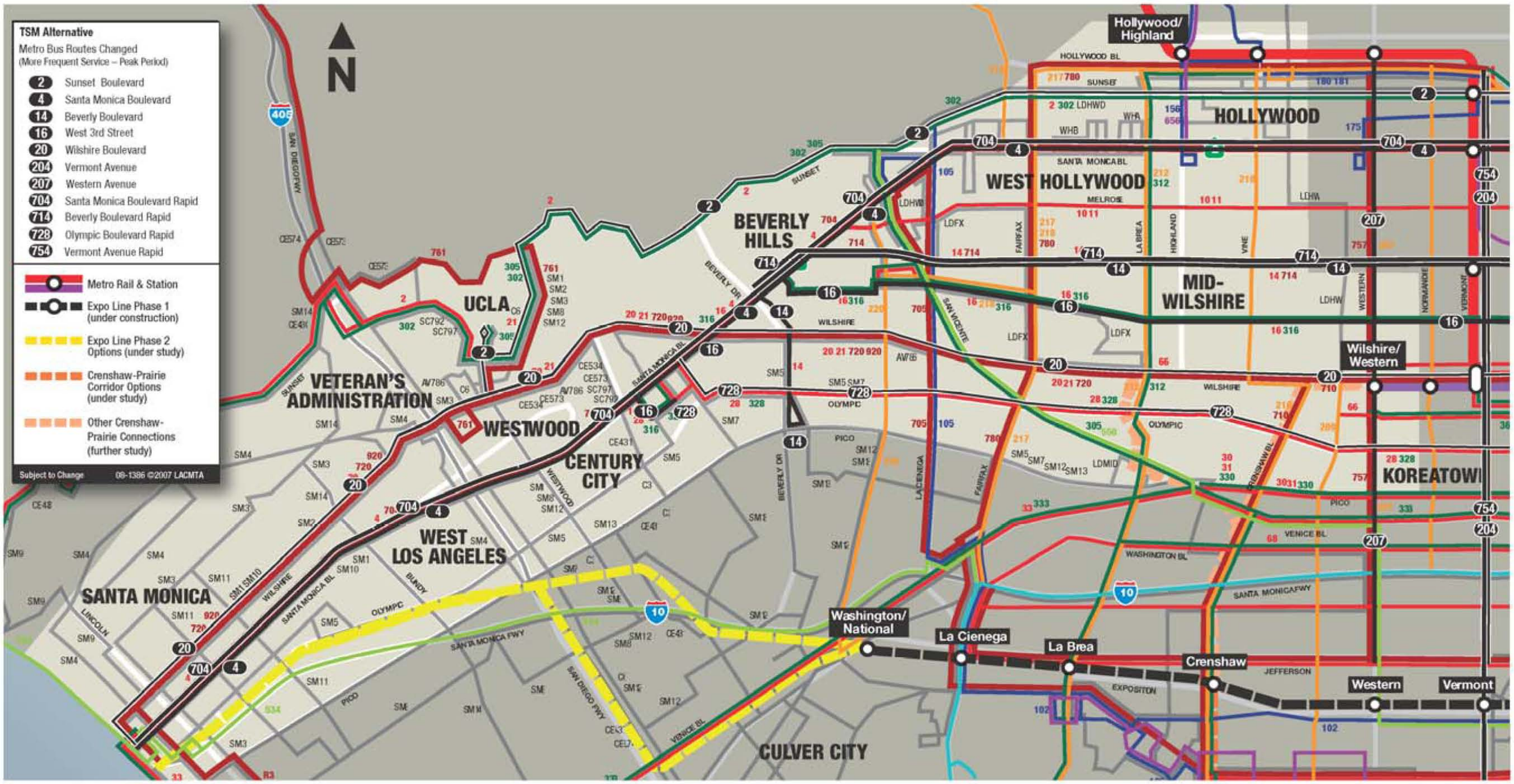
As defined in Section 2.8.2, the TSM Alternative builds upon the No Build Alternative by enhancing the existing Metro Rapid Bus service and local bus service in the Westside study area. No changes were made to the TSM Alternative as originally defined. The alternative emphasizes more frequent service to reduce delay and enhance mobility. Although the frequency of service is already very good, service frequency is proposed to be improved between 2 and 10 minutes during peak periods on selected routes. Refer to Figure 2-39.

A number of local Metro bus routes will see peak period frequency enhancements over the No Build Alternative. These routes include:

- Sunset Boulevard (short line (SL) Westwood) (Line 2)
- Santa Monica Boulevard SL (Line 4)
- Beverly Boulevard SL (Line 14)
- West Third Street Limited (Line 16)
- Wilshire Boulevard-Westwood (Line 20)
- Vermont Avenue SL (Line 204)
- Western Avenue SL (Line 207)

Figure 2-38. No Build Alternative

Figure 2-39. TSM Alternative



In addition to the local bus routes described above, a series of Metro Rapid Bus routes will also be enhanced as part of the TSM Alternative. These routes include:

- Santa Monica Boulevard Metro Rapid Bus (Line 704)
- Olympic Boulevard Metro Rapid Bus (Line 728)
- Vermont Avenue Metro Rapid Bus (Line 754)

2.11.4 Heavy Rail Alternatives

Four HRT subway alternatives and several alignment options were identified for further study based on their performance and results during the screening process. These alternatives are described below.

Attributes common to all HRT alternatives

- All alternatives have a portal section between Wilshire/Crenshaw and the Wilshire/Western Metro Purple Line Station to accommodate a possible Crenshaw at-grade alignment.
- Based on comments received from the public, the Wilshire/Crenshaw station will be optional and studied further.
- Several underground alignment options between Wilshire/Beverly and Wilshire/Westwood stations remain for further study.

Alternative 1 – Wilshire Boulevard Alignment HRT Subway

- This alternative extends from the Metro Purple Line Wilshire/Western Station to 4th Street and Wilshire Boulevard in Santa Monica underground with 10 stations and, 1 optional station. Refer to Figure 2-40.
- Stations include:
  - Wilshire/Crenshaw (optional)
  - Wilshire/La Brea
  - Wilshire/Fairfax
  - Wilshire/La Cienega
  - Wilshire/Beverly
  - Century City
  - Westwood/UCLA
  - Wilshire/Bundy
  - Wilshire/26th
  - Wilshire/16th
  - Wilshire/4th
- The alignment is generally under Wilshire Boulevard with a direct connection at the Wilshire/Western Station.

Figure 2-40. Alternative 1 - Wilshire Boulevard Alignment HRT Subway

Alternative 11 – Wilshire/Santa Monica Boulevards Combined HRT Subway

- This alternative extends from the Metro Purple Line Wilshire/Western Station and from the Metro Red Line at the Hollywood/Highland Station without a Red Line direct connection to 4th Street and Wilshire Boulevard in Santa Monica underground with stations, and 1 optional station. Refer to Figure 2-41.
- Public input received during community meetings, and positive preliminary analysis results, led to adding a proposed new station at Santa Monica/La Brea to the original list of stations.
- Stations Include:
  - Wilshire/Crenshaw (optional)
  - Wilshire/La Brea
  - Wilshire/Fairfax
  - Wilshire/La Cienega
  - Wilshire/Beverly
  - Century City
  - Westwood/UCLA
  - Wilshire/Bundy
  - Wilshire/26th
  - Wilshire/16th
  - Wilshire/4th
  - Hollywood/Highland (transfer)
  - Santa Monica/La Brea
  - Santa Monica/Fairfax
  - Santa Monica/La Cienega or San Vicente
  - Beverly Center Area
- There are two alignment options in the West Hollywood/Beverly Center area:
  - Option 11A follows San Vicente from Santa Monica Boulevard down to La Cienega Boulevard, where it curves south and then west to meet the Wilshire Boulevard alignment. Stations in this area would include Santa Monica/San Vicente and a Beverly Center/Cedars Sinai area station. An optional station at Wilshire/Robertson would replace a station at Wilshire/La Cienga. Refer to Figure 2-42.
  - Option 11B follows La Cienega from Santa Monica Boulevard south, past the Beverly Center, and curves west at Wilshire Boulevard. Stations include Santa Monica/Fairfax and a Beverly Center/Cedars Sinai area station. An optional station at Wilshire/Robertson would replace a station at Wilshire/La Cienga. Refer to Figure 2-43.

Alternative 14 – Wilshire Boulevard/Fairfax Centers HRT Subway

- This alternative extends from the Metro Purple Line Wilshire/Western Station to 4th Street and Wilshire Boulevard in Santa Monica underground with 11 stations, and 2 optional stations. Refer to Figure 2-44.
- Stations include:
  - Wilshire/Crenshaw (optional)
  - Wilshire/La Brea
  - Wilshire/Fairfax
  - Wilshire/Fairfax/3rd Street
  - Beverly Center Area
  - Wilshire/Robertson (optional)
  - Wilshire/Beverly

Figure 2-41. Alternative 11 - Wilshire/Santa Monica Boulevards Combined HRT Subway

Figure 2-42. Alternative 11A - Wilshire/Santa Monica Boulevards Combined HRT Subway

Figure 2-43. Alternative 11B - Wilshire/Santa Monica Boulevards Combined HRT Subway

Figure 2-44. Alternative 14 - Wilshire Boulevard/Fairfax Centers HRT Subway

- Century City
- Westwood/UCLA
- Wilshire/Bundy
- Wilshire/26th
- Wilshire/16th
- Wilshire/4th

- This alignment is generally under Wilshire Boulevard to Fairfax Avenue, continues under Fairfax Avenue to Beverly Boulevard, then west under Beverly Boulevard, stays underground to La Cienega Boulevard, continues under La Cienega Boulevard, transitions to Wilshire Boulevard and continues under Wilshire Boulevard to 4th Street in Santa Monica.

Alternative 16 - Wilshire/Santa Monica Boulevards Combined Centers HRT Subway with transfer at Hollywood/Highland

- This alternative extends from the Metro Purple Line Wilshire/Western Station and from the Metro Red Line Hollywood/Highland Station to 4th Street and Wilshire Boulevard in Santa Monica underground with 15 stations, and 2 optional stations, including a transfer at the Hollywood/Highland Station. Refer to Figure 2-45.
- Stations include:
  - Wilshire/Crenshaw (optional)
  - Wilshire/La Brea
  - Wilshire/Fairfax
  - Fairfax/3rd Street
  - Beverly Center Area
  - Wilshire/Robertson (optional)
  - Wilshire/Beverly
  - Century City
  - Westwood/UCLA
  - Wilshire/Bundy
  - Wilshire/26th
  - Wilshire/16th
  - Wilshire/4th
  - Hollywood/Highland (transfer)
  - Santa Monica/La Brea
  - Santa Monica/Fairfax
  - Santa Monica/La Cienega
- The Santa Monica Boulevard portion of the alignment transitions south under La Cienega, past the Beverly Center, and curves west at Wilshire Boulevard. The Wilshire alignment and the Santa Monica alignment meet at approximately Beverly Boulevard, with a station located just south of the junction.
- This alignment is generally under Wilshire Boulevard to Fairfax Avenue, then turns north under Fairfax Avenue to Beverly Boulevard, heads west under Beverly Boulevard to La Cienega Boulevard, where it turns south under La Cienega Boulevard. The alignment then transitions west again on Wilshire Boulevard to Santa Monica Boulevard, which it follows through Century City. After Century City, the alignment veers north again to rejoin Wilshire Boulevard, which it follows west to 4th Street in Santa Monica.

Figure 2-45. Alternative 16 - Wilshire/Santa Monica Boulevards Combined Centers HRT Subway with transfer at Hollywood/Highland

- Public input received during community meetings, and positive preliminary analysis results, led to the addition of a proposed new station at Santa Monica/La Brea to the original alternative.

2.11.5 Bus Rapid Transit Alternative

As described in Section 2.8.5, the BRT alternative consists of a specially operated dedicated peak period curb lane predominantly along Santa Monica Boulevard with two branches, one to 4th Street in downtown Santa Monica with 13 stations and the second along Santa Monica Boulevard to Westwood Boulevard with nine stations. The BRT alternative also includes a similarly operated Wilshire Line from the end of the Metro Purple Line along Wilshire Boulevard to Ocean Avenue, with a turn-around along Ocean Avenue back to 5th Street and Colorado Avenue in downtown Santa Monica with 15 stations.

Alternative 17 – Wilshire/Santa Monica Boulevards BRT At Grade

- This alternative predominantly uses Wilshire and Santa Monica Boulevards on street with physical transfers at the Wilshire/Western Metro Purple Line Station and Hollywood/Highland Metro Red Line Station providing service to downtown Santa Monica on both Wilshire and Santa Monica Boulevards. Refer to Figure 2-46.
- This alternative operates with three separate lines: Wilshire Boulevard to downtown Santa Monica (Line 1); Santa Monica Boulevard to downtown Santa Monica (Line 2); and Santa Monica Boulevard to the intersection of Westwood and Wilshire Boulevards (Line 3), as a branch of Line 2.
- Line 1 has 15 stops, Line 2 has 13 stops and Line 3 has nine stops.

Figure 2-46. Alternative 17 - Wilshire/Santa Monica Boulevards BRT At Grade

3.0 ENVIRONMENTAL ISSUES

3.1 Introduction

An environmental screening analysis was performed for the initial set of alternatives to identify potential environmental impacts. The environmental overview encompassed several objectives, including minimizing: displacement of homes and businesses (equity); traffic and right-of-way impacts; impacts to character of the community (aesthetics and visual quality and noise and vibration); and impacts to sensitive and protected environmental resources (cultural and historic resources).

The environmental analysis considered the physical and operational characteristics associated with the different alternatives in light of existing and future conditions in the Westside Extension Transit Corridor using conceptual plans. The environmental analysis in this section focuses on describing major differences among the five build alternatives, plus No Build and Transportation System Management (TSM) Alternatives, or illustrating where the environmental effects are generally similar. The elements that would make up the Locally Preferred Alternative will undergo more detailed environmental analysis consistent with National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) regulations. The environmental overview analysis provided in this section was developed in order to provide background information and focus for those future environmental studies and it also identified areas where the conceptual design of the various alternatives would need to be altered to avoid and minimize impacts to sensitive resources such as neighborhoods, public parks, and historic properties.

3.2 Environmental Issues of Critical Concern

The following section provides a discussion of the issues of most critical concern. These issues include:

- Geologic and Seismic Conditions
- Historic/Archaeological/Paleontological Resources
- Economic and Fiscal Impacts
- Equity and Environmental Justice Considerations
- Visual and Aesthetics
- Noise and Vibration
- Construction Impacts

Each of the five build alternatives (BRT, Alternative 17; Wilshire HRT, Alternatives 1 and 14; and Combined HRT, Alternatives 11 and 16), plus No Build and TSM, carried forward from the initial screening were evaluated on each of these environmental issues. The evaluation used the goals, objectives, and measures applied to the full range of alternatives in the initial screening process (see Chapters 1.0 and 2.0 for the list of goals and objectives and a description of the measures developed to assess the achievement of the goals and objectives). The analysis, however, was on a more detailed basis than that performed in the initial screening. The intent of this analysis is to provide the next level of screening of the five build, plus No Build and TSM, alternatives to determine if they should be carried forward for further analysis or eliminated from further consideration. This analysis is presented below, followed by a comparative summary of the alternatives.

3.2.1 Geologic and Seismic Conditions

This section summarizes the geologic materials, faults, and seismic characteristics, and other subsurface conditions found in the vicinity of the proposed alternatives.

The Alquist-Priolo Geologic Hazards Zone Act's purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The Act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Seismic Hazards Mapping Act of 1990 was enacted to address seismic hazards not included in the Alquist-Priolo Act, including strong ground shaking, landslides, and liquefaction.

To assess the alternative site areas for geologic and seismic conditions the following geotechnical/geologic screening measures were evaluated:

- <u>Alquist-Priolo</u> - Total length of alignment crossing Alquist-Priolo special fault-rupture study zones
- <u>Faults</u> - Total number of fault crossings
- <u>Liquefaction</u> - Total length of alignment crossing areas with potential for liquefaction and/or earthquake-induced ground movement
- <u>Methane</u> - Total length of alignment crossing zones with potential Methane risk. (Figure 3-1)

Evaluations were performed by overlaying the alternative alignments onto the following maps:

- Safety Element Exhibit A – Alquist-Priolo Special Study Zones & Fault Rupture Study Areas. (Figure 3-2).
- Seismic Hazard Zone, Beverly Hills + Hollywood Quadrangles (CDMG, 1999). (Figure 3-3).
- Regional Geologic Map. (Figure 3-4)
- Methane and Methane Buffer Zones; City of L.A. DPW, Bureau of Engineering. (Figure 3-5).

No Build Alternative

The No Build Alternative includes all existing highway and transit services and facilities and the committed highway and transit projects in the current Metro Long-Range Transportation Plan (LRTP) that are under construction and environmentally cleared. From a rail transit perspective, the Westside study area will continue to be served by the Purple and Red Metro Rail Lines along the eastern and northeastern edges of the study area. The No Build Alternative would not necessitate the extension of any corridors and thus would not experience impacts due to geologic and seismic conditions as there are no known faults in the existing area and no additional alignments that would be affected by potential methane.

Figure 3-1. Length of Alignment in Areas Potentially Containing Methane

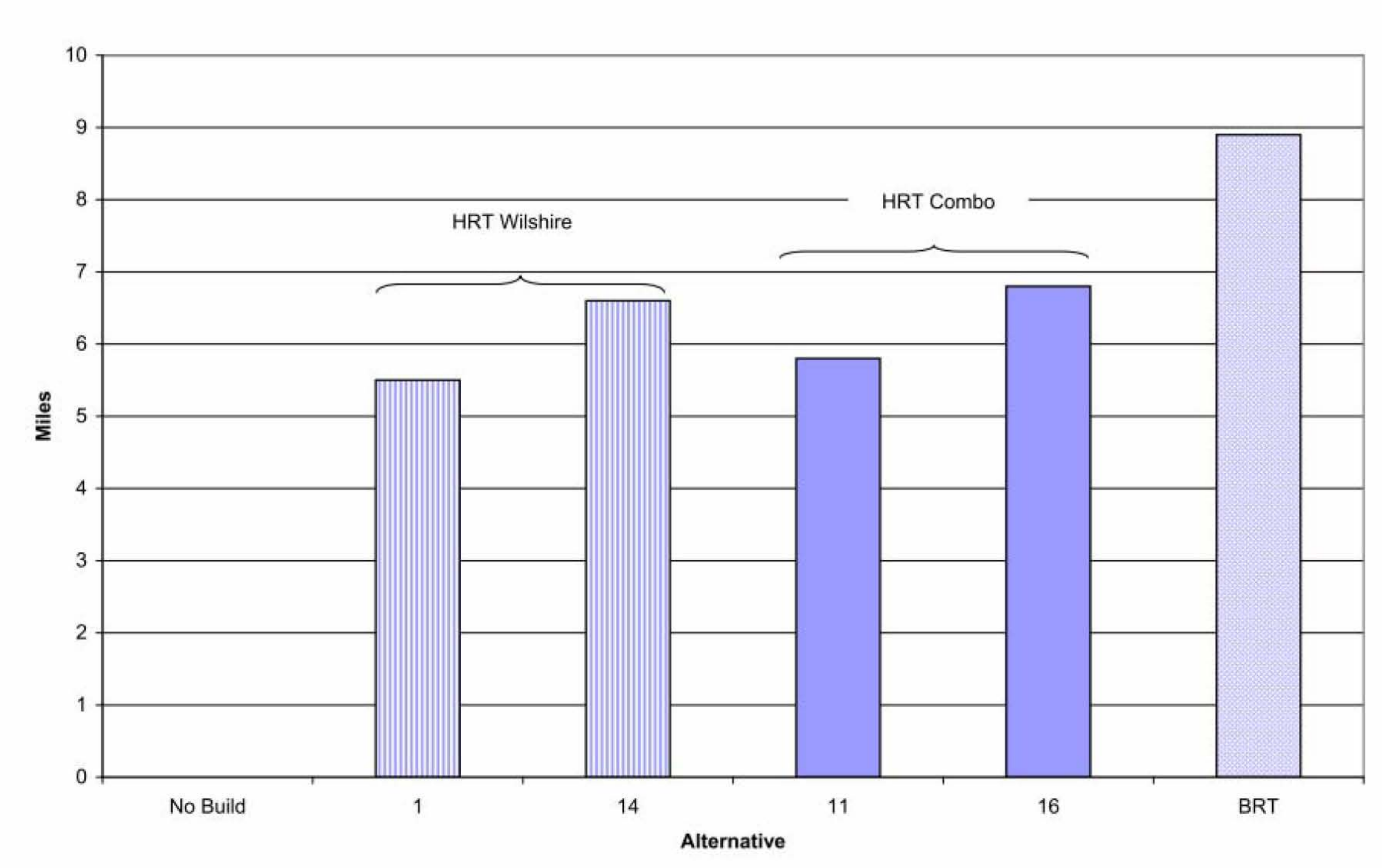
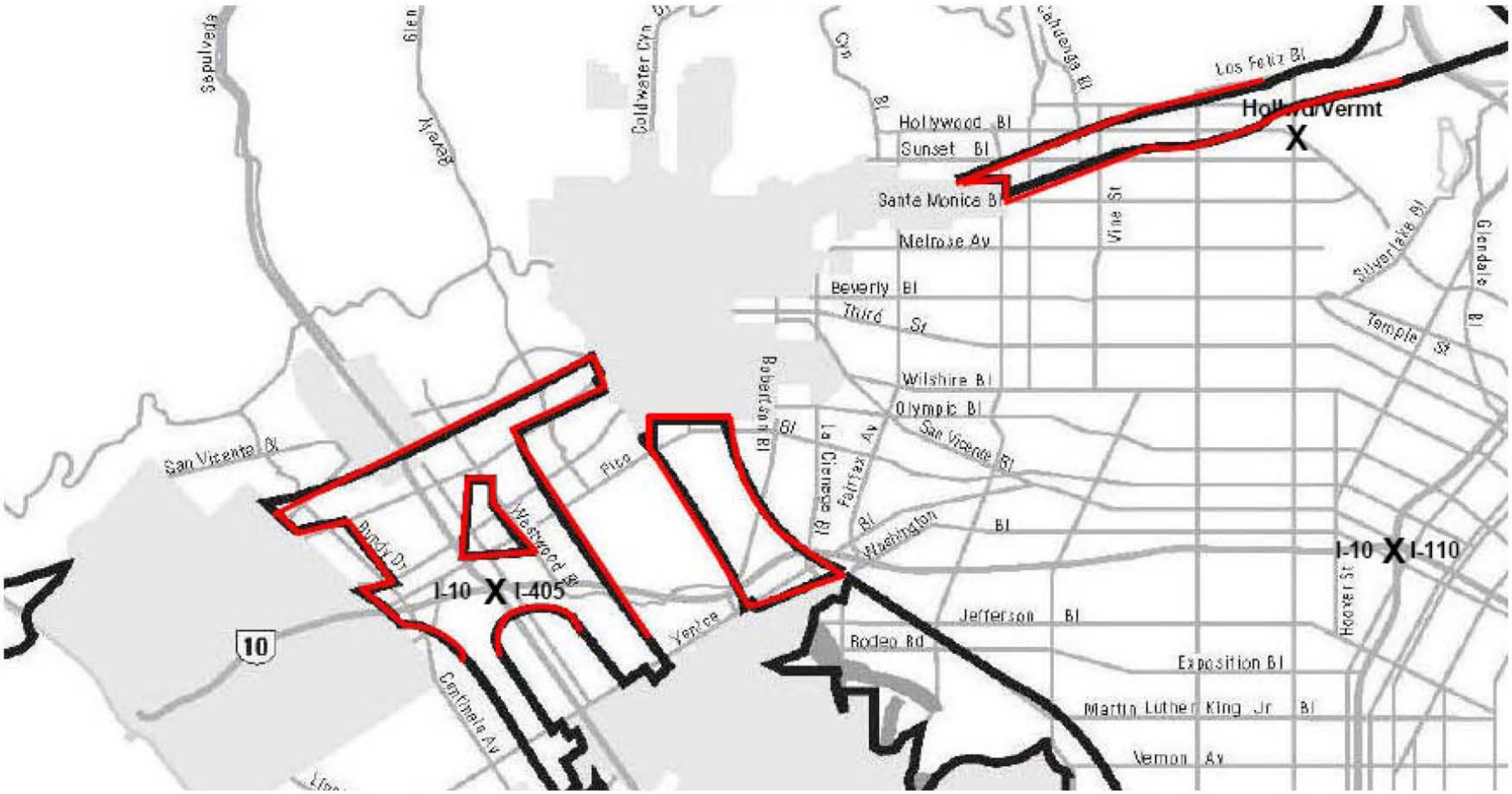
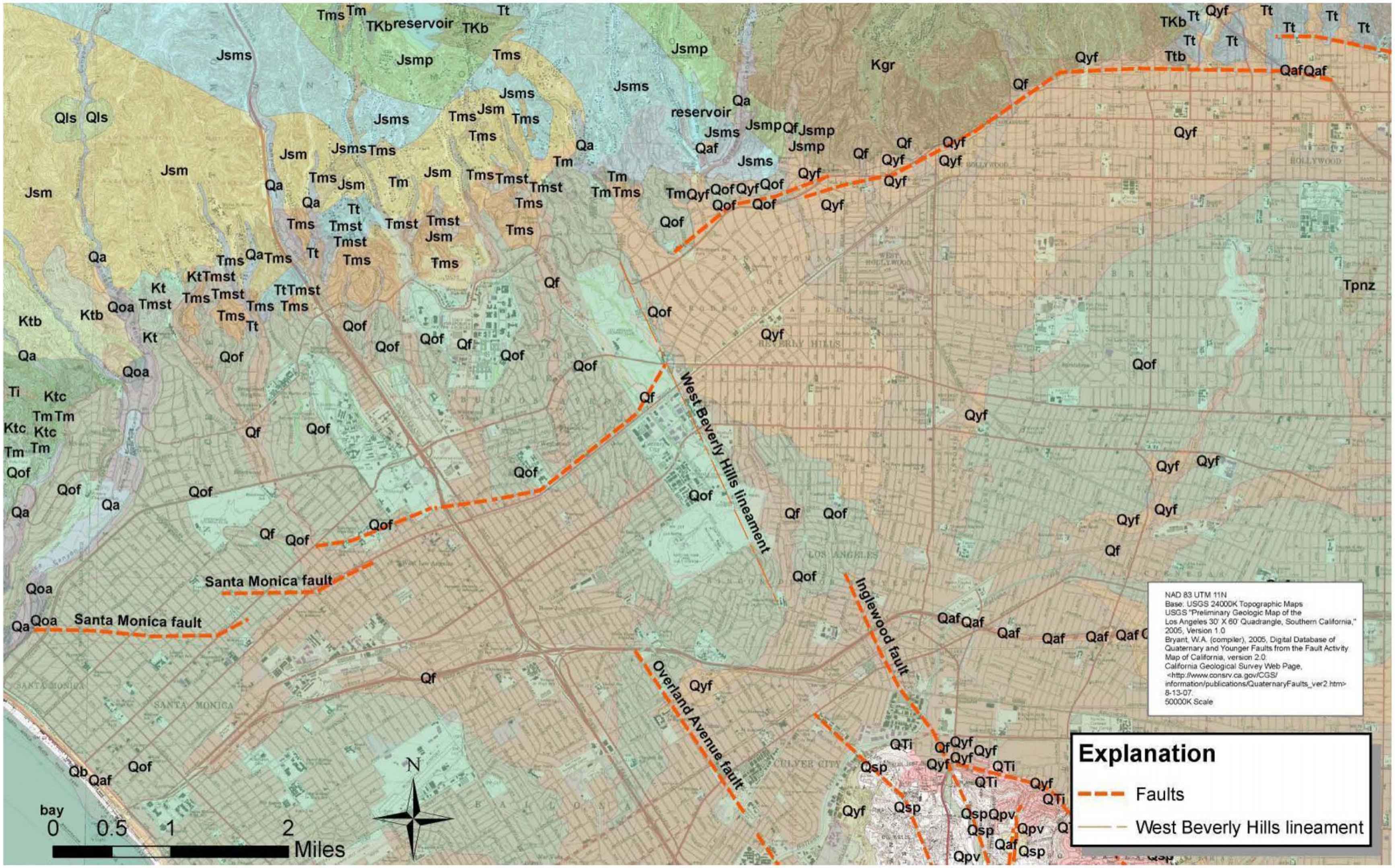


Figure 3-2. Safety Element Exhibit A - Alquist-Priolo Special Study Zones and Fault Rupture Study Areas



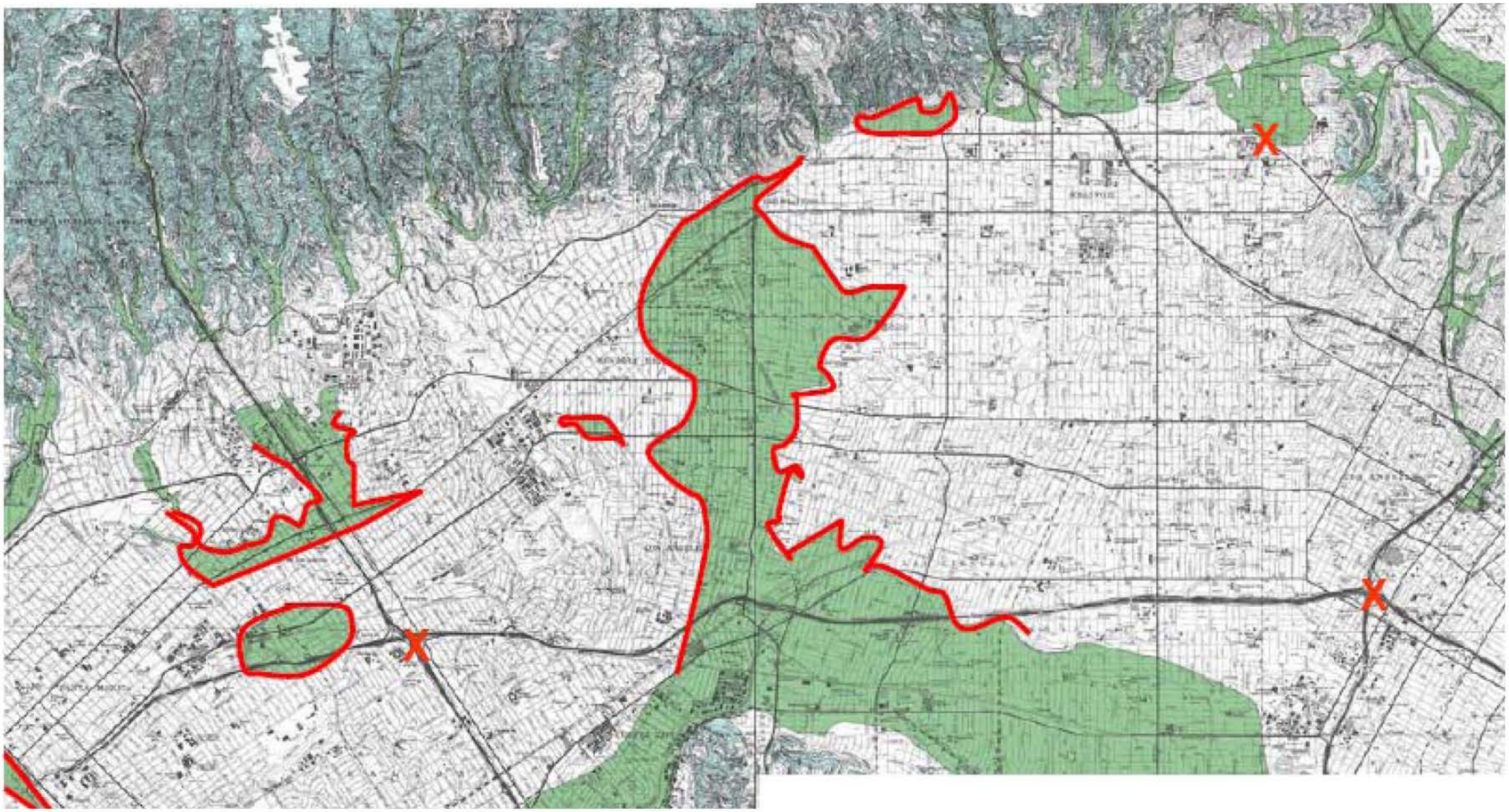
Note: Red lines indicate Alquist Priolo zones affected by proposed alignments
Ref: Safety Element Exhibit A – Alquist-Priolo Special Study Zones and Fault Rupture Study Areas City LA Planning Department, March 1994 – Council File No. 89-2104

Figure 3-3. Seismic Hazard Zones, Beverly Hills + Hollywood Quadrangles (CDMG, 1999)



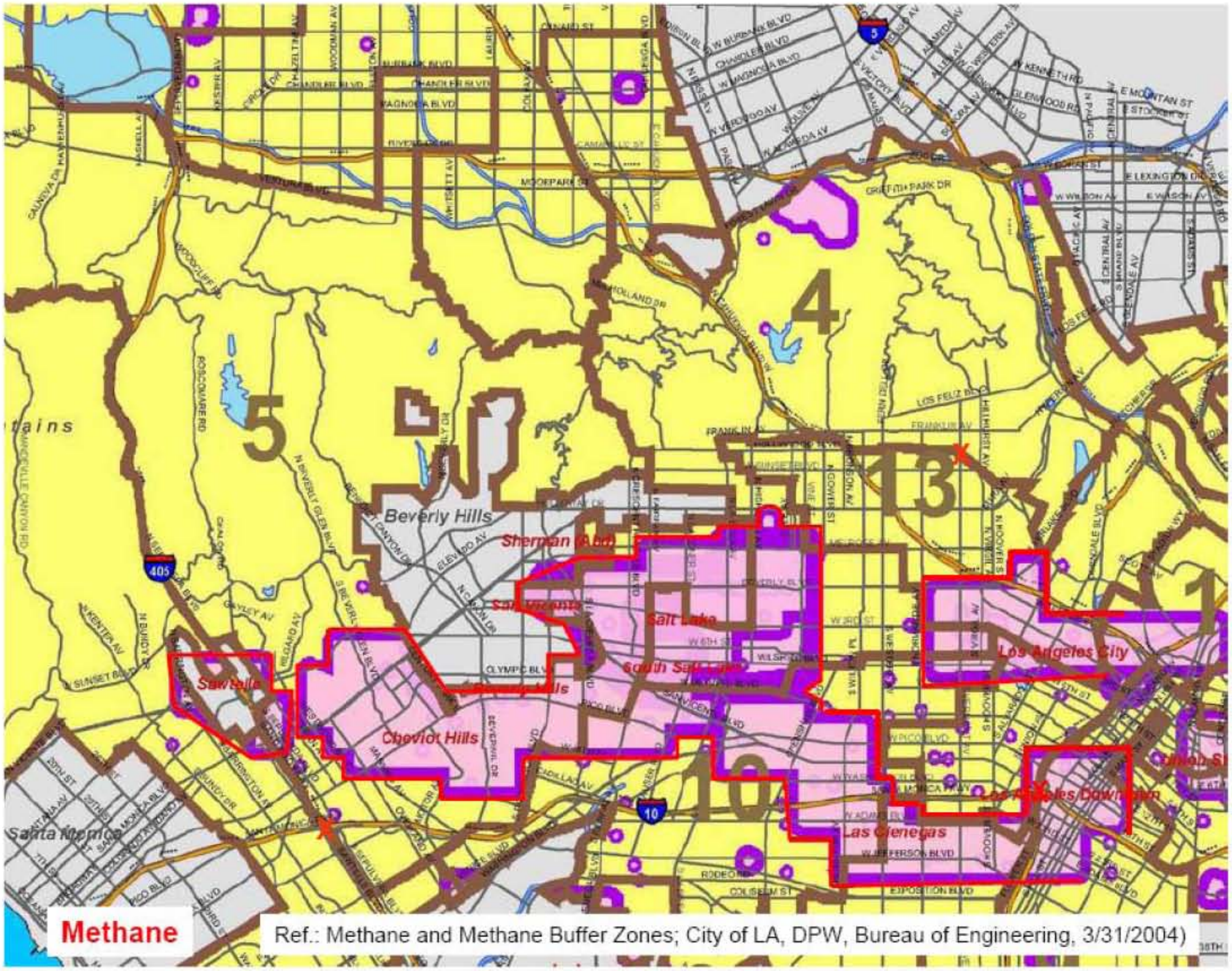
Ref: PBQ&D, 2007, Draft Geotech Evaluation and Tunneling Technology Recommendations, Chapter 3, Figure 4.

Figure 3-4. Regional Geologic Map



Note: Red lines indicate Liquefaction areas affected by proposed alignments
Ref: Seismic Hazard Zones, Beverly Hills + Hollywood Quadrangles (CDMG, 1999); PB, 2008, Geotech Evaluation and Tunneling Technology Recommendations, Chapter 3, Figure 4

Figure 3-5. Methane and Methane Buffer Zones; City of LA, DPW, Bureau of Engineering



Note: numbers are Council districts

Transportation Systems Management Alternative

The TSM Alternative enhances the No Build Alternative and improves upon the existing Metro Rapid Bus service and local bus service in the Westside study area. This alternative emphasizes more frequent service to reduce delay and enhance mobility. The TSM Alternative would also not necessitate the extension of any corridors and thus would not experience impacts due to geologic and seismic conditions as there are no known faults in the existing area and no additional alignments that would be affected by potential methane.

HRT Subway Alternatives 1, 11, 14 and 16

In terms of Alquist-Priolo fault-rupture study zones and number of fault crossings, there are no major differences between the alternatives. The greatest differences appear to be in terms of the potential to encounter methane, followed by the potential for liquefaction or earthquake-induced ground movements. Methane zones are not mapped in the cities of Beverly Hills and West Hollywood, so there may be methane present in these areas. Future studies would need to address site specific conditions. Since the alternative alignments have different lengths, comparisons in terms of geologic hazards per mile (relative hazards) are also meaningful. Liquefaction would mainly affect the elevated alignment alternatives of which none have been advanced for further consideration. It has little, if any, impact on the subway alternatives, characteristic of Alternatives 1, 11, 14, and 16 (Table 3-1).

Table 3-1. Hazards

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
D	2	a	Number of Fault Crossings - Alquist-Priolo Fault	0	0	6	4	4	4	4
D	2	a	Length of Alignment (miles) - Potential Methane**	0	0	8.9	5.5	6.6	5.8	6.8

** Note that presence of methane will have more impact on subway construction than aerial alternatives.

The rail alternatives with the highest number of hazards per mile within areas potentially containing methane are the Combined Heavy Rail Transit (HRT) Subway Alternative 16, followed by the Wilshire Boulevard HRT Subway Alternative 14.

Bus Rapid Transit (BRT) Alternative 17

This alternative predominantly uses Wilshire and Santa Monica Boulevards on street with physical transfers at the Wilshire/ Western Metro Purple Line Station and Hollywood/Highland Metro Red Line Station providing service to downtown Santa Monica on both Wilshire and Santa Monica Boulevards. The Bus Rapid Transit (BRT) Alternative has the highest number of hazards in terms of known fault crossings. It also has the most alignment within areas potentially containing methane. However, there are no tunnels or aerial structures, and few foundations; thus, this alternative has fewer geologic and seismic concerns compared to the HRT Subway Alternatives.

3.2.2 Historic/Archaeological/Paleontological Resources

Impacts to natural and cultural resources are assessed to address how to provide for the safety and security of pedestrians and transit users. These impacts are evaluated by estimating the number of cultural or natural resources directly impacted by implementation and operation of the proposed alternatives.

On December 20, 2007 URS staff archaeologist (Laurie Solis, M.A.) conducted an archaeological sites inventory search at the South Central Coastal Information Center at California State University Fullerton, for the presence of known archaeological resources identified along the proposed project alignments, as well as within 500 feet of the proposed alignments. For historic resources (structures), a thorough search was conducted of the City of Los Angeles Historic-Cultural Monument List from the City of Los Angeles, Department of City Planning, the National Register of Historic Places (for individual structures and districts), and the California Register of Historical Resources, to identify the number of listed historic resources along the proposed alignments. For 4(f) (publicly owned parks, recreational areas, wildlife/waterfowl refuges, or historical sites) and properties containing human remains, the above sources were used, as well as the most recent Thomas Guide maps for the proposed alignments. For paleontological resources, the USGS Dibblee, Los Angeles and Hollywood quadrangle was used, which illustrates the known subsurface stratum and their potential to yield fossil deposits.

No Build and TSM Alternatives

The No Build and TSM alternatives will most likely not impact historical, archaeological or paleontological resources as they will not require alterations to existing routes.

HRT Subway Alternatives 1, 11, 14, 16 and BRT Alternative 17

Alternatives 1, 11, 14, 16 and 17 have the potential to impact cultural resources in the study area to various degrees. As shown on Figure 3-6 and Table 3-2, these include, but are not limited to: impacts to historic structures through noise and vibration impacts during construction, as well as destabilization from underground excavation; disturbance to known and as yet unknown archaeological resources of a historic and prehistoric age; paleontological impacts to Pleistocene age terrestrial deposits, especially during excavation along Wilshire Blvd. within the Miracle Mile section of the City; and disturbance to human remains including those within formal burials, especially one of the proposed routes, which may traverse the Los Angeles National Cemetery and Westwood Memorial Park under a service right-of-way. In addition, there may be a number of historic period structures that have not undergone formal evaluation for historic significance. In order to assess this, a formal evaluation would need to be undertaken, which may increase the number of historic properties within the project site.

3.2.3 Economic and Fiscal Impacts

This section provides a comparative analysis of the economic and fiscal impacts for the Westside Extension Transit Corridor. The characteristics used to conduct the comparative analysis for the economic benefit include:

- Existing land use types along the corridor.
- The intensity of commercial development creating a number of high opportunity areas for development.

Figure 3-6. Estimated Number of Cultural Resources Directly Impacted

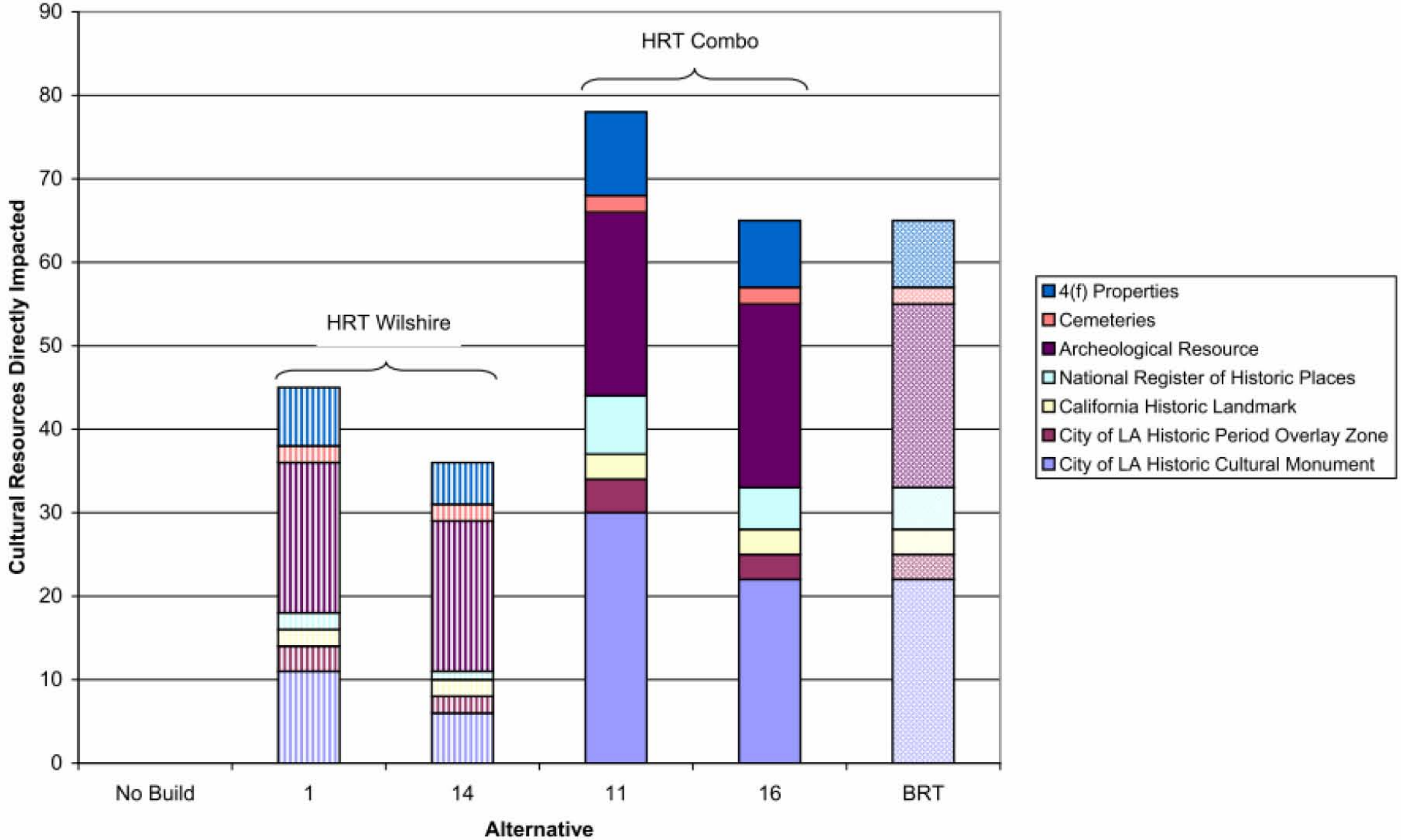


Table 3-2. Impacts on Sensitive and Protected Environmental Resources

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
F	5	a	Estimated Number of Cultural or Natural Resources Directly Impacted, including 4(f) properties and cemeteries	N.A.	N.A.	65	45	36	78	65
F	5	a	City of LA Historic Cultural Monument (HCM)	N.A.	N.A.	22	11	6	30	22
F	5	a	City of LA Historic Period Overlay Zone (HPOZ)	N.A.	N.A.	3	3	2	4	3
F	5	a	California Historic Landmark (CaHL)	N.A.	N.A.	3	2	2	3	3
F	5	a	National Register of Historic Places (NRHP)	N.A.	N.A.	5	2	1	7	5
F	5	a	Archeological Resource (AR)	N.A.	N.A.	22	18	18	22	22

- The existing development areas represented along each alignment.
- The incentives and policies in place that promote transit oriented development along the alignment and even more specifically at potential station locations.

Table 3-3 summarizes the research and analysis of land use plans, general plans, specific plans, community plans, and redevelopment plans from the Cities of Los Angeles, Beverly Hills, Santa Monica and West Hollywood.

Table 3-3. Employment and Employment Density within ½ Mile of the Alignment

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
A	4	a	Employment/Employment Density within 1/2 mile of Each Alignment (in thousands)							
			2005/6 Employment within 1/2 mile of Alignment	N.A	N.A	332	221	235	293	293
			2030 Employment within 1/2 mile of Alignment	N.A	N.A	387	258	274	342	334
			2005/6 Average Employment Density per Square Mile within 1/2 mile of Alignment	N.A	N.A	13.6	18.7	18.7	17.1	17.2
			2030 Average Employment Density per Square Mile within 1/2 mile of Alignment	N.A	N.A	15.9	21.9	21.8	20.0	19.7

The Westside Extension Transit Corridor is located in western Los Angeles County, in an area that is built-out predominantly with a mixture of mid to high-density uses. The Corridor is very densely populated. There are few areas where new development can occur. Over the next 25 years, employment and population is projected to grow in the Study Area, constituting a need for greater transit service. In 2005, employment density within the Study Area was about 12,600 employees per square mile. By 2030, this number is expected to increase to almost 14,800.

No Build Alternative

As this alternative will not necessitate any additional modifications to its existing condition, analysis of employment density within this area is not applicable.

TSM Alternative

The TSM Alternative will enhance the No Build Alternative by improving upon the existing Metro Rapid Bus service and local bus service. Consequently, this alternative is predicted to result in only a modest effect to economic and fiscal resources in the study area.

HRT Subway Alternatives 1, 11, 14, 16 and BRT Alternative 17

The Alternatives which are projected to capture the highest levels of growth in employment density, over 21,000 employees per square mile within the Study Area, are 1, and 14, as shown in Table 3-3. Alternatives 11 and 16, with 20,000 and 19,700 respectively, have the next highest levels of growth in employment density. The BRT Alternative 17 will have the lowest employment growth and density within ½ mile of this alignment with 15,900 employees per square mile.

With public transportation improvements, all alternatives will serve transit dependent populations, such as low income households, within the corridor. Low income households are associated with transit dependent populations as they are more likely to rely on public transportation as a primary mode of transportation. Figure 3-7 shows areas where low income households are found relative to the Study Area. With a number of significant educational, health and employment centers linked by the Metro Rail system, the alternatives will connect these centers to the regional network, providing access to riders who previously lacked or had limited commute choices.

Mixed Use Activity Centers

Mixed use activity centers create a focal point for activity and visual interest. These areas provide an opportunity for people to walk and interact. Activity centers feature a mixture of land uses, including higher density residential condominiums, townhomes and apartments, and retail uses that better facilitate pedestrian travel. They physically connect to adjacent neighborhoods and to parks and open space, and they often include internal public spaces. As shown in Table 3-4, the No Build Alternative, the TSM Alternative, and Alternatives 11, 16 and 17 would serve the greatest number of existing high density mixed use activity centers, with 14 to 17, within a 1/2 mile walk. The Wilshire Boulevard HRT Subway Alternatives 1 and 14 serve the lowest number of existing high density mixed use activity centers, with 9 to 12 high density mixed use activity centers.

Figure 3-7. 2005 Low Income Households

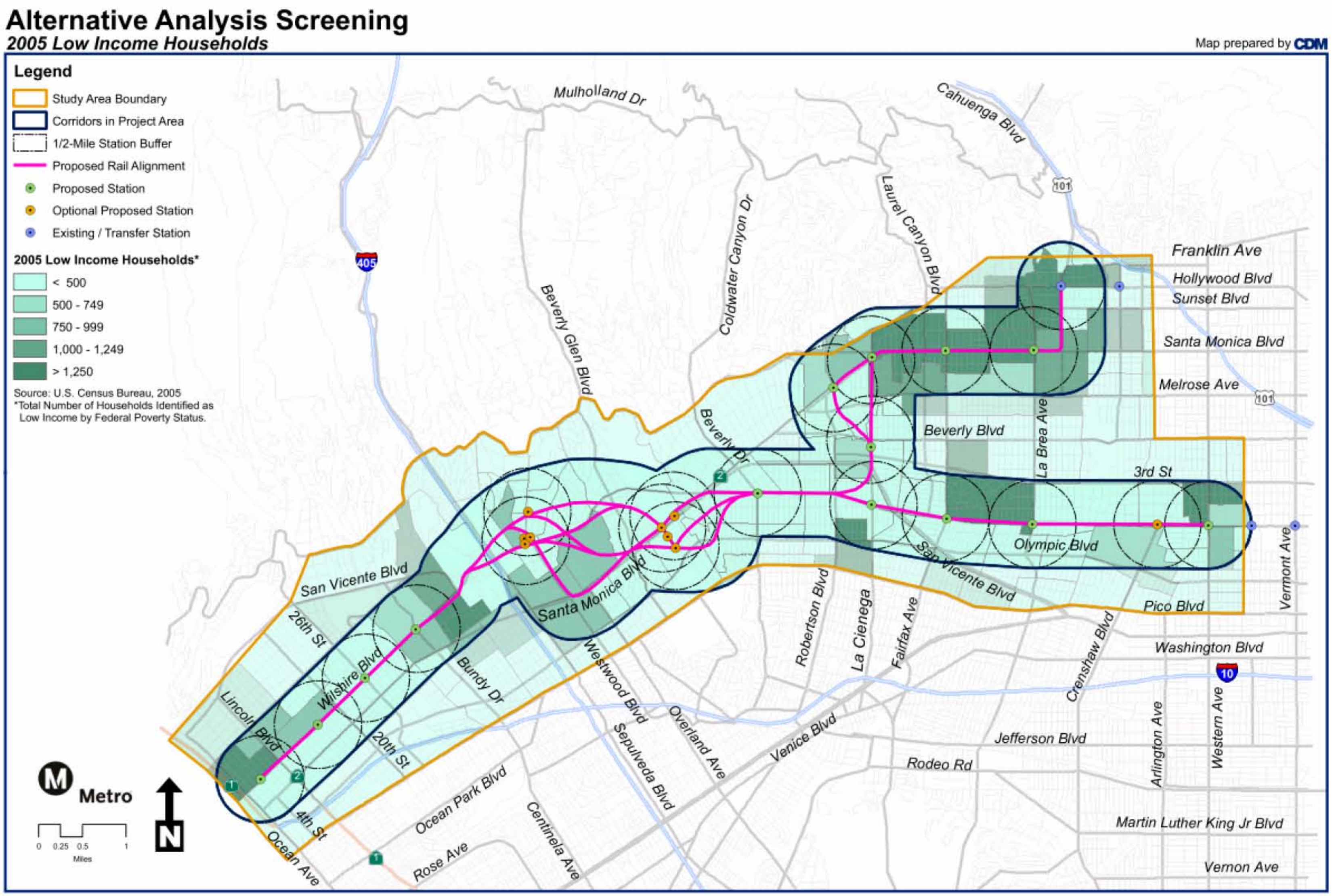


Table 3-4. High Density Mixed Use Activity Centers within ½ Mile of Each Alignment

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
B	1	a	Number of high density mixed use activity centers within 1/2 mile of each alignment	17	17	17	9	12	14	17

Note: Mixed Use Activity Centers are feature a mixture of land uses such as residential and commercial, and typically provide retail uses that encourage pedestrian travel.

High Opportunity Areas

High opportunity areas are defined as locations where major commercial activity and mixed uses occur. For the Westside Extension Transit Corridor, the following areas were identified as high opportunity areas for new or redevelopment that can be supportive by mass transit. They include:

- the Hollywood area including Highland Avenue from Hollywood to Santa Monica Boulevards,
- the area in close proximity to Santa Monica and San Vicente Boulevards,
- the area in close proximity to Fairfax Avenue and 3rd Street (the Grove),
- the area in proximity to Wilshire Boulevard and Western Avenue,
- the Civic uses at Wilshire Boulevard and Fairfax Avenue,
- Century City in proximity to Santa Monica Boulevard and Avenue of the Stars,
- the area in proximity to Westwood and Santa Monica Boulevards,
- Westwood at Wilshire and Westwood Boulevards, and
- Downtown Santa Monica.

Transit Oriented Development

As shown in Table 3-5, Cities within the study area maintain specific Transit Oriented Development (TOD) provisions or are receptive to TOD provisions as defined in their general plans, community plans or specific plans. There are two City of Los Angeles Community Redevelopment Agency (CRA) Redevelopment Areas served by the proposed alternatives, the Wilshire Center/Koreatown area and the Hollywood area. The Redevelopment Plans set forth an array of goals promoting business retention and expansion, attracting new businesses and developing public improvements. Key aspects of these plans related to TOD include pedestrian and transit improvements, urban design guidelines encouraging economic development, and expanding housing.

The Wilshire Center/Koreatown Recovery Redevelopment Project Area encompasses 1,207 acres and is generally bounded by Fifth Street on the north, 12th Street on the south, Hoover Street on the east, and Eastern Avenue and Wilton Place on the west. It also includes the Vermont Avenue Corridor to the Hollywood Freeway and Western Avenue to Melrose Avenue. The 1,107-acre Hollywood

Table 3-5. High Opportunity Areas for Redevelopment Within ½ Mile of Each Alignment

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
B	2	a	Number of high opportunity areas for redevelopment within 1/2 mile of each alignment	N.A.	N.A.	N.A.	W	W	W & H	W & H

Note: All Cities within Study Area maintain specific TOD provisions or are receptive to TOD provisions as defined in their general plans, community plans or specific plans

** W: City of Los Angeles CRA Redevelopment Area in Wilshire Center/Koreatown; H: City of Los Angeles CRA Redevelopment Area in Hollywood;

Redevelopment Project is generally bounded by Franklin Avenue on the north, Serrano Avenue on the east, Santa Monica Boulevard and Fountain Avenue on the south and La Brea Avenue on the west. Both areas are currently partially served by high capacity public transit via the Metro Red and Purple Lines, and have demonstrated transit oriented development adjacent to transit stations.

As shown on Table 3-5, Alternatives 11 and 16 are both within the City of Los Angeles CRA Redevelopment Area in Wilshire Center/Koreatown and the Los Angeles CRA Redevelopment Area in Hollywood, thus have the highest opportunities for redevelopment within the projected area. Alternatives 1 and 14 are only within the City of Los Angeles CRA Redevelopment Area in Wilshire Center/Koreatown while the No Build Alternative, the TSM alternative and the BRT Alternative 17 have no applicability within either the City of Los Angeles CRA Redevelopment Area in Wilshire Center/Koreatown or the City of Los Angeles CRA Redevelopment Area in Hollywood.

3.2.4 Equity and Environmental Justice Considerations

The purpose of equity is to ensure that both economic and environmental costs and benefits are distributed fairly across different population groups, with particular emphasis on serving transit dependent communities. To ensure that these objectives are met, the proposed alternative areas are surveyed for the number of low income households within ½ mile of proposed alignment; direct impacts (e.g., potential displacements, amount of construction impacts) categorized by local jurisdiction/ community; and the number of minority residents within ½ mile walking distance of proposed alignments.

As shown in Figure 3-8 and Table 3-6, the rail alternatives with the highest number of low income households within ½ mile of each alignment are the Combined HRT Subway Alternatives 11 and 16, with approximately 26,000 households. Local jurisdictions/communities directly impacted by displacements or construction include the City of Santa Monica, City of Beverly Hills, City of West Hollywood, City of Los Angeles, and Los Angeles County.

Figure 3-8. Number of Low Income Households within ½ Mile of Alignment

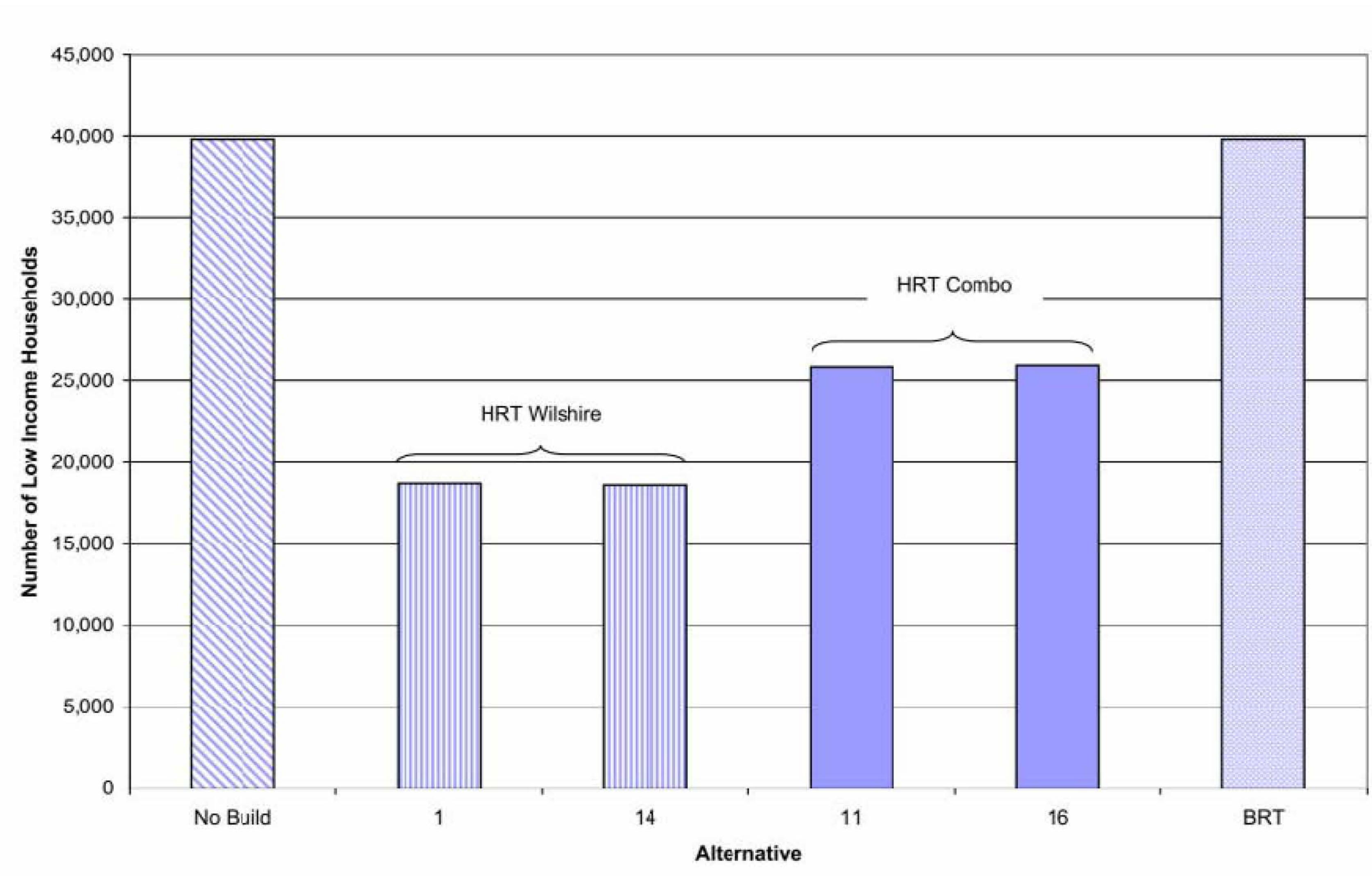


Table 3-6. Equity

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
E	1	a	Number of low income HH within 1/2 mile of each alignment - present	39.8	39.8	39.8	18.7	18.6	25.9	26.0
E	2	a	Local jurisdiction/communities directly impacted - displacements, construction							
				City of SM	City of SM	City of SM	City of SM	City of SM	City of SM	City of SM
				City of BH	City of BH	City of BH	City of BH	City of BH	City of BH	City of BH
				City of WH	City of WH	City of WH	City of LA (7)	City of LA (8)	City of WH	City of WH
				City of LA (8)	City of LA (8)	City of LA (8)	LAC	LAC	City of LA (8)	City of LA (9)
				LAC	LAC	LAC			LAC	LAC
			Total jurisdictions/ communities	12	12	12	10	11	12	13
E	2	b	Number of residents within 1/2 mile by ethnic group/minority populations							
E	2	b	Black	15,123	15,123	15,123	9,836	9,781	11,390	11,279
E	2	b	Amer. Indian Eskimo	1,030	1,030	1,030	521	554	720	694
E	2	b	Asian	47,951	47,951	47,951	35,528	35,358	38,356	38,620
E	2	b	Hawaiian/Pacific Islander	354	354	354	208	210	249	241
E	2	b	Other-Non-Hispanic	1,201	1,201	1,201	750	690	862	807
E	2	b	2+Races Non-Hispanic	13,180	13,180	13,180	7,977	7,713	9,679	9,450
E	2	b	Hispanic	47,041	47,041	47,041	21,837	22,012	27,021	27,048

Abbreviations: City of SM =City of Santa Monica; City of BH = City of Beverly Hills; City of WH = City of West Hollywood; City of LA = City of Los Angeles; LAC = Los Angeles County.

Environmental justice analysis addresses the concern of whether any group of people, including racial, ethnic, or socioeconomic group, would bear a disproportionate share of adverse environmental effects from implementation of the proposed alternatives. Consideration of environmental justice is a federal requirement based on Presidential Executive Order 12898. To evaluate environmental justice impacts, right-of-way (ROW) impacts to low-income households within ½ mile of the ROW are analyzed to assess the extent of displacement of homes and businesses.

A screening measure used to evaluate ROW impacts is to estimate the level of right-of-way impacts based on the proposed footprint of the alternatives. As shown on Table 3-7, Alternatives 11 and 16 have the greatest estimated ROW impacts based on proposed alternative footprint of between 550,000 and 570,000 square feet. Alternatives 1 and 14 require between 420,000 and 480,000 square feet. The No Build alternative has no estimated ROW impact, while the TSM alternative has a minimal ROW impact based on the proposed footprint, due to additional bus stops. The BRT

Alternative 17 would have the highest estimated ROW impact based on proposed alternative footprint of 1,335,000 square feet.

Table 3-7. Environmental Justice Estimated ROW Impact

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
F	1	a	Estimated ROW impact based on proposed alt footprint (thousands of square feet)	None	Mn	1,335	420	480	550	570

Mn = Minimal

3.2.5 Visual and Aesthetics

Visual impacts address how to minimize impacts to the character of the community. Estimating the level of visual impacts to the surrounding neighborhoods/community quantifies any changes to the areas in or around the projected alternatives. Visual impacts for underground alternatives include stations and associated structures.

The results of the evaluation, as shown on Table 3-8, demonstrate no visual impacts to the surrounding neighborhoods and community with the No Build and TSM Alternatives; moderate levels of visual impacts in the HRT Subway Alternatives 1, 11, 14 and 16; and low visual impacts in the BRT Alternative 17.

3.2.6 Noise and Vibration

A determination of a noise impact for this project was based on the criteria defined in the U.S. Federal Transit Administration (FTA) guidance manual *Transit Noise and Vibration Impact Assessment* (FTA Report DOT-T-95-16, April 1995). The FTA noise impact criteria are founded on well-documented research on community reaction to noise and are based on change in noise exposure using a sliding scale. Although more transit noise was allowed in neighborhoods with high levels of existing noise, smaller increases in total noise exposure were allowed with increasing levels of existing noise. The FTA Noise Impact Criteria group noise sensitive land uses into the following three categories:

- Category 1: Buildings or parks, where quiet is an essential element of their purpose.
- Category 2: Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.
- Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches and active parks.

Day-night sound level (DNL) was used to characterize noise exposure for residential areas (Category 2). For other noise sensitive land uses, such as outdoor amphitheaters and school buildings (Categories 1 and 3), the maximum 1-hour equivalent continuous noise level (L_{eq}) during the facility's operating period was used.

As shown on Table 3-8 and Table 3-9, there will be no airborne noise and a minimal amount of vibration due to the operation of the HRT in the subway portions of the line on the standard noise sensitive land uses in the area of the project proposed alignments. The vibration is expected to be felt in only the most noise sensitive land uses located adjacent to the selected right of way. There is the potential for some buildings, such as concert halls, recording studios and theaters, which are very sensitive to vibration, and which fall outside of the three noise sensitive categories, to exist along one or more of the proposed routes. Due to the sensitivity of these buildings, they will require special attention during the detailed environmental assessment of this project.

Table 3-8. Estimated Visual and Noise Impacts

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
F	3	a	Estimated level of visual impacts to surrounding neighborhoods	None	None	L	Md	Md	Md	Md
F	3	b	Potential noise & vibration impact - Operational Impacts	0	0	0	0	0	0	0

** L = Low; Mn = Minimal, Md = Moderate; H = High, VH = Very High
*** Total amount of acreage, 2 hospitals and 5 schools

Table 3-9. Summary of Operational Noise and Vibration Impacts

Alternative No.	Measure	Comment
No Build	N.A	No Operational Impacts expected
TSM	N.A	No Operational Impacts expected
1	FTA Noise Impact Criteria Level tables	No Operational Impacts expected
11	FTA Noise Impact Criteria Level tables	No Operational Impacts expected
14	FTA Noise Impact Criteria Level tables	No Operational Impacts expected
16	FTA Noise Impact Criteria Level tables	No Operational Impacts expected
17	FTA Noise Impact Criteria Level tables	No Operational Impacts expected

Depending upon the total number of trains/buses per day, and the existing ambient noise level in the area of the project, there is the potential for "impacts" and the possibility for "severe impacts" (as defined by the FTA Noise Impact Criteria) at noise sensitive land uses along the elevated portions of the proposed routes.

3.2.7 Construction Impacts

The Westside Extension Transit Corridor Study construction sites would have numerous site-specific impacts on adjacent land uses. However, some construction impacts would be more universal in nature. Construction Impacts may include the following effects.

Transportation and Traffic

The worksite would generate traffic on public roads leading to the site and on private haul routes running along the alignment or between the alignment and construction yards. The traffic would include construction worker commuting, delivering construction supplies (e.g., bulk cement, asphalt, steel, fuel, manufactured products), and moving construction materials (primarily dirt from excavations to embankments, and aggregate). In sensitive areas, these operations can be accomplished using the established right-of-way corridor with delivery of the material via the constructed rail line because in-line construction techniques are proposed.

Geology and Soils

The worksite would be cleared of ground cover for construction. As a result, rainstorms would produce greater runoff and erosion than would otherwise be the case.

Hazards and Hazardous Wastes, Water Quality, and Cultural Resources

The construction project has the potential to generate large quantities of material—from pavement demolition, clearing and grubbing, and soil/rock (from tunneling). Potential uses include aggregate for concrete and fill material for other portions of the line. The project itself would generate a much smaller volume of waste—product packaging, broken equipment, and site litter. The project may experience minor hydraulic fluid, motor oil, and fuel spills that would result in the disposal of contaminated soil. The project may generate a comparatively small volume of hazardous waste from building demolition and/or a potential to encounter harmful methane pockets as well as excavation of cultural resources of significance.

Land Use and Noise

Construction noise represents potentially high levels for short-term impacts to the surrounding environs. For the subway portions of the project, there will be vibration and vibration induced noise during the tunneling portion of the construction of the subway sections. The airborne noise will be located in and around the portals where the discharge material will be brought to the surface for disposal. If the discharge material will be brought out through a tunnel portal, then there will be noise and vibration associated with the trucks exiting the portal and traveling along the arterials toward the freeway and ultimately to the nearest available landfill. If the discharge material is brought to the surface by way of a vertical shaft, there will be noise and vibration associated with the cranes and loading of the trucks. The measure of the impact is the level of noise expected to emanate from the construction equipment on the surface at the tunnel portals and at the vertical shafts. The measure of impact from the tunneling activities will be taken from vibration measurement data collected from similar projects.

There will be no airborne noise and a minimal amount of vibration due to the construction of the subway. The vibration is expected to be felt in only the most noise sensitive land uses located adjacent to the selected right of way.

Some heavy civil construction activities, notably pile driving and rock excavation with explosives, would be inherently noisy. Most construction activities would use large pieces of construction equipment, and the equipment would generate noise. Individual pieces of construction equipment at grade level will generate noise levels up to 90 dBA L_{eq} at a distance of 50 feet. This will result in noise levels as high as 78 dBA L_{eq} at a distance of 200 feet, and levels as high as 76 dBA L_{eq} at a distance of 250 feet. Multiple pieces of equipment operated simultaneously will result in even higher levels. Should pile driving equipment be used on site, the noise level from these activities can be as high as 86 dBA L_{eq} at a distance of 250 feet. Noise levels of this magnitude will impact both noise sensitive land uses and can be disruptive to non-noise sensitive land uses such as commercial, retail, and offices. Construction noise and vibration impacts are summarized in Table 3-10.

Table 3-10. Summary of Construction Noise and Vibration Impacts

Alternative No.	Measure	Comment
No Build	N.A	No construction impacts expected
TSM	N.A	No construction impacts expected
1	Short-term Construction noise impacts	Potential low level vibration impact
11	Short-term Construction noise impacts	Potential low level vibration impact
14	Short-term Construction noise impacts	Potential low level vibration impact
16	Short-term Construction noise impacts	Potential low level vibration impact
17	Short-term Construction noise impacts	Potential low level vibration impact

Visual and Aesthetics

Tunnel excavation would likely take place 24 hours per day. As a result, tunnel heading access sites would also be occupied 24 hours per day and would be illuminated at night. The nighttime illumination may have an impact on adjacent land uses.

Transportation and Traffic

Roadway grade separations would connect to active roads at both ends of the grade separation worksite. Particularly in urban areas where the surrounding areas are not sensitive to noise impacts, roadway traffic may be such that the connection work must be performed overnight, when traffic volumes are less. The night connection work, if required, would be illuminated, and the illumination may have an impact on adjacent land uses.

Air Quality

The following construction activities would generate short-term pollutant noise increases and air emissions: fugitive dust emissions, mobile source emissions, and asbestos.

Public Utilities

Drilling, excavation, and removal of soil will result in the following potential impacts to Utilities (Public and Private). Replacement or relocation will be required for the following:

- Electrical facilities (Major transmission lines and substations)
- Natural gas facilities (Gas pipelines and facilities of various sizes)

- Wastewater treatment facilities (Wastewater pipelines and treatment facilities located in the project corridor)
- Water supply lines
- Storm drains
- Fiber-optic lines
- Telecommunication lines

Issues by Alternatives

Alternative 1 (also known as the "Wilshire Boulevard Alignment Alternative") is a below grade, HRT subway transit system traveling west from the Wilshire/Western Station towards 4th Street. Potential construction related impacts include: traffic disruption due to drilling sites/construction, nighttime noise and vibration, air and water quality, possibility of worker exposure to contamination and cultural resources, and relocation of public utilities.

Alternative 11 is a combination of Alternatives 1+ 6, (also known as the "Santa Monica Boulevard to Wilshire Boulevard Alignment Alternative") is a below grade, HRT subway transit system traveling west from the Wilshire/Western Station towards 4th Street. Potential construction related impacts include: traffic disruption due to drilling sites/construction, nighttime noise and vibration, air and water quality, possibility of worker exposure to contamination and cultural resources, and relocation of public utilities.

Alternative 14 is identical to Alternative 1, with an exception to the corridor segments and stations between Fairfax Avenue / Wilshire Boulevard to Beverly Drive/Wilshire Boulevard, is a below grade, HRT subway transit system traveling west from the Wilshire/Western Station towards 4th Street. Potential construction related impacts include: traffic disruption due to drilling sites/construction, nighttime noise and vibration, air and water quality, possibility of worker exposure to contamination and cultural resources, and relocation of public utilities.

Alternative 16 is a combination of Alternatives 11+14 (with the exception of both corridors merging at 3rd Street/ Burton Way/ Robertson Station), continues to merge route towards Beverly Drive/Wilshire Station to the Avenue of the Stars / Santa Monica Boulevard Station. The below grade, HRT subway transit system travels west from the Wilshire/Western Station towards 4th Street. Potential construction related impacts include: traffic disruption due to drilling sites/construction, nighttime noise and vibration, air and water quality, possibility of worker exposure to contamination and cultural resources, and relocation of public utilities.

Alternative 17 is an at-grade, BRT, is comprised of three routes: 1) Wilshire Boulevard Corridor; 2) Santa Monica Boulevard Corridor to Westwood; and 3) Santa Monica Boulevard Corridor to City of Santa Monica. Potential construction related impacts include: traffic disruption due to construction, nighttime noise, air quality; as well as accessibility to businesses.

Table 3-11 provides a summary of construction impacts.

Table 3-11. Summary of Construction Impacts

Alternative No.	1	11	14	16	17
No. of Stations	11	16	13	17	28
Total Length (in Miles)	12.76	17.60	14.30	18.65	31.87
Types of Transit	HRT (Subway)	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	BRT (At-Grade)
Types of Sensitive Land Uses*	1	1	1	1	1,2,3
Utility Relocation	Yes	Yes	Yes	Yes	No
Noise and Vibration	Construction noise levels > 65 dBA L_{eq}(h) and vibration levels > 65 VdB at sensitive receptors near portals.	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1
ROW	Commercial land uses near stations affected by construction.	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Sensitive land uses along entire alignment affected
Soil Removal and Truck Transport	Commercial land uses in 4-5 areas affected for several years by soil removal.	Same as Alt. 1	Same as Alt. 1	Same as Alt. 1	Sensitive land uses along entire alignment affected for several years

*Sensitive Land Uses include:
1. Public Facilities & Institutions (Churches, Museums, Hospitals, Cemeteries, Schools, Libraries)
2. Open Space & Recreation (Parks)
3. Residential Areas (Multi-Family Residential, Medium-High Density Residential)

3.3 Summary of Impacts

Table 3-12 below provides a summary of the potential environmental impacts with each of the five build, plus No Build and TSM, alternatives presented in this chapter.

Table 3-12. Summary of Impacts

Environmental Issues	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
			17	1	14	11	16
Geologic and Seismic Conditions	No Impacts	No Impacts	6 Fault Crossings. Contains most alignment within areas potentially containing methane, however, fewer impacts anticipated	Liquefaction would have little, if any, impact. 4 Fault Crossings – Alquist-Priolo Fault. 5.5 miles of alignment that may encounter potential methane.	Liquefaction would have little, if any, impact. 4 Fault Crossings – Alquist-Priolo Fault. 6.6 miles of alignment that may encounter potential methane.	4 Fault Crossings and 5.8 miles of alignment that may encounter potential methane.	4 Fault Crossings and 6.8 miles of alignment that may encounter potential methane.
Historic/ Archaeological/ Paleontological Resources	No Impacts	No Impacts	65 estimated number of cultural or natural resources directly impacted. 22 City of L.A HCM impacts. 3 City of L.A HPOZ impacts. 3 CaHL impacted. 5 NRHP impacted. 22 AR impacted.	45 estimated number of cultural or natural resources directly impacted. 11 City of L.A Historic Cultural Monument (HCM) impacts. 3 City of L.A Historic Period Overlay Zone (HPOZ) impacts. 2 California Historic Landmark (CaHL) impacts. 2 National Register of Historic Places (NRHP) impacts. 18 Archaeological Resources (AR) impacted.	36 estimated number of cultural or natural resources directly impacted. 6 City of L.A. HCM impacts. 2 City of L.A HPOZ impacts. 2 CaHL impacts. 1 NRHP impacts. 18 AR impacted.	78 estimated number of cultural or natural resources directly impacted. 30 City of L.A. HCM impacts. 4 City of L.A HPOZ impacts. 3 CaHL impacts. 7 NRHP impacts. 22 AR impacted.	65 estimated number of cultural or natural resources directly impacted. 22 City of L.A. HCM impacts. 3 City of L.A HPOZ impacts. 3 CaHL impacts. 5 NRHP impacts. 22 AR impacted.

Table 3-12. Summary of Impacts (continued)

Environmental Issues	No Build	TSM	BRT 17	Wilshire HRT 1	Wilshire HRT 14	Combined HRT 11	Combined HRT 16
Economic and Fiscal	17 mixed use activity centers within ½ mile of each alignment.	17 mixed use activity centers within ½ mile of each alignment	Lowest employment density within ½ mile of this alignment at 15,900. 7 mixed use activity centers within ½ mile of each alignment.	High levels of growth in employment density with 21,900 employees per square mile; 9 mixed use activity centers within ½ mile of each alignment.	High levels of growth in employment density with 21,800 employees per square mile; 12 mixed use activity centers within ½ mile of each alignment.	Employment density of 20,000 employees per square mile; 14 mixed use activity centers within ½ mile of each alignment.	Employment density of 19,700 employees per square mile;17 mixed use activity centers within ½ mile of each alignment.
Equity and Environmental Justice Considerations	No Impacts	Minimal impacts	Proposed alternative footprint of 1,335,000 square feet.	Proposed alternative footprint of 420,000 square feet.	Proposed alternative footprint of 480,000 square feet.	Proposed alternative footprint of 550,000 square feet.	Proposed alternative footprint of 570,000 square feet.
Visual and Aesthetics	No Impacts	No Impacts	Low level of impacts.	Moderate level of impacts.	Moderate level of impacts.	Moderate level of impacts.	Moderate level of impacts.
Noise and Vibration	No Impacts	No Impacts	Short-term construction noise impacts. Potential low-level vibration impacts. No Operational noise and vibration impacts				
Construction	No Impacts	No Impacts	Traffic disruption due to construction, nighttime noise, air quality; as well as accessibility to businesses.	Traffic disruption due to drilling sites/ construction, nighttime noise and vibration, air and water quality, possibility of worker exposure to contamination and cultural resources, and relocation of public utilities. Traffic disruption due to drilling sites/ construction, nighttime noise and vibration, air and water quality, possibility of worker exposure to contamination and cultural resources, and relocation of public utilities.			

4.0 TUNNEL FEASIBILITY REVIEW

This chapter analyzes tunneling challenges in the portion of the Study Area which contain gassy ground. Tunneling in these areas, which are known to contain methane and, in some places, hydrogen sulfide, presents special challenges during construction and operation. After summarizing the geotechnical conditions in the area, this chapter evaluates appropriate tunneling technologies with a focus on tunnel boring machines (TBMs), muck handling (the technical term for dirt and rock excavated during tunneling), and station construction methods. The chapter closes with a discussion of environmental issues and costs associated with tunneling in this area.

4.1 Geotechnical Review

Findings and recommendations of the Geotechnical Evaluation and Tunneling Technology Recommendations Report and related reports are summarized below. Subsurface conditions studied include geology, ground water, gas conditions, man-made contaminants, and seismic issues.

4.1.1 Geologic Conditions

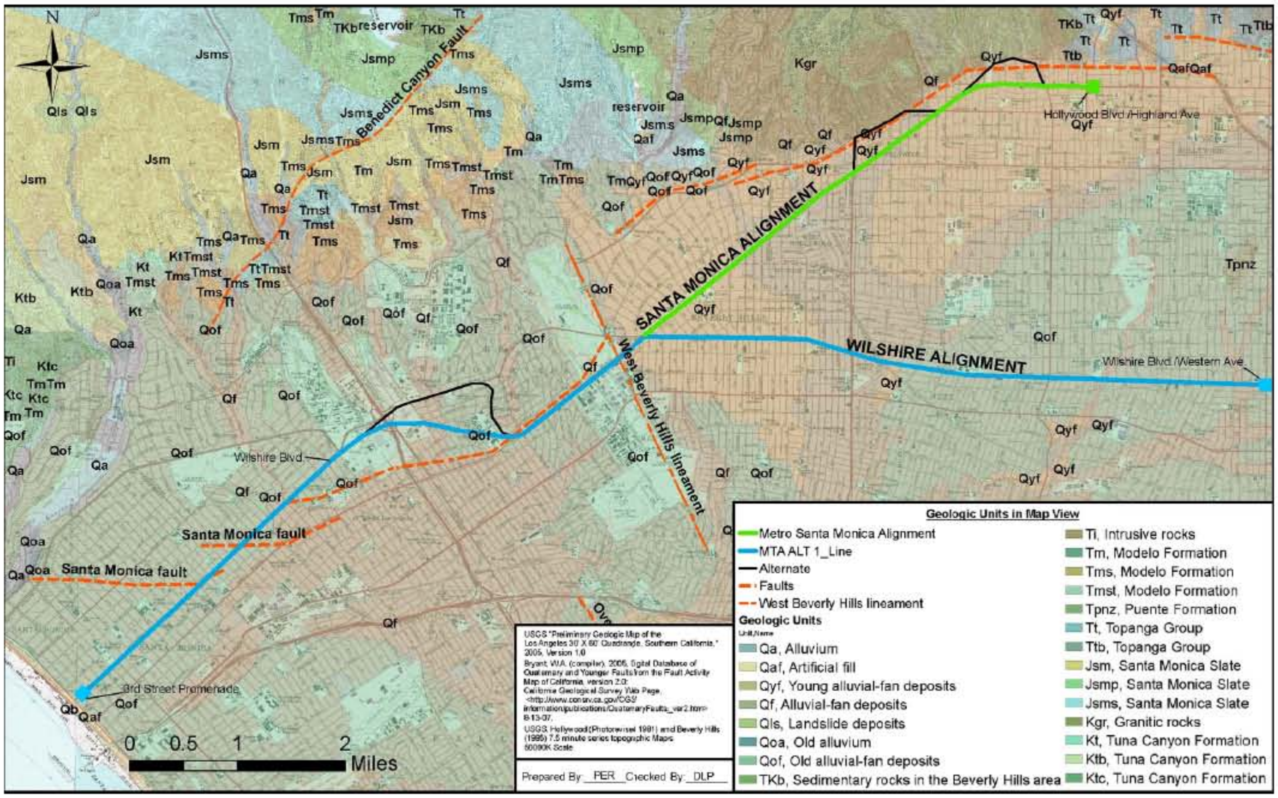
The alignments under study are located in the northern portion of the Los Angeles Basin, approximately 1/2 to 3 miles south of the Santa Monica Mountains. Regionally, the alignment is located at the northernmost end of the Peninsular Ranges geomorphic province, near the southern boundary of the Transverse Ranges geomorphic province. The Peninsular Ranges geomorphic province is characterized by elongate northwest-southeast trending geologic structures such as the nearby Newport-Inglewood fault zone. In contrast, the Transverse Ranges geomorphic province is characterized by east-west trending geologic structures such as the Santa Monica fault, the Hollywood fault, and the Santa Monica Mountains. The Santa Monica and Hollywood faults are considered the boundary between the two geomorphic provinces within the area of the alignments under study.

The geomorphology south of the mountain front in Santa Monica, Westwood, and West Los Angeles is characterized by deeply dissected, segmented old alluvial fans and two flights of marine terraces (Dolan et. al., 2000). The southern ends of these older fans appear to merge with the gently sloping Santa Monica Plain. The West Hollywood alignment from Hollywood Boulevard and La Brea Avenue to the west is geomorphologically distinct in that it traverses a relatively steep alluvial front characterized by numerous active alluvial fans that merge southward into a very gently sloping alluvial apron, referred to as the Hollywood Piedmont Slope (California Department of Water Resources [DWR], 1961).

Wilshire Boulevard Alignment (Alternatives 1 and 11)

The Wilshire Boulevard tunnel alignment will encounter several geologic units that range in age from Miocene to Holocene. The geologic units that would be encountered in a tunnel excavation along the Wilshire Boulevard alignment, from oldest to youngest in geologic age, are the Miocene-age sedimentary bedrock of the Puente Formation, Pliocene-age sedimentary strata of the Fernando Formation, Pleistocene-age San Pedro and Lakewood Formations, Pleistocene-age (older) alluvium, and Holocene-age (younger) alluvium. Pleistocene- and Holocene-age alluvial deposits comprise the surficial geologic units along the alignment. The San Pedro, Fernando, and Puente formations would be encountered at variable depths beneath the Holocene and late Pleistocene sediments in the subsurface along the Wilshire Boulevard alignment. The aerial distribution of geologic units and major Quaternary faults crossing and in close proximity to the Wilshire Boulevard and West Hollywood tunnel alignments under study are shown in Figure 4-1, Regional Geologic Map.

Figure 4-1. Regional Geologic Map



Petroliferous sands (tar sand) was encountered in the several borings drilled for the Metro Rail alignment along Wilshire Boulevard from just west of La Brea Avenue to Fairfax Avenue (CWDD/ESA/GRC, 1981). The petroliferous oil sands appear to be present within the San Pedro Formation between Fairfax and Sweetzer Avenues. The South Salt Lake oil field crosses Wilshire Boulevard between these two streets. The San Pedro formation would likely be encountered in portions of the tunnel excavation between Western and Fairfax Avenues based on the preliminary alignment profile grades.

West Hollywood Alignment (Alternative 11)

The West Hollywood alignment would traverse the Hollywood Piedmont slope and adjacent alluvial fans westward to its intersection with the Wilshire Boulevard alignment. The Hollywood Piedmont slope is composed of a series of coalescing alluvial fans that were deposited by intermittent streams that shed sediments from south flowing canyons draining the Santa Monica Mountains, and emptied out into the northern portion of the Los Angeles Basin. The section below discusses the general lithologic composition of the geologic units in the West Hollywood area.

4.1.2 Groundwater

Wilshire Boulevard Alignment (Alternatives 1 and 11)

The Wilshire Boulevard alignment passes through two of the four main hydrogeologic basins of the coastal plain of Los Angeles County. The alignment lies within the Central Basin from the eastern end to about the western city limits of Beverly Hills. The western portion of the alignment lies within the Santa Monica Basin. The Newport-Inglewood fault zone separates the two basins south of Beverly Hills (DWR, 1961).

Shallow groundwater, probably perched, lies between 10 to 35 feet below ground surface (bgs) (CWDD/ESA/GRC, 1981). Locally, groundwater as shallow as 5 to 10 feet bgs has been reported (LeRoy Crandall and Associates, 1983) in borings drilled along Wilshire Boulevard between Curson and Orange Grove Avenues.

A groundwater level contour map of the Hollywood Quadrangle, showing the historically highest groundwater levels (CDMG, 1998), indicates groundwater depths ranged from historic highs of 10 to 20 feet bgs along the Wilshire Boulevard alignment. A review of historical groundwater contour maps indicate that a portion of the Wilshire Boulevard alignment is located near an historic artesian area delineated by Mendenhall (1905). The most recent groundwater measurements from multi-level monitoring well/vapor probes along the Wilshire Boulevard alignment between Crenshaw Boulevard and Burnside Avenue in September 2007 indicate groundwater levels ranged between approximately 12 to 40 feet bgs (TRC, 2007).

Existing groundwater level data information along the Wilshire alignment west of the I-405 freeway is sparse. Groundwater level measurements recorded in 1974 and 1975 from three wells located near Wilshire Boulevard between Bundy Drive and Sepulveda Boulevard in the Sawtelle area of West Los Angeles ranged from about 40 to 75 feet bgs (DWR, 1977). Depth to groundwater was found to be 38.5 feet bgs in a boring that was drilled in 1989 on Wilshire Boulevard, about 200 feet west of Barrington Avenue (LeRoy Crandall and Associates, 1989). Groundwater level measurements in core borings that were drilled in 2004 on the northern portion of University High School, located at Texas and Barrington Avenues in West Los Angeles (about 1000 feet south of Wilshire Boulevard), indicated groundwater depths at approximately 20 to 25 feet bgs with apparent localized zones of perched water as shallow as 5 to 10 feet bgs (Mactec, 2004).

West Hollywood Alignment (Alternative 11)

The West Hollywood alignment lies within the Hollywood Basin from its proposed eastern connection with the Metro Rail Red Line to near the intersection of Santa Monica and Wilshire Boulevards. The Hollywood Basin is bounded on the north by the Santa Monica Mountains and the Hollywood fault, on the east by the Elysian Hills, the west by the Newport-Inglewood uplift, and the south by the La Brea High, an area of relatively shallow bedrock (DWR, 2007). The depth of the groundwater basin (to the base of the Pleistocene water bearing units) is about 660 feet (DWR, 1961).

Groundwater in the Hollywood Basin occurs within several aquifers of the Lakewood and San Pedro Formations. The aquifers consist generally of permeable sands and gravels separated by semipermeable to impermeable sandy clay to clay. Relatively shallow groundwater is present locally within the recent and/or older alluvium and is reported as semi-perched (DWR, 1961 and DWR, 2007). Groundwater contour maps prepared by the DWR show a general northeast to southwestward groundwater flow in the shallow aquifers of the Hollywood Basin.

Along Camino Palmero from Hollywood Boulevard northward to the foot of the south flank of the Santa Monica Mountains groundwater was encountered at depths ranging from about 45 to 55 feet bgs north of the main fault zone and at least 90 feet bgs south of the main fault zone (Earth Technology, 1993). This demonstrates that the fault zone is a barrier to the southward flow of groundwater. A groundwater level measurement of 27.8 feet was measured in March 1986 in soil vapor probe/monitoring well No. 61, located near the intersection of La Brea Avenue and Sunset Boulevard. This suggests groundwater levels may be shallower (with respect to ground surface) towards the south, away from Hollywood Boulevard. A groundwater level contour map of the Hollywood and Beverly Hills Quadrangle, showing the historically highest groundwater levels (CDMG, 1998), indicates groundwater depths ranged from historic highs of 10 to 150 feet below ground surface along the West Hollywood alignment.

4.1.3 Subsurface Gas Conditions

Wilshire Boulevard Alignment (Alternatives 1 and 11)

In the Mid-Wilshire area, methane and minor amounts of H_2S are encountered in the San Pedro and Lakewood Formations at 10 to 50 feet below ground surface. These gases migrate upward to the surface from deeper formations. Historically, there have been occasions when the gas has accumulated beneath or within structures. In 1985, methane accumulated in the basement of the Ross Store at Fairfax Avenue and Third Street caused an explosion. The City of Los Angeles has since implemented special building code provisions for “methane zones” and “methane buffer zones” within the city to address this natural occurrence and provide mitigation (see Figure 4-2).

Figure 4-2. Study Alignments with Methane Risk Zone and Methane Buffer Zone

Building measures in this area include proper investigation of gases, construction of methane barriers/liners and vent systems beneath building slabs, special heating, ventilating, and air conditioning (HVAC) requirements, and/or methane detection and eradication equipment/systems among other possibilities.

A panel of experts assembled by the American Public Transportation Association (APTA) has concluded that tunnels can be safely constructed and operated in the Wilshire Boulevard corridor given:

- Advances in TBM technologies such as use of Pressure Face TBMs,
- Increased local and international tunneling experience with Pressure Face tunneling,
- New knowledge about methods to mitigate risks,
- Local experience with subterranean construction along Wilshire Boulevard,
- Improvements in gas measurement instrumentation technology,
- Successful operation of the existing Metro System with its gas monitoring and mitigation measures, and
- Improved attitudes with regard to safety in the industry

Panel recommendations include:

- **Tunnel Liner and Gasket Design:** As the double gasketed system used for the Metro Gold Line Eastside Extension had not been tested in the field as of November 2005, the panel recommended staying with a "two-pass" system to provide redundancy in gas mitigation.
- **Alignment and Station Location:** Minimize construction in the gas and tar bearing formations as much as possible, particularly the San Pedro Formation's unsaturated zones. These zones were found to have high methane and hydrogen sulfide (H_2S) concentrations during explorations for Metro's Mid-City alignments in the mid 1990's.
- **Locate Abandoned Oil Wells:** Develop procedures for responding should they be found.
- **Be Aware of Lessons Learned:** Periodically review other tunneling projects to make use of lessons learned. Two experiences, the Detroit River Outfall and the Spanish Fork Canyon projects, were provided for examples.
- **Use a trial pit constructed in Tar Sand areas** to measure earth and gas pressures
- **Cross passage construction will expose workers to gassy ground** and will require special treatment.
- **Investigate technologies for methane and H_2S** degasification such as in-ground remediation
- **Develop procedures for membrane repair** should seismic events or fires occur.

In addition to the Mid-Wilshire area, gases are also detected at other former oil field areas such as in the Century City area and near downtown Los Angeles. In some areas near the La Brea tar pits, methane can reach up to 90 to 100 percent by volume of the vapor phase (the explosive range is 7 to

24 percent). Additionally, H_2S, has been measured in the range of 10 to 600 parts per million (ppm) in the Wilshire/Fairfax area.

Metro Purple Line Wilshire/Western Station. Historical data along the Westside alignment is fairly voluminous from Western Avenue to San Vicente Boulevard. In the area of the existing Western Avenue station historical H_2S data show fairly low values in the immediate vicinity (12 ppm) of the station footprint and methane as high as 9 percent by volume. However, values of H_2S and methane increase two blocks to the west with readings of H_2S reaching 98 ppm and methane reaching 35 percent by volume between Saint Andrews Place and Gramercy Place.

Wilshire/Crenshaw Optional Station. Approximately six blocks west of the Metro Purple Line Wilshire/Western Station footprint is the planned Wilshire/Crenshaw Station at the intersection of Crenshaw and Wilshire Boulevards. In this vicinity, methane and H_2S appear to have generally reduced in concentration with readings from the Engineering Science probe P-35 and other probes and borings indicating methane in the range of 1 to 3 percent by volume and H_2S between non detected to 1 ppm (based upon available data). Readings within the deeper portion of the San Pedro Formation are rare in this area however.

Wilshire/La Brea Station. Westward from the Crenshaw Avenue Station, methane and H_2S levels remain low for about six blocks along Wilshire Boulevard. At Rimpau Boulevard, there is a fairly significant increase in methane with a reading of 60 percent from P-39 (Engineering Science probe) in the San Pedro Formation. However, H_2S remains low at this location. With the exception of a reading of 33 percent methane at Tremaine Avenue and Wilshire Boulevard, the readings of both methane and H_2S remain low through the planned La Brea Station at La Brea Avenue and Wilshire Boulevard. Increased methane and H_2S concentrations can be seen at Sunsmur Avenue and Ridgeley Drive three blocks east of the La Brea Tar Pits (methane reaching 19 percent and H_2S at 157 ppm).

Rancho La Brea (Tar Pits). At the intersection of Masselin Avenue and Wilshire Boulevard, the highest recorded reading of H_2S (from available historical data along the Westside extension) was noted with a reading of 600 ppm from Enviro-Rail's RC-2 probe installed in 1994. Methane concentrations were low at this location, however. At Curson Avenue and Wilshire Boulevard (adjacent to the La Brea Tar Pits Park), methane was detected at 78 percent in the lower San Pedro Formation and H_2S was detected at 160 ppm.

Wilshire/Fairfax Station. Similar readings to those detected at the La Brea Tar Pits area were detected at Fairfax Avenue and Wilshire Boulevard. A probe from the Enviro-Rail projects of 1995 detected H_2S in the range of 17 to 33 ppm while methane was detected at 100 percent by volume in GW-2 (sample taken from headspace in groundwater well located approximately 400 feet north of Wilshire Boulevard). The high methane reading may be skewed due to it being from off-gassing of ground water within a well. A nearby probe (P-48) located approximately 150 feet north of Wilshire Boulevard (and the planned Fairfax Station) had methane readings of 58-65 percent.

As one approaches McCarthy Street two blocks west of Fairfax Avenue, a probe reading indicates lower methane (less than 1 percent) and some H_2S at the top of the San Pedro Formation (50 ppm). Further west, at San Vincente Boulevard, the methane readings and H_2S drop down to zero or none detected for both. Additional data to the west of La Cienega Boulevard is sparse, though some institutional knowledge has indicated that significant methane has been detected in the Century City area and the Sawtelle neighborhood near the I-405 Freeway intersection with Wilshire Boulevard.

Century City Area. Along Santa Monica Boulevard, between Wilshire Boulevard and Beverly Glen Boulevard, the West Area of the Beverly Hills Oil Field intersects the alignment. In this area, several oil wells are located both northwest and southeast of the alignment within a few hundred feet. In this area, there not only is a high likelihood of the presence of gases associated with oil field wells, but there have been measured levels of methane at a few documented locations ranging from 13 to 99.9 percent.

West of the I-405 Freeway. The alignment intersects the Sawtelle Oil Field beginning approximately 300 feet west of I-405 Freeway (going westward) to approximately where Wilshire Boulevard crosses San Vicente Boulevard (west of I-405 Freeway). Mapped wells in the Sawtelle Oil Field are fairly distant to the alignment (approximately 1/4-1/2 mile northwest), with the exception of three dry-hole plugged wells located approximately 1-2 blocks northwest of Wilshire Boulevard between San Vicente Boulevard and 26th Street (DOG Wildcat Map, 117, City of Santa Monica).

West Hollywood Alignment (Alternative 11)

The available gas data for much of the West Hollywood alignment is fairly sparse. A review of the California Department of Conservation Division of Oil and Gas Wildcat Maps (#117, June of 2006) indicated that from the Hollywood Boulevard/North Highland Avenue intersection to La Cienega Boulevard (along the West Hollywood alignment), no mapped oilfields are indicated. However, between La Cienega Boulevard and San Vicente Boulevard (going southwestward down Santa Monica Boulevard) an abandoned oil field is indicated - the Sherman Oil Field. Seven wells installed a few hundred feet southeast of Santa Monica Boulevard have since been abandoned.

4.1.4 Man Made Contaminants

Wilshire Boulevard Alignment (Alternatives 1 and 11)

The Wilshire Boulevard alignment will encounter the types of contaminant release sites typical in a large city. These findings are associated with normal contaminant releases related to gasoline stations and dry cleaner facilities. The contamination, in most cases, has been cleaned to site closure, but for those cases that are yet open the contamination is often confined to the upper 100 feet (below ground surface). One Superfund-listed site was noted due to releases of methyl tert-butyl ether (MTBE) and this site is currently being remediated. MTBE contamination is often associated with releases of gasoline. Contamination plumes associated with this site are likely in the process of being controlled from further spreading due to the pumping that is underway.

West Hollywood Alignment (Alternative 11)

Contaminant release and hazardous materials findings are generally similar to those along the Wilshire Boulevard alignment. The contamination associated with gas stations and dry cleaning facilities along the West Hollywood alignment is generally typical for this type of commercial area (heavy in gas stations, food establishments, and other service businesses). In most cases, such contamination is limited in depth and area and is generally confined to the upper 50 to 100 feet below ground surface. If a site is open, there may be Volatile Organic Compound (VOC)-contaminated groundwater with concentrations above Department of Health Services Drinking Water Maximum Contaminant Levels; or contaminants in soil (in the zone above first groundwater) at levels exceeding site screening goals. If a site is closed, there may be remnant low levels of VOC contaminant in soil and groundwater.

4.1.5 Seismic Conditions - Liquefaction

Wilshire Boulevard Alignment (Alternatives 1 and 11)

The California Geological Survey (CGS)has rated the liquefaction susceptibility for the Holocene age sediments in the alignment area as high if saturated and, if not saturated, the susceptibility is rated as low (CGS, 1998). In contrast, the liquefaction susceptibility of older alluvial sediments (pre-Holocene alluvial fans and sediments comprising the elevated La Brea geomorphic surface) is rated as low irrespective of ground-water levels. The young (Holocene) age deposits along the alignment, where present, are on the order of 5 to 35 feet thick. Preliminary alignment profiles show the tunnel crown elevations appear to be below the young alluvial deposits that are rated as highly susceptible to liquefaction.

For station locations with shallow ground water and younger alluvial deposits, station walls may have to be designed for greater than usual lateral earth pressures to account for liquefaction potential. This condition is more likely to occur at the proposed Westwood, Bundy, and La Cienega Station locations. Settlement beneath the aforementioned planned stations due to liquefaction is considered remote due to the dense character of the older alluvium at preliminary station depths.

West Hollywood Alignment (Alternative 11)

The eastern portion of the West Hollywood alignment would appear to traverse a portion of the late Holocene alluvial fans that are shown as susceptible to liquefaction. However, based on the relatively thin cover of Holocene-age sediments in this fan complex and the depth to groundwater identified in borings drilled along Camino Palmero (Earth Technology, 1992), it appears that at preliminary tunnel excavation invert grades, the tunnel will be driven below the Holocene section and above groundwater levels (north of Hollywood Boulevard). The portion of the alignment along Santa Monica Boulevard between La Cienega and Beverly Boulevards lies within a liquefaction susceptible zone. Likewise, it appears that based on preliminary tunnel excavation invert grades, the tunnel will be driven below the Holocene alluvial section and above groundwater levels along this reach of the West Hollywood alignment.

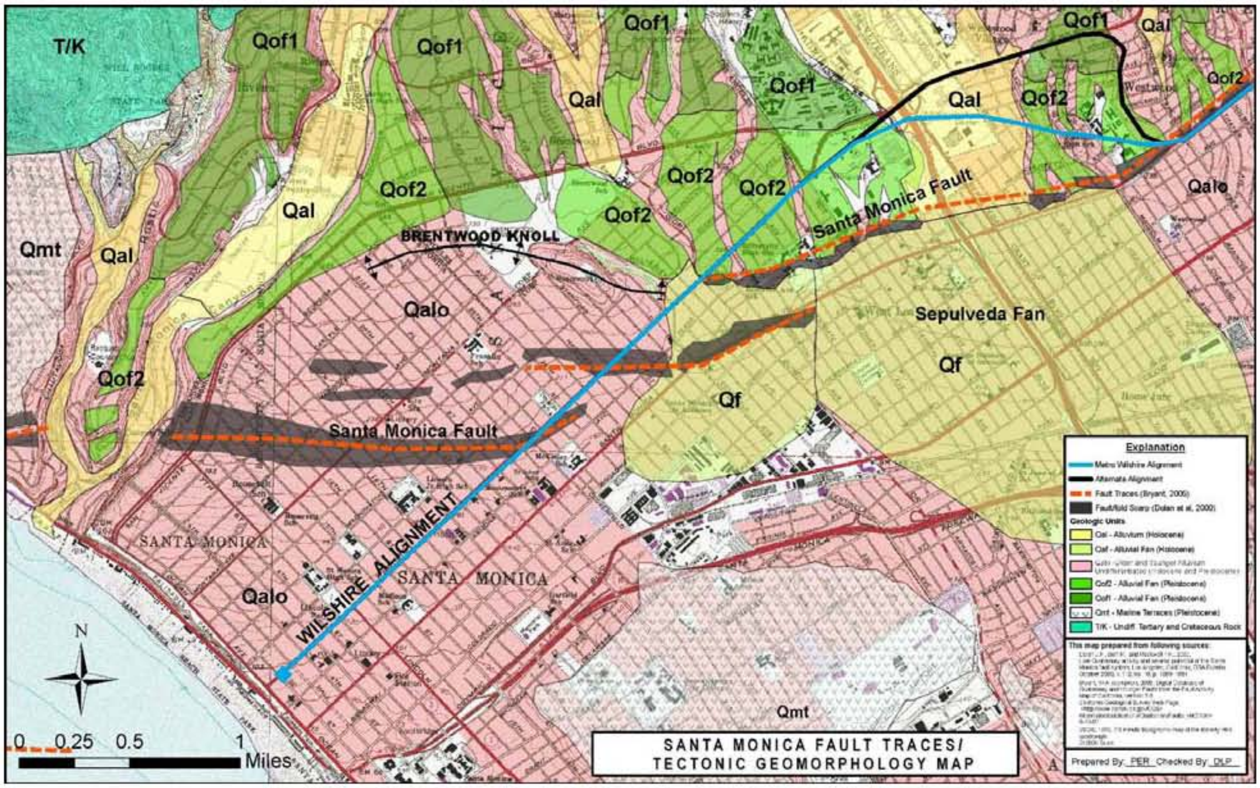
4.1.6 Seismic Conditions - Faults

Wilshire Boulevard Alignment (Alternatives 1 and 11)

The numerous faults in Southern California include active, potentially active, and inactive faults. An active fault is one that has had surface displacement within Holocene time (about the last 11,000 years). A potentially active fault is a fault that has demonstrated surface displacement of Quaternary age deposits (last 1.6 million years). Inactive faults have not moved in the last 1.6 million years. Active and potentially active faults that are located within five miles of the alignment are discussed below with respect to their known recency of displacement and location relative to the alignments under study.

Active Fault - Santa Monica Fault. The Santa Monica fault zone (SMFZ) is the western segment of the Santa Monica-Hollywood fault zone. The Wilshire tunnel alignment will traverse the SMFZ at several locations, as shown on Figure 4-3.

Figure 4-3. Santa Monica Fault Zone



The easterly portion of the northerly of the three scarps west of the I-405 freeway appears to cross Wilshire Boulevard near Bundy Drive in the Sawtelle District of Los Angeles. In the City of Santa Monica, the central scarp appears to cross Wilshire Boulevard between Stanford and Harvard Streets, whereas, the eastern scarp crosses Wilshire Boulevard between about 22nd and 24th Streets. The trend of the three scarps in the Sawtelle District and Santa Monica appear to intersect the Wilshire Boulevard alignment at a relatively small angle (i.e., the acute angle of intersection between the scarp crossing and Wilshire Boulevard is about 10 to 40 degrees).

Active Fault - Newport-Inglewood Fault Zone. The active Inglewood fault of the Newport-Inglewood fault zone is approximately 2.9 miles south-southeast of the alignment. This fault zone is composed of a series of discontinuous northwest-trending en echelon faults extending from Ballona Gap southeastward to the area offshore of Newport Beach. This zone is reflected at the surface by a line of geomorphically young anticlinal hills and mesas formed by the folding and faulting of a thick sequence of Pleistocene age sediments and Tertiary age sedimentary rocks (Barrows, 1974).

Active Fault - Hollywood Fault. The active Hollywood fault, located approximately 1.1 miles north-northwest of the Wilshire alignment, trends approximately east-west along the base of the Santa Monica Mountains from the West Beverly Hills Lineament in the West Hollywood-Beverly Hills area (Dolan et. al., 2000b and Dolan and Sieh, 1992) to the Los Feliz area of Los Angeles. The fault may act as a ground-water barrier within Holocene sediments (Converse et. al., 1981).

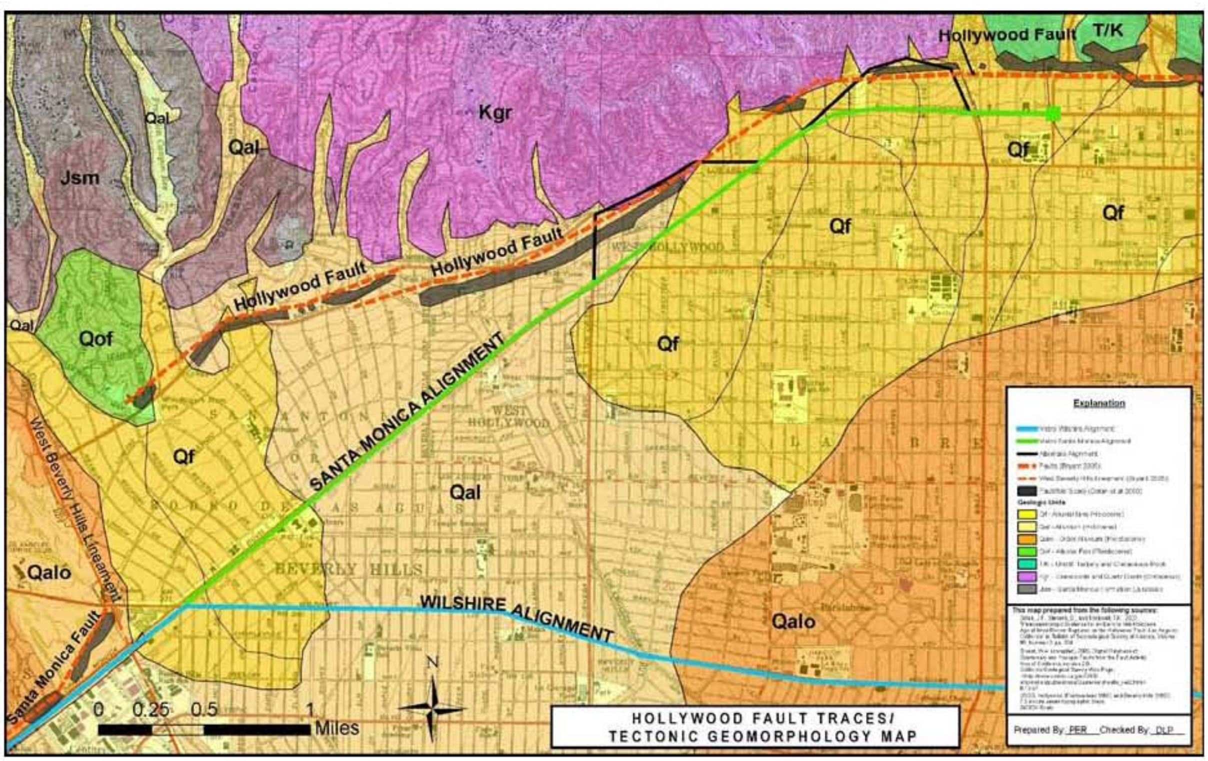
Blind Thrust Faults. Several deep, low-angle blind thrust faults underlie the Los Angeles Basin. They are not exposed at the ground surface and do not pose a ground rupture hazard; however, they are capable of generating earthquakes. Blind thrust faults postulated to exist within 10 miles of the alignment include the Elysian Park Thrust and the Puente Hills Blind-Thrust fault system (PHT). The Elysian Park Thrust is 4.5 miles east-southeast of the alignment at its closest point, and has an average slip rate of 1.5 millimeters/year (mm/yr) and a maximum magnitude of 6.7 (moment magnitude scale [Mw]). The PHT system extends eastward from downtown Los Angeles to Brea and overlies the Elysian Park Thrust. On this system, single segment fault ruptures are capable of producing a 6.6 (M*w*) earthquake and a multiple segment fault rupture could produce a magnitude 7.1 (M*w*) earthquake.

Potentially Active Faults. The closest potentially active faults to the alignment are the Overland fault, the Charnock fault, and the MacArthur Park fault located approximately two miles south, four miles south, and five miles east-northeast of the alignment, respectively. Other nearby potentially active faults include the Coyote Pass fault and the Northridge Hills fault located about 12 miles east and 12 miles north-northwest of the alignment, respectively.

West Hollywood Alignment (Alternative 11)

Active Fault - Hollywood Fault. The analysis of Dolan et. al. (1997) identified linear scarps and faceted, south-facing ridges in the topographic map of the Hollywood and Sawtelle quadrangles. The linear scarps cut across older alluvial fan surfaces. The location of the geomorphic fold and fault scarps described above are shown in Figure 4-4. It appears that the West Hollywood tunnel alignment under study would traverse the scarp near the intersection of La Cienega Boulevard and Fountain Avenue.

Figure 4-4. Hollywood Fault Zone



4.2 Evaluation of Tunneling Technology

The feasibility of tunneling for the Westside Extension Transit Corridor begins with comparison to past and present experience in Los Angeles, other cities around the U.S., and worldwide. That experience has shown that the proper combination of design, modern tunneling equipment and methods, and the use of sufficient ventilation will lead to successful tunnel construction. Evidence of this is found in the now completed Metro Gold Line Eastside LRT tunnels and in similar successes of other tunnel projects in the U.S.

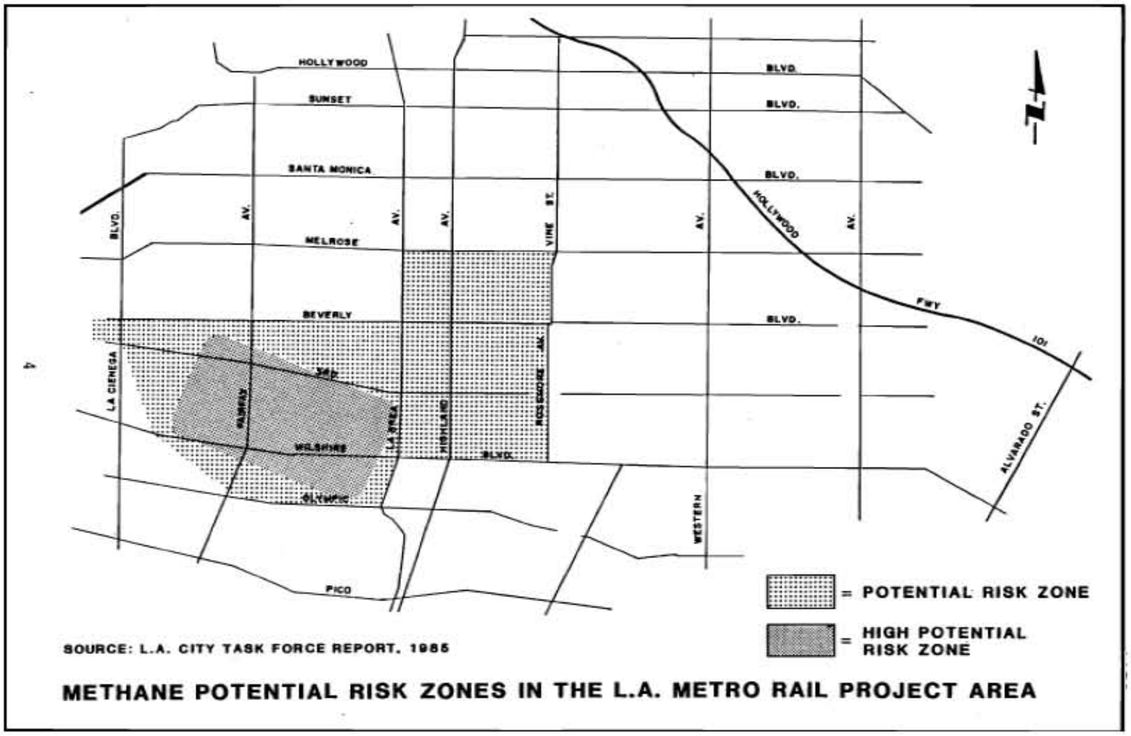
Of these success stories, that from the Metro Gold Line Eastside Extension is most applicable because it is local and demonstrates that tunnels can be constructed and operated in local conditions. Experience from Metro Red Line tunneling and other projects is also applicable to Westside alignments. The most recent completed Metro Red Line tunnel was the North Hollywood line completed in 2000. More modern tunneling practice, i.e., the use of earth pressure balance machines, has demonstrated even better success in the gassy ground of the Boyle Heights area of Los Angeles. The latter tunnels are not yet in service but were designed and constructed successfully and are judged ready and safe to go into service. Studies conducted for the Mid-City Extension and Red Line Eastside Extension (suspended) also provided testing results and recommendations for safe tunneling in gassy areas. Much of this experience can be applied to the evaluation of tunnel feasibility and development of design criteria for the Westside Extension area. The following sections expand on previous Metro experience and approaches to be taken for the next phases of the Westside studies given the known data and APTA panel recommendation.

4.2.1 Metro Red Line – Existing System Design and Construction

In 1985, after the Ross Dress-For-Less Fire and the subsequent creation of the Methane Risk Zone, Metro commissioned the Congressionally Ordered Re-Engineering Study (CORE) to evaluate alternative alignments with respect to gas conditions. Ultimately, the existing Metro Red Line alignment from the Wilshire/Vermont Station to Hollywood Boulevard was selected, and the final conclusions of the CORE study were:

1. No part of the study area (see Figure 4-5) can be considered to be free of gas.
2. Gas is more likely to be found over or near old oil fields.
3. The highest concentrations of gas were measured in the southern area (Wilshire and San Vicente Boulevards between La Brea and Fairfax Avenues). Less gas was found along Sunset Boulevard.
4. There is no discernible difference in the likelihood of the presence of gas between the portions of the alignment on Western Avenue and on Vermont Avenue.
5. Given that no part of the study area can be considered free of gas, subsurface facilities should be constructed using standard precautions and gas migration measures to ensure the safety of the system.

Figure 4-5. Methane Potential Risk Zones (1985)



In order to minimize gas (and water) inflow, all Metro Red Line segments were designed with a "two-pass" tunnel lining system that included a high-density polyethylene (HDPE) water and gas barrier. Early contracts used ribs and boards for initial support, and subsequent contracts used precast, expanded (non-gasketed) segments for initial support. Open face shields were used for all soft-ground tunnels, as this was the traditional tunneling method used in Los Angeles until about 1995, and most of the tunnel reaches were above groundwater. The Metro Red Line tunnel driven through the Santa Monica Mountains used a hard rock type (Closed Face) TBM. For construction, Metro Red Line tunnels excavated in the Los Angeles basin (south of the Santa Monica Mountains), have been classified Gassy by Cal/Occupational Safety and Health Administration (OSHA). This classification requires continuous air monitoring for hazardous and explosive gasses, "spark proof" equipment, and other special requirements for tunneling operations.

Several occurrences of gas alarms were reported during construction of the Metro Red Line. One of the most notable experiences was an encounter with tar seams in the tunnel reach of Red Line Contract B-201, 1,000 feet west of MacArthur Park. Initially, ventilation rates were increased, to dilute the gas. However, reduced air flow rates and slower mining proved to be the ultimate solution to mining safely through this zone. At the higher rates, volatiles were found to be more readily released.

4.2.2 Mid-City Studies

Although the Mid-City (Red Line) Extension was not constructed, much was learned from tunneling studies conducted in this area south of Wilshire Boulevard between Crenshaw and San Vicente

Boulevards (north of Pico Boulevard). Within this geographic area, gas measurements (H_2S in particular) were found to be higher than those measured at Wilshire Boulevard and Fairfax Avenue.

During the Mid-City Re-Assessment Study in 1994, soil-gas monitoring and testing programs were undertaken to locate the gas-bearing formations, determine the extent of the gas reservoir, examine methods of treatment - both pre-tunneling and during tunneling, and recommend tunnel and station configurations to avoid the gassiest ground. Conclusions pointed to safe tunneling if pressure face TBMs (in particular, slurry face TBMs) were used for worker protection. In-situ testing included soil-gas extraction and injection methods. By injecting air and extracting gases exposed to air, exposure to H_2S during tunneling could be reduced. These techniques are commonly used in the soil remediation work to reduce ground contamination. Other conclusions of this study were that:

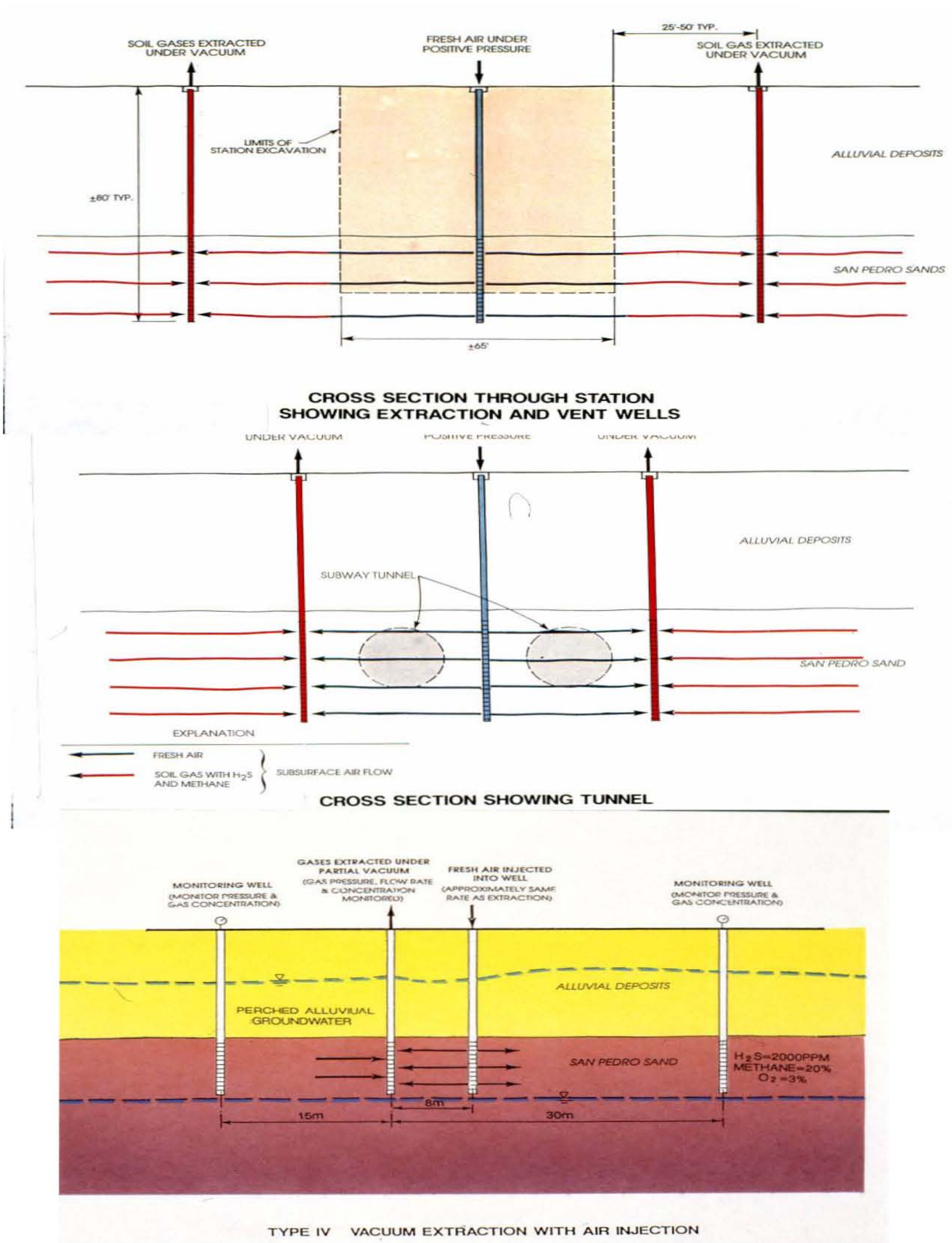
- Several alignments were feasible in Mid-City that involved raising the alignment above the gassiest ground, including one alternative with an aerial station.
- All structures were to be raised above the San Pedro Formation to the extent possible – especially if it were un-saturated.
- While Health and Safety thresholds are on the order of 10 ppm for H_2S, odor thresholds are much lower (about 0.002 ppm). The study concluded that while H_2S levels that the general public could tolerate in the subway were unknown, very low levels (safe yet above the odor threshold) might be objectionable.

Red Line Eastside Extension (Suspended Project)

Technology developed for the Eastside Suspended Project is directly applicable to the Wilshire Boulevard alignment in the Methane Risk Zone. During final design of the Suspended Project, high levels of H_2S (up to 21,000 ppm) were measured in head space of groundwater monitoring wells. These conditions occurred in the tunnel reach south of Union Station between the 101 Freeway and the Little Tokyo Station. Methane levels were also high, over the lower explosive limit of five percent. Other contaminants included man-made VOCs. In this reach, the water table was mostly above the proposed tunnel crown, conditions similar to those in the Wilshire Boulevard Alternatives' gassy areas.

As with the Mid-City Segment (refer to Section 4.2.2), slurry face TBMs were to be specified for the tunnel segment in H_2S bearing ground. Metro developed final specifications for slurry treatment and monitoring at the treatment plant, as well as pre-treatment of the ground prior to exit shaft excavation. Due to the configuration of the existing yard-lead tunnels, the Eastside tunnel separation required exit shafts to the surface in some locations, as opposed to cross-passages between tunnels. A number of environmental studies were undertaken to develop specifications to control H_2S. Studies included supplemental gas investigations and small scale "bench testing" to develop in-situ methods for reducing risks of mining in H_2S bearing environments.

Figure 4-6. Possible In-Situ Mitigation Measures – Mid-City Extension

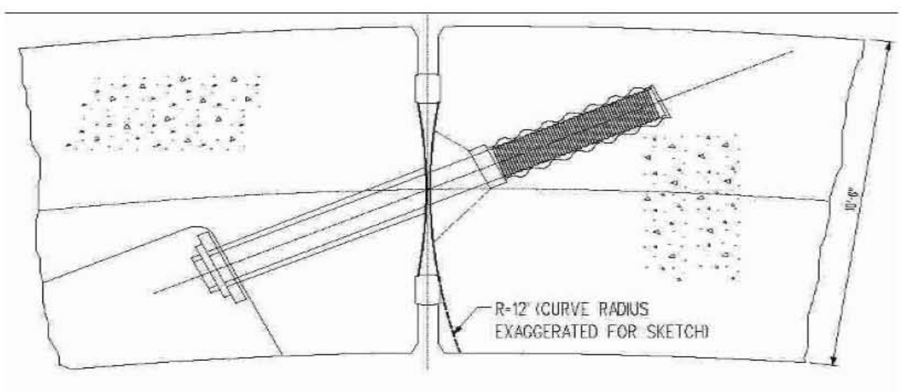


Three methods were identified for reducing H_2S:

1. Reduce concentration in groundwater ahead of the TBM or excavation. Injecting large quantities of H_2S -free water, treated with dilute hydrogen peroxide, appeared to be the most efficient means to accomplish in-situ mitigation. Injection from TBM probe holes could also be considered (but would delay tunneling). Injection well spacing requirements were close, less than 15 feet on centers.
2. Maintain high pH in the TBM slurry. Bench testing found that a pH of 10 would be sufficient to keep H_2S in a dissolved state. With the high pH, off-gassing at the slurry treatment plant was predicted to be less than 1 ppm. Additives to increase pH were checked against oil-field drilling experience, as some additives would adversely affect slurry properties. Sodium hydroxide (NaOH) was stated to be the most feasible additive. The most efficient approach would be to add the NaOH at the slurry treatment plant.
3. Use a zinc "scavenger" to precipitate dissolved sulfide out of the slurry.

Given the risks of H_2S and methane leakage in to the tunnel, designers and Metro's Tunnel Review Board recommended use of a double-gasketed tunnel liner ("one-pass" system) for use with the pressure face TBMs. Seismic conditions led to design of a convex to convex shape on radial joints principally to "flex" during earthquakes so that the tunnel remained sealed from gas. Figure 4-7 illustrates the double gasket system recommended. This sealing system was believed to be the first of its kind, and thus Metro undertook a six-month, nearly full scale, laboratory testing program, conducted at the University of Illinois. While the Red Line suspended project was not constructed, the double-gasket system was ultimately used on the Metro Gold Line Eastside Extension. These tunnels are not yet in service but have been constructed. No gas has been detected to date in the completed tunnels.

Figure 4-7. Schematic of Convex to Convex Double Gasketed Radial Joint



Metro Gold Line Eastside Extension

The Metro Gold Line Eastside Extension (MGLEE) project tunnels pass through the abandoned Boyle Heights oil field, and methane and H_2S were anticipated during construction. No H_2S gas was measured in soil borings but H_2S odor was reported on boring logs. Methane was measured with a maximum reading of 1,700 ppm. Cal/OSHA ultimately issued a "Gassy" tunneling classification. As with the suspended project, Metro specified pressure face TBMs (also refer to Section 4.3.3 for additional discussion of this technology) and a pre-cast concrete, bolted, gasketed lining for the MGLEE. This would provide additional safety with respect to gassy conditions.

Similar to the Suspended Project, specifications required PFMs for face control in the alluvial ground above and below the groundwater. Selection of an earth pressure balance (EPB) or slurry face TBM was left to the contractor. The primary objectives of the PFM specification were to minimize ground loss and related disturbance to the community and to increase tunneling safety. Thus, the specification called for tunneling under positive pressure (minimum of 0.7 bar or 10 pounds per square inch [psi] above groundwater pressure), as well as immediate backfilling of the tail void by grouting through the tail shield. Other requirements for the TBM tunneling included:

- Compressed air locks to access face
- Provisions for adding disc cutters, should they be needed in cobbly or bouldery ground
- Provisions for probe hole drilling and grouting through/ahead of the tunnel face
- Automatic Data Acquisition Systems to provide TBM data in “real-time”
- “Gassy” tunnel classification - compliance with Tunnel Safety Orders, Title 8, of the State of California for use in Class 1, Division 2, hazardous locations

The MGLEE project has proven that the tunneling specifications for that project were realistic and the construction was successful. Inflows of water have been well below specifications and no gas leakage through the tunnel lining has been measured. That the tunnel lining segments are operating as planned is apparent from observation and from all available measurements. It is noted that low levels of H_2S were encountered (smelled) in some construction areas (e.g., cross passages), but these were readily, safely, and successfully handled with an increase in local ventilation, which was no longer needed after completion of the tunnel lining.

4.3 Evaluation of TBM technology

4.3.1 Slurry Shield Tunneling

For this project, a pressure-face, slurry-shield tunneling boring machine (SF TBM) is expected to be used for tunneling in Methane Risk Zones. Tunneling using an SF TBM minimizes exposure of workers to elevated gas concentrations underground, since the excavated soil is removed in a fully enclosed slurry pipeline to an enclosed treatment plant. Based on the previous Metro and other project experience with pressure-face tunneling machines, it is anticipated that the SF TBM will travel approximately 50 feet per day on the average, and tunneling may utilize two or more SF TBMs simultaneously from one mining shaft, typically the station box excavation. The SF TBM will create a tunnel with a 19-foot inside diameter and a 21-foot outside diameter.

In a SF TBM, the excavated ground in front of the bulkhead is mixed with slurry (usually bentonite). The bulkhead allows for a positive pressure to be applied to the tunnel face, while allowing tunnel workers to be in free air (atmospheric pressure). Maintaining a positive pressure at the tunnel face decreases the potential for ground loss and soil instability (sloughing or caving), as well as preventing infiltration of groundwater. As a result, the spoil has the consistency of a viscous fluid. Pressure in this fluid is controlled by pressure gauges and pressure relief values. A separate air pressure may be applied to provide even closer control of the pressure. The bentonite is introduced to the face by pipe to the chamber and the bentonite and ground mix is removed through piping and pumped to the surface. At the surface, the solids are removed in a special treatment plant and the bentonite is reconditioned and recirculated to the heading.

An advantage of the SF TBMs is improved face control, as the hydraulic pressure can be finely adjusted using the added air pressure. For coarse grained soils, separation of slurry from the excavated material is less complex – than when clay materials are present. Bentonite provides some lubrication of the TBM cutting wheel, and wear may be reduced. Tunnel construction using SF TBMs is a cyclic process which begins with advancing of the TBM by excavating and removing soil from the tunnel face while the tunnel lining is erected within the end portion (tail) of the shield. After the lining is bolted into place, the machine is propelled forward by jacks that react against the installed lining. As the TBM advances, the annular space between the lining and the excavated perimeter is injected with grout from the tail shield of the TBM shield. Seals between the shield and the lining ring inside the TBM tail shield prevent the grout from flowing back to the inside of the shield. The segments themselves have gaskets to provide watertight joints while the lining as a whole is required to structurally maintain the safety and stability of the opening.

The SF TBM maintains a positive pressure on the tunnel face using a cake of bentonite that forms from impregnating (injecting) slurry at the tunnel face through the cutter head. The cake then acts as a membrane or penetrates the pore spaces at the face. Some SF TBMs use a compressed air buffer to help regulate chamber pressure. The buffer allows pressure applied at the tunnel face to be quickly adjusted based on varying earth (soil and groundwater) pressures encountered as the tunnel advances. Typically, pressure equal to or slightly greater than the prevailing earth pressure is applied. The effectiveness depends upon the extent of penetration of the slurry into the soil at the tunnel face, forming a membrane cake. Slurry penetration generally results in two types of caking:

- Membrane Cake (Figure 4-8) - Formed in ground of low permeability with use of relatively stiff slurry. The fine-grained soils do not allow slurry to penetrate into the ground and the slurry cake is formed at the tunnel face.
- Impregnation Cake (Figure 4-9) – Formed in moderate to high permeability ground. Due to the open nature of the ground, the slurry penetrates as much as several meters into the ground before it loses velocity and sets.

In addition to providing an impermeable membrane and assisting confinement pressure to develop within the excavation chamber, secondary functions of the slurry include:

- Spoils encapsulation and transport
- Lubrication for abrasion reduction
- Environmental acceptability (e.g., reduced impacts on adjacent structures)

Soil conditions in which a SF TBM would be best suited have been outlined by Maidl et. al., (1996). Sandy soils are considered best for efficient soil separation from the slurry. Clay soils will require additional processing at the treatment plant, and if not separated from the slurry can be difficult to dispose of due to the wet consistency.

Figure 4-8. Membrane Cake

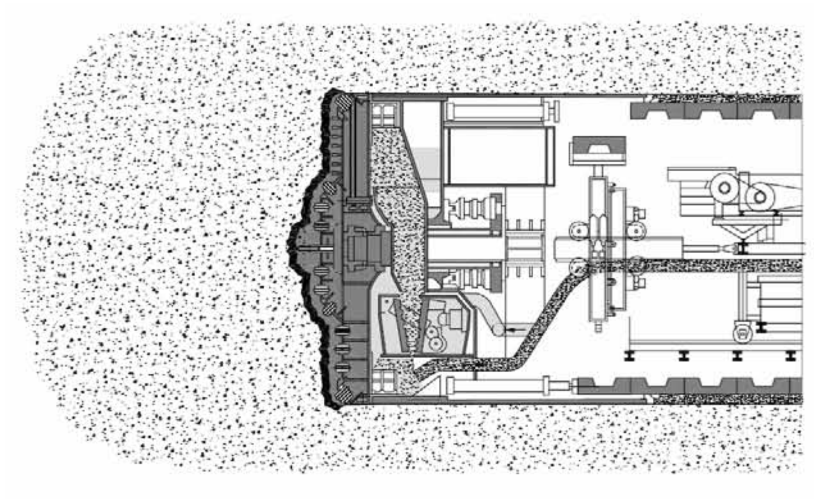
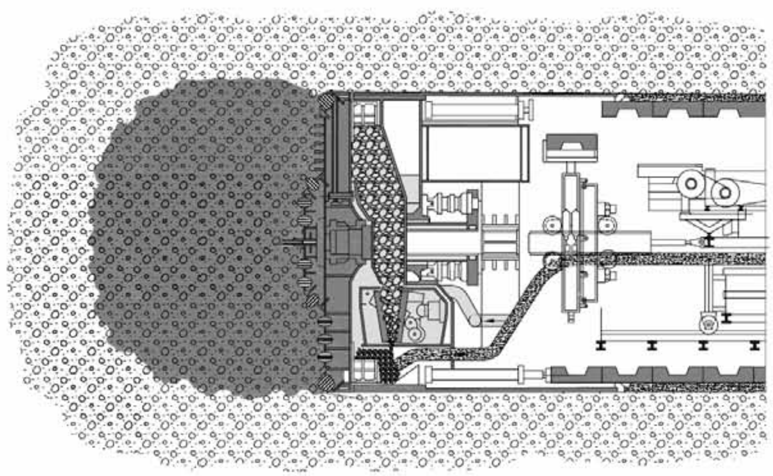


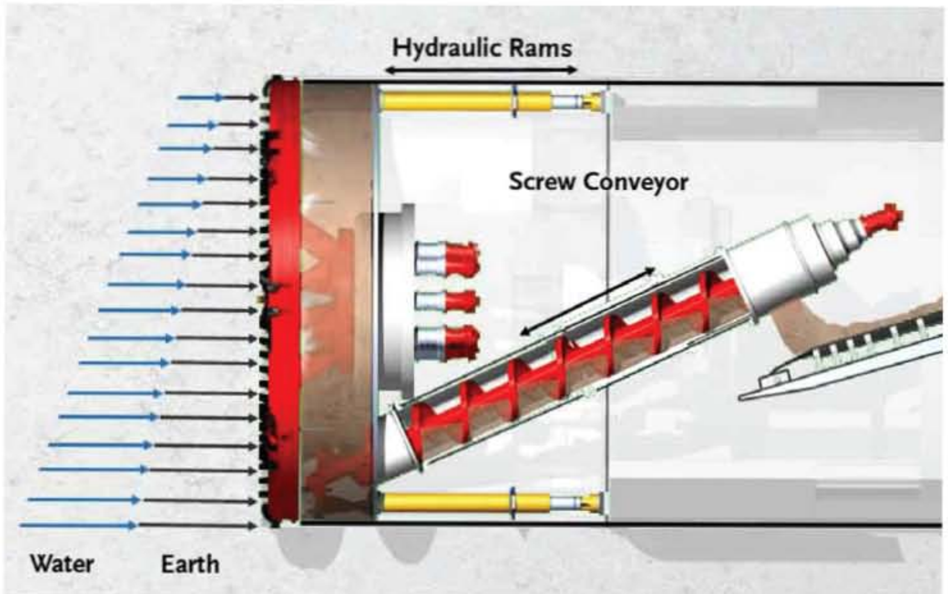
Figure 4-9. Impregnation Cake Formation (High-Permeability Ground)



4.3.2 Earth Pressure Balance Machine

EPBs are similar to SF TBMs in that the soil is excavated by a wheel and trapped at the face by a bulkhead in the machine (Figure 4-10). Removal of the soil is by means of a screw conveyor which also provides the pressure reduction (by friction) from the pressure at the face to ambient at the screw discharge point. As with the SF TBM, conditioners are typically added to the material to produce the optimum material properties for operation of the machine. For the EPB, that optimum is a greater stiffness than that for a SF TBM. Control of the pressure at the face is usually more difficult because it relies on mechanical or friction rather than hydraulic properties.

Figure 4-10. Schematic of EPB TBM



EPB TBMs were used very successfully for the MGLEE project. For that project, the contractor designed a special long screw conveyor to discharge soil well away from the tunnel working face, where most of the workers are located. At the end of the long conveyor, additional ventilation capacity was provided, should gas be detected.

Selection of the construction means, methods, sequences, and systems will require a full consideration of the ground conditions to be encountered, and the adoption of systems that offer flexibility to adapt to those conditions quickly without major re-tooling or costly delays.

4.3.3 Pressure Face Tunnel Boring Machines

For the original construction of the Metro Red Line, open face TBMs were used. These machines were modern adaptations of the Brunel tunnel shields first used in the late 1800s. They were called open face machines because the ground at the face of the machine was exposed to the tunnel atmosphere and relied upon installation of timbers, plates, jacks or mechanical doors to attempt to stabilize the face. Given the availability and success of pressure face tunneling methods, open face methods are not likely to be permitted for long tunnel drives in soft ground.

4.3.4 Recommended Boring Machine

At the present, it is tentatively recommended that SF TBMs are most appropriate tunnel boring machines for the Westside Extension gassy areas based on the following:

- Removal of contamination occurs at the surface where it can be handled more safely
- No release of contaminants within the tunnel

4.4 Spoils Handling and Disposal

Tunneling operations will require worksite space for accessing the tunnel, slurry and grout plants, electrical equipment, muck storage, dump truck access, segment storage, and other equipment storage. For Slurry TBMs, a slurry separation plant requires space for slurry handling and separation. Slurry processing is more difficult in clay and silty soils. Additional steps are required for separation of soil from the slurry, and sufficient plant capacity must be available to keep up with the tunnel progress. Wet materials (not fully processed) may be hauled away, but this also means additional cost. Treatment plants for slurry processing would also require air monitoring for hazardous gases and appropriate ventilation systems.

The size of these slurry treatment facilities can be reduced somewhat by stacking some of the equipment. Noise and protection of the equipment generally requires an enclosed building. For planning purposes, an area of two acres for a two TBM tunneling site can be used. This would not include parking or offices. It may be feasible to pipe slurry for treatment some distance from the tunneling work shaft. Feasibility of this approach depends on the mining sites selected.

With the SF TBM method of tunneling, a bentonite slurry is used to apply fluid (hydraulic) pressure to the tunnel face and to transport soil cuttings from the tunneling machine's pressure chamber to the surface. The slurry mixed with soil cuttings is processed to separate the soil from the slurry. Soil is disposed of off site and the cleaned bentonite slurry is returned to the machine's cutting chamber. The slurry mixed at a surface plant is pumped in and out of the tunnel and the machine's pressure chamber through a series of pipes. The result is that excavated material is kept enclosed and fluid until it reaches the slurry separation plant on the surface.

The SF TBM technology involves the setup of a temporary slurry treatment plant(s) at surface. The slurry treatment plant provides two basic functions: (1) to prepare the bentonite slurry by mixing the slurry for use in the tunneling process; and (2) to treat the used slurry, i.e. the slurry discharge. The slurry discharge will be pumped out via pipeline to the ground surface where it will undergo a separation process for soil (clay, sand, and gravel) removal. The removal process involves settling and the use of sieves for separation of large particles and centrifuges for small particles. Once the excavated material is separated from the slurry, the resulting soil can typically be stockpiled at the plant grounds or at offsite locations for approximately two to three days to dry before being hauled to a landfill or other disposal facility.

General assumptions for slurry treatments plants at this conceptual level of study are as follows:

- The slurry plant is anticipated to require an approximately one-acre site for the building enclosure
- The building is anticipated to be approximately 40 feet tall and the ventilation structures 50 feet tall
- The tunneling would require approximately 150 pounds of bentonite per one linear foot of the tunnel. Based on two tunneling machines, approximately 100 feet per day would be tunneled, using approximately 15,000 pounds of bentonite each day.
- Diesel locomotives will be used in the tunnel to transport workers, pre-cast concrete tunnel liner segments, and other materials to the tunnel working face.

- Water removed from the discharge slurry would be recycled for further use in preparing the bentonite slurry.

A schematic diagram of the slurry treatment process is shown in Figure 4-11. Examples of slurry treatment plants are shown in Figure 4-12 and Figure 4-13. When space and noise restrictions are of concern, treatment plants may be containerized for size reduction and sound proofing.

Figure 4-11. Slurry Treatment Process

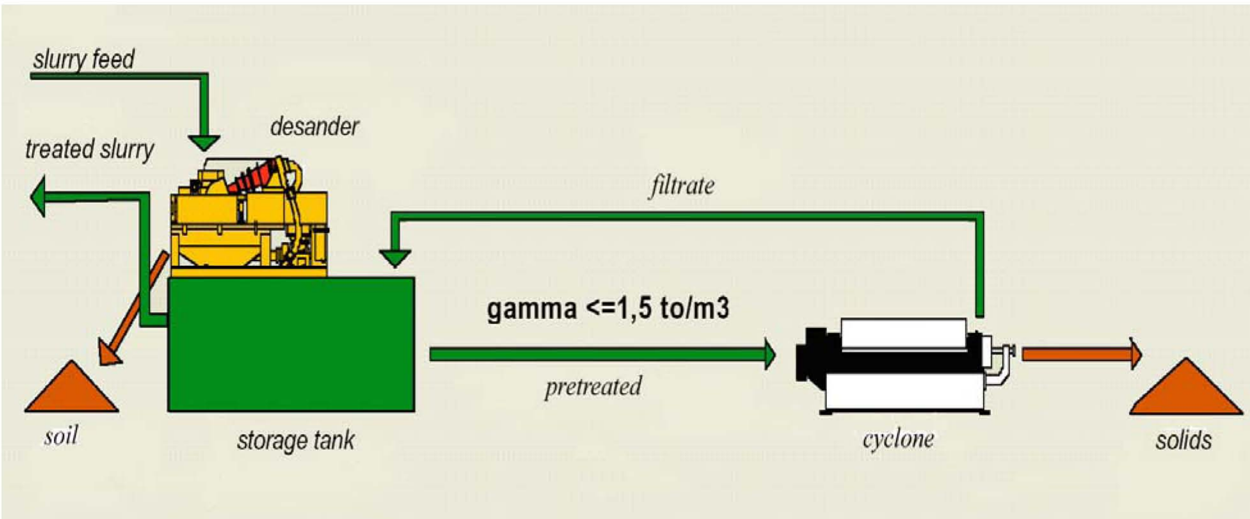


Figure 4-12. Slurry Treatment Plant, Westside CSO Project, Portland, OR

Figure 4-13. Enclosure with Materials Storage Silos, Eastside CSO Project, Portland, OR

4.5 Station Construction Methods

Existing Metro stations generally have been excavated and supported using conventional methods. Typically, initial ground support has been provided by soldier piles and lagging (timber or shotcrete) followed by a cast-in-place concrete final lining. Exceptions to this have been at Union Station, where slurry walls were used to reduce ground water treatment, at the Hollywood/Vine Station, where a deep soil mixing technique was used for initial support, and at the Barnsdall (construction) Shaft, where secant piles were used with tie-backs. For final walls, all stations were wrapped with HDPE to exclude gas and have used a modular approach to allow for local variations in the station layouts. This construction has occurred successfully in ground containing methane and/or H_2S. Figure 4-14 shows examples of these various methods.

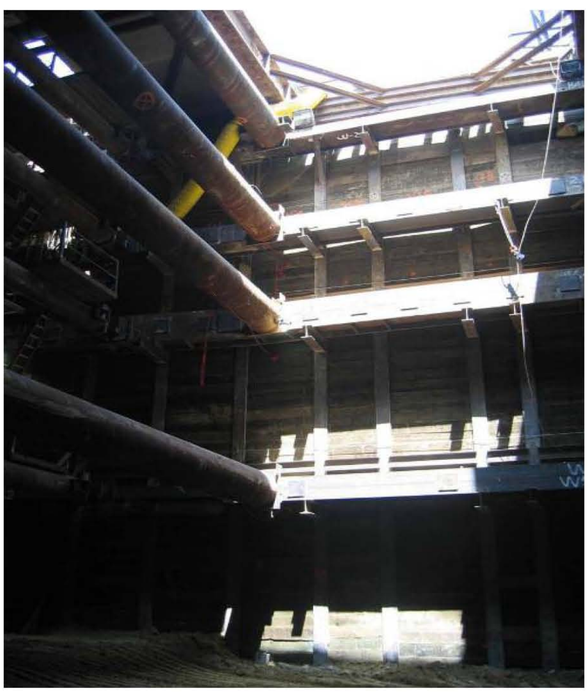
4.5.1 Underground Construction in Methane Zone

In addition to Metro stations and other Metro structures, there is now an extensive history of construction in the Westside geology. This includes parking garages successfully excavated and completed in ground containing methane and H_2S and extending to depths similar to those anticipated for the Westside Project. The APTA panel (described previously in Section 4.1.3) noted "no problems with deep basements along Wilshire Boulevard," referring to new construction in the Methane Risk Zone since 1985. Several other projects constructed in the Methane Risk Zone were reviewed to check if problems with gas or tar occurrences have been reported during operations, and if any construction issues could be verified. Figure 4-15 shows the concentration of high-rise buildings in the Methane Risk Zone around the Tar Pit Area.

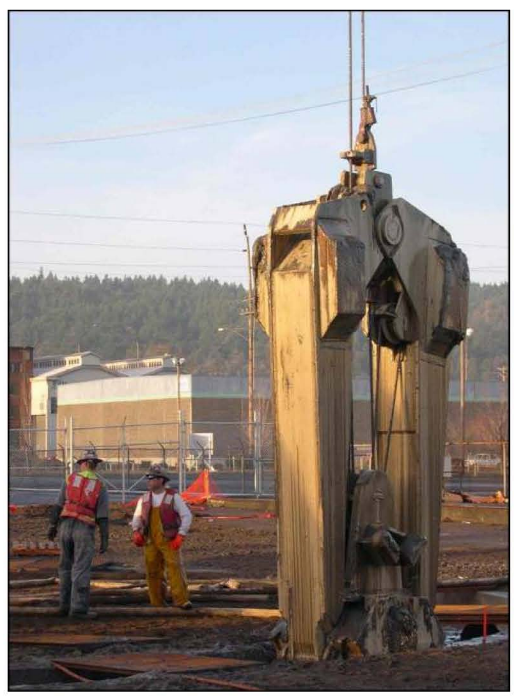
Figure 4-14. Station Wall Initial Support Methods

SECANT PILE WALLS, BARNSDALL SHAFT, HOLLYWOOD

DEEP SOIL MIX WALL EQUIPMENT, HOLLYWOOD AND VINE STATION

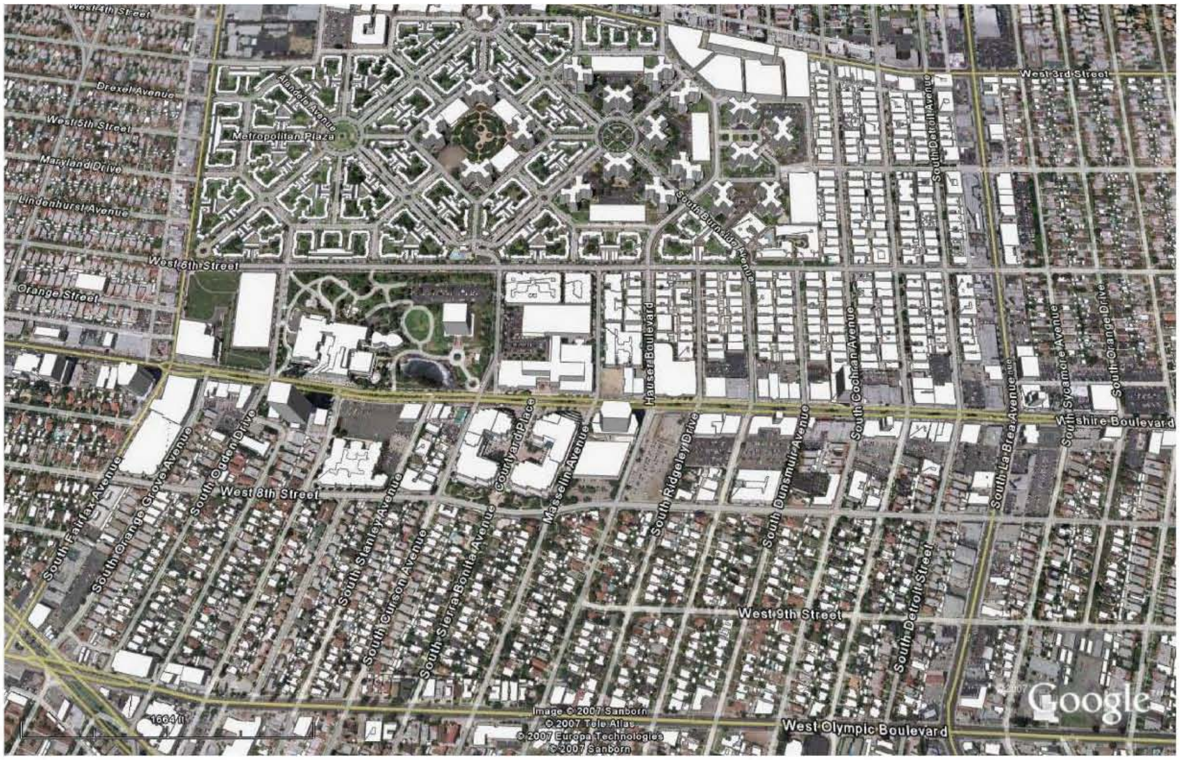


SOLDIER PILES AND LAGGING WITH CROSS BRACING, MARIACHI PLAZA, MGLEE



SLURRY WALL EXCAVATION, PORTLAND, OR

Figure 4-15. Building Concentration Wilshire Boulevard/Fairfax Avenue Area



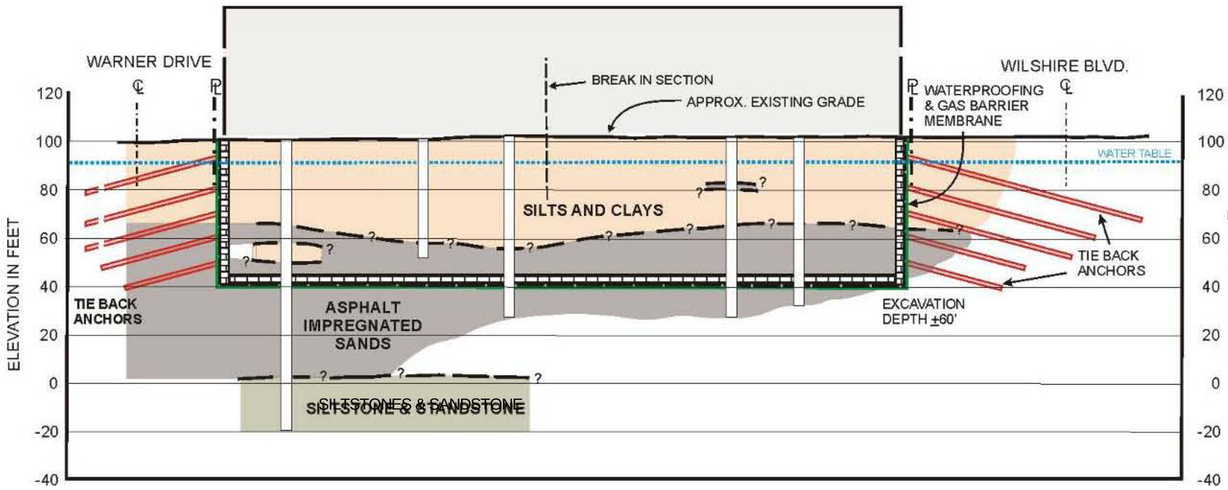
Subterranean construction (parking garages) can extend 80 feet below street level. Many of these structures are located within the Methane Risk Zone. Typically, deep excavations use tied-back soldier pile and lagging methods. Some deep excavations use slurry wall construction. These excavations addressed the challenges of shallow ground water and of protecting adjacent buildings and streets against settlement (subsidence). Of these numerous deep excavations, two that have particular similarities and application to the planned stations are discussed below.

6100 Wilshire Building

This building, at the southwest corner of Wilshire Boulevard and Fairfax Avenue was constructed in the early 1980s. It has a subterranean garage approximately 60 feet deep. The lower 20 to 30 feet of the excavation extended into asphaltic sands (tar sands), which are a well recognized source of methane and H_2S. Groundwater was encountered at depths as shallow as 15 feet. Similar to most deep excavations along Wilshire Boulevard, the subterranean excavation was achieved by the use of tied-back soldier piles and logging.

The excavation was achieved successfully and the building was supported on the asphaltic sands by a quasi mat-type foundation. To protect the building against water and gas intrusion, an 80-mill HDPE membrane was used to encapsulate the entire subterranean portion of the building. During a recent visit to the subterranean garage in the company of the building maintenance engineer, it was confirmed that during the past 20+ years no incidence of gas or water intrusion has occurred. Figure 4-16 illustrates the Foundation System and Geology.

Figure 4-16. Foundation System used at 6100 Wilshire Boulevard



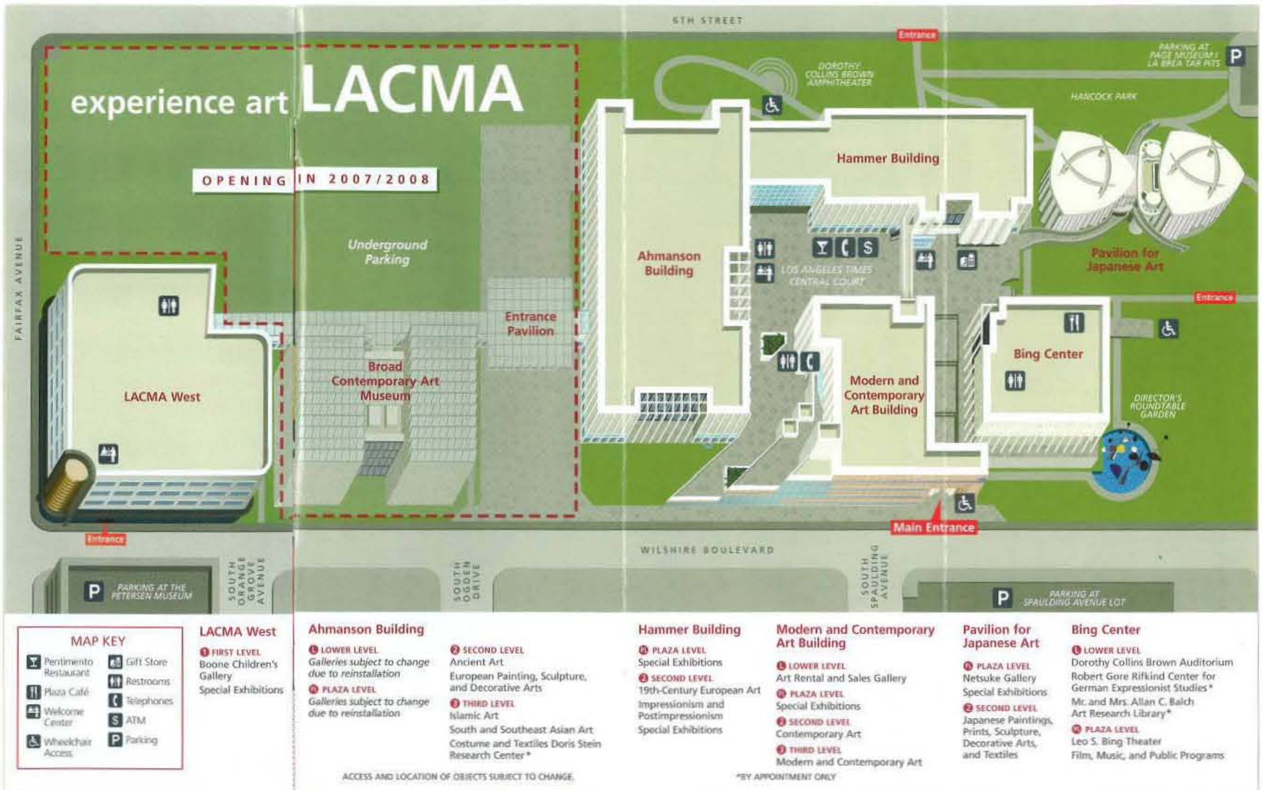
LACMA

New construction (2007) has been underway at the Los Angeles County Museum of Art (LACMA) for a new museum building and a large two level underground parking structure. Figure 4-17 shows the location of the new underground parking area in the northwest portion of the site. The parking garage was constructed to be a sealed system with heavy (reported to be five feet thick) concrete walls to resist uplift pressures from high groundwater. Groundwater at the site was reported to be about 10 feet below the ground surface in some locations and dewatering was specified for garage construction. Less water than anticipated was pumped, and this was believed to be due to the presence of tar, less permeable soil and/or smaller volumes of perched water.

During excavation through alluvial soils, gas encounters occurred on several occasions, and workers donned Personal Protective Equipment (PPE) to protect against exposure to H_2S. Water and gas-proofing of the underground structure was provided by bentonite and an HDPE gas proofing membrane. At this writing, the foundation sealing system is not complete, and the effectiveness is not known. Other buildings investigated in the area were found to have minor tar leakage into sumps or through walls in underground parking garages. These were typically dealt with as a maintenance issue, and no gas detection or alarms were reported.

As with the existing Metro tunnels, construction of structures in the methane zone has followed the provisions of the Los Angeles City Code Division 71 and guidance from Cal/OSHA. Ventilation is the principle means for such construction and specifications have typically provided for it in abundance. Once the excavation is completed, the structures are completely wrapped with HDPE to passively prevent the ingress of any gas. The final concrete walls and interior structures are placed inside of, and fully protected by, the HDPE lining. In addition, sensing devices and alarms are also used in the final structure, with the alarms set to go off at low levels, i.e., before the concentration begins to approach a dangerous level. This construction approach has been proven by operation of the final structures to be efficient and successful.

Figure 4-17. New Construction at LACMA



4.5.2 Potential Construction Methods – Metro Stations

It is assumed that, given the success of existing Metro stations and other structures in gassy grounds, these methods can be used again for the Westside project along with provisions for additional redundancy where conditions are more severe such as the Wilshire/Fairfax area (Area of Methane Zone in 1986). Station construction methods will be selected based on the ground conditions (soil, water and gas) and the requirements for the final structure. In areas of high gas levels, final design of the structure will include provisions for water and gas-proofing in the form of barrier systems, and operational systems for station ventilation and gas detection. The final design could also incorporate provisions to repair leakage, should it occur. Additional discussion of these methods to be used in final design is presented in the Final Geotechnical Evaluation and Tunneling Technology Recommendations Report (22c).

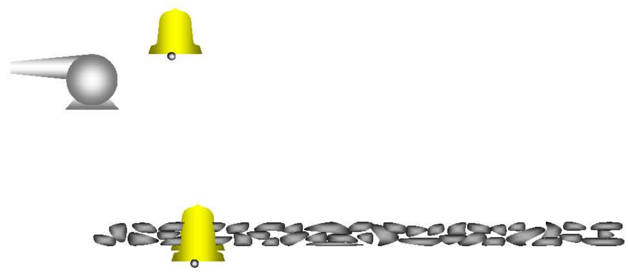
Table 4-1 compares various station construction methods. Additional techniques may include Deep Soil Mixing, Pre-Construction Grouting (such as by Jet-Grouting to reduce soil permeability), or combinations of these. Post treatment methods should also be investigated such that the work is done on an as-needed basis. For example, the Vermont/Santa Monica Station has experienced water leakage, and de-watering wells outside the station have recently been installed to reduce leaks and facilitate repairs. In the Wilshire/Fairfax area, some gas wells have been installed to reduce methane and Tar leakage at the surface.

Table 4-1. Station Design Construction Methods

Station Construction Method	Advantages	Disadvantages
Soldier Piles and Lagging	■ Traditional station construction method, usually least cost. ■ Placement of HDPE, Inspection and cast-in-place concrete used on previous Metro Stations, methods have been improved over time. ■ Minimum street/traffic impacts – single lane closures during pile drilling, several weekends needed for deck beam placement. ■ Some cross-excavation utility relocation may be avoided and/or some utilities may be suspended from deck beams.	■ Dewatering required if groundwater present ■ Initial support not “gas-tight.” ■ Gas could be encountered in piles drilled without drilling mud. ■ This “flexible wall system” requires added stiffness when construction is close to adjacent buildings and facilities. ■ May require slurry or casing to install soldier piles in sand. ■ Requires concerted effort to obtain tight lagging to reduce raveling of sand and related wall movement.
Slurry Walls	■ Minimal Dewatering required. ■ Best gas barrier for initial and final support. ■ Initial support can be incorporated as final, balancing some of the additional cost. ■ Greater wall stiffness and potential for increased bracing spacing. ■ Minimal deformation – least impacts to adjacent structures/utilities. ■ Reduces worker exposure to gas during excavation support installation.	■ Requires “specialty” contractors and equipment. ■ Generally requires more utility re-locations to avoid conflicts during wall excavation. ■ Impacts to surface have longer duration for wall installation. ■ At least one, possibly two, dedicated traffic lane(s) needed for heavy excavation equipment. ■ If tiebacks have been installed for adjacent structures these could interfere with wall excavation. ■ Requires mixing slurry on site and disposing of wet materials with some adhered slurry residual. ■ Generally more expensive. ■ Secondary gas barrier and cast in place wall (resists hydrostatic pressure only) may be required for gas barrier and finished appearance. ■ System used with secondary barrier and wall could facilitate leak repair using flexible repair products (e.g., Turbo-seal).
Secant Pile Walls	■ No specialized equipment/contractors. ■ Minimal dewatering required. ■ Depending on geology and ground water conditions, piles may be drilled “dry” (No slurry).	■ Higher potential for leakage due to number of joints between piles. ■ Similar to slurry walls with respect to existing utilities and tie-backs.

Conceivably, in-situ mitigation measures, or "active barriers" could be used for long term control of gas. An example of this approach is a double walled foundation with a pressurized or vented void between sections (Figure 4-18). Such active systems have been reviewed previously and rejected in favor of the passive systems of HDPE envelopment used on all Metro projects to date. Active foundation systems involve the use of permanent air injection and air/gas extraction to keep a station or other element "flushed" of gas at all times, and would require more rigorous maintenance than the existing Metro system.

Figure 4-18. Active Foundation System



Metro has used a passive HDPE envelope on other designs. Such an envelope continues to function for the life of the systems without additional attention. Laboratory testing has verified our confidence in the veracity of this assumption. At this time, it is our professional opinion that reliance on HDPE (and/or other barrier materials) is the appropriate way to proceed. However, Metro should study other possible in-situ solutions during Preliminary Engineering. These are likely to include supplementing HDPE with other products such as non-curing methane-resistant materials and repair methods. Subsequent studies during preliminary and final design should be undertaken to evaluate the best alternative for leak prevention, detection and repair. Design and construction methods will need to be developed to assure system safety and reliability in the "challenging" environmental conditions. In addition to the hazardous subsurface gasses, design must also address effects resulting from seismic shaking.

4.5.3 Potential Construction Methods – Cross Passages

Cross passages perform two basic functions: they allow passengers to move from one tunnel to the other any time that it becomes necessary, such as egress in the event of an emergency on a train, and similarly they allow emergency personnel to pass from one tunnel to the other any time that becomes necessary. In addition, they provide space for train operations equipment and sump structures.

Excavation of cross passages is typically a "hand" operation because they are too short for the use of large construction equipment or tunneling shields. Thus, some pre-treatment of the ground is usually necessary to allow safe construction of the cross passages. Such pre-treatment is determined on a case by case situation depending upon the local geology and geometry, and thus there is no single design that suits all situations. Pretreatment may include any of the following, either singly or in combination:

- Permeation grouting (single or multiple stages), jet grouting, or soil mixing with a variety of materials: cement (including micro fine and ultra fine), colloidal silica, and others, depending on soil properties
- Pre-treatment of ground and/or ground water by such techniques as dewatering, local draining, or freezing

Relocating cross passages for improved ground should be evaluated; however, Fire/Life Safety requirements must also be strictly adhered too. Sealing cross passages against tunnel liners will also require special details, to be developed during later design phases. Similar to tunnel segment design, the following features may include: swelling materials to seal joint; adding gaskets and plates at connections; and post-construction grouting to maintain seals at cross passage to tunnel connections.

Cross passage linings have traditionally been “two-pass” systems, where initial ground support may consist of ribs and lagging or shotcrete and lattice girders. Installation of the final cast-in-place lining must take into account protection of the HDPE (or other methane-resistant barrier) during installation and placement of concrete. Waterproofing products continue to improve, and composite materials with felt or other protective backings are now common. Final design details will include the investigation of new products for ease of installation and reduced leakage.

4.6 Preliminary Environmental Analysis

4.6.1 Tunnel Safety

4.6.1.1 Construction

Prior to tunnel construction, designs will have been developed to minimize gas intrusion into the tunnel or station under construction and for the final structure. Potential methods are discussed in Task 4.2, Geotechnical Evaluation and Tunneling Technology Recommendations Report, including using pressure-face tunneling boring machines (specifically slurry face machines in highly gassy ground), and gasketed tunnel liners. Additional precautions involve a strict adherence to tunnel safety standards including use of tunnel ventilation systems during construction, monitoring for gas, and use of specialized mechanical and electrical equipment.

In California, tunnel construction safety is governed by the California Occupational Safety and Health Administration (Cal/OSHA) Tunnel Safety Orders and worker safety training. The Safety Orders are contained in California’s Code of Regulations, Title 8, Tunnel Safety Orders Division 1, Department of Industrial Relations, Chapter 4, Division of Industrial Safety, Subchapter 20, Tunnel Safety Orders. California Electrical Safety Orders also will apply for use of electric equipment. California Tunnel Safety Orders are considered to be among the most comprehensive, structured, and most stringent in the world, and have been cited for use in other states.

The Tunnel Safety Orders regulation “establishes minimum safety standards in places of employment at tunnels, shafts, raises, inclines, underground chambers, and premises appurtenant thereto during excavation, construction, alteration, repairing, renovating or demolishing.” These apply to not only bored tunnels but also to cut and cover operations, such as subway stations, that are both physically connected to ongoing underground construction operations and are covered in such a manner as to create conditions characteristic of underground construction.

This regulation focuses on tunnel safety in all tunnels where methane and H_2S gases are expected to be encountered. For these conditions, the regulations are very specific, and begin with the tunnel classification, as determined by Cal/OSHA. The classifications range from “non-Gassy” where there is little likelihood of encountering gas during the construction of the tunnel, to “Gassy” which is applied when gas in the tunnel is likely to be encountered at a concentration greater than five percent of the Lower Explosive Limit (LEL) of the gas. “Extra hazardous” classifications have been assigned upon discovery of serious danger to the safety of employees. Classifications are assigned by Cal/OSHA based on the geotechnical investigations, experience in the area, existence of oil fields, gas measurements, and other data that may be available.

More specific safety requirements of the Tunnel Safety Orders include:

- The tunnel must have adequate ventilation to dilute gasses to safe levels.
- All equipment used in the tunnel must be approved.
- Smoking is not allowed in the tunnel.
- A fixed system of continual automatic monitoring equipment must be provided.
- Tests for flammable and hazardous gas must be conducted.
- Whenever gas levels in excess of 10 percent of the LEL are encountered, Cal/OSHA is to be notified immediately.
- The main ventilation systems must exhaust flammable gas or vapors from the tunnel.
- A refuge chamber or alternate escape route must be maintained.
- Health and safety training and procedures will be implemented.

These training and safety procedures need to be reflected in the cost projections and schedules for this segment of the tunnel. A process that involves training, auditing, and monitoring will ensure that procedures are followed and that health and safety can be maintained during construction in these areas.

Environmental controls will also be required to dilute and control elevated methane and/or H_2S to protect workers underground, workers above ground, and the areas surrounding tunnel excavation and ventilation sites. Issues associated with gaseous release during construction will be minimized since a slurry-face tunnel boring machine (SF TBM) will be used in the affected reaches. The tunneling with a SF TBM in the methane zone minimizes exposure of workers to elevated gas concentrations underground, since the excavated soil is removed in a fully enclosed slurry pipeline to the surface. Vapor controls and monitoring, and possibly other safety design features, will be employed at the surface if gaseous contaminants are released as the slurry is desanded and circulated for reuse by the SF TBM.

4.6.2 Operations

Operational safety and procedures will be developed that depend on the alternative selected, subsurface conditions encountered, and advances in equipment and technology in the years prior to construction. Basic operations are likely to be similar to those of existing Metro systems that are designed for locations where gas is known to be present, which include:

- Design to exclude gasses, through use of barriers such as HDPE barriers and reinforced concrete wall systems
- Inspection and testing during construction to ensure quality for the concrete placements and barrier construction and to minimize leakage into the structure

- Installation of ventilation systems capable of purging gas to safe levels. These systems are also used for exhaust smoke in case of fire.
- Installation of gas detection and monitoring equipment to warn if gas levels approach pre-set alarm levels, and to automatically activate additional ventilation.
- Provisions for minimal air-flow during non-revenue service to prevent gas accumulation.
- Inspection and maintenance programs for all of the above.

4.6.3 Seismic Considerations

The Westside study area could be subjected to ground shaking as a result of earthquakes on any of the documented or undocumented nearby active or potentially active faults. The interactive probabilistic seismic hazard map of California on the California Geological Survey website (accessed March 2008) is based on the 2002 National Earthquake Hazards Reduction Program data, including adjustments for alluvium site conditions. For the study area, this map indicates that the peak ground accelerations (which are measures of the how hard the earth is shaking during an earthquake in a given area) with a 10 percent probability of being equaled or exceeded in 50 years range from about 0.47 g to 0.53 g, with “g” representing the ground acceleration due to gravity. Along the Wilshire Alternatives, between Western Avenue and La Cienega Boulevard, no known active faults are mapped. Metro seismic criteria currently uses two ground shaking levels for design and is described below.

Station walls may have to be designed for greater than usual lateral earth pressures to account for liquefaction potential. This condition is only indicated to occur at La Cienega Station location in the Study Area, but would be evaluated in more detail in the preliminary geotechnical investigations.

Metro began developing special seismic design criteria for its underground structures in the early 1980s[1] and has continued to update ground motion parameters for design of new structures as the California Division of Mines and Geology (CDMG) publishes new data, or based on findings of site-specific geotechnical investigations. Metro’s design ground motion criteria have been based on two levels of earthquake:

- **Operating Design Earthquake (ODE)**: Defines, for any point on the subway system, the level of ground shaking at which critical items maintain function so that the overall system will continue to operate normally. In other words, after an ODE, the system shall be inspected and go back into service immediately. This earthquake has a return period of about 100 years and has a reasonable expectation of occurring during the life of the facility.
- **Maximum Design Earthquake (MDE)**: The level of ground shaking at which critical items continue to function as required to maintain public safety, preventing catastrophic failure and loss of life. This earthquake level has a small probability of occurrence – a return period of several thousand years – or less than five percent probability of occurring.

[1] Converse Consultants, for SCRTD, Seismological Investigation and Design Criteria.

During design, the ground motions expected to occur for the ODE and MDE are evaluated based on CDMG publications and site specific conditions. Stations and tunnels are designed to structural standards for reinforced concrete structures under the various loading scenarios that include ground and groundwater loads, earthquake loads, and the dead loads of the structure and adjacent structures as applicable. All design for seismic conditions would be further developed during subsequent project phases.

LACMTA's ODE criterion was tested during the Northridge earthquake, when ground motion reached ODE levels. The system was quickly inspected and was back in service within hours of the earthquake. No damage to Metro structures was reported.

4.6.4 Hazardous Waste/Disposal of Soils during Construction

The issue of disposal of soils and other waste from construction in the Methane Risk Zone that also contains tar and other potential contaminants is preliminarily addressed through records-database searches and other available information. The focus is on identifying any special handling and/or safety issues associated with such waste and identifying existing disposal facilities with capacity to receive the waste. In addition, a database search of federal, state, and local listed hazardous waste sites was conducted for both the Wilshire Boulevard and West Hollywood alignments.

The Wilshire alignment alternatives will likely encounter sites impacted by numerous listed underground storage tanks, dry cleaners, and other small- and large-quantity generators of hazardous waste. The West Hollywood alignment alternatives will also encounter similar sites, with more small-quantity generators, due to the large number of small businesses along the alignment.

The Wilshire alignment alternatives, particularly the segment between Western Avenue and La Cienega Boulevard, will encounter soils impacted with petroleum hydrocarbons, VOCs, and H_2S from natural sources.

4.6.5 Potentially Impacted Soils

Potentially impacted soils may be encountered during construction of the selected alignment near existing and historic underground storage tank sites (UST) including gasoline stations, dry cleaners, and industrial facilities. Soils may be impacted with petroleum hydrocarbons, VOCs, and H_2S. Many soils along the Wilshire Boulevard Corridor are impacted with tar and crude oil due to presence of oil producing formations, evidenced by existing and abandoned oil fields.

A review of the Environmental Data Resources (EDR) database for listed properties was conducted as an initial screening for identifying properties of potential environmental concern to the proposed alignments. Table 4-2 shows that there are several large-quantity generators (LQG), as defined by the Resource Conservation and Recovery Act (RCRA), along both the West Hollywood and Wilshire alignments. More small-quantity generators (SQG) are found along the West Hollywood alignment, since there are more small businesses along this alignment. Underground storage tanks (UST), including those on databases for leaking (LUST), hazardous substances (HISTUST), and the State Water Resources Control Board (SWEEPSUST), are distributed equally along the corridors, as are drycleaners.

Table 4-2. Sites Containing Hazardous Materials: West Hollywood and Wilshire Alignments

Hazardous Site Type	West Hollywood	Wilshire
Resource Conservation and Recovery Act - Large-Quantity Generators (RCRA-LQG)	4	3
Resource Conservation and Recovery Act - Small-Quantity Generators (RCRA-SQG)	122	85
Leaking Underground Storage Tank (LUST)	33	33
Underground Storage Tank (UST)	41	41
Hazardous Substance Storage Container Database (HISTUST)	46	46
State Water Resources Control Board, Underground Storage Tank Listing (SWEEPSUST)	79	79
Drycleaners	37	37
California Environmental Protection Agency Hazardous Waste Information System for Annual Manifest (HAZNET)	521	521

Source: EDR, 2008

4.6.6 Soil Management/Soil Disposal

During construction, soils containing contaminants that are encountered along the corridor will be sampled, characterized, excavated from the site, loaded onto trucks, and transported offsite to a treatment and disposal facility. Waste disposal profiles will be generated from soil sampling and site characterization data. Based on the site characterization data, soils excavated at the site will be classified as non-hazardous or hazardous depending on the concentration of the impacted soil.

Soils characterized as non-hazardous would be transported to one of the following local non-hazardous Class III landfills or recycling facility:

- Waste Management, Palmdale Landfill, Palmdale, California
- Waste Management, McKittrick Waste Disposal Facility, McKittrick, California
- Thermal Remediation Solutions, Azusa, California,
- Other disposal facilities licensed or permitted by the State of California to accept this type of material

In the event that soils excavated from the site are determined to be a RCRA or non-RCRA hazardous waste, the hazardous soils would be transported to the following Class I landfill facility for disposal:

- Waste Management, Class I Kettleman Hills Facility, Kettleman Hills, California
- Other sites as determined / become available during subsequent phases.

These sites are licensed to accept these materials and, therefore, the feasibility of constructing the tunnel through the petroleum-contaminated sites along the Wilshire alignment would not be compromised.

Tunneling using SF TBM may generate wet soils (muck), particularly if clay soils are predominant. Therefore, either a disposal facility that accepts wet soils would need to be identified, or these wet soils would need to be dried prior to disposal. For the soils that are mostly sandy, drying can be accomplished on site through the soil separation system. For soils with higher water content (clays), in the event that the volume of such clay soils is substantial, additional temporary offsite storage location may be needed, unless a disposal facility that accepts wet soils can be identified. Additional separation processes may also be an option.

4.6.7 Storm Water Quality

Tunnel construction activities may affect storm water quality where excavated materials come in contact with storm water or are discharged into storm water drainage facilities. The processed water used in the slurry is also a potential source of concern if not properly contained and disposed but allowed to discharge from the construction site and into nearby drainage facilities.

The construction will require a National Pollutant Discharge Elimination System (NPDES) permit coverage under the NPDES General Permit, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity (General Permit). This Construction General Permit issued by the State Water Resources Control Board will require a Construction Storm Water Pollution Prevention Plan (SWPPP) to be developed and implemented. In the Construction SWPPP, a detailed site plan and descriptions of all best management practices (BMPs) selected for implementation to reduce or eliminate the potential for pollutants (sediment, tar sand, etc.) generated from all construction activities from contacting storm water runoff will be provided.

It is likely that the following minimum BMPs will need to be implemented. After more detailed definition of project activities, additional specific BMPs may be identified.

- Slurry treatment plant operation areas (mining sites) will require BMPs to divert potential storm water runoff from entering the construction area. Containment around the site may include use of temporary measures such as fiber rolls to surround the construction areas to prevent any potential spills of slurry discharge or spoils recovered during the separation process. Downstream drainage inlets should also be temporarily covered to prevent potential discharge from entering the storm drainage system.
- Construction entrance/exits should be properly set up so as to reduce or eliminate the tracking of sediment and debris offsite. Appropriate measures may include measures such as grading to prevent runoff from leaving the site, and establishing rumble racks at the exit to remove sediment from construction vehicles.
- Overhead covering for the soil separation plant and debris loading areas should be considered to prevent contact with rainfall.
- Onsite rinsing or cleaning of any equipment should be performed in contained areas and rinse water collected for appropriate disposal.
- TBM motors require cooling. Typically, cooling water is recycled and cooled using cooling towers near the access shafts. Thus, cooling water will have little impact on water use or discharge into the sanitary or storm drain system.

- Depending on the amount of wastewater generated from the slurry discharge, a tank may be required onsite to collect the waters for periodic offsite disposal. Since the slurry production is a closed loop system in which the water separated off from the discharge slurry is continually recycled, minimal and infrequent water discharges are anticipated. These discharges can be accommodated in a tank on site to collect the waters and dispose offsite periodically.
- If any soil is planned for storage on-site, it must be contained and covered to prevent contact with storm water and potential offsite discharge.

Implementation of the above BMPs (and any additional BMPs identified in project-specific construction SWPPPs) minimizes the potential for storm water impacts due to tunneling activities in the gas zones and supports project feasibility.

4.6.8 Noise

The types and levels of noise associated with tunneling and construction activities in the Methane Risk Zones would be generally the same as those associated with tunneling in a non-gas zone. In any zone, construction activities that generate noise include demolition, station erection, workers travel, hauling of soils and debris for disposal, deliveries of materials, and other. Since a SF TBM will likely be used for tunneling in the Methane Risk Zones, the slurry plant would be an additional component of the construction activities and associated noise. Noise from the treatment plant may be mitigated partially by enclosing the plant within a building. The noise associated with this single component would not result in significantly higher noise levels from overall construction activities.

Noise at street level from underground train operations would be transmitted through vent shafts at station locations. The vent shafts would transmit both train passby and ventilation fan noise to street level. An underground station located in the Methane Risk Zones would have the same train passby noise at street level as any other station. The level of passby noise would be dependent on the depth of the station and any acoustical treatment in the shaft. In most cases the train passby would be barely audible at street level.

Tunnel ventilation in a non-gas zone would require routine testing of the fans, usually on a monthly basis. These tests are conducted during non-revenue hours which are typically between 1 a.m. and 5 a.m. The fans would require noise control in the form of sound attenuators and/or the addition of sound absorptive treatment to the vent shafts to meet the requirements of both the Metro Systemwide Noise and Vibration and the Los Angeles Noise Ordinances. If the ventilation fans are operated under emergency conditions then they would be exempt from any noise limits. The level of noise control required for fan testing would be dependent on the fan speed and system load.

In the Methane Risk Zones, ventilation fans would be operated during non-revenue hours (as they are now for existing systems). Noise control would be required for both daytime and nighttime operations. The fan noise control measures for continuous operation versus periodic nighttime testing would be similar. Therefore, there may be no difference in either the expected noise levels at street level for a vent shaft located in a gas zone or the cost of noise control required. However, federal and state noise attenuation requirements increase as average exposure time increases.

4.6.9 Air Quality

4.6.9.1 Odors

Hydrogen sulfide gas has a distinctive "rotten egg" odor. The typical odor recognition threshold for hydrogen sulfide is 0.0005 ppm by volume. Hydrogen sulfide concentrations in the tunnel may be controlled utilizing a combination of techniques. These techniques include dilution through additional ventilation, and potentially, pre- and post-treatment using compounds such as hydrogen peroxide, as well as use of Personal Protective Equipment (PPE). Above-ground hydrogen sulfide concentrations may be controlled by methods such as maintaining high pH levels in the slurry or using a zinc "scavenger" to precipitate dissolved sulfide out of the slurry prior to its reaching the treatment plant. These methods will be further evaluated during design phases of the project.

Given the potential for "pockets" of high concentration hydrogen sulfide in the segment between the Wilshire/Western and Wilshire/La Cienega stations, it is likely that the odor of hydrogen sulfide would occasionally be detectable by workers (above the typical odor recognition threshold of 0.005 ppm) even after implementation of control techniques. However, because of the tar pits in this area, odors are commonly perceived at the ground surface. It is therefore unlikely that the additional hydrogen sulfide would be noticeable.

4.6.9.2 Construction Emissions

Table 4-3 shows estimated emissions that would be associated with tunnel construction. Short-term emissions would occur from operation of the slurry treatment plant, tunneling, soil transport, station construction, and worker travel. Volatile organic compound (VOC) carbon monoxide (CO), sulfur oxide (SO_x), particulate matter 2.5 microns or less in diameter ($PM_{2.5}$), and particulate matter 10 microns or less in diameter (PM_{10}) emissions would not exceed the South Coast Air Quality Management District (SCAQMD) regional construction significance thresholds. Nitrogen oxide (NO_x) emissions would exceed the SCAQMD the regional construction significance threshold of 100 pounds per day during the soil transport phase, and would result in a significant impact. The exceedance would primarily result from emissions generated by haul trucks. In addition, $PM_{2.5}$ and PM_{10} emissions would likely exceed the SCAQMD localized significance thresholds during soil transport and station construction phases. Although emissions would be significant, the emissions are short-term and would not affect long-term operational air emissions.

Table 4-3. Construction Emissions Associated with Tunneling Activity

Emission Source	Pounds Per Day					
	VOC	NO_x	CO	SO_x	$PM_{2.5}$	PM_{10}
Slurry Treatment Plant	--	--	--	--	<1	<1
Tunneling	2	12	16	<1	<1	<1
Soil Transport	11	109	45	<1	5	5
Station Construction						
Demolition	5	44	19	<1	2	4
Excavation	8	69	33	<1	4	7
Station Construction	9	75	36	<1	4	4
Worker Travel	<1	<1	1	<1	<1	<1

Source: Terry A Hayes Associates LLC, 2008

Slurry Treatment Plant. Particulate matter emissions for the slurry treatment plant were calculated based on US Environmental Protection Agency (USEPA) AP-42 calculation formulas for materials handling. The slurry treatment plant would include a bag house to collect dust during the mixing process. Bag houses typically filter at least 99 percent of fine particulate matter. As a result, the slurry treatment plant generates minimal dust emissions.

Tunneling. The SF TBMs use electric power, which would be connected to the electric grid, would not generate air emissions. Diesel locomotives would be used in the tunnel to transport workers, pre-cast concrete tunnel liner segments, and other materials to the SF TBM. For the emissions estimates, it was assumed that tunneling activity would utilize two 185-horsepower diesel locomotives typically operating six hours per day. Locomotive emission rates were obtained from the USEPA *Emission Factors for Locomotives (December 1997*) document. Construction activity was assumed to occur in 2012.

Removal and Transport of Soils for Disposal. The majority of construction emissions would occur as a result of removal and transport of soils for disposal from tunneling activity. The tunneling could simultaneously utilize two tunneling machines, each with the capability of tunneling a 21-foot outside diameter for an assumed distance of 50 feet per day. Each tunneling machine would generate approximately 641 cubic yards of excavated soil per day resulting in a total of 1,282 cubic yards per day. Excavated soil would be separated from the slurry and stockpiled on the surface for two to three days. The soil would be hauled to a landfill or other disposal area using trucks that would average approximately 9.5 cubic yards per load. Thus, approximately 135 haul truck trips would be generated to remove the excavated material each day. Haul truck emission rates were obtained from the California Air Resources Board's (CARB) EMFAC2007 Motor Vehicle Emissions Inventory Model. Note that if more than two SF TBMs are used, the amounts of emissions would increase accordingly.

Station Construction. Station construction activities would include demolition (as required at station entrances or other locations), excavation, and station construction. It was assumed that demolition would require two front-end loaders and 25 debris haul truck trips per day. Based on the CARB URBEMIS2007 Transportation and Land Use Program Model, demolition debris haul trucks were assumed to travel 30 miles per round trip.

Sources of air emissions during station construction would include heavy-duty equipment and heavy-duty truck trips associated with materials delivery. It was assumed that station construction equipment would include simultaneous operation of two front-end loaders, two forklifts, one crane, two pumps, and two miscellaneous pieces of equipment. It was further assumed that daily materials delivery activity would include ten trucks traveling 20 miles per round trip. Heavy-duty equipment emission rates were obtained from OFFROAD2007 and truck emission rates were obtained from EMFAC2007. It was assumed that heavy-duty equipment would operate for 12 hours per day.

Worker Travel. Emissions from construction workers' travel to and from the site would be a function of vehicle emission rates and commute distances. Vehicle emission rates were obtained from EMFAC2007. It was assumed that worker vehicles would be split equally between light-duty automobiles and light-duty trucks. The worker commute distance of 13.3 miles per one-way trip was obtained from URBEMIS2007.

4.6.10 Sensitive Land Uses

With the conclusions of these preliminary assessments indicating that potential impacts can be mitigated, including the consideration of the advanced gas monitoring and ventilation systems that can manage the presence of gas in a safe manner, tunneling along Wilshire Boulevard would be expected not to have an adverse effect on sensitive land uses located near the stations and the alignment.

This section presents a description of land uses within the vicinity of the existing Metro Purple Line station at Wilshire/Western, and at four preliminary station locations between Western Avenue and La Cienega Boulevard on Wilshire Boulevard, at Crenshaw Avenue, La Brea Avenue, Fairfax Avenue, and La Cienega Boulevard. These five locations are located within the Methane Risk Zone.

A land use survey was conducted within an approximate three-block radius for each of the station locations to identify the types of land uses that exist in the vicinity of each station, as shown in Figure 4-19 through Figure 4-23. Generally, Wilshire Boulevard is lined with commercial uses, with residential uses (either single-family or multi-family or both) predominantly occupying the parcels behind the commercial frontage, north and south of Wilshire Boulevard.

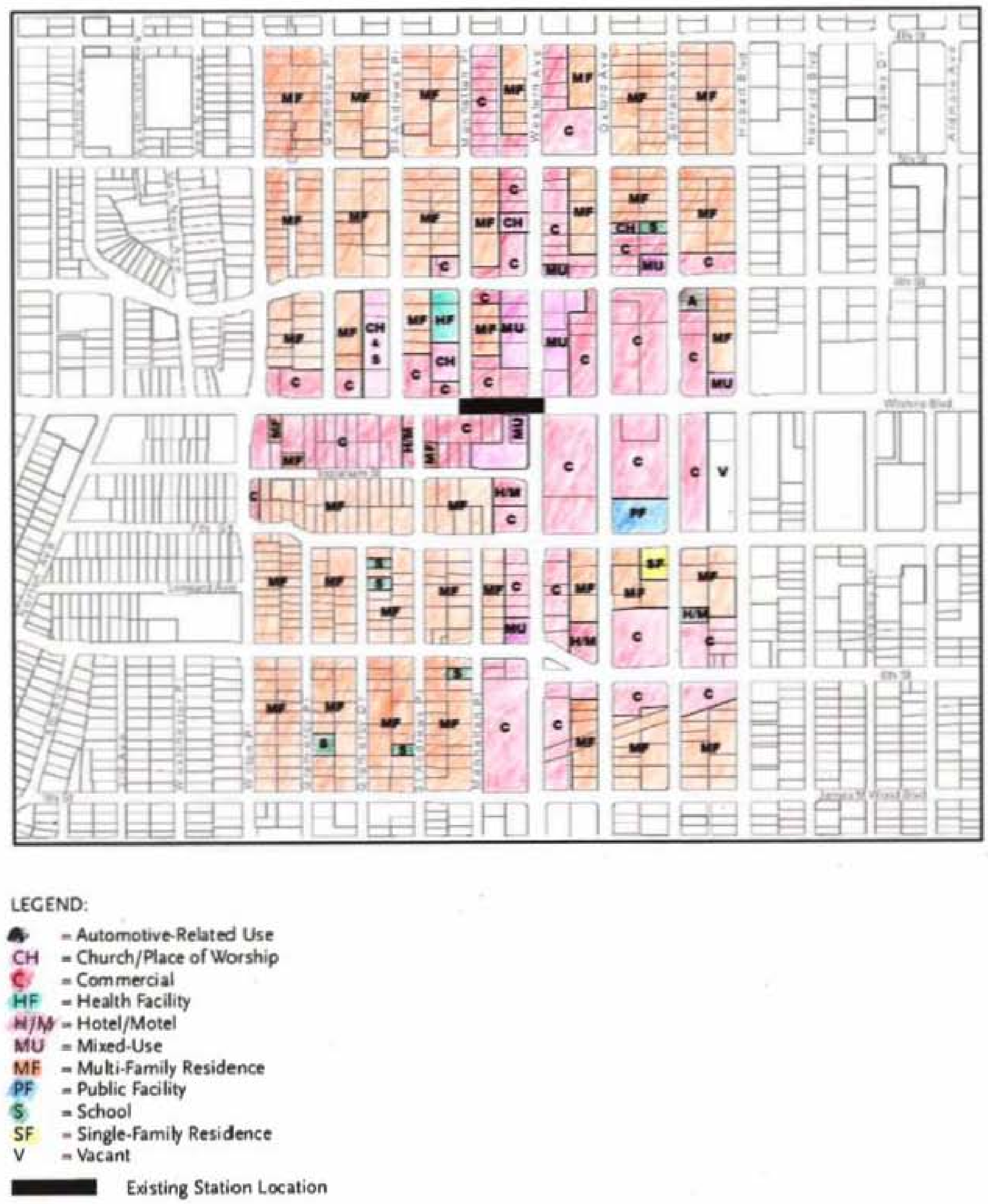
Some land uses are considered more sensitive to changes in air quality (including gaseous, fugitive dust, and particulate emissions) than others, depending on the population groups and the activities involved. People most likely affected by air pollution include children under 14 years old, the elderly over 65 years old, athletes, and people with cardiovascular and chronic respiratory diseases. According to the South Coast Air Quality Management District (SCAQMD), sensitive land uses include residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. For the purpose of this analysis, these uses have been identified as sensitive to potential exposure to emissions and odors associated with gas releases and the slurry treatment plant near the existing and preliminary station locations.

The following provides a more detailed description of the sensitive uses near each of the five proposed station locations.

Wilshire/Western Station

This station is part of the Wilshire Center, which is a dense regional commercial center that includes high-rise office buildings, large hotels, regional shopping complexes, churches, entertainment centers (e.g., the Wiltern Theater), and high-rise and low-rise apartment buildings. Sensitive land uses in the immediate vicinity of the station (within one block) consist primarily of multi-family residences and high-density mixed-use development, as shown in Figure 4-19.

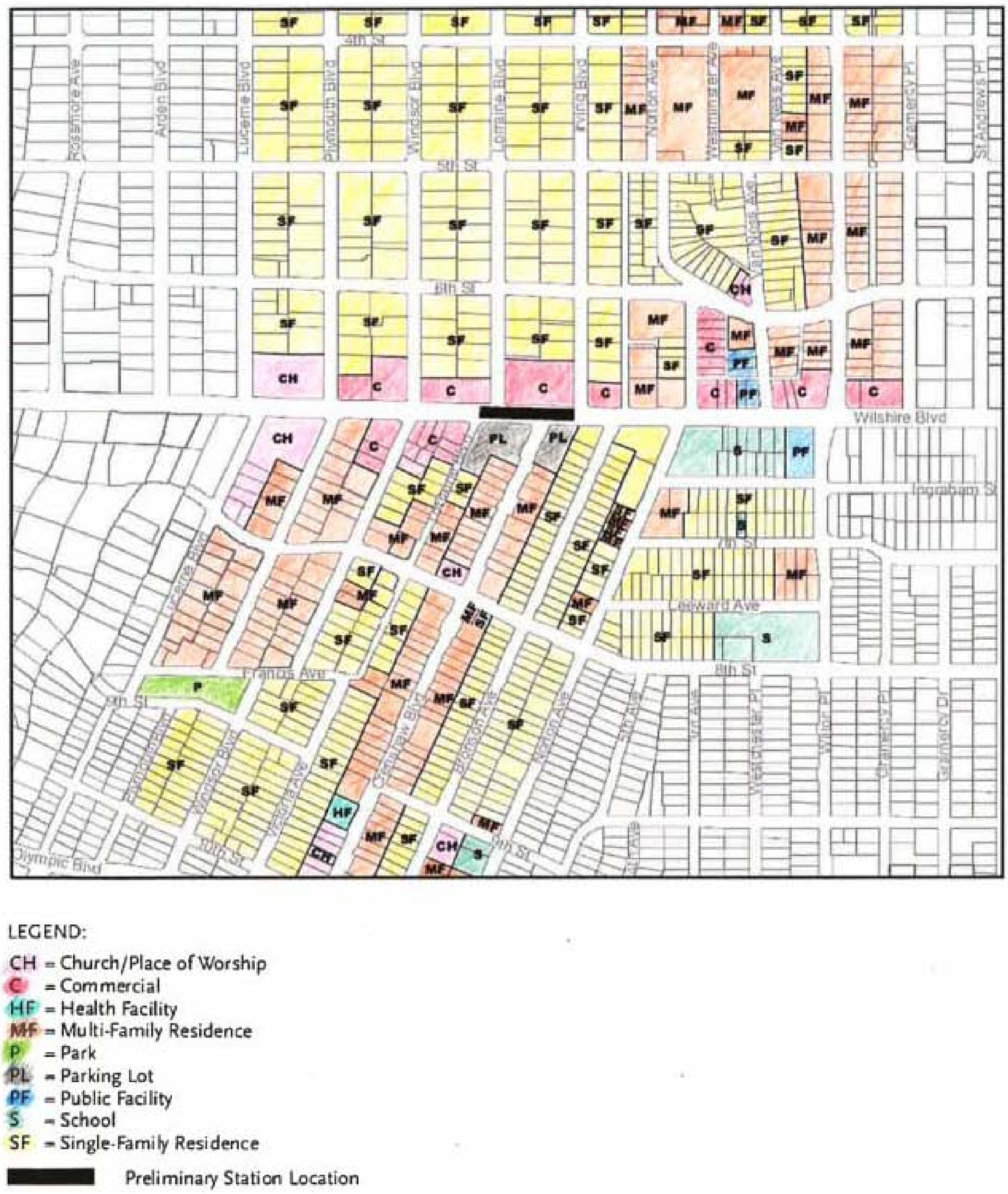
Figure 4-19. Sensitive Land Uses – Wilshire/Western Station



Wilshire/Crenshaw Station

This station would be located in the mid-Wilshire area near Windsor Square. Sensitive land uses in the vicinity consist primarily of low-density single-family residences north of Wilshire Boulevard, and a mix of single-family and multi-family residences south of Wilshire Boulevard, as shown in Figure 4-20.

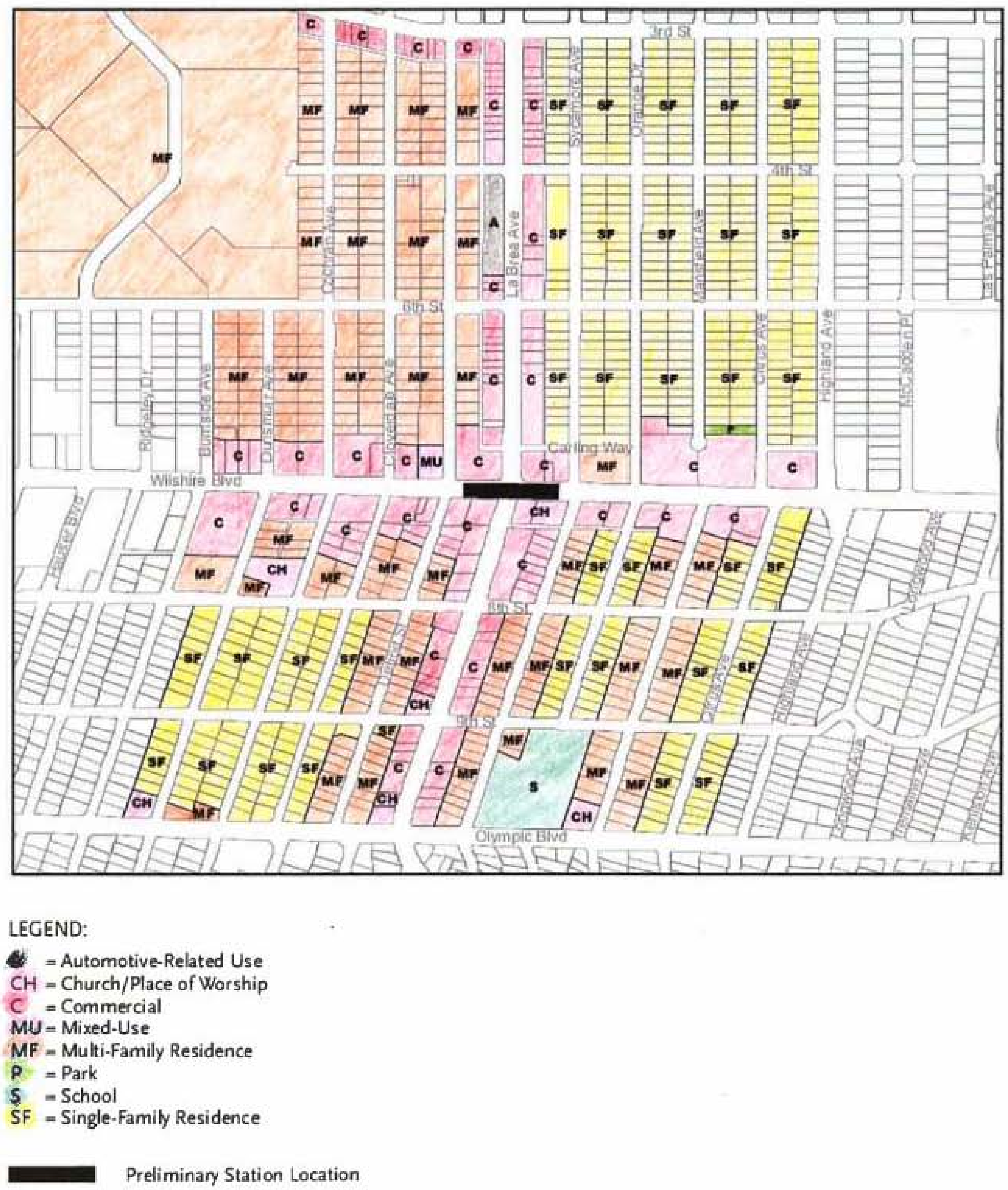
Figure 4-20. Sensitive Land Uses – Proposed Wilshire/Crenshaw Station



Wilshire/La Brea Station

This station would be located in the eastern end of the Miracle Mile District, which is one of the city of Los Angeles' more densely populated areas. Sensitive land uses in the vicinity consist primarily of residential uses, including single-family and multi-family uses north and south of Wilshire Boulevard. A mixed-use development is located at Wilshire Boulevard and Detroit Street, as shown in Figure 4-21.

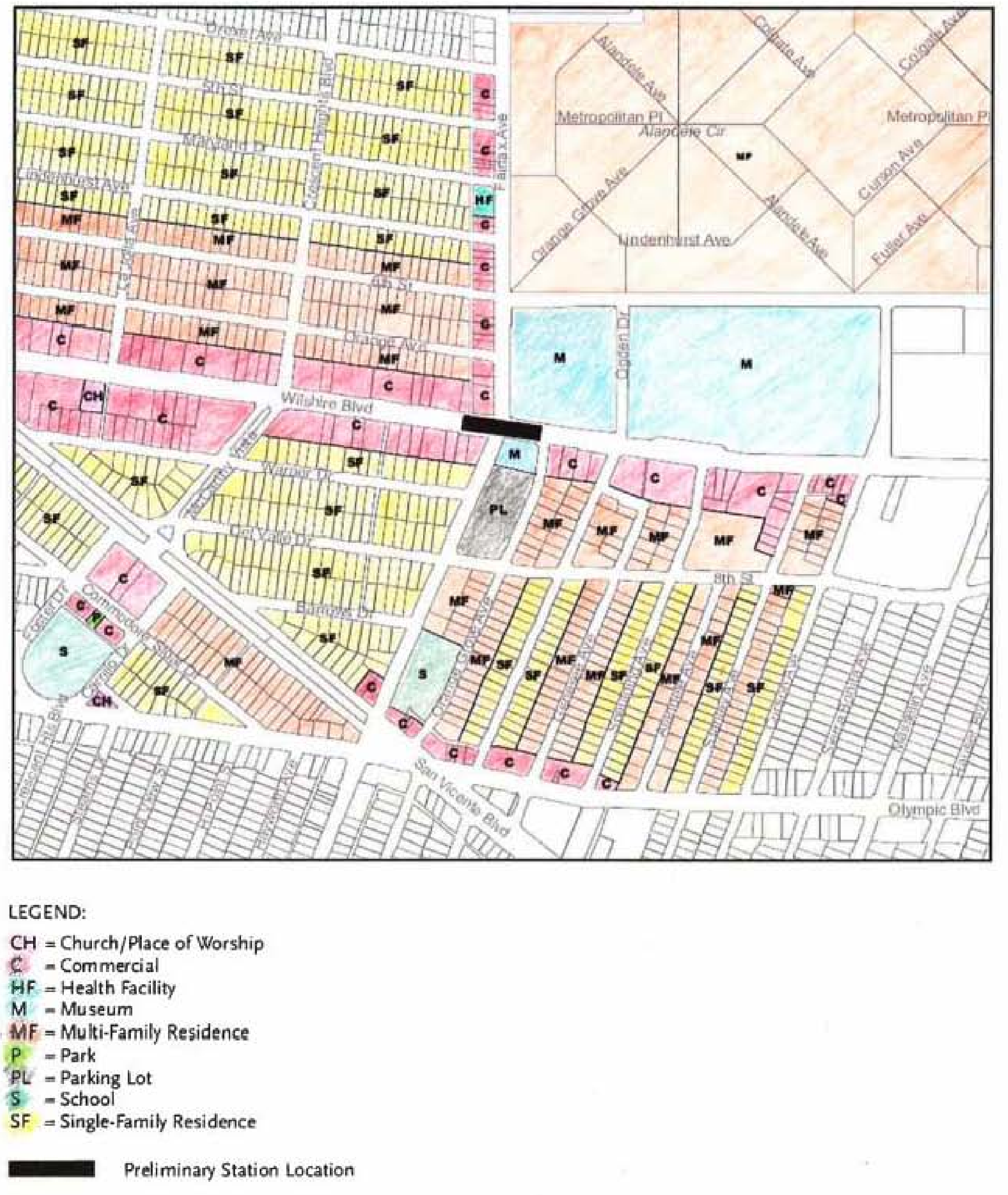
Figure 4-21. Sensitive Land Uses – Proposed Wilshire/La Brea Station



Wilshire/Fairfax Station

This station would be located in the western end of the Miracle Mile District, immediately adjacent to the Los Angeles County Museum of Art, Hancock Park, and the La Brea Tar Pits. Sensitive land uses in the vicinity consist of multi-family residences north and south of Wilshire Boulevard, and single-family residences south of Wilshire Boulevard. Park La Brea, a large residential complex with over 4,000 apartments, is located one block north of the station, as shown in Figure 4-22.

Figure 4-22. Sensitive Land Uses – Proposed Wilshire/Fairfax Station



Wilshire/La Cienega Station

This station would be located adjacent to the eastern boundary of Beverly Hills. Sensitive land uses in the vicinity of the station include single-family residences north and south of Wilshire Boulevard and west of La Cienega Boulevard, and multi-family residences north and south of Wilshire Boulevard and east of La Cienega Boulevard, as shown in Figure 4-23.

Figure 4-23. Sensitive Land Uses – Proposed Wilshire/La Cienega Station

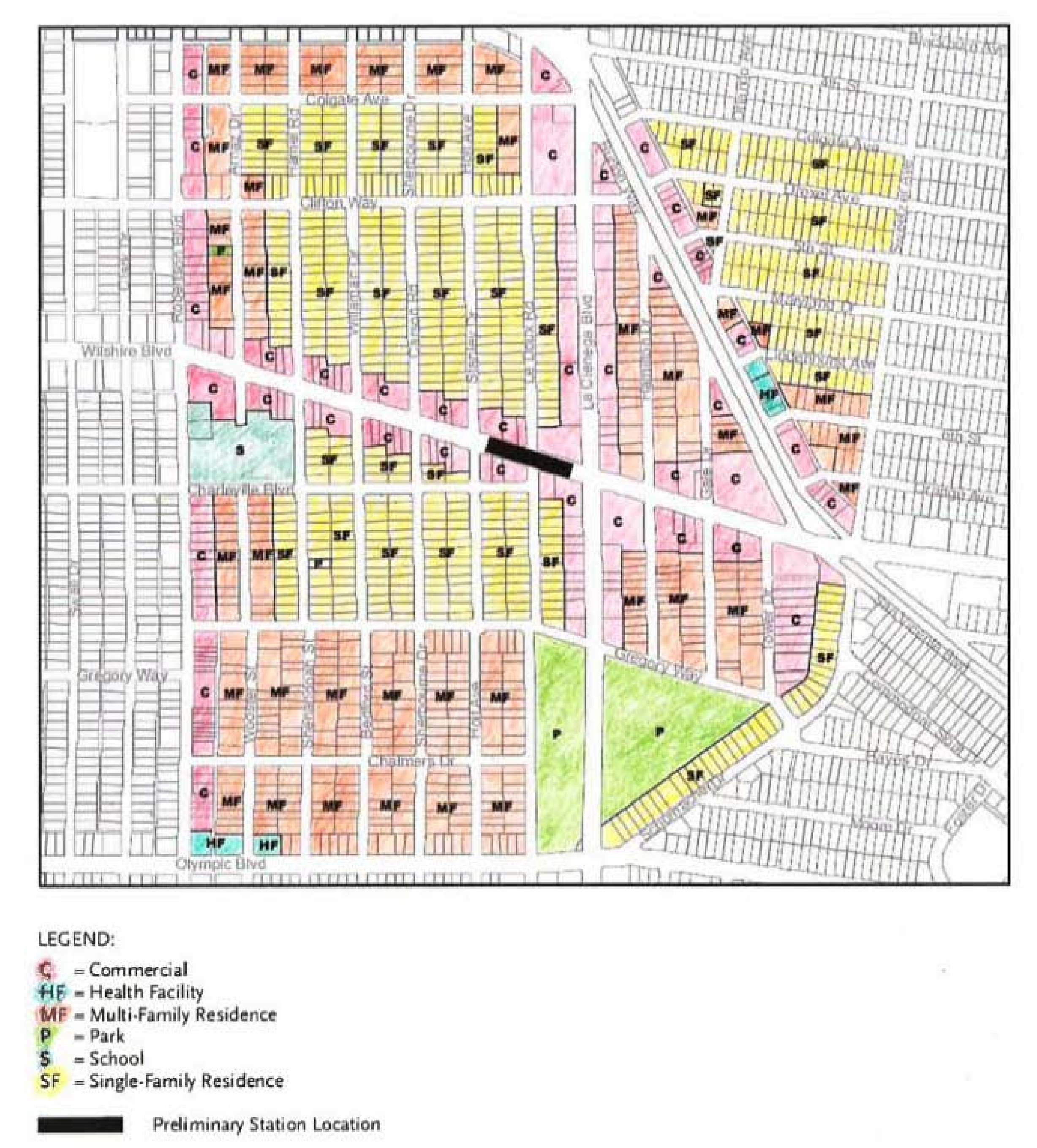


Table 4-4 presents a matrix indicating the type of sensitive land uses located within approximately three-block radius of each of the five station locations.

Table 4-4. Sensitive Uses near Proposed Station Locations

Station Location	Single-Family	Multi-Family	Mixed-Use	Health Facility	School	Park
Wilshire/Western *	Y	Y	Y	Y	Y	
Wilshire/Crenshaw	Y	Y			Y	Y
Wilshire/La Brea	Y	Y	Y		Y	Y
Wilshire/Fairfax	Y	Y	Y	Y	Y	Y
Wilshire/La Cienega	Y	Y		Y	Y	Y

* Existing Metro Purple Line Station

4.6.11 Cultural Resources

This section identifies existing paleontological, archaeological, and historic resources that could potentially be impacted by tunneling and construction activities in the areas along the Wilshire/Western to Wilshire/La Cienega segment located in the Methane Risk Zone.

The analysis is based on available existing information such as past studies in and around the study area, as well as national, State, and City historic resource registers and inventories available online.

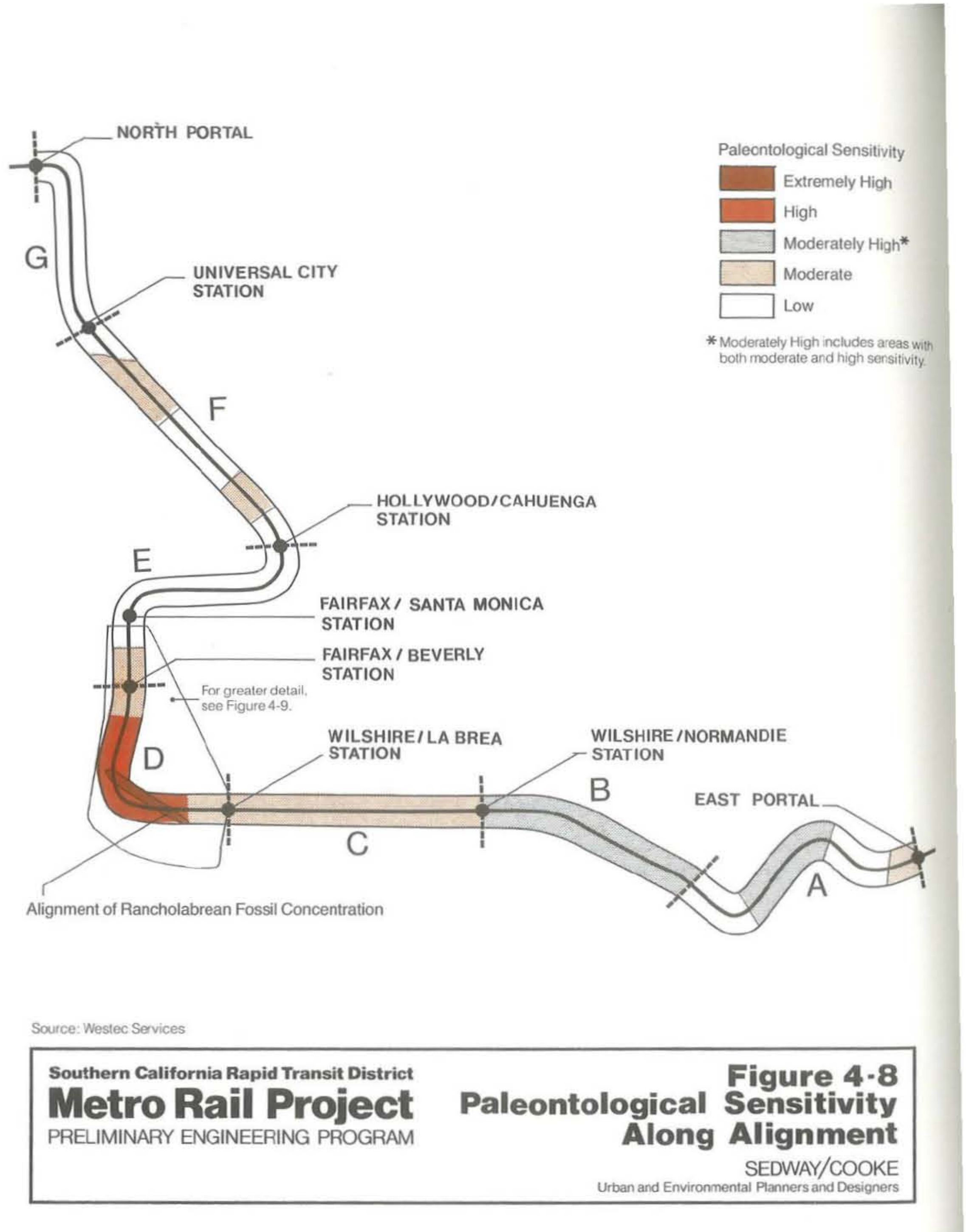
4.6.12 Paleontological Resources

The potential for encountering paleontological resources (sites of fossils or ancient life forms) is related in part to the depth of the tunnel in relation to the type of subsurface soil/rock strata (stratigraphy) present at that depth. While a surface or aerial alignment would disturb those strata closest to the surface, tunnel alignments would affect deeper strata. The largest paleontological impact and recovery opportunity would be at station sites, especially those near the La Brea Tar Pits.

The Los Angeles County Metropolitan Transportation Authority, *Los Angeles Rail Rapid Transit Project Final EIS*, December 1983, is of particular relevance since it considers the alignment that parallels the alternatives presently considered. Also, it is the only previous study found that both covers the study area and considers the impacts of a tunnel configuration on paleontological resources. The study identified one very important recorded paleontological resource along the alignment, the La Brea Tar Pits area (see Figure 4-24). The study also noted, however, that “the route would pass through and disturb a variety of marine and nonmarine sedimentary deposits ranging in age from Medial Miocene to Holocene.” All stratigraphic units except the Holocene alluvium (young Quaternary alluvium) and the intrusive basalts and andesites in the Topanga Formation are considered to have at least moderate potential for paleontological resources.”

Three of the segments analyzed in the study parallel or cross some of the alternatives being presently considered. The analysis of each of those segments is provided below. Note that this is a preliminary study and further evaluation will need to be performed during future phases of the project.

Figure 4-24. Paleontological Sensitivity, 1983



1983 Alignment: Wilshire/Normandie Station to Wilshire/La Brea Station. According to the 1983 study, "this segment would encounter old Quaternary alluvium from the surface down to depths of 50 to 60 feet. Deeper tunneling would also reach the San Pedro, Puente, and Fernando Formations. There are no known paleontological resources along this segment of the Metro Rail route, but there is a moderate potential for finding nonmarine vertebrates, as well as mixed nonmarine and marine invertebrates, in the old alluvium (Palos Verdes Sand)."

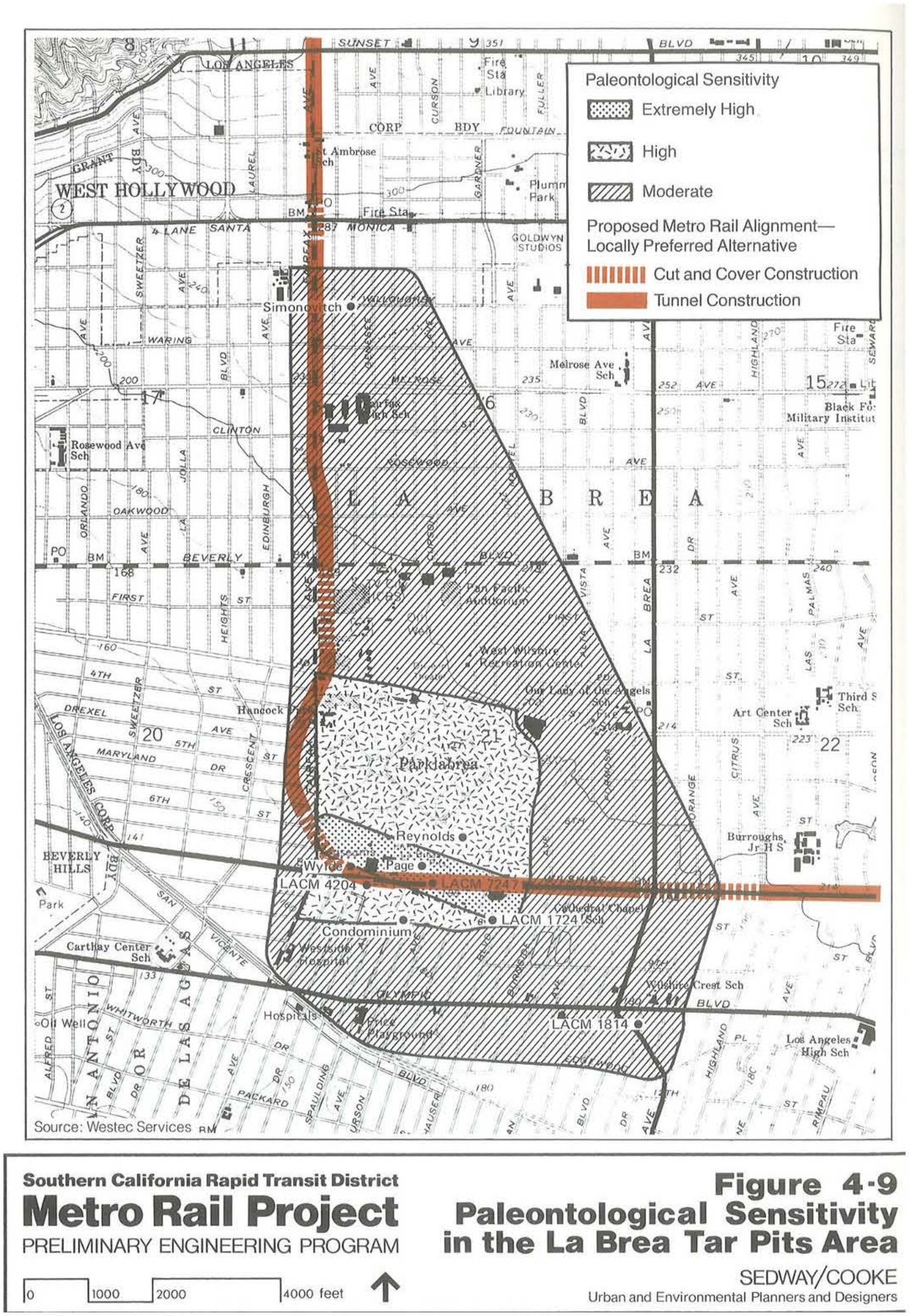
1983 Alignment: Wilshire/La Brea Station to Fairfax/Beverly Station. According to the 1983 study, "this segment includes old Quaternary alluvium (Palos Verdes Sand) from the surface down to depths between 30 and about 60 feet. The San Pedro Formation would be reached in some areas below about 30 feet. This segment includes the La Brea Tar Pits area, which has produced abundant marine and nonmarine invertebrates, plants, and world-famous ice-age land animals. Because of the abundance and extraordinary preservation, the Rancho La Brea area has provided the most prolific record of Late Pleistocene vertebrate animal life discovered anywhere in the world. Rancholabrean fossils are abundant in the upper 11 to 26 feet (under recent fill) of the area studied." Figure 4-25 "shows the area with the heaviest concentration of known fossil deposits and, therefore, an area with extremely high paleontological sensitivity."

The sensitivity area starts at approximately Hauser Boulevard and ends at Fairfax Avenue. It is rectangular in shape with a width of 700 feet, running from east-south-east to west-north-west. The area, described as high in sensitivity, is roughly bounded by Third Street on the north, Eighth Street on the south, Fairfax Avenue on the west, and Burnside Avenue on the east. Deposits in this area tend to occur in large cone-shaped pockets, oriented vertically and tapering downward. More than one million fossil bones, as well as specimens of insects, shelled invertebrates, and plant remains, have been recovered from about 35 excavations of various size (from approximately 100 that have been dug) since excavations began in 1906 in the La Brea Tar Pits area. Additional excavations outside the park area also have produced fossils, indicating that fossils are not concentrated in the La Brea Tar Pits area alone. The fossiliferous deposits at Rancho La Brea appear to be confined to the uppermost 55 feet below the present surface and particularly within the uppermost 25 to 30 feet."

1983 Alignment: Fairfax/Beverly Station to Hollywood/Cahuenga Station. According to the 1983 study, "along this segment, young Quaternary alluvium would be encountered from about 30 to 85 feet beneath the surface, with increasing alluvium thickness from south to north along Fairfax Avenue. Below this level, old Quaternary alluvium extends for 100 feet or more. No fossils are expected in young alluvium, but there may be some terrestrial vertebrates in old alluvium. This segment is of low sensitivity because excavations are not likely to reach below the base of young alluvium. The young alluvium at the Fairfax/Santa Monica, La Brea/Sunset, and Hollywood/Cahuenga Stations is between 75 and 100 feet thick."

Conclusions. The relevant data from previous studies, discussed above, indicate that since the La Brea Tar Pits area lies within the known Methane Risk Zone, there is an increased probability of encountering pockets of presently unknown resources while tunneling through tar soils in this general area. For other portions of the entire Methane Risk Zone area, there is no relevant data indicating that the likelihood of encountering paleontological resources would be significantly greater in tunneling in those portions of the gas zone when compared with tunneling in areas outside the gas zone. At this time, the exact extents of the Methane Risk Zone are not precisely known (although an estimate has been mapped by the City of Los Angeles within the City area), and it is unknown whether there are paleontological resources along much of the candidate alignments.

Figure 4-25. La Brea Tar Pits Area



Overall, with an increased likelihood of encountering scientifically significant paleontological resources in tar soils, it is likely that mitigation measures would need to be implemented to recover and preserve such potentially encountered resources. The mitigation measures would most likely be similar to those identified in the 1983 Final EIR as follows:

"If important or potentially important fossils are discovered during the excavation phase, excavation would be temporarily halted or diverted until the findings can be appraised and, if necessary, the fossils removed by a qualified paleontologist." Also, since "the proper repository for significant specimens is one of the most important elements in the mitigation of adverse impacts on paleontological resources, invertebrate fossils and fossil plant material would be donated to an appropriate educational/research institution as dictated by the significance of the materials."

In addition, a "Recovery and Salvage Plan", similar to the plan prepared by the Page Museum for the 1983 study, will also be appropriate for the project. Such a plan would include the identification of the most feasible mitigation measures for minimizing impacts, as well as time and cost estimates for excavation monitoring by paleontologists, recovery, management, storage, treatment, archiving/repository, and other associated activities. Depending on the magnitude of potential discoveries and availability of qualified paleontologists, these activities may also include freezing and preserving all fossil-bearing soils excavated from a Wilshire/Fairfax station site for a period of up to 20 years until qualified paleontologists can examine the materials. As appropriate, the provisions for protection of these resources may also be included in the memorandum of agreement with an appropriate educational/research institution as identified and determined by Metro.

It is possible that the duration and cost of paleontological recovery efforts would be greater in the Methane Risk Zones since additional safety measures and procedures for the monitoring and recovery personnel may be necessary in these areas.

4.6.13 Archaeological Resources

Several previous studies, as noted, in and around the study area were reviewed to assess the potential for encountering archaeological resources during tunneling.

The 1983 and 2001 studies are of particular relevance since they consider alignments within the study area. The 2001 study identifies three known archaeological sites along its alignment, one in the Mid-City area and two in West Los Angeles. Of the several archaeological sites identified in the 1983 study, one site, the Hancock Park/La Brea Tar Pits, is located in the study area. The 1983 study provides the following description of this site.

"A site (labeled LAn-159) in Hancock Park is represented by artifacts recovered from the La Brea Tar Pits. Artifacts recovered indicate the La Brea Tar Pits may have been visited for hunting purposes and for acquiring pitch and tar rather than for settlement. The first non-Indian visitors to the La Brea Tar Pits were scouts of the Portola expedition on August 3, 1769. No mention of Native American settlement at that location was made in diaries kept by these explorers. The La Brea Tar Pits, containing Pleistocene to Early Recent fossil deposits, are considered one of the most significant paleontological sites in the world and have been designated California State Historic Landmark No. 170."

The study further summarizes the potential for discovering archaeological resources during construction as follows:

"The Metro Rail Project route follows existing right-of-way through extensively urbanized areas. Very little undisturbed original ground surface is visible, and little is known of archaeological sites in the Regional Core. Few archaeological sites have been recorded with the California State Clearinghouse in the vicinity of the proposed Metro Rail Project. The potential for affecting subsurface archaeological resources in the remaining areas is unknown because no archaeological sites or artifacts have been recorded in the vicinity."

Any disturbance of the ground surface has the potential to impact archaeological resources, whether this results from permanent change such as excavation for a station or tunnel entrance, or only temporary use such as parking or storage. Significant impacts to archaeological resources would require implementation of mitigation measures similar to the following measures identified in the 2001 study:

"Monitoring and Scientific Recovery of Archaeological Resources: In the event that archaeological and buried historic sites are encountered, evaluation of the site is often accomplished through test level excavation designed to determine the horizontal and vertical extent of the site, and to characterize the content of the site. If the site is determined to be potentially eligible for listing on the National Register, and project plans cannot be altered to avoid impacting the site, then an adverse effect would result pursuant to 36 CFR 800.5(d)(2). To resolve an adverse effect it would be necessary to implement a Memorandum of Agreement (MOA) per 36 CFR 800.6(c) to resolve the adverse effect. Under CEQA, impact to archaeological sites can be mitigated to a less than significant level through the preparation and implementation of a data recovery plan."

Based on the data from previous studies summarized above, there is no indication as to whether there is a higher probability of encountering archaeological resources in the Methane Risk Zone when compared to other areas. At this time, it is unknown whether there are archaeological resources along much of the candidate alignments, and the exact extents of the Methane Risk Zone are also not precisely known. However, since the La Brea Tar Pits site is located within the Methane Risk Zone, it is possible that other archaeological resources may be uncovered nearby because a larger area may have been visited by ancient people "for hunting purposes and for acquiring pitch and tar". If an archeological resource is encountered, it is not expected that the duration or cost of recovering archaeological resources encountered in the Methane Risk Zone would be greater than that of recovering resources in other areas. Archaeological recovery efforts typically involve shallow excavation efforts which are not significantly affected by elevated gas levels.

4.6.14 Historic Properties

An initial database of historic properties in or near the study area was assembled and is on file. The database is based on the following listings:

- National Historic Landmarks
- National Register of Historic Places
- California Register of Historical Resources
- California Registered Historical Landmarks
- Local landmarks and districts for cities within the study area: Los Angeles, West Hollywood, Beverly Hills, and Santa Monica.

In addition to the structures and districts listed in the database, many of the street fixtures (such as streetlamps) along Wilshire Boulevard may have been installed prior to 1950 and may therefore be considered potentially historic (Mid-City Westside Transit Corridor Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR), April 6, 2001).

As the study progresses and additional and more precise information becomes available, the database will be both updated and refined to correspond to specific properties located within the Area of Potential Effects (APE) that will be identified in the later stages of the project development. The APE typically includes all parcels located above off-street tunnel configurations, and all structures within the first tier of structures adjacent to the project alignment, stations, subway, or open cut construction areas, or areas proposed for acquisition.

The preliminary database includes more than 900 listings within the study area, including 188 in the National Register. Of the 188 properties or sites listed in the National Register, nine are located on Wilshire Boulevard, two on Santa Monica Boulevard, six on Hollywood Boulevard, one on Beverly Boulevard, and six on Sunset Boulevard. There is also one property located on Rodeo Drive north of Wilshire Boulevard and one on Westwood Boulevard about a block north of Wilshire Boulevard.

Thus, there are numerous existing historic resources adjacent to the proposed alternative alignments. By itself, there is no discernable difference with respect to historic resources from tunneling in the Methane Risk Zone versus tunneling in other zones. The ancillary ventilation and other facilities used in the elevated gas zones are not substantially different from such ancillary facilities used for tunnels outside the gas zones, and are unlikely to result in a greater potential to affect historic properties.

4.7 Cost Methodology Differential

This section summarizes the findings of the Final Initial Tunnel and Station Cost Methodology Report (27c), which evaluated differential costs for tunneling in areas having elevated methane levels. Elevated areas are defined for this study as those areas having a potential for tunnel construction to encounter methane levels that are significantly higher than other areas to be tunneled under this project and areas previously tunneled for the Metro Red Line and Gold Line Eastside Extension. The differential cost consists of additional parts and labor required to address the higher expected levels of methane exposure. Note that these costs do not constitute a bottom up cost analysis.

The elevated methane area is expected to be found between the existing Wilshire/Western Station and La Cienega Boulevard, including tunneling and station excavation through asphalt impregnated (tar) areas. The elevated zone is generally considered to be the area surrounding the La Brea Tar Pits, within about a one-mile radius of the Wilshire/Fairfax intersection, and portions of the area defined previously by the City of Los Angeles as a high Potential Risk.

Table 4-5 below summarizes the additional costs to construct tunnels and stations where gas concentrations are well above the concentrations found in other areas where Metro has previously constructed. The costs in the table account for twin (two) tunnels. For the overall estimate, these costs may be added to the unit costs developed for the AA study cost estimates. Where ranges are shown for the tunnel costs, some interpretation by geotechnical engineers must first be made as to the percent of high-level gassy ground to be covered, and then more definitive costs can be applied as appropriate.

Table 4-5. Summary of Estimated Cost Differentials – Methane Zone

Item	Differential Cost
I – TUNNELS (SCC 10)	$ / LF (twin tunnels)
1. Slurry TBM	$ 360
2. Worksite Required for Slurry Processing	$ 70
3. Tunnel Lining Additional Seal: a. Grout Between Double Gaskets (as required) b. HDPE – Invert (as required)* c. HDPE – Arch (as required)*	 $ 18 $ 100 $ 300
4. Additional Liner (Second Pass) (as required)* 5. Additional Contaminated Soil Disposal 6. Silica Fume Concrete	$ 450 $ 40 $ 100
Total - Tunnels	*$ 870 - 1,738*
II - CROSS PASSAGES (SSC 10)	Each
1. Additional Ventilation, monitoring and Soil Grouting	$ 30,000
Total – Cross Passages	*$ 30,000*
III –STATIONS (SSC 20)	Per Station
1. Ventilation and Gas Monitoring 2. Reduced Exc. Production 3. Slurry Wall system 4. Contaminated Soil Disposal 5. Cost of Double Wall Concrete (range $1.7 to $2.1 million, say $2M)	$ 90,000 $ 1,300,000 $ 1,500,000 $ 4,000,000 $ 2,000,000
Total – Stations	*$ 8,890,000*

Range dependent on approach to tunnel lining enhancements for gas control.
General Note: Tunnel unit costs are based on total phase (27,840 lf) of tunnel and are therefore tempered to the lower side of unit cost for the affected portion of the tunnel within the phase.

5.0 URBAN DESIGN CONCEPT

5.1 Purpose and Goals

As part of the Metro Westside Extension Transit Corridor Alternatives Analysis (AA) Study, an urban design process for station location planning was conducted that resulted in the Urban Design Concept Report. This report describes the process by which urban design guidelines were developed for the Westside Extension Corridor, one that involved participation by representatives from the cities affected; extensive data collection of existing information and review of plans and policies from these cities relevant to transportation planning; and research regarding planning precedents in cities and transit agencies around the US.

The goals of the urban design process were to:

- Facilitate discussion about the unique characteristics and identity of the Corridor and how individual station areas can be designed to fit within this framework and vision for this Corridor.
- Provide a space for critical analysis of how the Alternatives Analysis should approach considerations of land use, design, and linkages between stations along the line and their urban neighborhoods.
- Propose design considerations for station areas so they will "fit" appropriately within the surrounding urban context.
- Involve stakeholders and the Westside Extension planning team in a comprehensive station planning process.
- Facilitate discussion about sensitive areas (in which station locations are less easily sited) so alternative station locations can be analyzed.
- Help ensure that planning for the corridor takes into account and builds upon the needs, desires, and policies of each city.
- Assist in establishing guidelines and standards that may be helpful for future Metro transit corridor initiatives.

The Urban Design Concept Report (Task 6.3) describes the framework for working with the community and the local jurisdictions during the station area planning and station design phases of the project.

The guidelines put forth in this report are intended to provide Metro and city planners with a planning and design toolkit with which they can participate in future station area planning, establishes a framework in which the cities can understand how the station areas within their boundaries relate to other station areas along the line, and as a tool to clarify the design intent and the system-wide identity of the Corridor during later design phases.

5.2 Summary of the Urban Design Concept Report

The Urban Design Concept Report presents an overview of research compiled as part of the planning and urban design concept study, including relevant plans from each city. This information provides a comprehensive overview of the Corridor and an understanding of the existing context, existing land use and zoning policies, and the design characteristics of the existing Metro system which the Westside Extension is part of. The report describes station area planning precedents and station area typologies that have been developed previously as a tool to assist in the visualization and design of transportation networks.

The report analyzes possible urban design concepts and vision for the Corridor and proposed station areas. A key component of these urban design concepts is a set of station area typologies, which have been proposed for each of the potential station locations within the Corridor. These station area typologies are intended to help inform planning and design decisions as the project progresses, to begin to establish an urban design vision unique to this Corridor. These typologies, in conjunction the existing Metro Red Line and Purple Line station entrance prototypes, will be the basis of developing a Kit-of-Parts for station area design that will give planners and Metro staff preliminary tools to plan and design individual station areas that are unique to the needs and vision of the communities the system serves.

5.3 Urban Design Principles

Fundamental to the urban design process is the establishment of urban design principles. These principles will inform station planning and design at all levels of planning and design:

1. Promote sustainable design.
   - Develop pedestrian connections and streetscape improvements to create pedestrian-friendly station areas and promote transit-oriented development.
   - Preserve existing cultural/historic resources.
   - Promote the use of recyclable materials and alternative energy systems.
   - Accommodate and encourage non-motorized access to stations.
2. Support local land use goals.
   - Anticipate redevelopment and zoning revisions where planned by local jurisdictions.
   - Concentrate development around established activity centers.
   - Provide for possible future station portals and joint development at station sites, where appropriate.
   - Conform to city growth plan and zoning regulations, including general plans and specific plans.

3. Promote design excellence and enhance the urban environment.
   - Involve urban designers, architects, and artists in the design of the system and its adjacencies.
   - Develop innovative design solutions that are cost effective and promote joint development objectives.
   - Reflect a community's vision in station design and station area planning.
   - Encourage new design concepts, and use innovative materials and technologies.
   - Promote design solutions that create environments accommodating to pedestrians and transit riders.

4. Promote safety, security, and defensible space.
   - Promote a sense of community ownership of the station areas through high-quality design.
   - Use Crime Prevention Through Environmental Design (CPTED) principles in station and station area design.
   - Ensure equal access to all transportation facilities and apply Universal Design principles to the design of these facilities.
   - Eliminate pedestrian barriers and circulation conflicts at stations.

5.4 Vision

The principles described above must be the foundation of the urban design vision for this Corridor and inform the planning and design of the station areas for the Westside Extension. Fundamental to this vision for the station areas are design goals that encourage designs that are:

- Linked to various intermodal transit connections.
- Comfortable, safe and inviting to pedestrians and bicyclists.
- "Imageable" to riders – they are memorable and navigable.
- Supportive of transit-oriented development and joint development opportunities.
- Sensitive to the particular urban context in which they are located.

5.5 Data Collection

As part of the urban design study, the design team gathered data and evaluated:

- Existing plans and policies from each city that relate to transportation, land use, and development.
- Sustainability policies to see how station area planning can take advantage of screening strategies.

- On-the-ground conditions in and around potential station areas in the Corridor and at station areas along existing subway lines in Los Angeles.
- Station planning precedents from cities across the US.
- Urban design considerations and existing Metro design criteria for the existing Metro Red and Purple Lines.

5.5.1 City Plans and Review of Existing System Design

The data collected during this study was part of a comprehensive research and analysis documentation that included:

- Gathering and analyzing all available local transportation and land use plans and policies, including specific plans, community plans, pedestrian-oriented districts, historic preservation overlay zones, and other designated zones and area plans
- Documentation of the existing Red Line and Purple Line typical station prototypes and typical station entrance conditions
- Investigating how these plans and policies address transit and the potential for the Westside Extension within their boundaries
- Conceptualizing how the extension of the existing Red Line and Purple Line can best fit within the existing policy frameworks in each city.

As a result of the data collection process, it was determined that the policy documents from the Cities were generally consistent with the Metro Westside Extension proposed alignment options and transit-oriented development expectations (Figure 5-1). This will be an important factor in establishing a high-ranking for the transit-supportive land category related to the New Starts process.

- Los Angeles, Beverly Hills, and Santa Monica all actively support an alignment along Wilshire Boulevard and all also include smart growth and/or transit-oriented principles and goals in their policy documents.
- West Hollywood recognizes Santa Monica Boulevard as the area in the city with the highest density and concentration of retail and commercial uses. Santa Monica Boulevard is appropriate for transit projects such as the Westside Extension as it is a destination, major transit corridor, and the main spine of West Hollywood.

As part of the urban design process, workshops were held with representatives of the cities and other key stakeholders within the Corridor. The data collected on the potential station sites along the alternative alignments under study was mapped on the following five maps (Figures 5-2 through 5-6) and presented in a workshop held on July 15, 2008 to collect feedback on possible potential station locations.

Figure 5-1. Quotes from Policy Documents and Reports from the Cities

Los Angeles

- Focus future growth of the City around transit stations
- Increase land use intensity around station areas
- Provide a wide variety of housing for a substantial proportion of the project City-wide population
- Reduce reliance on the automobile
- Protect and preserve existing single family neighborhoods

-Objectives from the Land Use and Transportation Plan, 1993

"Wilshire/Western to I-405, serving Century City and Westwood is a priority corridor for high capacity transit service post-2010."

-LA General Plan, Policy 2.13

West Hollywood

"Support 'Smart Growth' initiatives that provide incentives to local governments that promote balanced growth."

-City Council's Primary Strategic Goals, 2008

"Work with other agencies in the region in supporting current funding levels and encouraging increased funding and flexibility in both operating and capital funding for mass transit."

-City Council's Ongoing Strategic Goals, 2008

Beverly Hills

"The Committee unanimously acknowledges the need and benefits of a Westside Subway Extension to serve the City of Beverly Hills."

-Mass Transit Committee, 2007

"The future possibility of a western Metro Red Line subway extension should be acknowledged and actively supported by the City... Transit-Oriented Development (TOD) should be considered along the Wilshire Corridor in the Land Use Element at appropriate locations."

-Circulation Element White Paper, No. 2, 2006

Santa Monica

"The City shall support a future Westside Subway extension or "Subway to the Sea" as a desirable project..."

-LUCE Strategy Framework, 2008

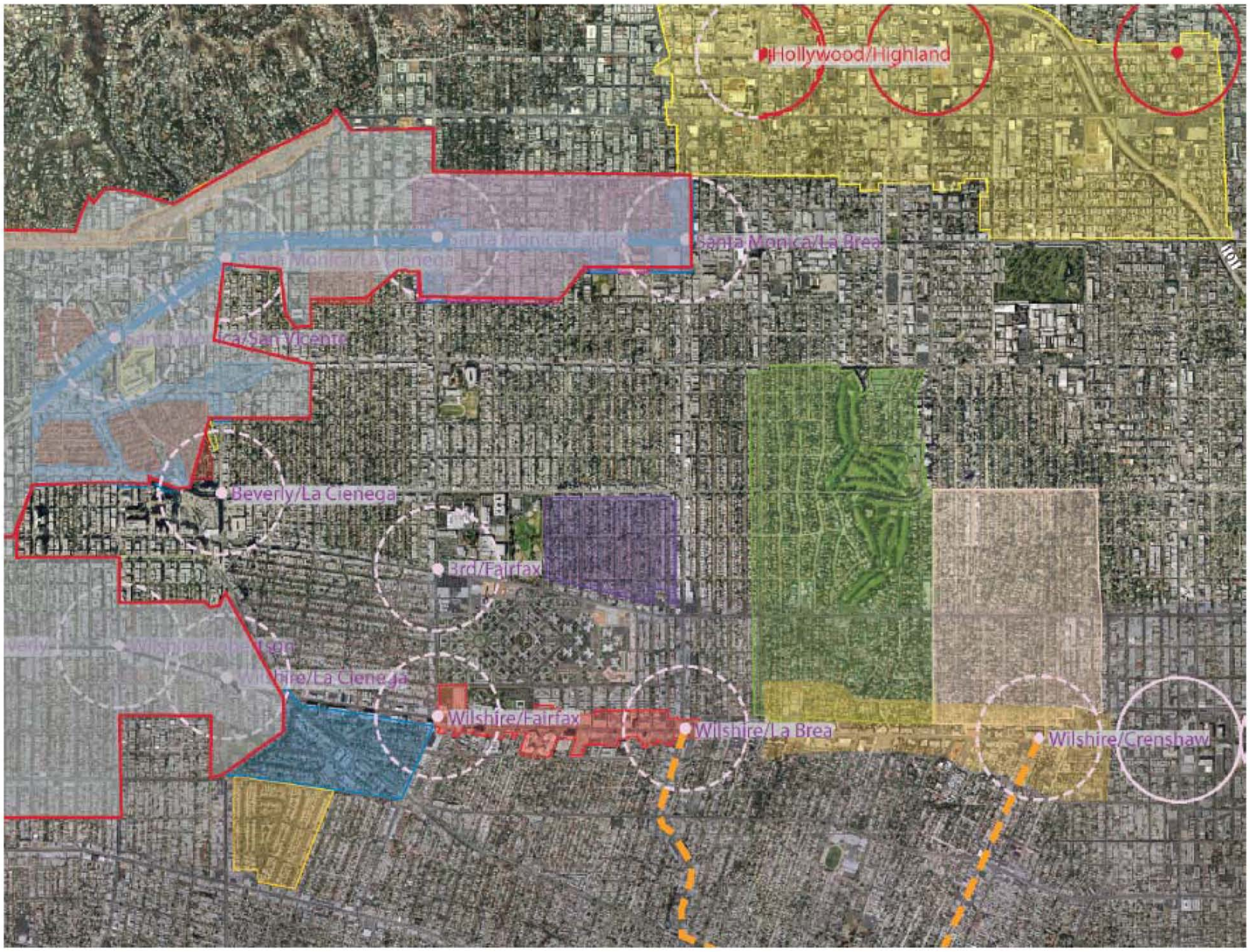
"The City shall support transit-oriented development patterns and uses that are known to generate a high level of transit ridership."

-LUCE Strategy Framework, 2008

5.5.1.1 Los Angeles (East of Beverly Hills)

Several historic preservation overlay zones exist in the Los Angeles (east of Beverly Hills) area near the proposed Extension. These zones regulate maintenance, rehabilitation, and repair of existing structures, and design of new construction. The zones often call for maintenance of mature landscaping, contextually-compatible street furniture, and pedestrian-friendly building orientation. This area includes the Park Mile Specific Plan which also defines zoning restrictions at the proposed Crenshaw station site on Wilshire Boulevard. The proposed Crenshaw-Prairie Line could connect to the Westside Extension in this area.

Figure 5-2. Plan Areas in the Los Angeles (East of Beverly Hills) Area

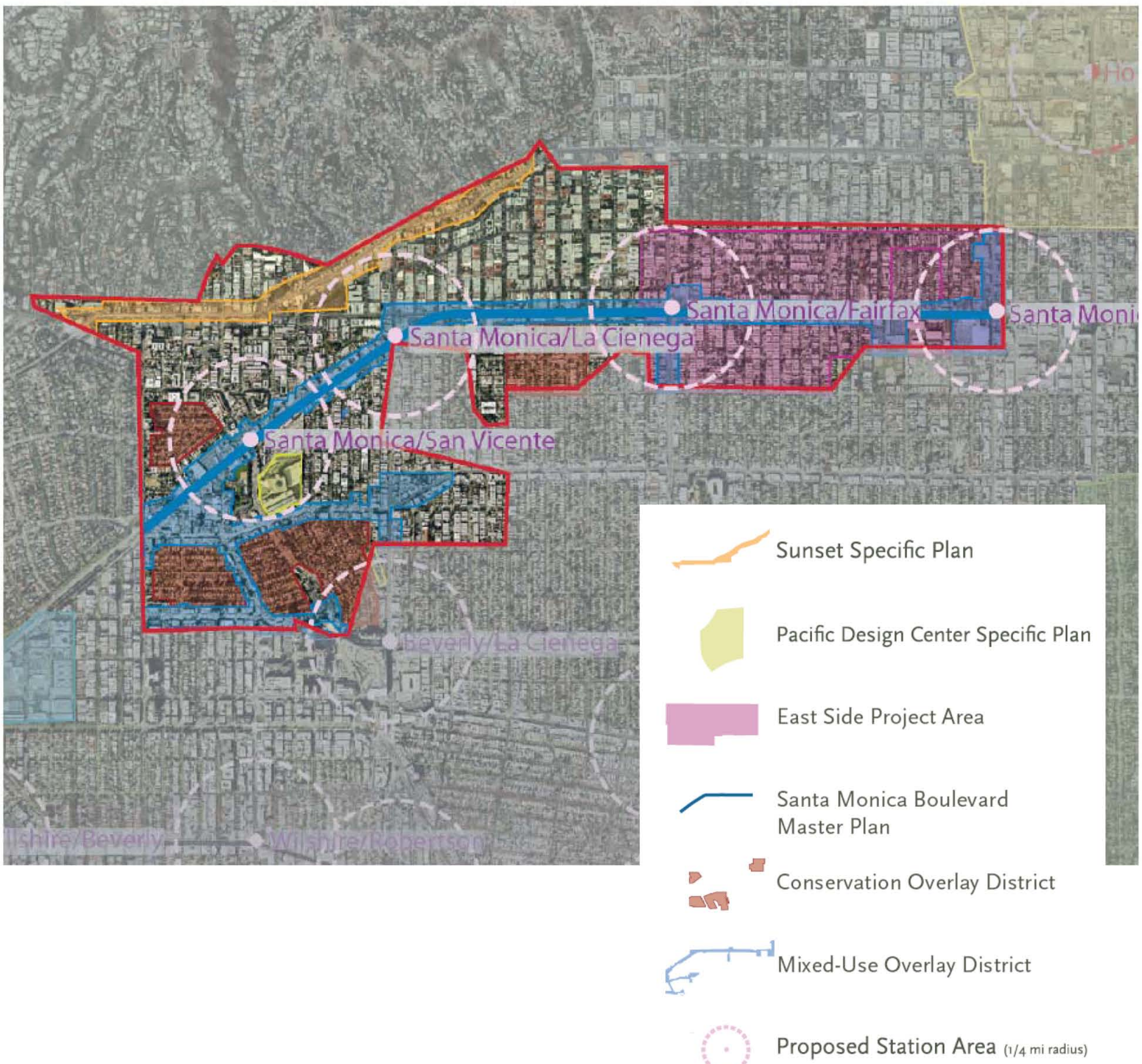


- Proposed Crenshaw-Prairie Line
- South Cathay Historic Preservation Overlay Zone
- Carthay Circle Historic Preservation Overlay Zone
- Miracle Mile
- North Miracle Mile Historic Preservation Overlay Zone
- Hancock Park Historic Preservation Overlay Zone
- Park Mile Specific Plan
- Windsor Square Historic Preservation Overlay Zone
- Hollywood Redevelopment Area
- Proposed Station Area (1/4 mi radius)
- Proposed Station Area (at existing red line)
- Existing Red Line Station Area
- Existing Purple Line Station Area

5.5.1.2 West Hollywood

The City of West Hollywood has specific and master plans which regulate development along particular corridors and at key locations. The Santa Monica Boulevard Master Plan envisions Santa Monica Boulevard as a key corridor with gateways at La Brea, Doheny, Fairfax, and San Vicente. Three of these locations are potential Extension station locations. The Pacific Design Center and Sunset Boulevard, which would be connected to the Extension, are two key draws for the city. West Hollywood is currently updating its general plan. In terms of transit-oriented development policies, planning for the Westside Extension should be taken into account during the update.

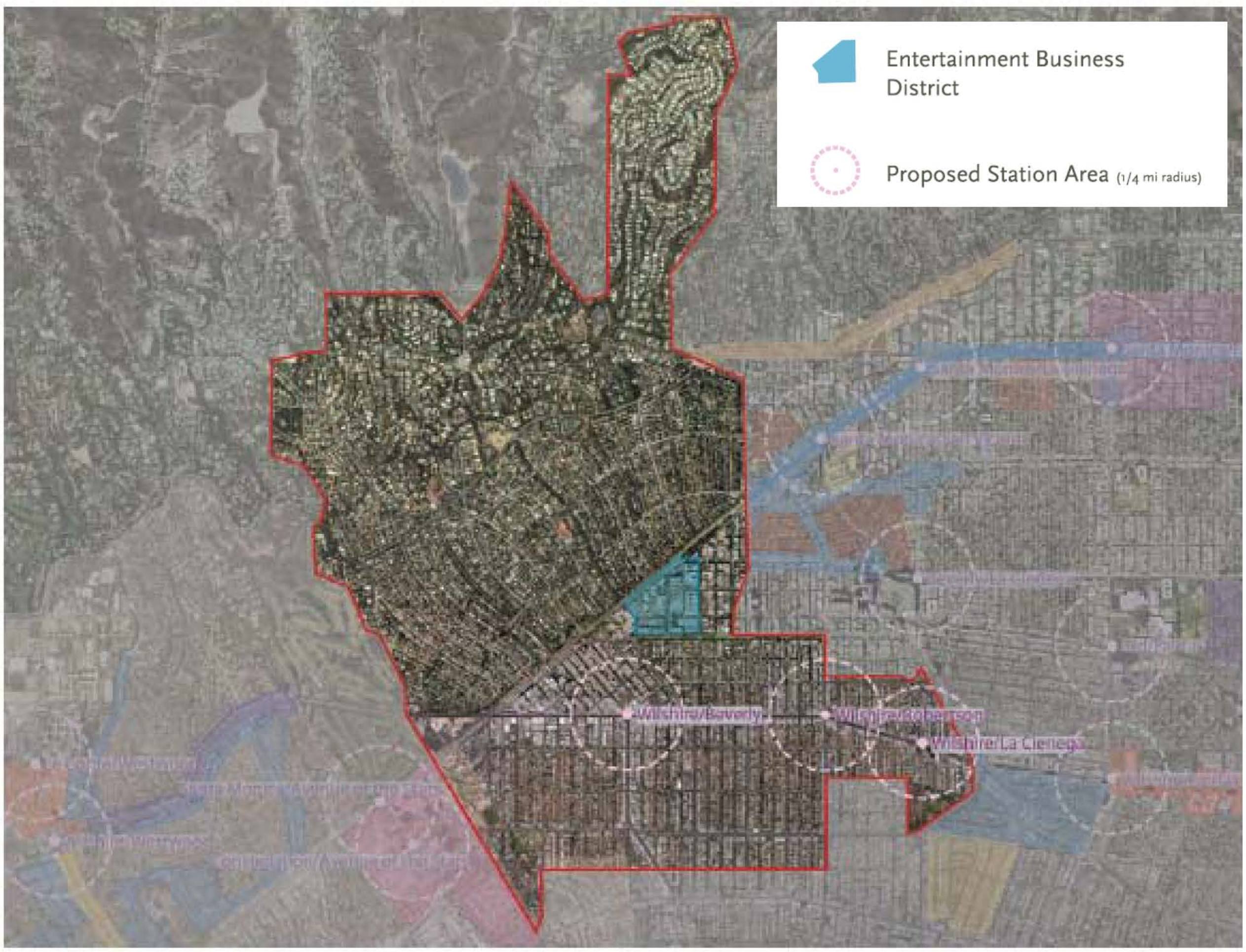
Figure 5-3. Plan Areas in West Hollywood



5.5.1.3 Beverly Hills

Beverly Hills is currently updating its general plan. In updated documents released to date, the City supports the Westside Extension and describes the need to be actively engaged in the planning and design process. The City recognizes that the transportation system must be augmented to accommodate the increases in travel demand expected in the coming years. Beverly Hills also has an active Mass Transit Committee that supports the Westside Extension, and has identified it as one of the top three long-range transportation initiatives to address congestion in the city. The committee recognizes Wilshire Boulevard as the preferred alignment, citing the high employment, population, and transit usage numbers that currently exist there. Beverly/Wilshire and La Cienega/Wilshire are identified as preferred station locations.

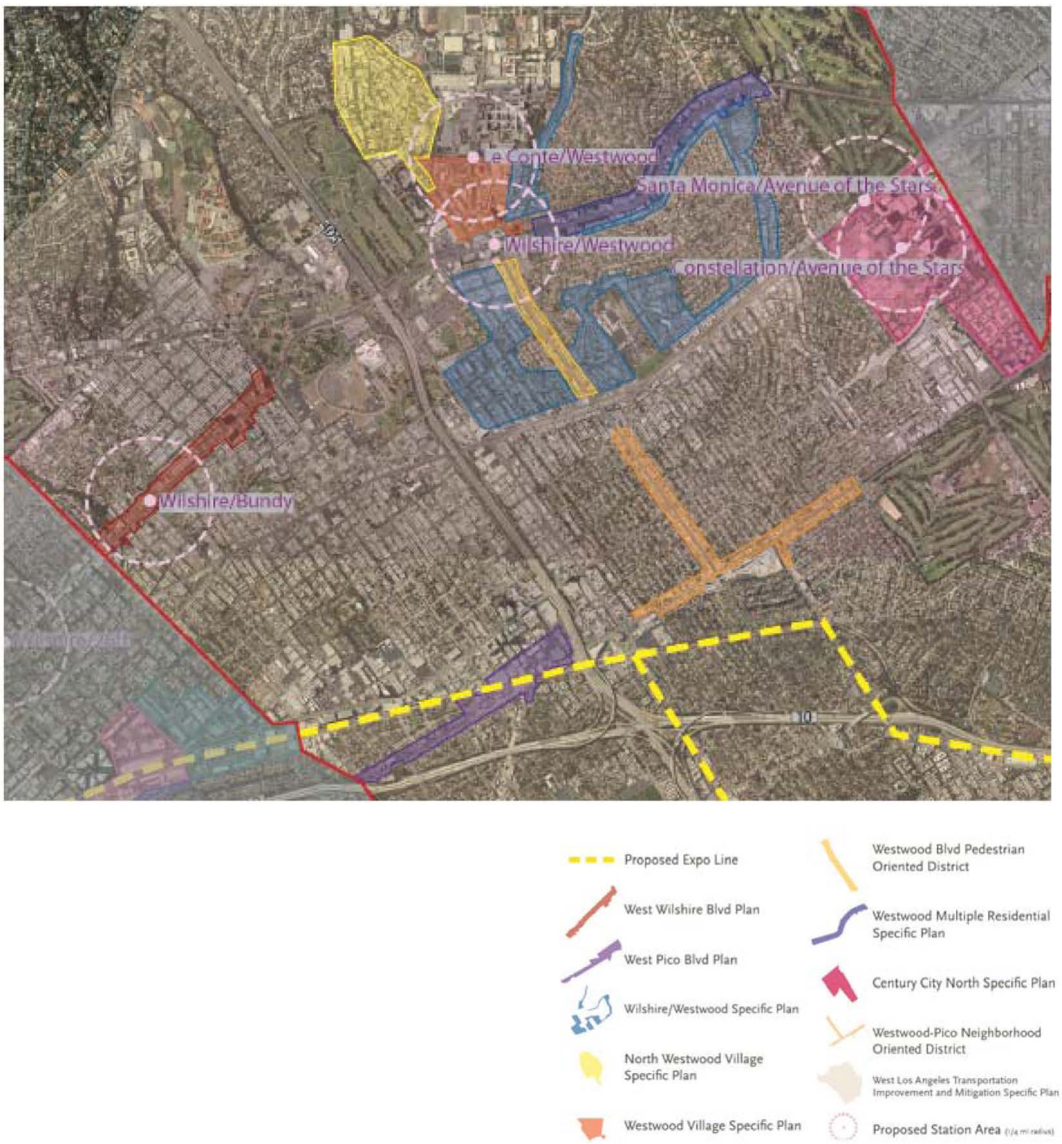
Figure 5-4. Plan Areas in Beverly Hills



5.5.1.4 West Los Angeles

Several specific and district plans exist at or near potential station areas in the West Los Angeles area. Five of these plans are in the Westwood area. The City envisions this as a pedestrian-friendly area with well-designed landscaping and street-oriented buildings. The West Los Angeles Transportation Improvement and Mitigation Specific Plan calls for "provisions of or contributions toward transit station centers..." and "...additional transit lines in major corridors." Other plans acknowledge the retail and commercial orientation of the areas. The West Wilshire Community Design Overlay also encourages pedestrian orientation and underground or screened parking. As illustrated in the plans, there is high density in Westwood and along Wilshire Boulevard.

Figure 5-5. Plan Areas in West Los Angeles Area



5.5.1.5 Santa Monica

Like Beverly Hills and West Hollywood, Santa Monica is also updating its general plan. The new general plan includes transit-supportive land use goals and puts an emphasis on developing mobility alternatives to relieve traffic congestion. The Land Use and Circulation Element Framework explicitly supports the Westside Extension. The Sustainable City Plan calls for an increase in the use of sustainable transportation options and a reduction in vehicle ownership rates and traffic counts.

Figure 5-6. Plan Areas in Santa Monica

5.5.2 Understanding the Existing and Proposed Station Areas

Because the Westside Extension will be an extension to the existing Metro Red Line and Purple Lines, it is important to understand the station design and station entrance design along the existing system. A comprehensive visual documentation that included photo simulations was made of Westside Extension Corridor and well as the existing stations that are part of the Westside Extension.

Figure 5-7. Photo simulation showing possible integration of a historic structure with joint development

Urban form along the Extension varies in scale and aesthetic. For example, while the Santa Monica/Fairfax intersection is more neighborhood oriented, potential station areas at Westwood and Century City are regionally oriented, with taller and denser buildings. There are several visitor attractions immediately along the line, including the Los Angeles County Museum of Art, the historic Farmers Market, Hollywood Boulevard and the Walk of Stars, the Beverly Center and Rodeo Drive shopping areas, and the 3rd Street Promenade. While some potential stop locations are retail nodes, others are commercial centers or institutional destinations.

The design of the existing Metro Red and Purple Lines includes different entrance types, such as entrances within plazas, entrances integrated into existing buildings, and entrances as part of joint development entrances with intermodal connections. Understanding how the current Metro system interfaces with its surroundings in terms of its design and orientation is key.

Figure 5-8 depicts station entrances along the existing Metro Red Line. As evident from these photos, elements such as signage, amenities, landscaping, special paving, art, and entrance canopies create a "customer environment" for the Metro rider that relates the design of the station to the community that it serves in a unique way. The customer environment is the station public space that that is tailored to the design vision and requirements of the community, especially at the station entrances and station areas. Understanding the power of a customer environment to make the station area and the route as a whole imageable and rider-friendly is key to creating the urban design vision for the Westside Extension.

Figure 5-8. Typical Existing Station Entrances: Wilshire/Vermont to Hollywood/Western

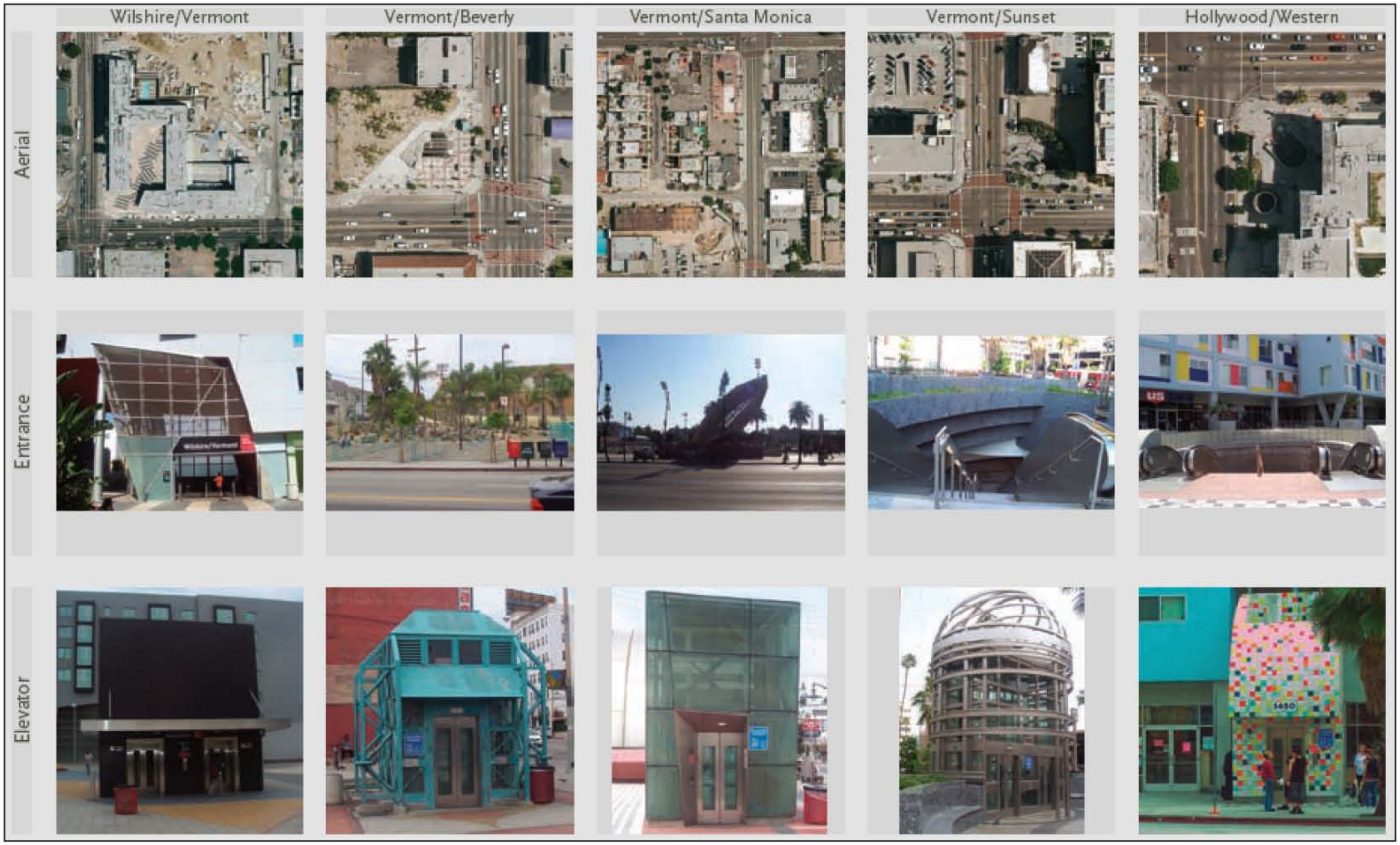


Figure 5-9. Features that Come Together to Create the "Customer Environment"

5.5.3 Urban Design Station Planning Precedents

Municipalities and transportation planning agencies have planned rail systems in the past using station area typology frameworks. This has helped them identify key urban design issues and make design recommendations that are consistent with the needs, image, and vision of their particular community. The goal of all of these typology-based studies is to provide transportation planners and designers with a design tool to help them respond sensitively to the context of the system. Visualizing station areas through a spectrum of typologies helps assure continuity throughout the system.

Figure 5-10 shows eight planning precedents in which agencies and municipalities have created a set of urban design typologies for station areas along a planned rail corridor that could be applied to the Westside Extension station areas. These typological systems inform station planning for the Westside Corridor. Each of these typological systems can be conceptualized as part of a "transect" that runs from a more urbanized and dense character to a more rural character with less intense density. By placing the typologies on this transect system, the team was able to see the similarities and differences between each of the typology frameworks and to understand which aspects of the typologies might be relevant to planning for the Westside Extension.

Each of the typology frameworks included a dense "downtown" or "(major) urban center" station area category, and a less dense "urban neighborhood" or "community" category to differentiate between scales of urban form and development. Some frameworks also included regional or commuter typologies. The typologies that relate to the Westside Corridor are those at the denser end of the spectrum since the corridor is relatively dense and built-up. Some typology frameworks included a "special district" category, which could also apply to the Westside Corridor.

- Many of the typology frameworks:
  - Regulate density, scale, and/or height
  - Regulate land uses near the stations
  - Suggest housing types that are appropriate for station areas
  - Include guidelines for connectivity to bus and bike/pedestrian paths
- Only a few of the typology frameworks:
  - Include guidelines for paving, signage, visibility, public art, accessibility, amenities, etc.
  - Include parking guidelines
  - Are linked to job targets for the area
  - Prescribe location and design of station entrances
  - Include guidelines for finishes and materials

While the Gateway and Neighborhood Centers identified in the Metro Exposition Light Rail Transit (LRT) Project are very helpful for light rail planning in the Los Angeles area, a typology tailored to underground heavy rail is more appropriate for the Westside Extension. The Gateway/Neighborhood typology presented is still, however, potentially applicable to at-grade LRT modes within Metro's system.

Figure 5-10. Station Typology Precedents: Looking at Past Station Planning Designations in Los Angeles and Other Municipalities around the US

More Intense .... Less Intense

LA Land use Transportation Plan	Major Urban Center	Major Bus Center Urban Complex	Neighborhood Center	Regional/ Suburban Center	
LA Metro Exposition Light Rail	Gateway Center		Neighborhood Center		
NJ Transit Hudson-Bergen Light Rail	Major		Community		Industrial Developing
Charlotte Mecklenburg South Corridor Light Rail	Urban	Multi-Modal	Neighborhood Community	Regional	
Denver Light Rail	Downtown Major Urban Center	Urban Center	Urban Neighborhood	Main Street Commuter Town Center	Campus/ Special Events Station
BART	Urban Urban with Parking	Balanced Intermodal		Intermodal Auto-Reliant Auto Dependant	
San Francisco Bay Area MTC	Regional Center City Center		Urban Neighborhood Mixed Use Neighborhood Transit Neighborhood	Suburban Center Transit Town Center	
"The New Transit Town"	Urban Downtown		Urban Neighborhood Neighborhood Transit Zone	Suburban Town Center Suburban Neighborhood Commuter Town Center	

While some of the planning precedents inform the urban design study for the Westside Extension, it is clear that a place-specific typology is necessary, one that relates to the unique dynamics of the Westside Corridor.

Ridership patterns and transit mode studies in the AA Study can be used to develop a new typology framework for the Westside Extension. Discussions with stakeholders, review of policy documents, and integration of station area planning precedents can all also inform the creation of a new set of typologies relevant to the Corridor.

5.5.4 Unifying the System

Urban Design principles must guide the urban design guidelines and the station area typologies for the corridor. The following systemwide urban design principles apply to the Westside Extension. These principles relate to elements of:

- Connectivity (bus, bicycle, and pedestrian)
- Joint development and transit-oriented development
- Parking
- Placement and design of auxiliary functions
- Wayfinding
- Station amenities
- Landscaping
- Lighting
- Finishes and materials
- Sustainability and creativity

During station area design and planning phase, the main considerations include:

- Assuring convenient, visible, and pleasant bus, bicycle, and pedestrian connectivity.
- Crafting development that is transit oriented.
- Using sustainable, innovative, and place-specific design elements.

Bus Connectivity

- Station areas should have connections to bus lines within the immediate station area.
- Station areas should have bus shelters and adjacent locations with additional pedestrian queuing areas.
- Large bus stop areas (more than 1 bus in length) and bus layover areas

should be located away from prime retail frontage.

- Directional signage should be used to indicate location of bus stops in and around the station portal and throughout the station area.
- All station signage will conform to Metro signage standards.

Bicycle Connectivity

- New bike routes should be planned to connect the station areas to key locations.
- Station areas should have bike racks that conform to Metro design standards.
- Gaps in existing bike routes should be filled, whenever possible, to better connect stations with the bike route network.
- Bike racks should be designed so they do not impede pedestrian activity. Station areas should have bike lockers placed in unobtrusive locations.

Pedestrian Connectivity

- Station areas should have large sidewalks (22' or wider) and plaza areas to encourage visibility and increased usage of the station area.
- Mid-block crossings are encouraged where possible to facilitate better pedestrian access to the station.
- The use of knock-out panels should be maximized to increase the potential for future pedestrian connectivity.
- Station escalators and elevators should be situated with consideration to the vistas and views that present themselves upon exiting the station portal.
- Ground floor building frontages should maximize transparency to create indoor-outdoor relationships.
- Street furniture should be designed to encourage pedestrian participation in the outdoor realm.
- Crime Prevention Through Environmental Design (CPTED) principles should be used in station and station area design. Four of the main principles are:
  - Natural surveillance: maximize the visibility of people, parking, areas, building and entrances by facing doors and windows onto these areas and providing adequate nighttime lighting.
  - Territorial reinforcement: create a sense of territorial control, which deters offenders, by defining property lines

- ► Natural access control: clearly indicate public routes and discourage access to private areas
- ► Target hardening: prohibit entry or access

Joint and Transit-Oriented Development

- A mix of uses is encouraged at station areas and surrounding areas.
- Only development that is transit oriented is appropriate at station areas and their surroundings.
- The size and shape of developable parcels at the station site should be maximized.
- Whenever possible, stations or tunnels should not be located diagonally through future development sites. Tunnels must be spanned, and it is more expensive and less efficient to construct around this configuration. Clearances around station structures should adequately accommodate future building foundations.
- Adequate cover over the station box should be provided or accommodate enough density to compensate the developer for higher construction costs.
- Reliable as-built conditions should be produced that facilitate conceptual design for joint development submissions and simplify the negotiation process.
- Station portals shall be highly visible within any development to maintain customer access and visibility.
- Whenever possible, bus waiting areas should be located within existing right-of-ways to avoid negative impact on developable areas.
- Station artworks should be designed to be easily removable without damage to artwork or station elements when new construction occurs.

Ancillary Equipment

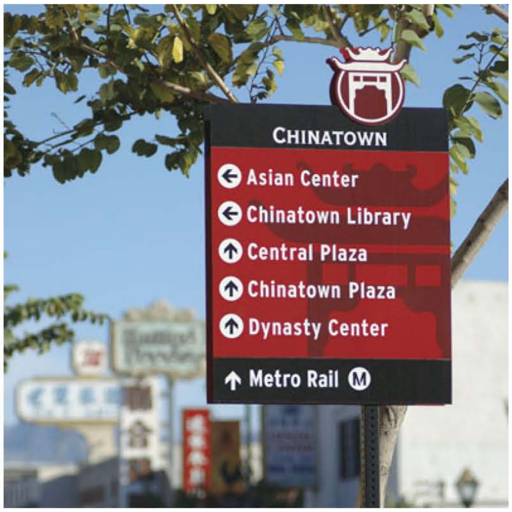
- Ancillary equipment and supportive functions, such as station vent shafts and grates, emergency exits, should be clustered together so they are minimally invasive.
- Ancillary functions should be located at site edges or outside of the building restriction line (e.g., within the public right-of-way) or incorporated with joint development mechanical spaces.
- Ancillary functions at potential joint development station areas should not be scattered within the middle of the potential site in order to maximize the efficiency, usability, and constructability of the site, and its economic value.

Motor Vehicle Parking

- Transit and bike/pedestrian connectivity should be the primary means of accessing stations. Therefore, connectivity is a higher priority than parking.

- Consider relaxing required parking ratios for development at station areas because of the area's transit orientation.
- Where parking is included as part of station planning or joint development, it should be contained within an underground structured garage and shared among a mix of uses.

- Consider whether any parking provided should be market-priced, paid parking. Fees collected should be directed towards a TOD parking benefit district.
- Consider variable pricing for parking, which can encourage the use of transit during peak periods by charging higher rates when there is greater demand.
- Techniques reducing the footprint of parking spaces may be encouraged, such as robotic parking.
- Consider whether any parking provided should prioritize rideshare vehicles.



Station Canopy

- Station entrances not integrated into a building should be covered by a unique canopy reflective of the area's characteristics, architecture, local artisans, etc.

Wayfinding

- Consistent graphics and placement of signage at stations and station areas.
- Station areas should have maps with local points of interest and walking distances.
- Multi-lingual signs are encouraged.
- Signage using pictograms is encouraged.
- Signage/ wayfinding will conform to Metro signage standards.

Amenities

- Amenities should be integrated into the initial overall design of the station area rather than as an afterthought.
- Station areas should have benches, bike racks, lockers, trash cans, shade trees, and some form of a "geographical narrative," which conveys to the rider information about the environmental, cultural, geological or historical characteristics of the local area.

Landscaping

- Station plazas and entrance areas are the introduction to the Metro customer environment and a gateway to the neighborhood. Station area landscaping should reflect this quality.
- Landscape design should be thought of in terms of placemaking. Station areas should be good places to be, not just pass through.

- Landscaping should support pedestrian connections and create a safer, more secure environment.
- Shade trees are an amenity and help define space and should be used in station areas.
- Station areas should use drought-tolerant landscaping with native or adaptable/ noninvasive species.

Lighting

- Lighting should meet all applicable local requirements and be energy efficient.
- Pedestrian-scale lights improve walkway illumination for pedestrian traffic, community safety, and business exposure.
- Outdoor lighting should be scaled to the pedestrian. Typically, 12' lampposts should be used in residential neighborhoods and 15' lampposts on retail streets.
- Outdoor lighting can also be mounted on buildings or strung on wires spanning across plazas suspended from buildings.

- All street lighting should be "full-cutoff" or fully shielded to minimize light pollution and save energy.
- All lampposts should have a visually differentiated base, middle, and top.
- Metal halide lights are encouraged; whereas, high pressure sodium lights are discouraged as they visually render all colors the same.
- Multi-head column streetlights are encouraged on retail streets.
- Cobra heads should not be used on residential or pedestrian-oriented commercial streets.

- Cobra heads should only be used on high-volume traffic streets and should be decorative. They should have a supplemental non-cobra head light mounted at 12'-14' to light the sidewalk.

Finishes and Materials

- Finishes and materials should be of high quality and promote permanence.
- Station finishes and materials will conform to Metro Architectural Design Criteria.

Sustainability

- All new station development will conform to Metro's Sustainability and Energy Policy.
- New development should meet LEED® Silver and LEED® ND Silver standards.
- Station areas should be designed to use landscape, street furnishing, power sourcing, and water conservation best management practices.
- Existing cultural/historic resources should be preserved in or around the station areas. The sensitive adaptive reuse of buildings is encouraged.
- Development at the station should use recyclable materials and alternative energy systems.
- Station areas should use innovative materials and technologies.
- Stations should accommodate and encourage non-motorized access to stations.

Creativity

- Urban designers, architects, and artists should be involved in the design of station areas and station area amenities.
- The visions and aesthetics of the cities should be integrated into the design of stations and station area planning.
- Innovative materials, technologies, and station area planning approaches should be encouraged.

5.5.5 Station-Specific Urban Design Principles

Urban design principles relating to the following station area characteristics interact differently at each station and thus can be understood on a typological level:

- Density
- Scale
- Number of station entrances
- Station orientation
- Signage
- Public and station art
- Vendors
- Special paving

5.5.5.1 Station Typologies for the Corridor

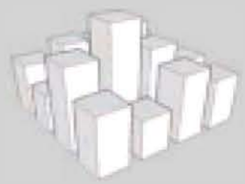
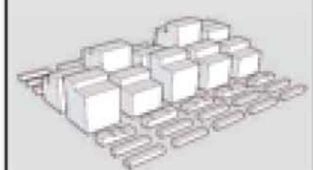
There are four station area typologies for the Westside Extension:

Each typology indicates that different densities, scales, and number of station entrances are appropriate at each station area along the Extension.

The ranges of values of these factors along the Extension are:

- Density
  - High: FAR ≥ 6.0, ≥ 100 DUA
  - Mid: FAR = 2.5-5.9, 40-99 DUA
  - Mid/Low: FAR = 1-2.4, 20-39 DUA
  - Low: FAR = .5-.9, 8-19 DUA
- Scale
  - High-rise: ≥ 240'
  - Mid/High-rise: 75'-239'
  - Mid-rise: 51'-74'
  - Low-rise: ≤ 50'
- Station Entrances
  - At least three
  - At least two
  - Two preferred
  - One or more

Figure 5-11. Station Area Typologies Quick Reference Chart

	Typology	Density	Scale	Station Entrances	Station Portal Type
Major Urban Center		High	High-rise Mid/High-rise Mid-rise Low-rise	At least three	Joint development Restricted right-of-way Existing building Intermodal transportation center
Urban Corridor		High along the corridor Low/Mid-rise to Mid-rise adjacent	Mid/High-rise along the corridor Mid-rise adjacent	At least two	Plaza Joint development Restricted right-of-way Existing building Intermodal transportation center
Urban Center		Mid Low/Mid	Mid/High-rise Mid-rise	Two preferred	Plaza Joint development Restricted right-of-way Existing building
Neighborhood Center		Low/Mid Low	Mid-rise Low-rise	One or more	Plaza Restricted right-of-way

5.5.5.2 Kit-of-Parts

While density, scale, and number of entrances help classify typologies, there are a variety of other urban design considerations. These relate to:

- Station Orientation
- Signage
- Station and/or Public Art
- Street Vendors and Performers
- Special Paving

Each of these parts creates a certain customer environment for the Metro rider. The kit-of-parts uses the typologies to codify these elements.

The kit-of-parts in applied to station areas based on each area's identity as a:

- Tourist Destination (e.g. museum or pedestrian-oriented area)
- Institutional Destination (e.g. near a university or hospital)
- Business Center (near substantial employment areas)
- Retail Destination
- Development Potential

Table 5-1. Kit-of-Parts

Tourist Destination 	Station portal(s) should be oriented in the direction of the tourist attraction or should be integrated into the building directly.	Directional signage and maps should be used near station portal(s) and in station plazas to indicate tourist destinations. Signage around the station portal(s) should link with signage in the station area (up to ½ mile radius).	If the tourist destination is arts-based, it may be appropriate for elements of the art to be brought into the station area and the station itself.	Station areas should have spaces for vendors and street performers (e.g. mobile and permanent kiosks, newsstands, built-in benches, locations for stalls).	Special paving, such as brick, paving patterns, and in-floor mosaic, is encouraged.

Table 5-1. Kit-of-Parts, cont.

Institutional Destination 	Station portal(s) should be oriented in the direction of the institution or integrated into the institution.	Directional signage and maps should be used near station portal(s) and in station plazas to indicate institutional destinations. Signage around the station portal(s) should link with signage in the station vicinity area (up to ½ mile radius) and correspond to the sub-signage of the institution, in terms of elements such as font, size, placement, etc. Station areas should include information booths/kiosks and maps of the institution.	Station area planning should include institutions in the design and concept for public art. Institutions should be encouraged to contribute creative, informative displays and interactive advertisements in the station area and the station itself.	N/A	Special paving, such as brick, paving patterns, in-floor mosaic, is encouraged. Paving patterning can be used to link the station with the institution nearby.

Table 5-1. Kit-of-Parts, cont.

Business Center 	N/A	Station areas may include maps, which may be interactive or non-interactive, describing the businesses and amenities in the station vicinity area.	N/A	Newsstands and service related vendors, such as shoe shine and key repair, are encouraged.	N/A
Retail Destination 	Station portal(s) should be oriented in the direction of the main retail area or should be integrated into the retail area itself (e.g. portal entry through Westfield Century City Mall).	Directional signage and maps should be used near station portal(s) and in station plazas to indicate retail destinations.	N/A	Vendors are encouraged in retail areas to supplement retail offered and activate the sidewalk.	N/A

5.6 Transit Supportive Land Use, Development-Oriented Development (DOT) and Transit-oriented Development (TOD)

TOD and DOT are interrelated approaches to transit-supportive land uses. Both focus on existing as well as new development with attention to detailed urban design, and focus on the needs of the pedestrian. The difference between the two transit-supportive land use approaches is one of perspective and geographic scale:

TOD involves the larger station area and is put in place by plans and policies that guide future development within ½ mile of a station. It seeks incentives to allow desired development to easily occur and encourages higher levels of density around station areas; it seeks to align transit investments with a community's vision for how it wants to grow, creating "livable" mixed-use densities. Much of the potential station areas for the Westside Extension already have TOD in place. DOT, on the other hand, focuses more on the station entrance area development and may be more relevant in areas already fully developed. Determining which approach to use will be part of the station area planning process during the next phases of the project, However, given the built-out characteristics of this corridor, the DOT methodology, which focuses more on pedestrian connections and the design of the immediate station area and station entrance, may be a more appropriate approach than the traditional TOD station area planning approach for this Corridor.

DOT is a newer approach to station area planning that focuses on sustainability as an approach to planning to help communities and transit systems better achieve the dual goals of increasing ridership and enhancing transit supportive development patterns. DOT methodology is directly linked to principles of sustainable land use development and New Urbanism. Like the traditional TOD approach, it is a community-based process for station area planning and development. It is most effective if initiated early in the planning phases of a project when decisions regarding station locations and potential station entrances are made. It is a methodology that is especially relevant to development patterns in a built-up corridor such as the Westside Extension and will be further studied in analyzing transit-supportive land use opportunities at potential station sites within the Corridor.

5.6.1 Key DOT Design Principles

DOT focuses on the importance of non-motorized access to station areas and emphasizes walkability within the station areas. Parking for the station is discouraged; station development is important for creating lively pedestrian-oriented urban spaces that are community focal points. Station architecture and excellence in design are important components to creating sustainable environments that contributes to civic pride and add value to the community. These concepts are embodied in the key DOT design principles:

Stations as the Heart of the Community

Design transit stations to serve as the hub of a community and provide a local identity. Metro stations will create a new front door to the community, and serve as a local landmark or a place to linger in an appropriately scaled public plaza.

Connect Communities with Transit

Link communities along the Corridor together with transit, and link transit stations to the community through a well-connected street, bus, bicycle, and pedestrian network. Transit stations in the Corridor can be special places which bestow economic value and advantage to the communities through their locational advantage, people-sensitive design, and supportive local plans and policies.

Create a Pedestrian Environment
Provide lively, safe, and convenient sidewalks and paths connecting Metro stations to residences, jobs, schools, parks, and shopping, with buildings directly oriented to those pedestrian connections. The key to growing ridership and creating economic value in a community is accommodating the pedestrian. Transit facilities in the Corridor should celebrate the pedestrian by giving them priority in design decisions.

Tame Traffic
Major streets separate and divide the Corridor. The coming of the Metro system provides an opportunity to reconnect parts of station communities by calming traffic and designing parking lots and associated street improvements so that traffic operates at speeds compatible with a healthy, safe community.

Balance Parking
Parking must not separate traffic from the community. Move, share, wrap, and deck parking to provide the right balance of parking to support the economic viability of the station area and make the area pedestrian friendly. Evaluate the need to provide parking at station sites.

Create Partnerships
Secure public-private partnerships that will maintain the success of the Corridor and the communities it serves to capture and enhance the public investment made in transit improvements.

Complement Community Objectives
Help realize the vision and economic vitality of each community with quality development that provides a mix of uses close to transit. Understanding and working closely with the community is critical to guiding the design and fit of transit in the Corridor to be a good neighbor and a catalyst for realizing the community's vision.

The Urban Design Process and Station Area Planning
The DOT principles described on the previous pages will be the basis of an ongoing urban design process that will include station area planning charrettes/workshops during the next phases of the project. They will be part of the development of the station typologies and urban design guidelines available to the communities during future phases of the project to assist in preparing conceptual plans for the Corridor and station areas as part of the Preliminary Engineering phase of the project.

5.7 Initial Station Planning and Urban Design Workshop Process

A key component of the urban design study and the station area planning process during this phase of the project was the participation of the Cities in an initial Workshop on July 15, 2008, and a follow-up meeting to discuss the urban design concepts and potential station locations. These workshops and meetings were part of the public outreach effort during the Alternative Analysis Study and will be part of a continuing design process for the station area planning process in future phases of the project. The station area planning process and public outreach process establish the necessary framework for documenting and implementing key decision related to the selection of potential station locations with best transit-supportive land use opportunities for this Corridor.

The following section describes the results of the findings of the initial Workshop with key stakeholders and updates to these findings as a result of the follow-up meeting held on September 4, 2008.

5.7.1 Los Angeles (East of Beverly Hills)

Plans and Policies Reviewed

Workshop participants in the Los Angeles (east of Beverly Hills) group indicated that along with the plans and policies already considered as part of the Urban Design Study, the following documents need to be considered:

- Park Mile Specific Plan
- The city-wide list of historical/ cultural monuments
- Windsor Village and Wilshire Park pending historic zones
- General Plan Framework
- City Wide Urban Design Principles
- Walkability Checklist
- Bicycle Plan (currently being updated)

General Feedback Received

The following comments were given by the Los Angeles (east of Beverly Hills) stakeholders during the workshop sessions:

- Create bikeable neighborhoods - “local streets.”
- Bike storage facilities need to be improved.
- Station entrances need to accommodate non-motorized transport access.
- Biker gym-transition area for showering changing is needed.
- Transit-oriented development for Los Angeles means making stations as permeable as possible.
- Improve pedestrian crossings.
- Focus on getting people out of cars, but not having to add density.
- Urbandesignla.com is a helpful Los Angeles planning website.

Station-Specific Feedback Received

There are five potential station areas in the Los Angeles (east of Beverly Hills) area. The specific feedback received during the workshop break-out sessions is summarized on the following pages.

Wilshire/Crenshaw Area

Figure 5-12. Wilshire/ Crenshaw

Workshop Feedback Received

- Important to have connection to proposed Crenshaw/ Prairie Light Rail
- Respect the Park Mile Specific Plan
- More planning must be undertaken to determine if this station should be retained or removed from further consideration
- Station considered a Neighborhood Center

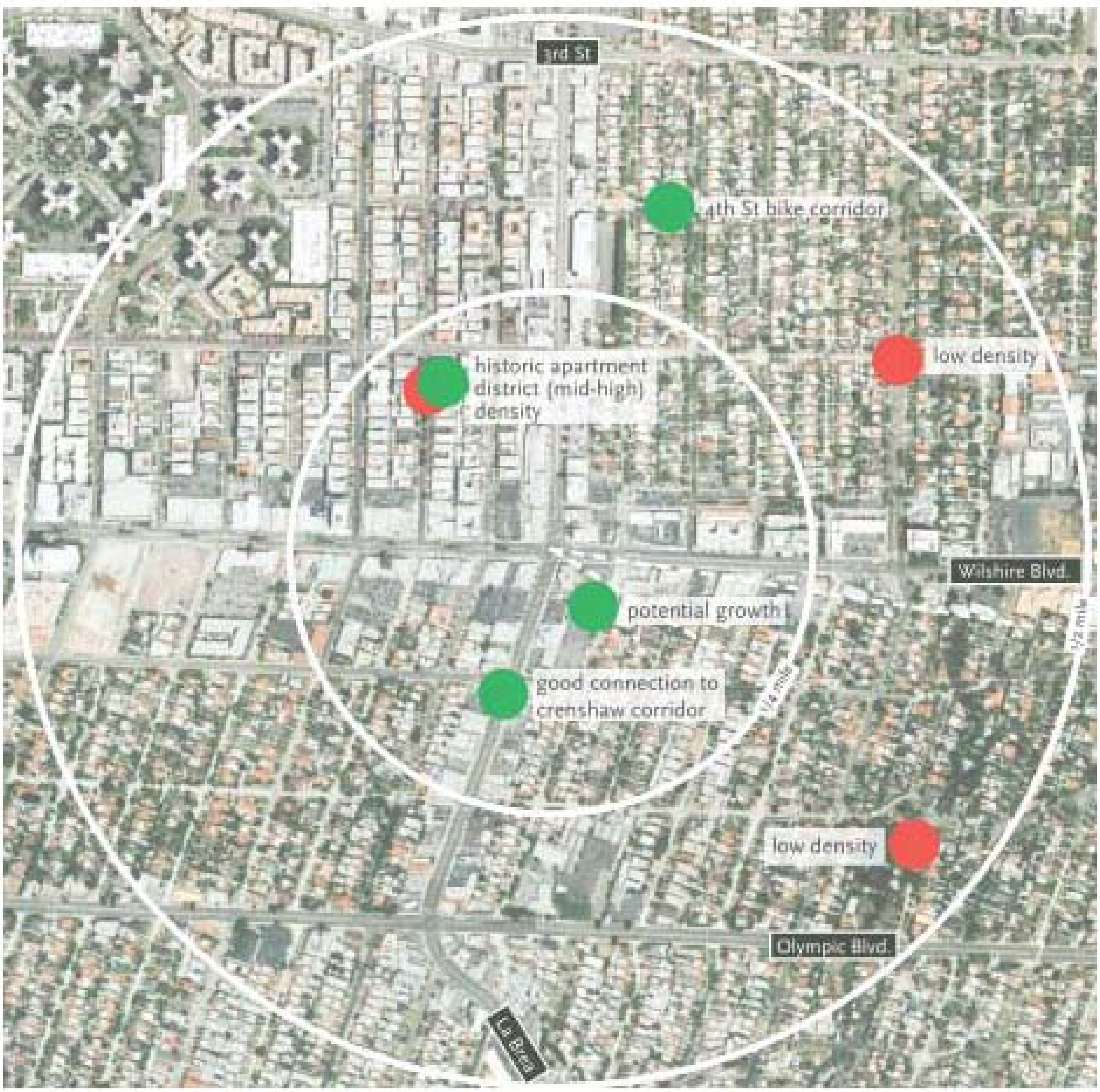
Follow-Up Meeting Feedback Received

- Perception is important –change the idea from "should we keep this station"

- Not very dense
- Link to economic development to the east and south
- Intent of zoning unclear
- Possibly expand Dash service

Wilshire/La Brea Area

Figure 5-13. Wilshire/ La Brea



Workshop Feedback Received

- 4th Street bike corridor
- Development potential in station area
- Good connection to Crenshaw Corridor
- Urban Complex- area in transition
- Not quite a destination yet, but a lot of opportunity here

Follow-Up Meeting Feedback Received

- Potential TOD to be created
- Potential for development through improved connectivity
- 2 miles is a huge gap between the La Brea and Western stations
- Could be considered an “Activity Center”

Wilshire/ Fairfax Area

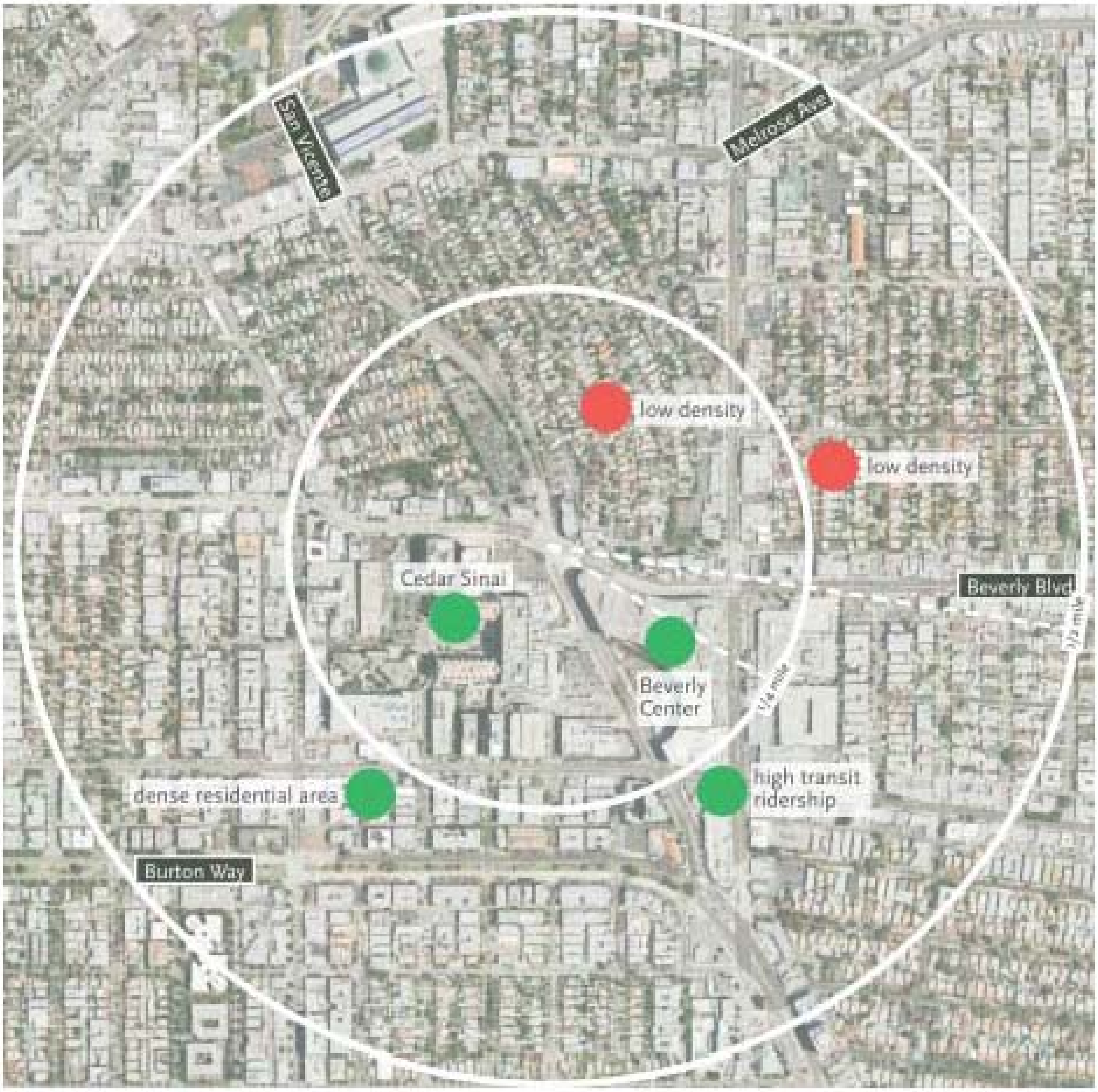
Figure 5-14. Wilshire/ Fairfax

Workshop Feedback Received

- Give station area a new name such as 'Specialty Center"
- Station area has museum, institutional, regional and tourist uses
- Typology is based on existing conditions, not proposed- should be reverse
- If alignment is to the north there are potential routing constraints
- Think better descriptive language could be used such as "Museum Complex"

Beverly Center Area

Figure 5-15. Beverly Center



Workshop Feedback Received

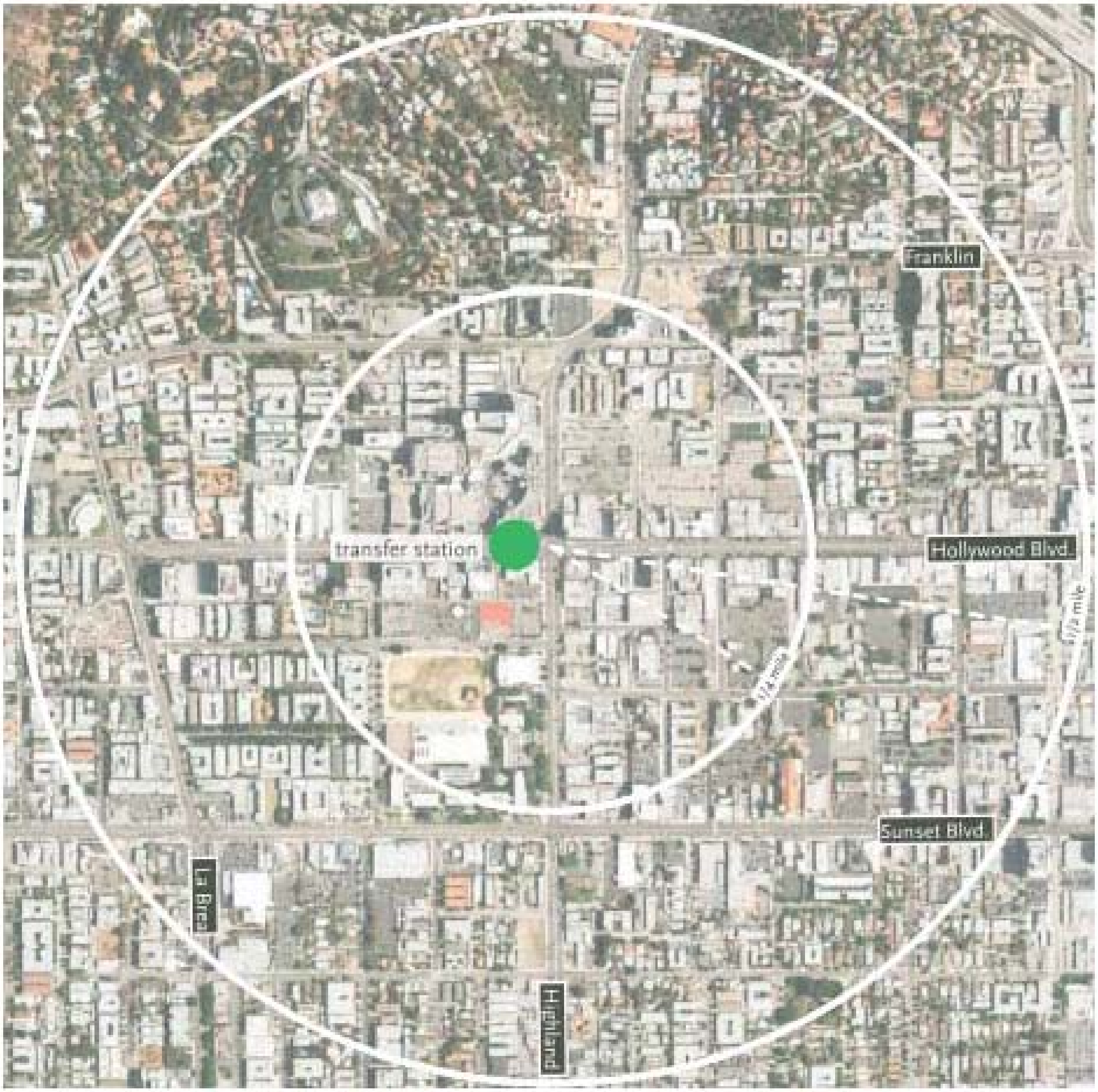
- Is the station area a "Specialty center?"
- Station area has a focus on medical uses and is rich in jobs
- La Cienega would become a major but needs to be developed
- Change "Urban center" to something that speaks to the access and the types of uses
- Station area is already a TOD

Follow-Up Meeting Feedback Received

- Move station a little bit
- Needs longer portal access
- Possibly move further south
- People already walk more in the north, therefore may be more willing to walk further
- Multiple entrances
- Dense not intense

Hollywood/ Highland Area

Figure 5-16. Hollywood/Highland



Workshop Feedback Received

- Station area is a major entertainment/ regional attraction
- Station area contains high density residential area
- Connecting this regional center with other regional center is desired
- Station would become a transfer station, which would be advantageous, therefore considerations must be made

5.7.2 West Hollywood

Plans and Policies Reviewed

Workshop participants in the West Hollywood group indicated that along with the plans and policies already considered as part of Urban Design Study, the following documents need to be considered:

- Redevelopment Area Plan (east of Fairfax and Hayward)
- Mixed-Use Area Zone (east of Fairfax)
- Westside Specific Plan
- Santa Monica Master Plan
- Transit Study
- West Hollywood Park
- Plummer Master Plan
- Lot Motion Picture Studios
- Comprehensive Development Plan
- Division 7 Bus Facility Redesign Study
- Land use transportation reports
- West Hollywood survey groups
- Existing West Hollywood General Plan

General Feedback Received

The following comments were given by the West Hollywood stakeholders during the workshop sessions:

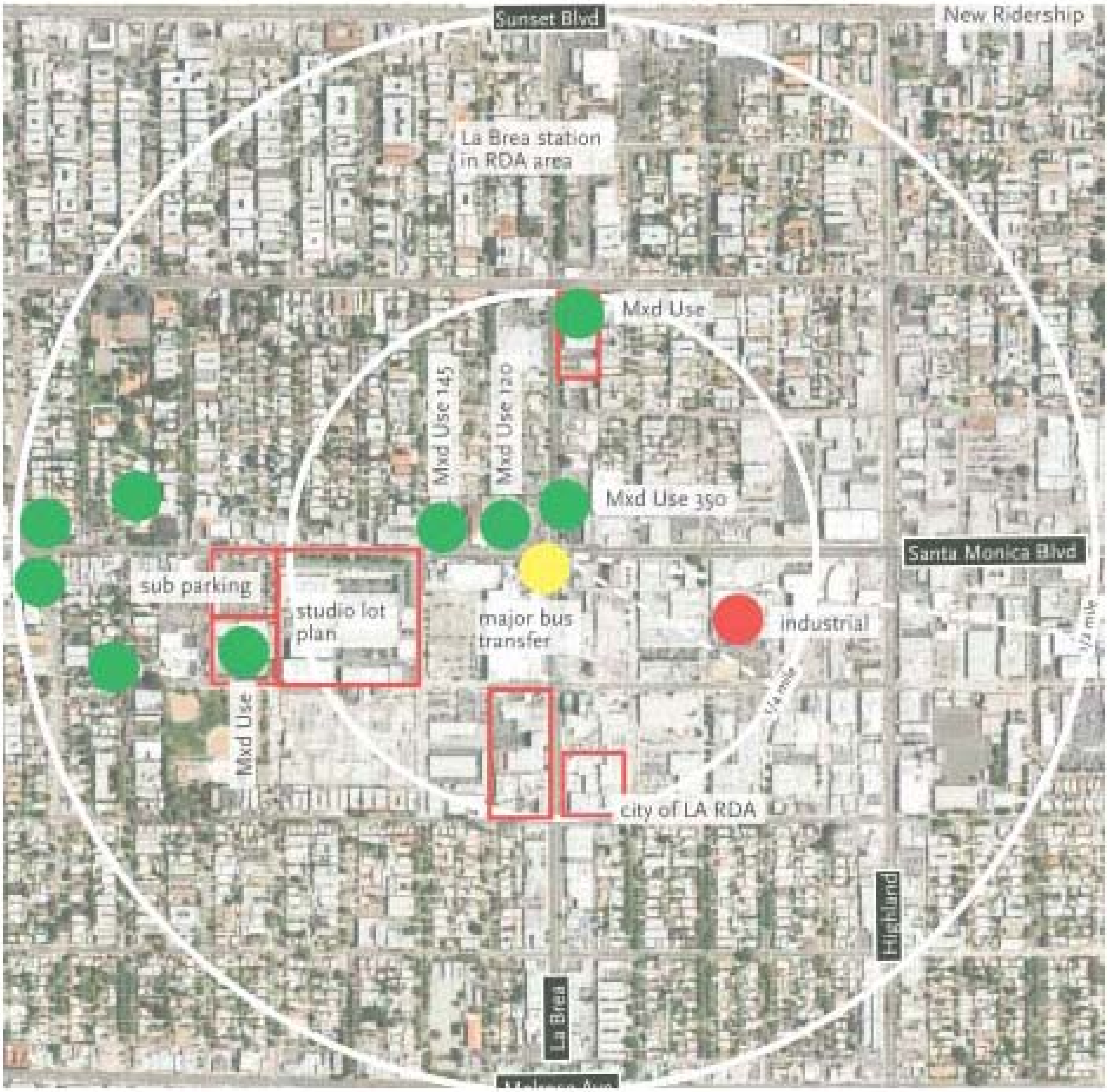
- City is in the process of updating the general plan and specific documents with teeth will follow.
- Keep in mind non-traditional employment (e.g. live-work, artist-studio).
- There are many development projects in the works that support the Extension.
- Santa Monica Boulevard is the correct location for the alignment.

Station Specific Feedback Received

There are three potential station areas in the West Hollywood area. The specific feedback received during the workshop break-out sessions is summarized on the following pages.

Santa Monica/ La Brea Area

Figure 5-17. Santa Monica/ La Brea



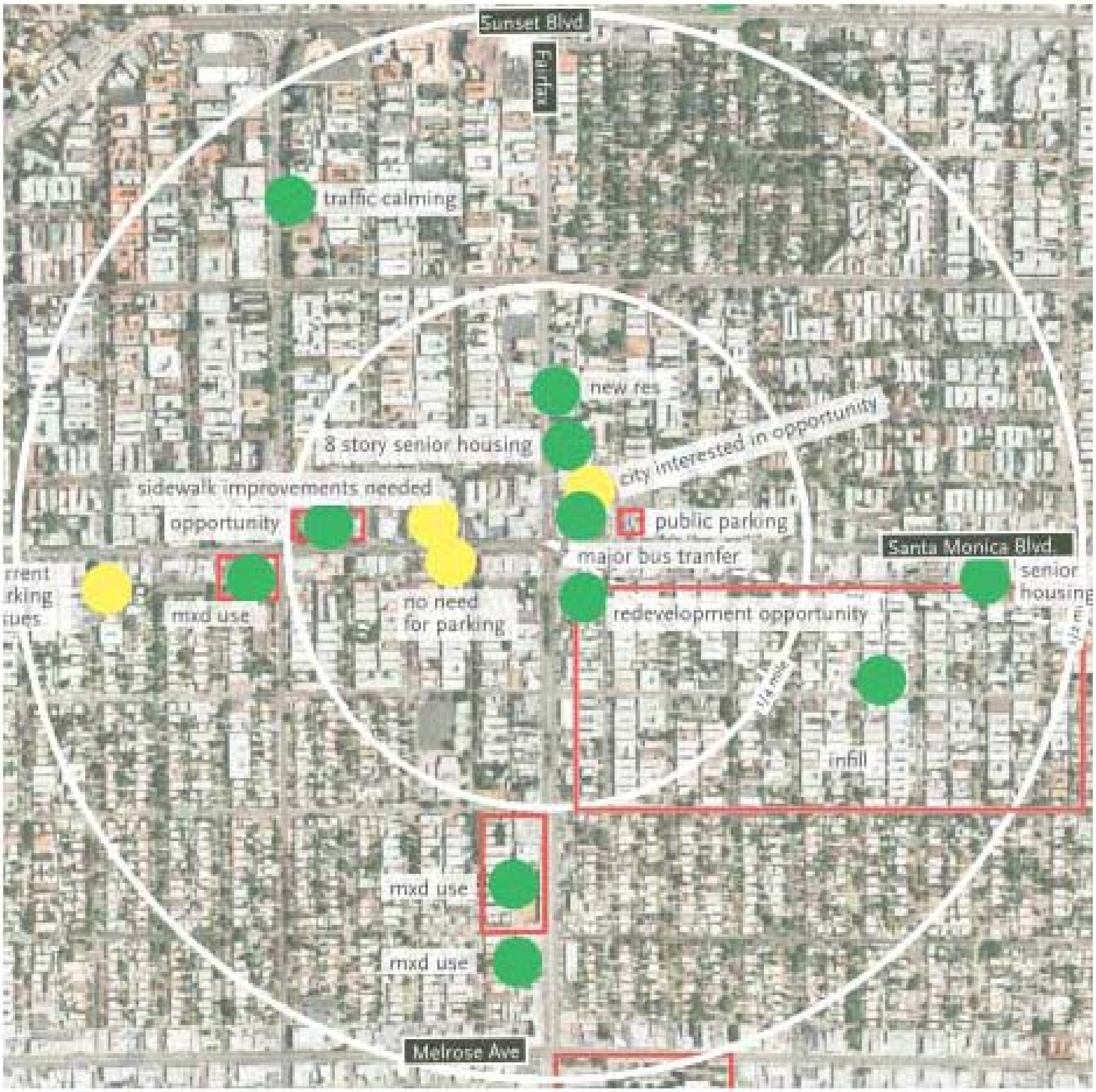
Workshop Feedback Received

- Major bike/ bus interface
- City interested in redevelopment of area because of alleyways
- Substantial amount of mixed-use development in the pipeline
- Several redevelopment areas within pedestrian sheds
- Greatest residential/ employment density

- Benefits:
  - Transfer points
  - Landscape connections
  - Not stealing existing riders from Wilshire
- Constraints:
  - Acquisition of land
  - Expansion of Los Angeles city boundary
  - Parking

Santa Monica/ Fairfax Area

Figure 5-18. Santa Monica/ Fairfax



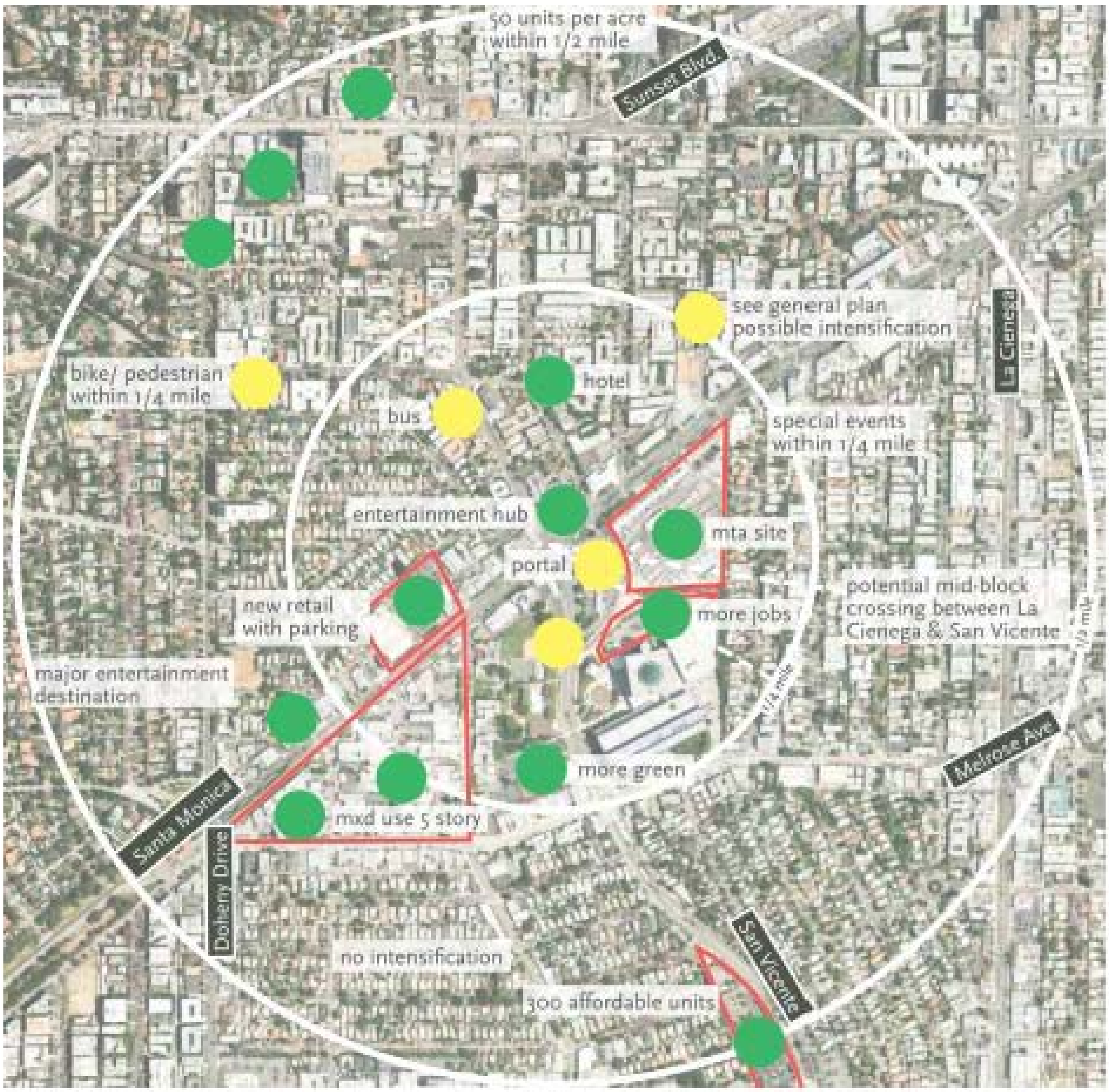
Workshop Feedback received

- Important because of its high density
- Extending bikeway connection (north/ south on Fairfax)
- Parking limitations west of Fairfax
- Traffic studies to liven up pedestrian activity
- Intersection is not pedestrian friendly

- Parking alternatives will be needed by riders who do not typically drive in addition to those who drive

West Hollywood Option 1: Santa Monica/ San Vicente Area

Figure 5-19. West Hollywood Option 1: Santa Monica/ San Vicente



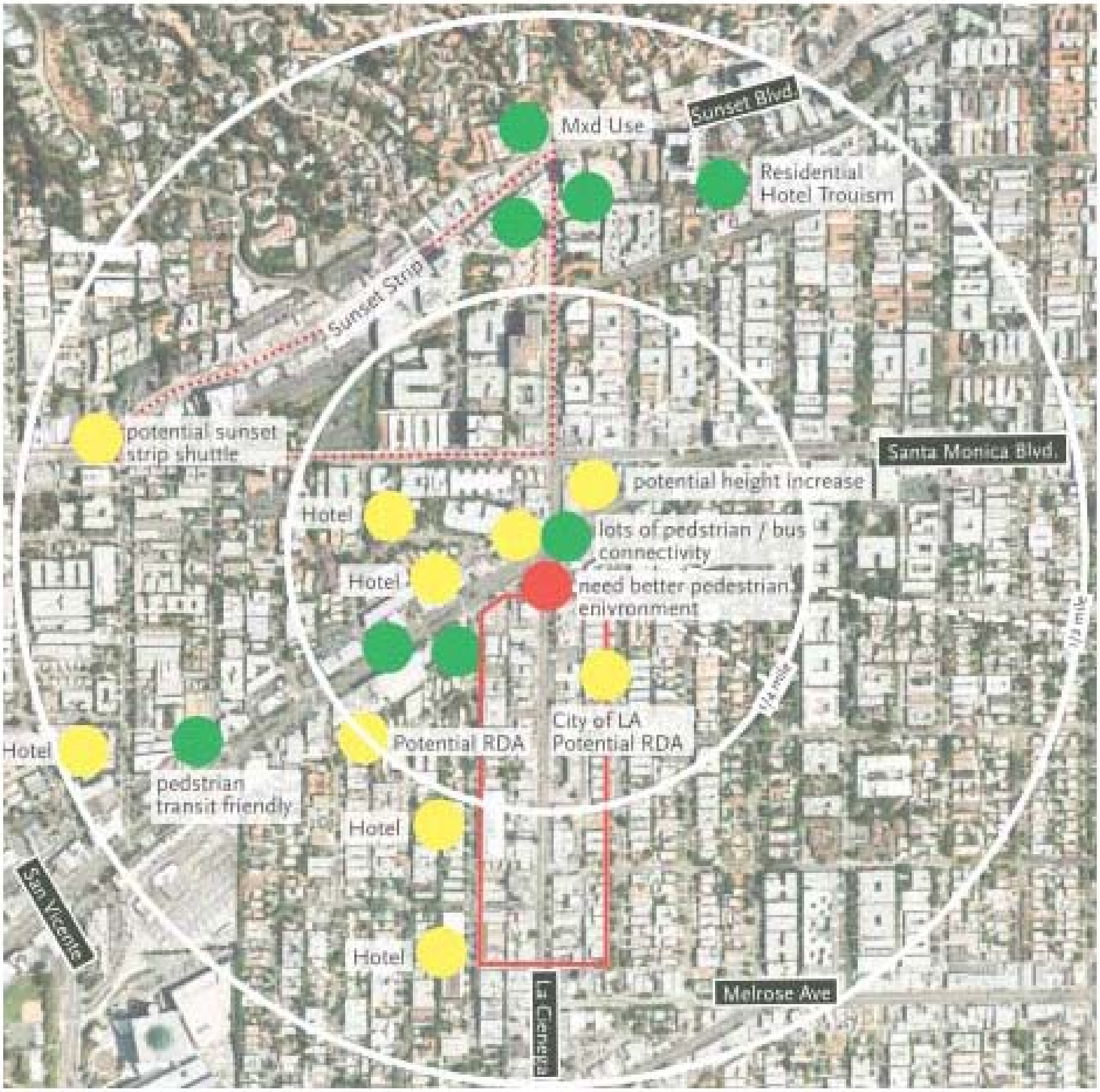
Workshop Feedback Received

- Sidewalks on Robertson Boulevard need improvement
- Senior/ affordable housing on San Vicente Boulevard to connect with Beverly Center stop
- Preliminary concept to intensify residential areas outside of the ¼ mile walk shed
- Tens-of-thousands of people come for special events and holidays

- Bike lanes and sidewalks with street furniture
- Station serves as bus interface
- Important for civic uses, entertainment, development activity, tourist hub
- Potential for jobs/ housing development
- Potential for portal at sheriff station
- Very dense area (50 dwelling units per acre)
- Potential mid-block crossing between La Cienega and San Vicente Boulevards

West Hollywood Option 2: Santa Monica/ La Cienega Area

Figure 5-20. West Hollywood Option 2: Santa Monica/ La Cienega



Workshop Feedback Received

- Several Redevelopment Areas within pedestrian sheds
- Potential shuttle for Sunset strip
- In proximity to Sunset Millennium (hotel development)
- There are several mixed-use project proposals along Sunset Boulevard
- Connectivity to retail/ condo developments
- Presence of tourist activity and lodging

- Sidewalks need to be widened
- Southern corner could be a portal entrance

5.7.3 Beverly Hills

Plans and Policies Reviewed

Workshop participants in the Beverly Hills group indicated that along with the plans and policies already considered as part of Urban Design Study; the following documents need to be considered:

- Mass Transit Committee Report

General Feedback Received

The following comments were given by the Beverly Hills stakeholders during the workshop sessions:

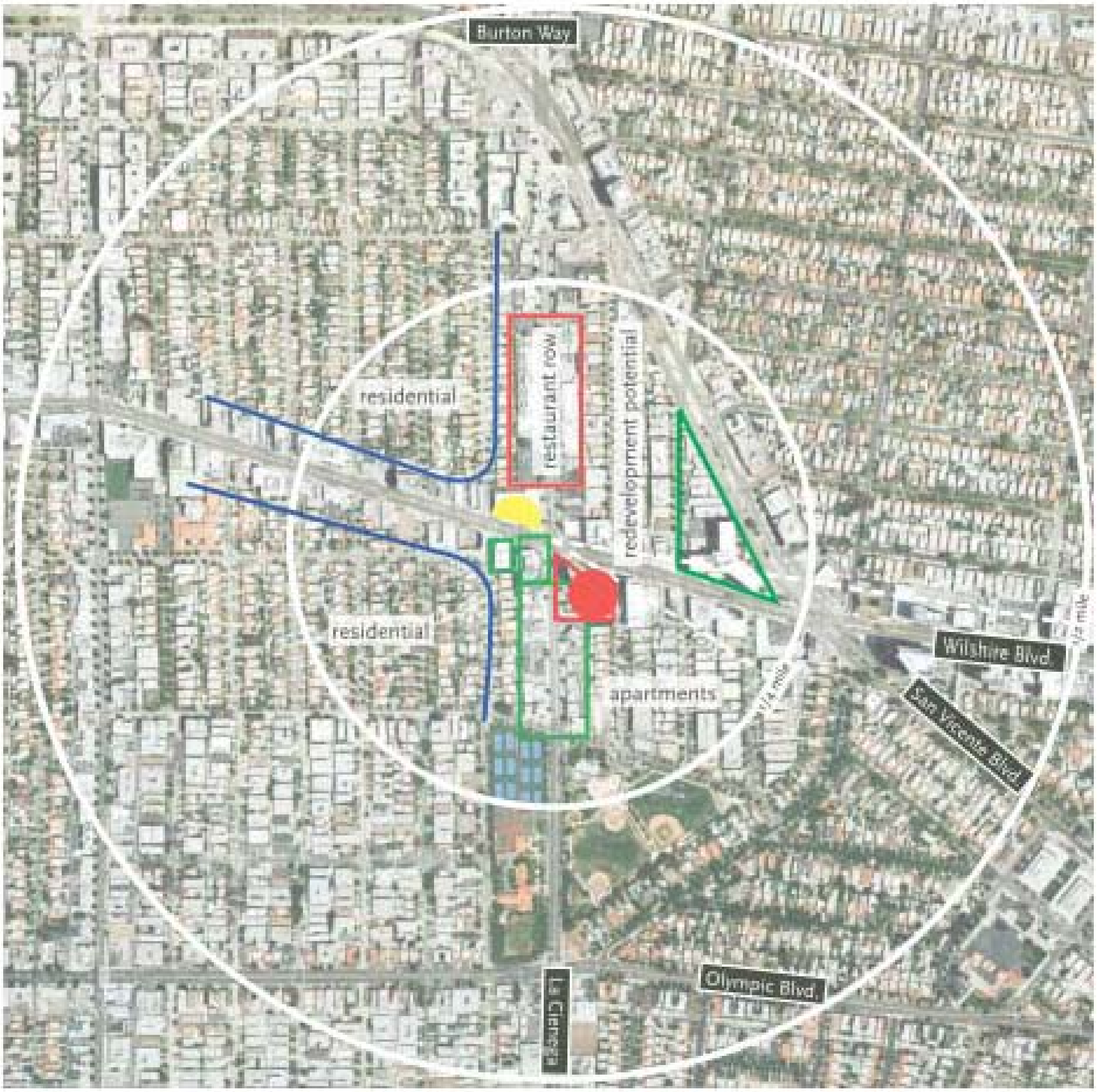
- North of Wilshire, there is no development potential
- South of Wilshire, there is some development potential
- Ballot measure for some redevelopment projects
- The city is in favor of the Wilshire alignment
- The Wilshire corridor is high density and very busy

Station- Specific Feedback Received

There are two potential station areas in the Beverly Hills area. The specific feedback received during the workshop break-out sessions is summarized on the following pages.

Wilshire/ La Cienega Area

Figure 5-21. Wilshire/ La Cienega



Workshop Feedback Received

- Preferable to Robertson Boulevard as station location
- Good redevelopment potential along La Cienega Boulevard and east along Wilshire Boulevard
- Possibility for much more density

Wilshire/ Rodeo Area

Figure 5-22. Wilshire/ Rodeo

Workshop Feedback Received

- Location should be moved closer to Rodeo Drive
- Rename to "Beverly/Rodeo" to advertise
- Station area is already a major center
- Wilshire Boulevard development potential
- Very limited north of Wilshire Boulevard
- Potential along south side of Wilshire Boulevard
- New hotel construction is in the pipeline

- Will generate great ridership
- Shops along Beverly Drive south of Wilshire Boulevard
- Commercial strip to Olympic Boulevard adjacent to single family residential which limits redevelopment potential in this area
- Additional redevelopment projects will probably generate ballot referenda (discussion about how collaborative planning process could reduce this risk)

5.7.4 West Los Angeles

Plans and Policies Reviewed

Workshop participants in the West Los Angeles group indicated that along with the plans and policies already considered as part of the Urban Design Study, the following documents need to be considered:

- San Vicente Specific Plan
- Westwood/Pico Neighborhood Oriented District
- General Plan Framework
- Greening of Century City Plan
- West Los Angeles Transportation Improvement and Mitigation Specific Plan

General Feedback Received

The following comments were given by the West Los Angeles stakeholders during the workshop sessions:

- Car flexing should be considered
- TODs are about 3D form not density
- The area needs a new shared parking ordinance
- Invite young people to participate in construction of art

Station-Specific Feedback Received

There are three potential station areas in the West Los Angeles area. The specific feedback received during the workshop break-out sessions is summarized on the following pages.

Century City Option 1: Avenue of the Stars/Santa Monica Area

Figure 5-23. Century City Option 1: Avenue of the Stars/Santa Monica

Workshop Feedback Received

- No specific feedback received

Follow-Up Meeting Feedback Received

- Possibly move the station further south
- Moving the station further south would center density
- Do not move the station too far south- it would be too close the Beverly Hills hotel development
- 20th Century Fox is further south
- Look at Crystal City

Century City Option 2: Avenue of the Stars/ Constellation Area

Figure 5-24. Century City Option 2: Avenue of the Stars/ Constellation

Workshop Feedback Received

- Station area is a Major Urban Center
- Desire for underground shops
- Suggested portals on Santa Monica Boulevard, Constellation Boulevard and Century Park East
- Could the subway entrance be in the mall?
- Station area has strong relationship with downtown- should be linked

Follow-Up Meeting Feedback Received

- Pulling people through retail
- Include potential incentives for underground development in conjunction with development in the greening of Century City Park

- Existing underground parking could give way for underground retail
- On the edge of employment center Westwood Option 1: Wilshire/Westwood

Westwood Option 1: Wilshire/ Westwood Area

Figure 5-25. Westwood Option 1: Wilshire/ Westwood

Workshop Feedback Received

- Suggested portals on Gayley Avenue, Westwood Boulevard and Glendon Avenue
- Consider the station area a "Specialty Center"
- Desire for a shuttle to UCLA
- Desire for class 1 bike facilities

- Potential for multi-modal transportation due to neighboring parking lots
- Desire for station to be multi-level transit center

Follow up Meeting Feedback Received

- Station area has many federal employees
- Keep the village activated
- Possibly will be the end-of-line station for a while due to phasing
- Cannot go under the cemetery

Westwood Option 2: Westwood/ Le Conte Area

Figure 5-26. Westwood Option 2: Westwood/ Le Conte

Workshop Feedback Received

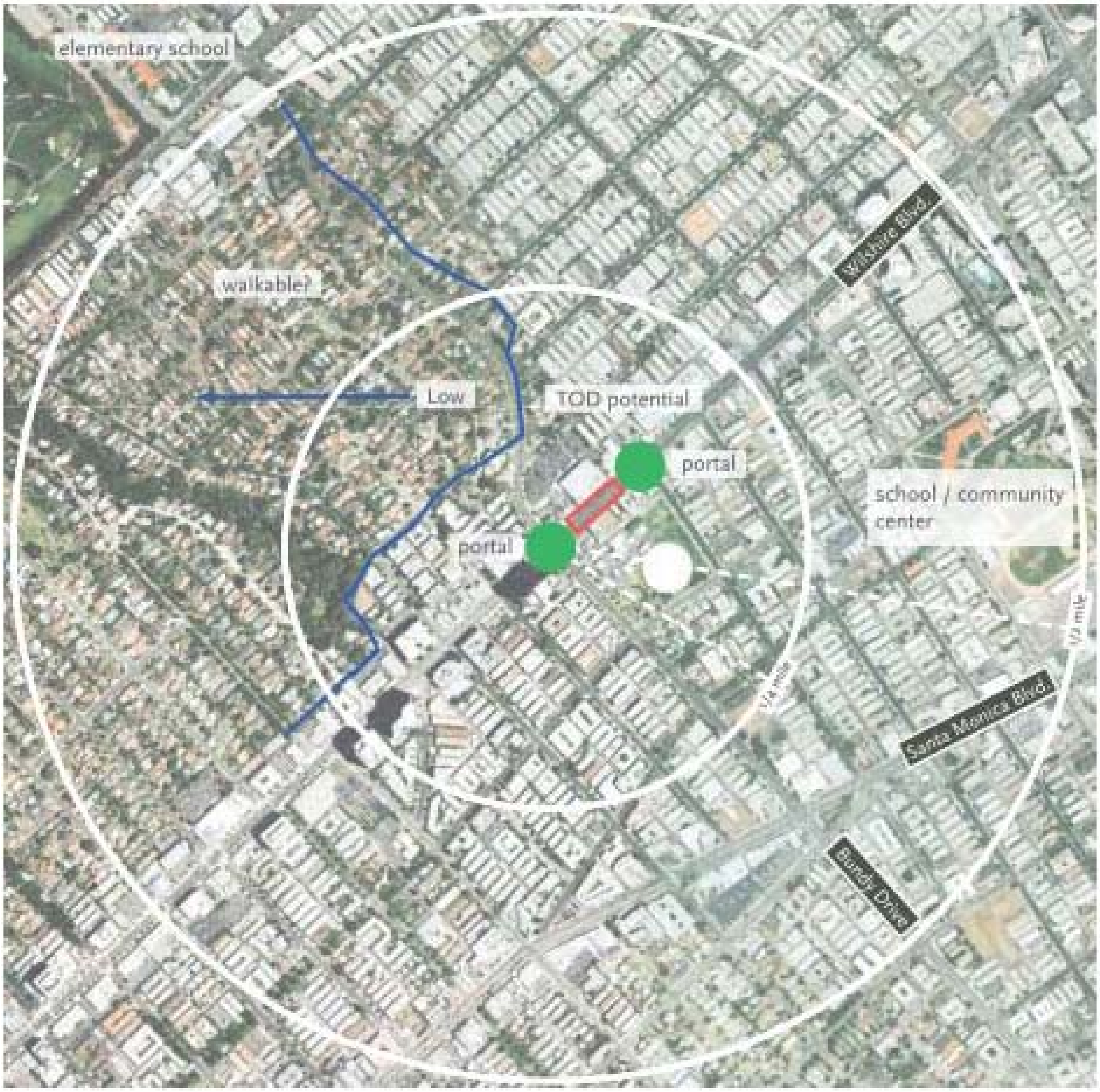
- Worse bus interface
- How does Berkley bus interface work?
- Perhaps it can be used as a model
- Should station area be considered a "Specialty center?"
- UCLA is the identity of the station area. It has medical and educational employment

Follow Up Meeting Feedback Received

- Station location makes the engineers cringe the more it is studied
- Too far into the village
- Too narrow
- Keep the village activated
- Cannot go under the cemetery

Wilshire/Bundy Area

Figure 5-27. Wilshire/ Bundy



Workshop Feedback Received

- Station area has TOD potential
- Potential portals on Bundy Drive and Saltaire Avenue
- Major employment in station area
- Station area wants to be Urban Center but isn't, although zoning allows it
- More suitable for TOD
- Potential station location east of Bundy Drive
- West LA Civic Center is within station area
- High school within station area

- Consider two entrances- Bundy Drive and east of Bundy Drive
- Zoning allows a Floor Area Ratio of 4:1
- Needs more crosswalks

5.7.5 Santa Monica

Plans and Policies Reviewed

Workshop participants in the Santa Monica group indicated there were no plans or policies not included in the initial urban design study.

General Feedback Received

The following comments were given by the stakeholders during the workshop sessions:

- Some residents have expressed interest in bus only lanes on Wilshire. There is an overwhelming desire for more transit.
- There is development potential throughout the city for neighborhood services to help balance jobs, housing and retail.
- Desire for improved bike connectivity with links to the new transit lines.
- Santa Monica is attempting to link the 3rd Street Promenade with its Civic Center. They have a specific plan in place, and are considering including additional housing, civic uses and open space in the plan.
- Santa Monica College is the number one transit trip generator and is only served by Big Blue Bus.
- All Metro Rapid stops are designated as Activity centers.
- There is controversy surrounding the types of uses that should be used in former industrial areas e.g. housing/employment balance.
- Santa Monica is shifting away from a jobs focus to a more balanced housing/jobs focus.
- Coastal Commission requirements are more significant than those of the City.
- City desires additional connections to the beach- station must link.
- There have been talks of a beach circulator.
- Lincoln has major transit potential.
- Desire for more downtown circulation.
- There are bridges crossing interstate to every third intersection.
- Parking is perceived to be limited throughout city.
- Arizona Avenue is a good biking/walking street
- California Avenue is a weak biking street because of stop signs at every intersection.
- Hospitals might consider future housing, TOD potential.
- Consider adjusting walk circles for topography-land slopes up to the north.

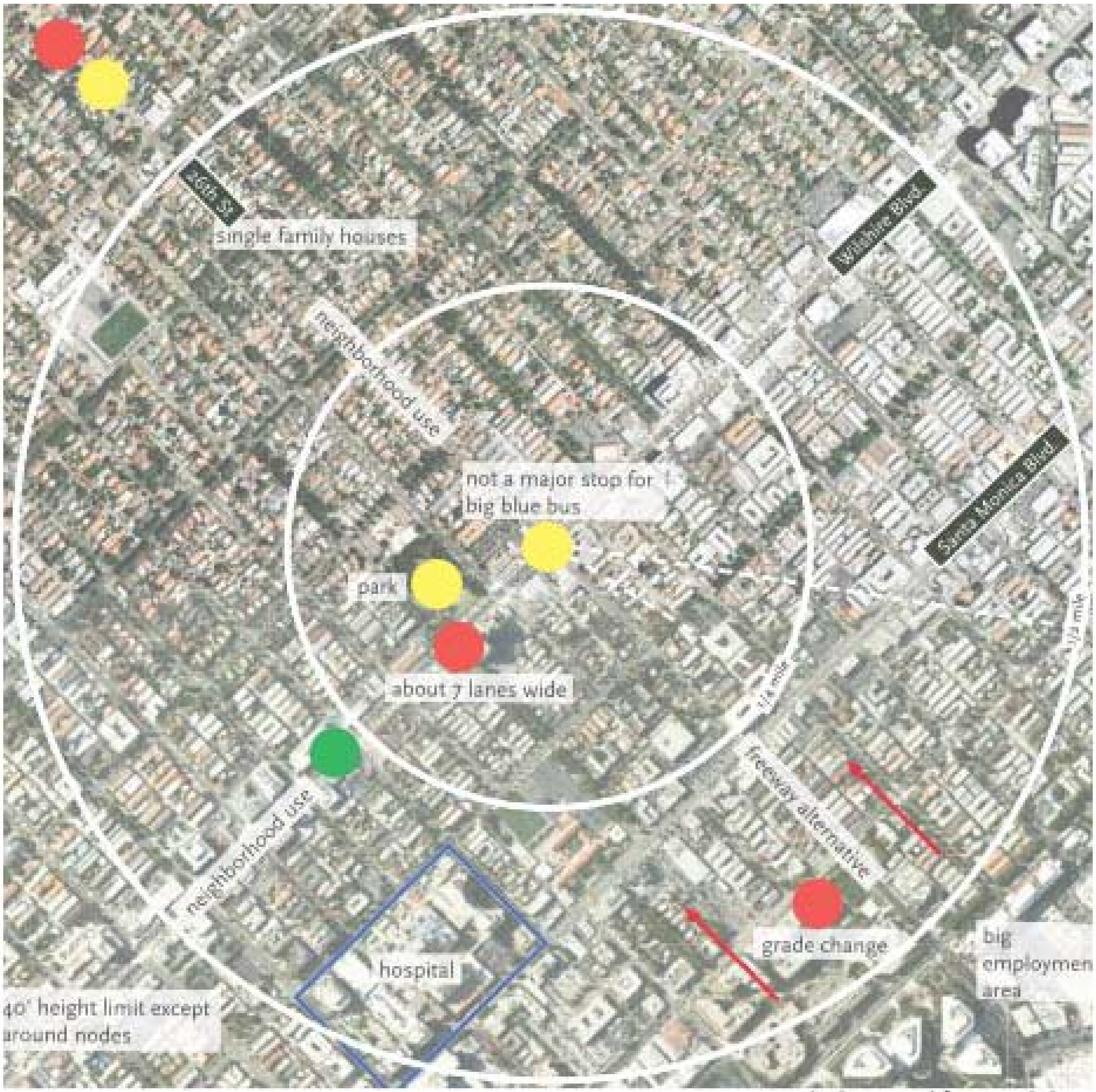
- Would consider doing away with 26th Street stop in exchange for increases investment at 4th and 16th Streets.
- Desire for more neighborhood uses on Wilshire Boulevard.
- Avoid locating stops in a way that would require users to cross a major arterial in order to get to a bus, such as the case in North Hollywood for the Orange Line.
- Stations may need to be used for circulation as certain streets have minimal sidewalks.
- City welcomes art in station design.
- City has strict regulations for vendors.
- City allows no advertising on public property.

Station-Specific Feedback Received

There are three potential station areas in the Santa Monica area. The specific feedback received during the workshop break-out sessions is summarized on the following pages

Wilshire/26th Street Area

Figure 5-28. Wilshire/26th Street



Workshop Feedback Received

- Not a major Big Blue Bus stop
- Less of a boarding stop and thus a questionable stop location
- Wary of stop as there is already a lot of through traffic, and the right of way is too narrow for significant bus capacity and is easily overwhelmed
- Use stop for neighborhood services

Follow-Up Meeting Feedback Received

- Need a station somewhere between Bundy Avenue & 16th Street - not sure if this is necessarily the correct location
- Unclear on where the best station location is
- Area is more linear along Wilshire Boulevard

Wilshire/16th Street Area

Figure 5-29. Wilshire/16th Street

Workshop Feedback Received

- Desire for extra bike parking at this stop because of substantial employment
- Would potentially consider stop an Urban Center
- Box portals potentially on 14th/16th or 20th/18th Streets
- 17th Street is more bike friendly than 14th Street
- Desire for lots of bike parking (500+ spaces)

Wilshire/4th Street Area

Figure 5-30. Wilshire/4th Street

Workshop Feedback Received

- Desire for portal on 4th Street as well as Ocean Boulevard with view to the ocean, which would require an element to get users down the hill to the beach
- Transit mall located on 4th Street could be a major bus feeder
- Downtown Santa Monica requires no parking
- Special events on weekends should be taken into account when sizing the station
- People are willing to walk farther to Promenade facilities

6.0 FINANCIAL ANALYSIS

This chapter presents the capital cost for design and construction, as well as the annual operating and maintenance (O&M) costs and farebox revenues, for the TSM, HRT, and BRT alternatives. This chapter also discusses the proposed funding sources and the actions needed to financially build and operate the alternatives.

The cost of a transportation investment falls into two categories: capital costs, and operating and maintenance (O&M) costs. Capital costs are the start-up costs for the project, including the costs of guideway construction, stations, vehicles, and any system facilities necessary before the project can begin operation. Operating and maintenance costs are the costs associated with the regular running of a new transportation facility including supporting operations such as feeder buses, or other improvements needed. Costs such as labor, vehicle maintenance, and overall facility maintenance are included in this category.

6.1 Capital Costs

6.1.1 Approach

Capital cost estimates have been developed in accordance with FTA guidelines. The guidelines call for cost estimates to be prepared and reported using the latest revision of FTA's Standard Cost Categories. In the estimates, cost components for the various alternatives are developed and summarized into the Standard Cost Categories. These cost categories form the basis for the format and structure that is used for the capital cost detail and summary sheets developed for this project. The Capital and O&M Cost Methodology Report (Task 6.6.1, August 11, 2008) provides a more detailed discussion on the methodology used to estimate capital costs.

The current FTA Standard Cost Categories consist of the following:

- Guideway
- Stations
- Support Facilities
- Sitework and Special Conditions
- Systems
- Right-of-Way, Land, Existing Improvements
- Vehicles
- Professional Services
- Contingency
- Finance Charges

Each of the alternatives under consideration has a set of conceptual engineering drawings, typical sections, station locations, and written descriptions that provide the needed definition for each of the major cost components. These planning documents form the basis for the identification of the various infrastructure elements used to prepare the capital cost estimates. These facility elements can be classified into one of two broad groups, either typical or non-typical facilities. Typical facility costs are developed for elements that can be defined by a typical cross-section and applied over a given length of alignment or based on a conceptual scope of work developed as appropriate for a specific typical facility. The typical facility composite unit cost is developed by combining the costs for all of the individual construction elements applicable to a given typical section or facility and creating a representative composite unit cost. Typical sections or facilities have been developed for each of the alternatives.

Non-typical facility costs are developed based on conceptual engineering and design related to the unique facility under consideration. For non-typical facilities, elements necessary for overall system operation, but whose costs cannot be allocated to a specific geographic segment of the system (e.g., vehicles, maintenance and storage facility); these costs are included at the summary level. After details are prepared for both typical and non-typical facilities and the cost data are developed, they are put into a format summarizing overall alternative cost, as well as identifying the cost of various alignment segments.

6.1.2 Contingency

Contingency, in the statistical sense, is the estimated percentage by which a calculated value may differ from its true or final value. The contingency allowance is used to account for those items of work (and their corresponding costs) that may not be readily apparent or cannot be quantified at the current level of design, such as unknown project scope items or a potential project change resulting from public or political issues, or environmental or technical requirements. For the purposes of this study, contingency is divided into two major categories, allocated and unallocated.

Allocated contingency was based on the level of design information available for individual items of work, as well as the relative difficulty in establishing unit prices for these items. The allocated contingency allowance, in the range of five percent to 35 percent, will be allocated according to FTA construction or procurement cost categories. The exact percentage selected for each cost category is based on processional judgment and experience related to the cost variability typically seen for items of work within a particular cost category.

Unallocated contingency is similar to allocated contingency in that it is primarily applied as an allowance for unknowns and uncertainties due to the level of project development completed. The major difference is that allocated contingencies are intended to address uncertainties in the estimated construction, right-of-way, and vehicle costs that typically occur as the amount of engineering and design information advances, while unallocated contingencies are typically much broader in nature and often address changes in the project scope and schedule. Unallocated contingency is calculated as 10 percent for all cost categories.

6.1.3 Professional Services

This cost category includes allowances for Preliminary Engineering, Final Design, project and construction management, agency program management, project insurance, surveys and testing, and start-up costs. These allowances are computed by applying a percentage to the total construction cost estimated for each cost category (excluding right-of-way and vehicle costs). Right-of-way and vehicle costs typically are calculated to include the management and administration costs associated with these activities and are therefore excluded from the calculation of professional services.

6.1.4 Capital Costs Assumptions

Key assumptions affecting the capital cost estimates are discussed below.

The capital costs presented represent the additional capital improvements needed to build and operate each alternative over the No Build.

The capital cost estimates were prepared with all costs expressed in 2008 dollars. Cost estimates were developed by identifying quantities from the Conceptual Engineering Drawings (Task 6.2, October 31, 2008).

The tunnel cost on a route foot basis was validated by the consultant team with a similar project just constructed in the Seattle area.

No Build: As part of the Metro Long Range Transportation Plan, a number of maintenance and operations improvements have been identified to support the operating scenarios presented. For the Purple and Red Metro Rail lines to provide the operations assumed in the No Build and TSM Alternatives, a complete re-evaluation of the Red/Purple Line operations was under taken by Metro staff. The improvements included in the Metro Long Range Transportation Plan are:

- Improvements to the North Hollywood Terminal by the addition of one cross-over and two 6-car tail tracks and one 6-car half-pocket track
- Division 20 Major Improvements (Red Line Yard) to establish a mainline turnaround including consideration of two mainline tracks east of the Red Yard Line to facilitate rapid and efficient turn around of the Red Line train sets and to allow Union Station to operate as a "through" station for operations.
- Complete the analysis of the potential track needs for inter-city and Metro rail transit projects on the West Bank of the Los Angeles River adjacent to the Red Line Yard.
- Upgrade of the train control system, communications system, and traction power system to support 2 to 2.5 minutes headways throughout the Purple/Red Lines.
- Add the ventilation systems to support the operating headways between the Hollywood/Highland station and the North Hollywood Station, including the construction of a new ventilation shaft between the Hollywood/Highland station and the Universal City station.

The estimated cost of these improvements is approximately $450 million in 2008 dollars. Note that because this cost is a part of the No Build Alternative and will be incurred regardless of which build alternative is selected, it is not included in the cost estimates for the Build alternatives.

Build Alternatives: For the BRT Alternative, it is assumed that the use of roadway rights-of-way controlled by local jurisdictions would be granted to the project at no cost, except for construction of new facilities and replacement or repair of existing facilities and utilities.

Procurement: The capital cost estimates assume traditional design-bid-build procurements, construction, and equipping for implementing the Build alternatives, although other means of project implementation could be used, such as design-build.

6.1.5 Capital Cost Estimates

Table 6-1 summarizes the capital costs for the TSM and each Build Alternative. Table 6-1 shows the increasing cost of the alternatives. HRT alternatives have higher capital costs than BRT alternatives due to the tunnels, continuous track, power, and signal systems required for HRT.

For the HRT alternatives the overall cost per mile varies between $475 million and $513 million per mile; a range of about 8 percent. The HRT alternatives that include a West Hollywood alignment in addition to a Wilshire alignment have higher capital costs per mile due to the increased ratio of stations per mile, the additional costs associated with a transfer station at Hollywood/Highland, and the greater cost of a connector structure at La Cienega and Wilshire where the two lines meet.

6.2 Operating and Maintenance Costs

6.2.1 Approach

Estimating operating and maintenance costs for an Alternatives Analysis involves two major steps: 1) development of operating plans and estimation of operating statistics for the transit mode included in each alternative, and 2) development of operating and maintenance cost models and their application to the operating statistics obtained in Step 1 to estimate the operating and maintenance costs for the new service. The operating statistics (e.g., vehicle hours, vehicle miles) are derived from the final operating plan for each service alternative after the equilibration step in the travel demand process. Equilibration is the step whereby the supply of transit service (number of vehicles operating and passenger carrying capacity provided in a given period) is balanced with the demand (number of passengers to be carried in a given period) as estimated using travel demand models. The final operating plan describes the level of service to be provided as part of each alternative, including peak and off-peak service for weekdays and weekends.

The estimating approach used for this study conforms to the FTA's most recently issued technical guidelines for transit alternatives analysis (*Procedures and Technical Methods for Transit Project Planning: Review Draft*, September 1986 and updates), to the extent possible at this stage of the planning process. In particular, the transit cost models use the resource buildup approach methodology recommended by FTA, and the cost models and fully allocated models. This means that they test the effects of system changes (such as expansions of the rail or bus system) on costs of all areas of the agency's operation and are capable of testing different levels of costs for many individual elements of the operation, including the wages and salaries of operators and maintenance personnel, costs for fringe benefits and fuel. The models, which are derived principally using National Transit Data, follow FTA's recommended approach of separating and classifying individual expense categories.

Public transportation in the corridor is provided by a variety of transit agencies, including Metro, Santa Monica Big Blue Bus, Culver City, Antelope Valley, LADOT, Santa Clarita, and West Hollywood.

The resulting operating and maintenance cost estimates were validated by comparing them to actual expenditures using recent Metro bus and light rail operation statistics. The O&M cost methodology and O&M cost estimates are found in the following two Metro documents: Capital & O&M Cost Methodology Reports (Task 6.6.1, August 11, 2008) and Operating and Maintenance Cost Estimate

Table 6-1. Capital Cost Estimates (2008 Dollars)

Cost Category Code	Cost Element	2008 Dollars (in Millions)						
		TSM	HRT ALT-1	HRT ALT-11 A	HRT ALT-11 B	HRT ALT-14	HRT ALT-16	BRT ALT-17
	Route Miles	N.A.	12.76	17.80	17.40	14.30	18.65	31.87
	No. of Stations	N.A.	11	16	16	13	17	28
10	Guideway	$0.0	$1,245.5	$1,702.3	$1,660.5	$1,383.0	$1,790.8	$247.2
20	Stations	$0.0	$1,274.3	$2,002.1	$2,000.4	$1,503.6	$2,031.6	$50.2
30	Support Facilities	$45.0	$120.3	$268.1	$257.8	$158.1	$295.6	$13.2
40	Sitework & Special Conditions	$0.0	$468.0	$697.0	$689.2	$541.9	$726.5	$209.4
50	Systems	$0.0	$208.8	$294.6	$289.7	$237.3	$309.9	$201.0
60	ROW, Land, Existing Improvements	$0.0	$408.8	$503.3	$503.3	$471.8	$524.3	$0.0
70	Vehicles	$62.4	$691.2	$1,128.2	$1,097.7	$803.0	$1,209.5	$24.9
80	Professional Services	$14.9	$1,094.6	$1,638.2	$1,616.2	$1,261.9	$1,701.0	$237.9
90	Unallocated Contingency	$12.2	$551.1	$823.4	$811.5	$636.1	$858.9	$98.4
100	Finance Charges	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
TOTAL Project Alternative Costs		**$134.4**	**$6,062.5**	**$9,057.2**	**$8,926.4**	**$6,996.7**	**$9,448.1**	**$1,082.3**
Average Cost ($M) per Mile		N.A.	$475.2	$508.9	$513.2	$489.4	$506.6	$34.0

Report (Task 6.6.3, September 22, 2008). These reports document the development of the operating and maintenance cost models and estimates, including documentation of the data sources.

The HRT and BRT Alternatives involve three elements affecting operating and maintenance costs: the costs of operating and maintaining the line haul HRT or BRT services, including vehicles; the cost of operating and maintaining the HRT or BRT facilities, including guideways, stations, and other physical components; and the changes in operating and maintenance costs from the adjustment of the local bus services along and across the corridor to reflect shifting ridership demand.

6.2.2 Operating and Maintenance Cost Assumptions

Metro is responsible for operation and maintenance of the Westside Transit Corridor Extension services and associated costs. Metro is also responsible for much of the additional bus service that comprises the bulk of the additional service operated under the TSM alternative.

Metro, LADOT, Santa Monica Big Blue Bus, and other transit operators in the corridor and surrounding regions will continue to be responsible for operations and maintenance of their bus and rail transit services and facilities, recognizing that some adjustments to service levels and routing (in the case of bus services) may result from implementation of the project.

The operating and maintenance cost estimates assume the current practice of operating and maintaining transit services would continue, although other means of operating and maintaining the services and facilities could be used.

The O&M costs reflect the expected operations planned in 2030 but are estimated in 2008 dollars consistent with FTA's procedures for measuring cost-effectiveness.

6.2.3 Operating and Maintenance Cost Estimates

Operating and maintenance cost estimates for each alternative were determined by multiplying the unit costs by the number of vehicles, hours and miles of service, and, in the case of HRT, the one-way track miles under each option. The fully burdened cost comes from adding the costs generated by these factors as well as the factors for the BRT guideway and an add-on cost for underground stations.

Table 6-2 summaries the O&M costs for each alternative by operator and within Metro by heavy rail, light rail, and bus operations. Table 6-3 summarizes the estimates increase in annual O&M costs over the No Build Alternative.

The Build HRT alternatives will require between $96 million (Alternative 1) and $167 million (Alternative 16) in additional Metro funding. This will represent between a 7 percent and 12 percent, respectively, over the increase in the estimated No Build operating and maintenance cost budget.

Table 6-2. Summary of Operating & Maintenance Costs (2008 Dollars)

Operators	Alternatives							
	No Build	TSM	HRT - Alt 1	HRT - Alt 11A	HRT - Alt 11B	HRT - Alt 14	HRT - Alt 16	BRT - Alt 17
Metro Heavy Rail	$117,089,183	$117,056,850	$213,804,104	$272,729,420	$271,219,102	$227,791,696	$284,915,464	$117,535,998
Metro Light Rail	$258,010,769	$258,001,858	$258,809,859	$258,788,104	$258,785,400	$258,684,861	$258,645,530	$258,017,038
Metro Bus	$987,918,525	$1,002,718,978	$986,856,197	$986,710,909	$986,714,398	$986,769,087	$986,655,672	$993,108,808
Subtotal Metro	**$1,363,018,477**	**$1,377,777,686**	**$1,459,470,160**	**$1,518,228,433**	**$1,516,718,900**	**$1,473,245,644**	**$1,530,216,666**	**$1,368,661,844**
Santa Monica	$75,739,423	$75,706,449	$75,524,267	$75,587,199	$75,588,853	$75,505,932	$75,571,150	$75,713,404
Culver City	$22,190,059	$22,190,078	$22,189,100	$22,189,122	$22,189,154	$22,189,178	$22,189,200	$22,189,235
Antelope Valley	$17,113,299	$17,113,277	$17,110,488	$17,111,146	$17,110,919	$17,110738	$17,111,463	$17,112,937
Los Angeles DOT	$61,167,338	$61,160,834	$61,175,325	$61,150,349	$61,150,052	$61,229,655	$61,151,931	$61,124,803
Santa Clarita	$19,245,787	$19,246,251	$19,258,883	$19,262,128	$19,260,853	$19,256,681	$19,257,840	$19,253,552
West Hollywood	$1,249,257	$1,249,257	$1,249,257	$1,249,257	$1,249,257	$1,249,257	$1,249,257	$1,249,257
Subtotal Municipals	**$196,705,163**	**$196,666,146**	**$196,507,320**	**$196,549,201**	**$196,549,088**	**$196,541,441**	**$196,530,841**	**$196,643,188**
Grand Total	**$1,559,723,640**	**$1,574,443,832**	**$1,655,977,480**	**$1,714,777,634**	**$1,713,267,988**	**$1,669,787,085**	**$1,726,747,507**	**$1,565,305,032**
Change Compared to No Build (Refer to Table 6-3)	**N.A.**	**$14,720,192**	**$96,253,840**	**$155,053,994**	**$153,544,348**	**$110,063,445**	**$167,023,867**	**$5,581,392**

Table 6-3. Change in Annual Operating & Maintenance Costs (2008 Dollars) Compared to No Build

Operators	Alternatives							
	No Build	TSM	HRT - Alt 1	HRT - Alt 11A	HRT - Alt 11B	HRT - Alt 14	HRT - Alt 16	BRT - Alt 17
Metro Heavy Rail	N.A	-$32,333	$96,714,921	$155,640,237	$154,129,919	$110,702,513	$167,826,281	$446,815
Metro Light Rail	N.A	-$8,911	$799,090	$777,335	$774,631	$674,092	$634,761	$6,269
Metro Bus	N.A	$14,800,453	-$1,062,328	-$1,207,616	-$1,204,127	-$1,149,438	-$1,262,853	$5,190,283
Subtotal Metro	N.A	$14,759,209	$96,451,683	$155,209,956	$153,700,423	$110,227,167	$167,198,189	$5,643,367
Santa Monica	N.A	-$32,974	-$215,156	-$152,224	-$150,570	-$233,491	-$168,273	-$26,019
Culver City	N.A	$19	-$959	-$937	-$905	-$881	-$859	-$824
Antelope Valley	N.A	-$22	-$2,811	-$2,153	-$2,380	-$2,561	-$1,836	-$362
Los Angeles DOT	N.A	-$6,504	$7,987	-$16,989	-$17,286	$62,317	-$15,407	-$42,535
Santa Clarita	N.A	$464	$13,096	$16,341	$15,066	$10,894	$12,053	$7,765
West Hollywood	N.A	$0	$0	$0	$0	$0	$0	$0
Subtotal Municipals	N.A	-$39,017	-$197,843	-$155,962	-$156,075	-$163,722	-$174,322	-$61,975
Grand Total	N.A	$14,720,192	$96,253,840	$155,053,994	$153,544,348	$110,063,445	$167,023,867	$5,581,392

6.3 Proposed Funding Sources

The Westside Extension Transit Corridor is a Tier 1 strategic project in Metro's draft Long Range Transportation Plan (LRTP). As such, it is a high priority project. The AA Study provides the criteria to select the most cost effective fixed guideway transit investment in the Westside Extension Corridor. The AA Study has been prepared in compliance with Federal Transit Administration (FTA) New Starts Program guidelines and standards. Selection of the candidate alternatives and initiation of the second phase of the study will lead to the selection of a cost-effective fixed guideway transit project in this highly congested, major transit corridor which will be competitive for federal funding. Further, it is a necessary step in securing a federal funding grant for the project.

A funding source is not currently identified for any of the proposed Westside Extension Transit Corridor Build Alternatives under consideration. No new revenue sources are assumed to be available over and above those local, state, and federal revenue sources that are currently obtainable or identified by law to become available. Only if Federal, State, or local funds increase, can projects (such as this one) and services be added in accordance with the available revenues and priorities of the Metro Board of Directors.

Most capital projects along with the operating and maintenance costs are funded through the following fund sources:

- Local Sales Tax Revenues
  - Proposition A
  - Proposition C
  - Measure R
  - Transportation Development Act
- Other Local Revenues
  - Bonds/Financing Mechanism (Proposition A and C Bonds)
  - City/County Contributions
  - Metro Fare Revenues
- State Revenues
  - Proposition 1B State Infrastructure Bonds
  - Proposition 42 Sales Tax on Gasoline Funds
  - Regional Improvement Program (RIP) Funds
  - State Transit Assistance (STA)
- Federal Revenues
  - Congestion Mitigation and Air Quality (CMAQ)
  - Section 5307 Urbanized Formula
  - Section 5309 Bus and Bus Facilities/Section 5308 Clean Fuel Program

- Section 5309 Fixed Guideway Modernization
- Section 5309 New Starts
- Surface Transportation Program (STP)

In addition to the above funding sources, Los Angeles County voters approved Measure R on November 4, 2008, a ½ percent increase in the local sales tax dedicated to transportation projects. This will provide funding for construction of a significant amount of the selected Westside Extension project and its operation. The project development process would require that the Metro Board of Directors also adopt the selected Westside Extension project into the fiscally constrained Metro Long Range Transportation Plan and recommend its inclusion in the Regional Transportation Plan. The Regional Transportation Plan is approved by the Southern California Association of Governments (SCAG) and is a requirement before Federal 5309 New Starts funding and other funding sources can be requested.

7.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

7.1 Introduction

This chapter presents the comparative analysis of the five build alternatives, plus No Build and Transportation System Management (TSM), carried forward from the initial screening process (see Chapter 2.0, Alternatives Considered for Early Scoping for a discussion of this process). The initial screening (Step 1, Screening Evaluation) evaluated a broad set of alternatives covering a range of alignment and modal alternatives. This evaluation reduced the initial set of 17 alternatives to five build alternatives, plus the No Build and TSM. The other alternatives considered in this evaluation were eliminated from further consideration due to their inability to meet the project's goals and objectives.

The alternatives remaining from the Step 1 Screening Evaluation and carried forward into the next step include:

- Bus Rapid Transit (Alternative 17);
- Wilshire Subway (Alternatives 1 and 14);
- Combined Wilshire/West Hollywood Subway (Alternatives 11 and 16); and
- No Build and TSM.

These alternatives were then evaluated on a more detailed level (Step 2, Detailed Evaluation). This analysis was conducted at a conceptual engineering level of detail, and relied on more specific performance measures as well as Federal Transit Administration (FTA) guidance to support the Metro staff recommendation of the alternatives to carry forward.

The analysis, the results of the analysis, and the recommendations are presented in this chapter.

7.2 Approach

Step 2 of the Evaluation Framework was used to evaluate the remaining alternatives during this analysis. This involved evaluating the alternatives on a conceptual engineering level and applying the established goals and objectives for this project to each alternative. Seven goals were identified for the Westside Extension Transit Corridor. These include (refer to ***Analysis Methodology Report, Task 2.5***):

Goal A – Mobility Improvement: The primary purpose of the project is to improve public transit service and mobility in the Westside Extension Transit Corridor. To evaluate the goal of Mobility Improvement, the analysis will examine how well each alternative improves the ability of residents and employees to reach desired destinations through the provision of high quality, convenient, and reliable east-west transit service throughout the Corridor.

Goal B – Transit Supportive Land Use Policies and Conditions: A major aspect of this goal is to locate transit alignments and stations in areas with existing land uses conducive to transit use or in those areas which have the greatest potential to develop transit supportive land uses.

Goal C – Cost-Effectiveness: This goal ensures that both the capital and operating costs of the project are commensurate with its benefits.

Goal D – Project Feasibility: The fourth goal is that the project be financially feasible, in other words, that funds for the construction and operation of the alternative be readily available in the sense that they do not place undue burdens on the sources of those funds. This goal also includes minimizing the risk associated with project construction.

Goal E – Equity: This goal evaluates project solutions based on how well costs and benefits are distributed fairly across different population groups with particular emphasis on serving transit dependent communities.

Goal F – Environmental Considerations: The sixth goal, Environmental Benefits, is to develop solutions which minimize impacts to environmental resources and communities within the study area.

Goal G – Public Acceptance: This goal aims to develop solutions that are acceptable to a reasonable portion of the public with special emphasis on residents and businesses within the study area.

Specific criteria and measures were developed for each goal as a means of assessing whether an alternative meets the goal. A comparative analysis among the alternatives was then conducted to determine how well each one performs against the others.

The results of this Step 2 analysis using these goals and objectives, and the specific evaluation criteria and performance measures developed for each goal, are provided in the following sections.

7.3 Mobility Improvement (Effectiveness)

This goal is intended to improve the ability of residents and employees to reach desired destinations through the provision of high quality, convenient, and reliable east-west transit service through the corridor.

Objectives for mobility improvement include:

- Reduce transit travel times
- Improve trip reliability
- Provide sufficient transit capacity to meet the transit demand in 2030 and beyond (expandability)
- Maximize potential transit ridership
- Enhance linkages to the transportation system as well as major trip attractors/generators within the corridor

7.3.1 Transit Travel Time Reduction

The reduction in transit travel times is measured through the calculation of travel time savings for each alternative. The measures used to calculate travel time savings include: (a) peak period travel times between major origin-destination (OD) pairs (in minutes; min); and b) average end-to-end transit operating speeds (miles per hour [mph]).

Table 7-1 below shows the comparison of peak period travel times among the alternatives. As seen in Table 7-1, the Combined Heavy Rail Transit (HRT) Subway has more instances of faster peak period travel times between major OD pairs than the other alternatives. The Wilshire Boulevard HRT Subway group of alternatives has the second most instances of faster peak period travel times between major OD pairs. The at-grade Bus Rapid Transit (BRT) alternative has the most instances of slower peak period travel times.

Table 7-1. Peak Period Travel Times (minutes) between Major Origin-Destination Pairs

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
A	1	a	**Transit Peak Period Travel Time (AM Peak) (minutes) – Between Del Mar Station (Gold Line) and:**								
			Century City	80	92	92	80	48	53	48	53
			Santa Monica/San Vicente (WeHo)	72	83	83	64	60	65	55	55
			Wilshire/Beverly (BH)	78	90	90	65	46	51	46	51
			Wilshire/Westwood (UCLA)	82	94	94	75	50	55	50	55
			4th/Wilshire (Santa Monica)	112	129	129	91	57	62	57	62
			Transit Peak Period Travel Time (AM Peak) (minutes) – Between Pershing Square Station (Red Line) and:								
			Century City	48	55	55	47	20	25	20	25
			Santa Monica/San Vicente (WeHo)	49	56	56	37	35	40	28	28
			Wilshire/Beverly (BH)	42	48	48	35	18	23	18	23
			Wilshire/Westwood (UCLA)	54	62	62	45	23	28	23	28
			4th/Wilshire (Santa Monica)	70	81	81	65	29	34	29	34
			Transit Peak Period Travel Time (AM Peak) (minutes) – Between Florence Station (Blue Line) and:								
			Century City	60	69	69	74	41	46	41	46
			Santa Monica/San Vicente (WeHo)	69	79	79	57	53	58	47	47
			Wilshire/Beverly (BH)	64	74	74	56	39	44	39	44
			Wilshire/Westwood (UCLA)	76	87	87	66	44	49	44	49
			4th/Wilshire (Santa Monica)	99	114	114	86	50	55	50	55
			Transit Peak Period Travel Time (AM Peak) (minutes) - Between Reseda Station (Orange Line) and:								
			Century City	72	83	83	66	66	71	45	45
			Santa Monica/San Vicente (WeHo)	83	95	95	57	77	82	41	41
			Wilshire/Beverly (BH)	80	92	92	71	64	69	58	58
			Wilshire/Westwood (UCLA)	59	68	68	71	68	73	47	47
			4th/Wilshire (Santa Monica)	97	112	112	86	75	80	54	54

Table 7-1. Peak Period Travel Times (minutes) between Major Origin-Destination Pairs (continued)

PERFORMANCE MEASURES				ALTERNATIVES							
							BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	Today	No Build	TSM	17	1	14	11	16
			Transit Peak Period Travel Time (AM Peak) (minutes) - Between Covina Station (Metrolink) and:								
			Century City	94	108	108	92	67	72	67	72
			Santa Monica/San Vicente (WeHo)	99	114	114	87	79	84	69	69
			Wilshire/Beverly (BH)	98	113	113	82	65	70	65	70
			Wilshire/Westwood (UCLA)	99	114	114	93	69	74	69	74
			4th/Wilshire (Santa Monica)	119	137	137	108	76	81	76	81
			Transit Peak Period Travel Time (AM Peak) (minutes) - Between Wilshire/Western Station (Purple Line) and:								
			Century City	35	40	40	34	10	15	10	15
			Santa Monica/San Vicente (WeHo)	30	35	35	30	22	27	17	22
			Wilshire/Beverly (BH)	23	26	26	19	8	13	8	13
			Wilshire/Westwood (UCLA)	36	41	41	31	13	18	13	18
			4th/Wilshire (Santa Monica)	51	59	59	47	19	24	19	24
			Transit Peak Period Travel Time (AM Peak) (minutes) - Between North Hollywood Station (Red Line) and:								
			Century City	58	67	67	35	39	44	26	26
			Santa Monica/San Vicente (WeHo)	51	59	59	26	51	56	18	18
			Wilshire/Beverly (BH)	49	56	56	45	37	42	25	25
			Wilshire/Westwood (UCLA)	61	70	70	43	42	47	29	29
			4th/Wilshire (Santa Monica)	77	89	89	55	48	53	35	35

As seen in Figure 7-1 and Table 7-2, the Wilshire Boulevard HRT and the Combined HRT along Wilshire Boulevard with no deviation (Alternatives 1 and 11) have the fastest average end-to-end transit operating speeds at 32 mph. Alternatives 14 and 16 between Union Station/Downtown and 4th/Wilshire in Santa Monica take approximately five more minutes. The at-grade BRT alternative is the slowest at 16 mph.

7.3.2 Trip Reliability Improvement

Trip reliability improvement is another objective of mobility improvement. The measures used to evaluate trip reliability improvement include: (a) the percentage of the transit alignment operating in mixed flow traffic by type of operation; and (b) the number of transfers between major OD pairs.

Trip time reliability describes how much the travel time for a particular trip may vary from day to day. This variability is due in most part to the levels of congestion on the route, with high levels of congestion generally making trip times more variable. An additional factor in reliability is transfers, which are typically assumed to decrease transit reliability.

Figure 7-1. Average End-to-End Transit Operating Speeds (mph)
between Union Station (Downtown) and 4th/Wilshire (Santa Monica)

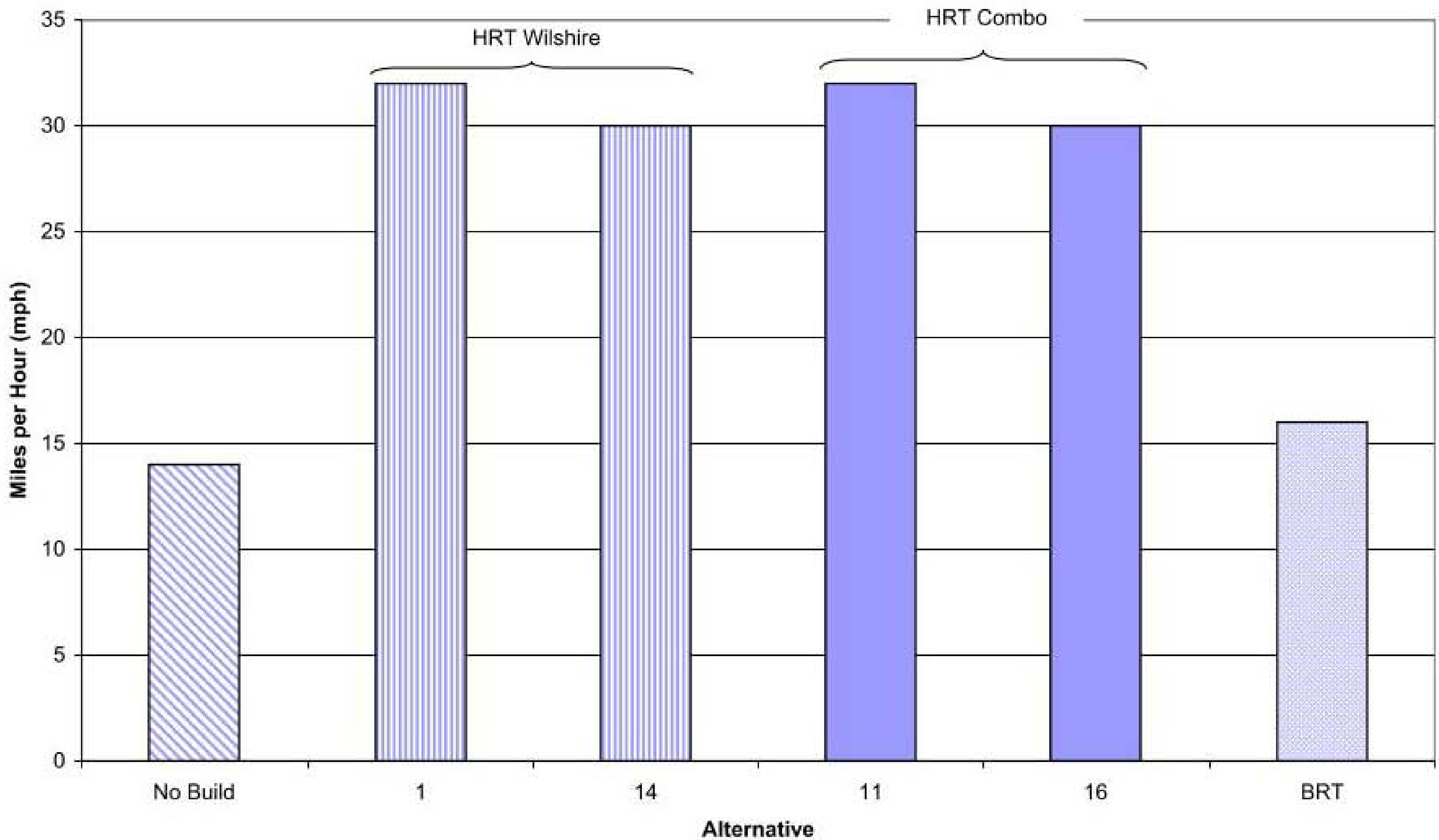


Table 7-2. Average End-to-End Transit Operating Speeds (mph)

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
A	1	b	Avg end to end transit operating speed in mph (Between Union Station/Downtown and 4th/Wilshire, SM)	14	12	12	16	32	30	32	30

Note: Some alternatives (11, 16) require transfer(s) to travel between Union Station and Santa Monica

As seen in Table 7-3, the percentage of transit alignment operating in mixed flow traffic was analyzed by type of operation. Types of operation include completely grade separated (continuity of the transit alignment over or under a cross street), transit pre-emption (signal timing at intersections is interrupted to accommodate transit vehicles), transit priority (signal phasing is adjusted to give priority to transit vehicles without interrupting the overall traffic signal timing plan), or no transit priority (transit vehicles are treated the same as all the other traffic). The percentage of transit alignment operating in mixed flow traffic by operation type is zero in the HRT alternatives because they are all grade-separated. Thus, it is inferred that these alternatives have higher transit reliability than that of the at-grade BRT alternative, which operates in 100 percent mixed-flow traffic but in a dedicated curb lane. Higher transit reliability means that the effectiveness and efficiency of the facility is maximized due to on-time performance.

Table 7-3. Percentage of Transit Alignment Operating in Mixed Flow Traffic

PERFORMANCE MEASURES				ALTERNATIVES						
Goal	Objective	Measure	Criteria	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
						17	1	14	11	16
A	2	a	% of transit alignment operating in mixed flow traffic by operation type	100	100	100	0	0	0 (transfer)	0 (transfer)

As seen in Table 7-4, the Combined HRT Subway alternative has somewhat fewer instances of transfers based on the selected OD pairs.

Table 7-4. Number of Transfers between Select Origin-Destination Pairs

PERFORMANCE MEASURES				ALTERNATIVES					
							BRT	Wilshire HRT	Combined HRT
Goal	Objective	Measure	Criteria	Today	No Build	TSM	17	1 / 14	11 / 16
A	2	b	**Transfers Required (AM Peak) - Between Del Mar Station (Gold Line) and :**						
			Century City	1	1	1	1	1	1
			Santa Monica/San Vicente (WeHo)	1	1	1	2	2	2
			Wilshire/Beverly (BH)	1	1	1	2	1	1
			Wilshire/Westwood (UCLA)	1	1	1	2	1	1
			4th/Wilshire (Santa Monica)	1	1	1	2	1	1
			Transfers Required (AM Peak) - Between Pershing Square Station (Red Line) and :						
			Century City	0	0	0	1	0	0
			Santa Monica/San Vicente (WeHo)	0	0	0	1	1	1
			Wilshire/Beverly (BH)	0	0	0	0	0	0
			Wilshire/Westwood (UCLA)	0	0	0	0	0	0
			4th/Wilshire (Santa Monica)	0	0	0	0	0	0
			Transfers Required (AM Peak) - Between Florence Station (Blue Line) and :						
			Century City	1	1	1	2	1	1
			Santa Monica/San Vicente (WeHo)	1	1	1	2	2	2
			Wilshire/Beverly (BH)	1	1	1	1	1	1
			Wilshire/Westwood (UCLA)	1	1	1	1	1	1
			4th/Wilshire (Santa Monica)	1	1	1	1	1	1
			Transfers Required (AM Peak) - Between Reseda Station (Orange Line) and:						
			Century City	1	1	1	2	2	1
			Santa Monica/San Vicente (WeHo)	2	2	2	2	3	1
			Wilshire/Beverly (BH)	2	2	2	3	2	1
			Wilshire/Westwood (UCLA)	1	1	1	2	2	1
			4th/Wilshire (Santa Monica)	2	2	2	2	2	1
			Transfers Required (AM Peak) - Between Covina Station (Metrolink) and:						
			Century City	1	1	1	2	1	1
			Santa Monica/San Vicente (WeHo)	1	1	1	2	2	2
			Wilshire/Beverly (BH)	1	1	1	2	1	1
			Wilshire/Westwood (UCLA)	2	2	2	2	1	1
			4th/Wilshire (Santa Monica)	2	2	2	2	1	1

Table 7-4. Number of Transfers between Select Origin-Destination Pairs (continued)

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
			Transfers Required (AM Peak) - Between Wilshire/Western Station (Purple Line) and:								
			Century City	1	1	1	1	0		0	
			Santa Monica/San Vicente (WeHo)	1	1	1	1	1		1	
			Wilshire/Beverly (BH)	0	0	0	0	0		0	
			Wilshire/Westwood (UCLA)	0	0	0	0	0		0	
			4th/Wilshire (Santa Monica)	0	0	0	0	0		1	
			Transfers Required (AM Peak) - Between North Hollywood Station (Red Line) and:								
			Century City	1	1	1	1	1		1	
			Santa Monica/San Vicente (WeHo)	1	1	1	1	2		1	
			Wilshire/Beverly (BH)	1	1	1	2	1		1	
			Wilshire/Westwood (UCLA)	1	1	1	1	1		1	
			4th/Wilshire (Santa Monica)	1	1	1	1	1		1	

7.3.3 Expandability

Providing sufficient transit capacity to meet the transit demand of 2030 and beyond is another objective of mobility improvement. Transit capacity is the criteria used to address this objective. The measures used to evaluate expandability include: (a) (maximum) capacity of new east-west transit service (e.g., transit vehicle capacity - maximum person throughput per hour); and (b) assessing the potential for expandability beyond 2030 (e.g., station facility capacity limitations; on-street lane capacity limitations; mode/technology/alignment conducive to future system expansion).

Table 7-5 provides typical transit capacity by mode.

Table 7-5. Typical Transit Capacity by Mode

Transit Mode	Capacity (passengers per hour, one direction)
HRT	18,000
Light Rail Transit (LRT)	9,000
Monorail	9,000
BRT	3,000

As seen in Figure 7-2 and Table 7-6, the greatest estimated (maximum) capacity of new east-west transit service is among the Wilshire HRT Subway and the Combined HRT Subway groups of alternatives. The estimated capacity for these groups of alternatives is 18,000 passengers per hour in one direction. These alternatives also have the potential for expandability beyond 2030, depending on future system expansion and routing needs.

Table 7-6. Provide Sufficient Transit Capacity

PERFORMANCE MEASURES				ALTERNATIVES								
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
A	3	a	Estimated maximum capacity (in thousands) of new EW transit service (Passengers per hour) (Assuming 18 trains per hour or 30 buses per hour)	N.A	3	3	3	18	18	18	18
A	3	b	Potential for capacity expansion beyond 2030	L	L	L	Md	H	H	H	H

* L = Low; M = Medium; Md = Moderate; H = High

The BRT has the least estimated capacity with 3,000 passengers per hour in one direction and a moderate potential for future expandability. The maximum future capacity of a BRT system is 6,000 passengers per hour per direction (based on headways of one bus per minute).

7.3.4 Transit Ridership Maximization

Maximizing potential transit ridership is another objective of mobility improvement. Ridership is the criteria used to address this objective. Measures used to evaluate transit ridership maximization include: (a) the number of residents/population density within 1/2 mile of proposed alignment; (b) the number of jobs/employment density within 1/2 mile of proposed alignment; (c) the ability of the transit service to reach transit-dependent populations; and (d) the ability of transit services to provide competitive speeds to the automobile for key origin-destination pairs (average peak period speeds). Table 7-7, Figure 7-3, Figure 7-4, and Figure 7-5 illustrate the forecasted ridership for each alternative by showing the change in daily transit trips as compared to the No Build alternative, the change in urban rail boardings as compared to the No Build alternative, and the number of "new stations" urban rail boardings.

Table 7-7. Transit Ridership

PERFORMANCE MEASURES	ALTERNATIVES						
Criteria	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
			17	1	14	11	16
Daily New Transit Trips (Change from No Build) in thousands	N.A.	1.7	13.8	39.3	37.0	47.8	44.9
Change in Urban Rail Boardings (Change from No Build) in thousands	N.A.	-0.8	13.3	95.5	88.3	117.0	109.0
"New Stations" Urban Rail Boardings in thousands	0	0	0	61.5	59.9	80.0	77.1

Figure 7-2. Estimated Maximum Capacity of New EW Transit Service
Assuming 18 trains per hour or 30 buses per hour

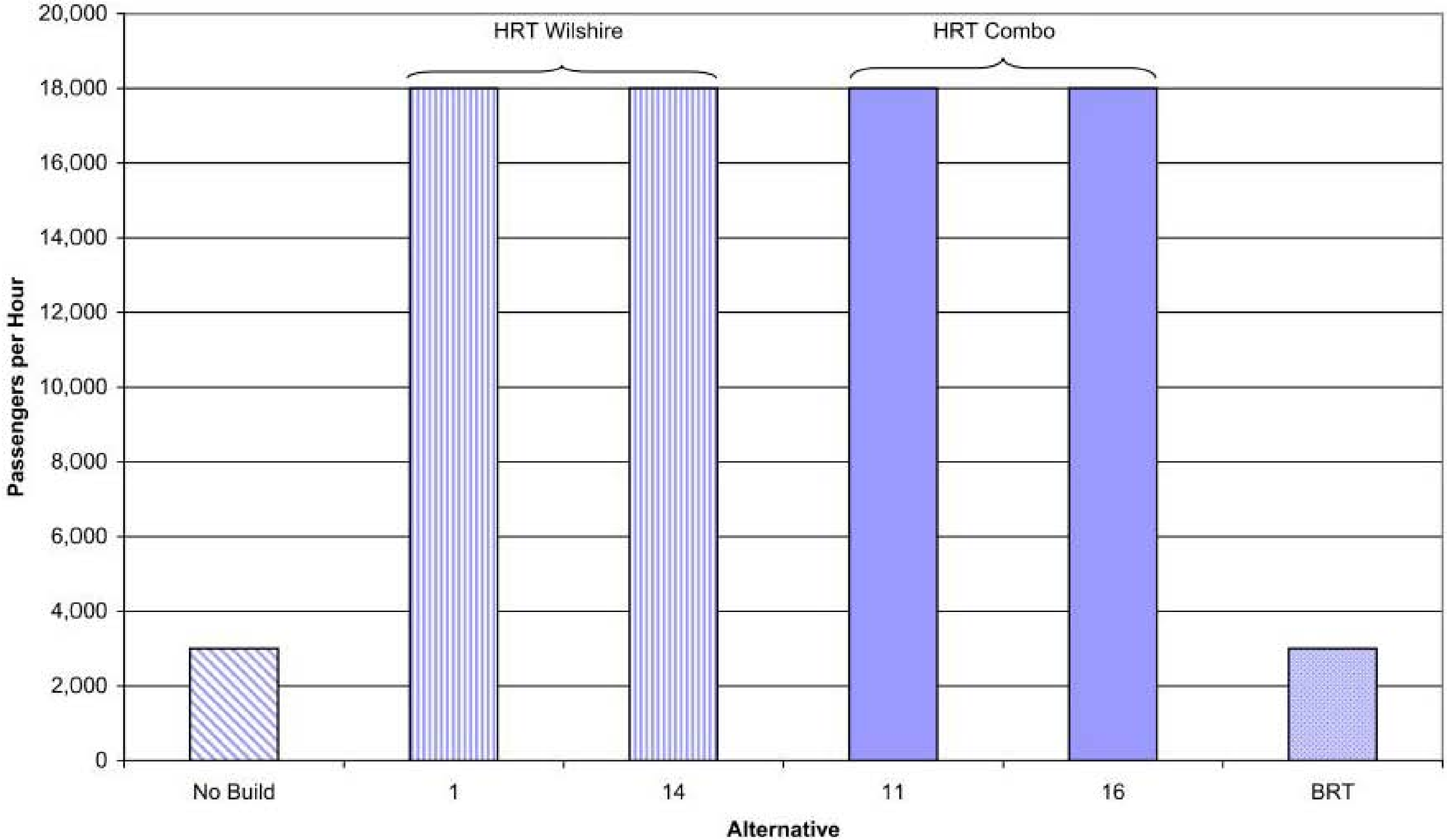


Figure 7-3. Daily New Transit Trips (As compared to No Build)

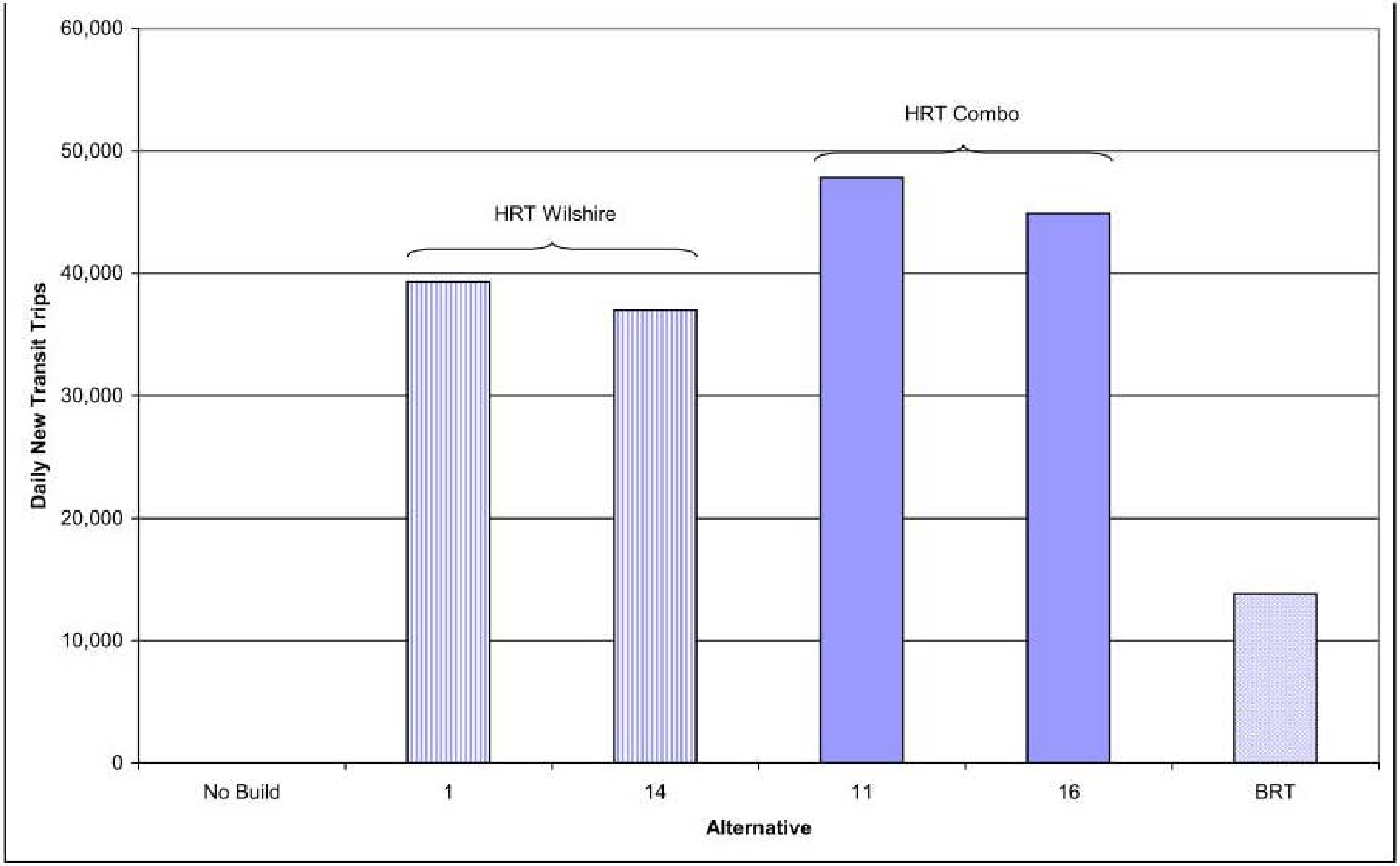


Figure 7-4. Change in Urban Rail Boardings (As compared to No Build)

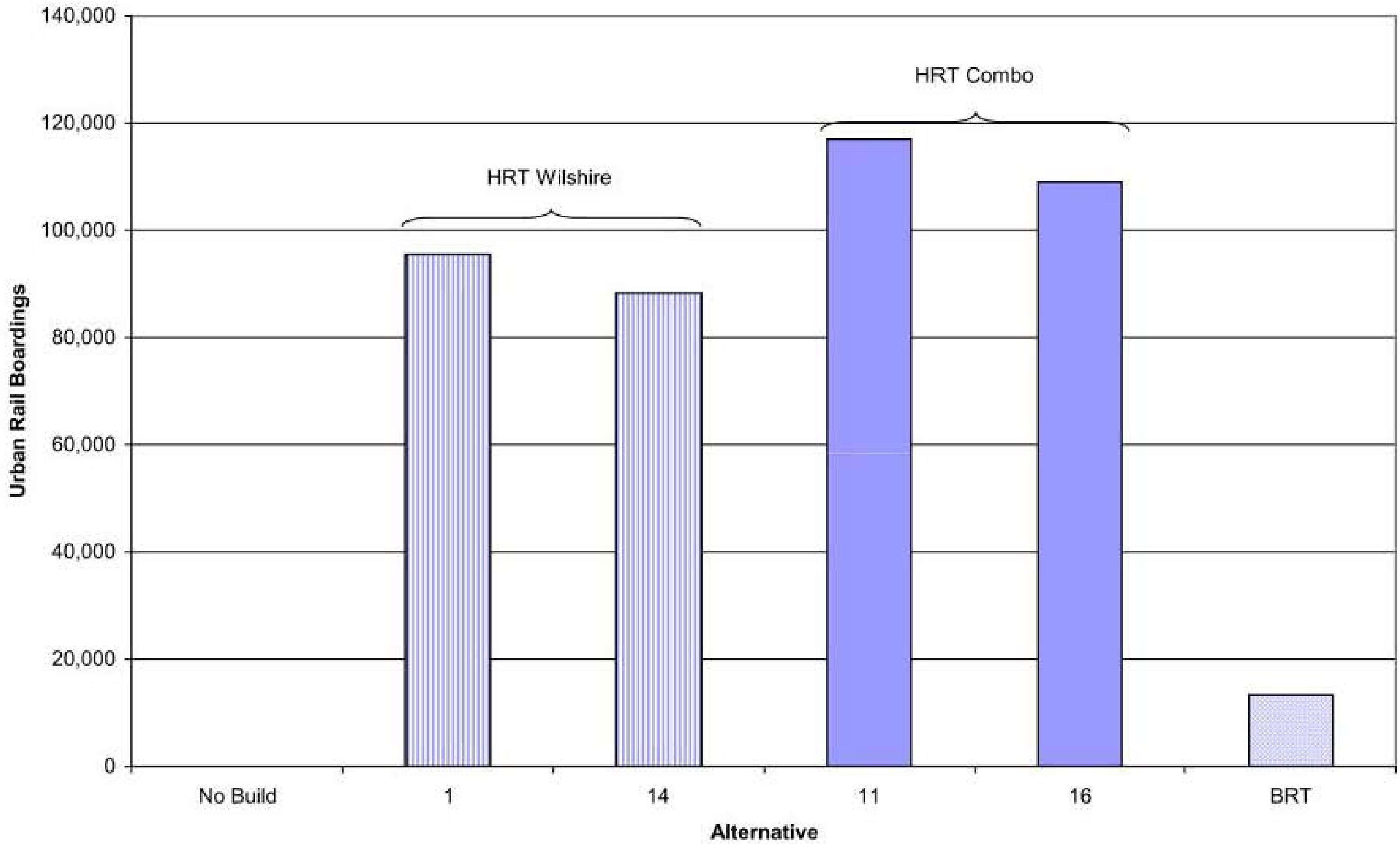
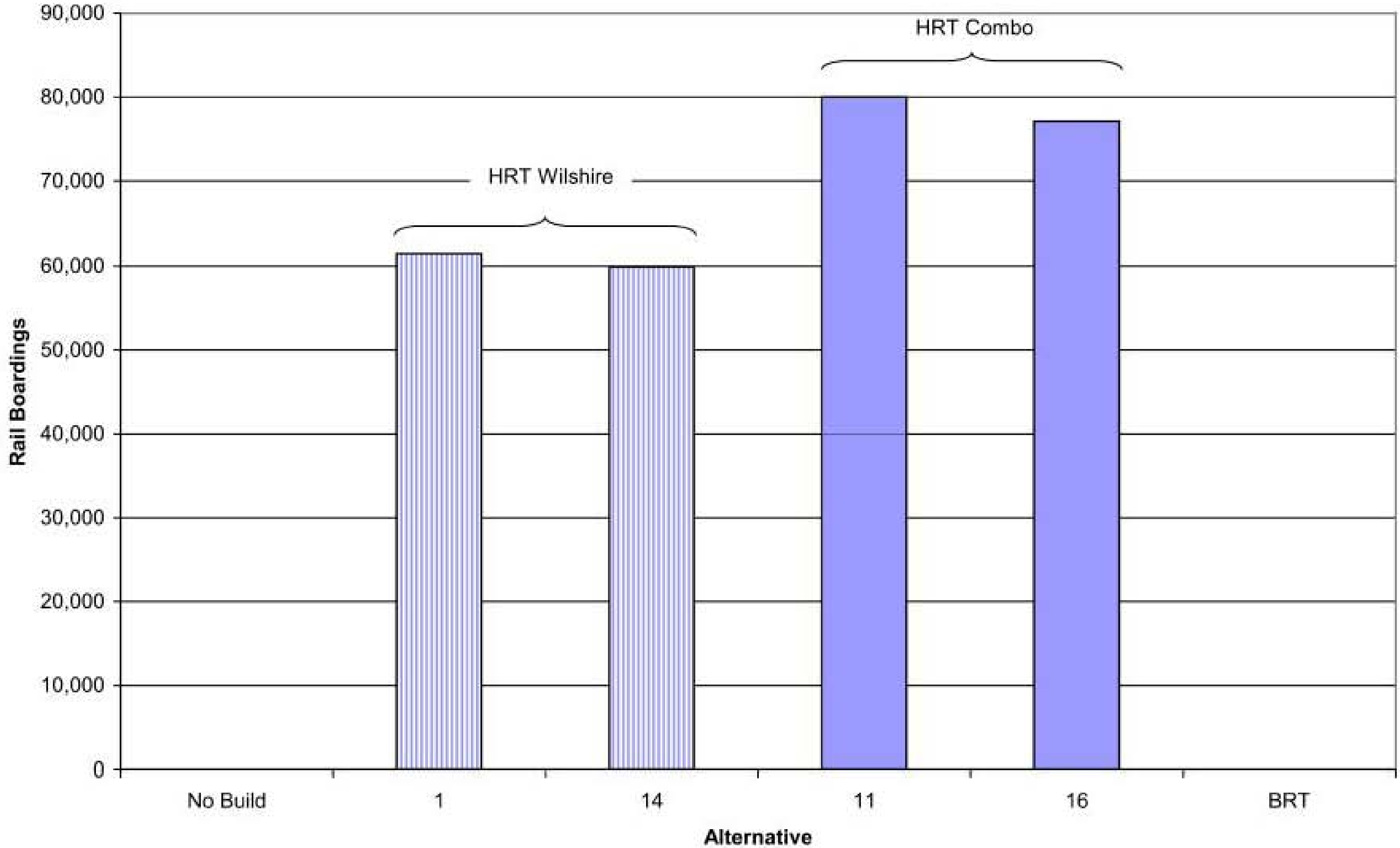


Figure 7-5. "New Stations" Urban Rail Boardings



7.3.4.1 Population

Population and population density are measures to evaluate the ability of an alternative to maximize transit ridership; the closer an alternative is to population centers and higher population densities, the more an alternative has the opportunity to attract and maximize ridership.

The Westside Extension Study Area is one of the densest areas in Los Angeles County. Population forecasts for the study area show an increase in population density within a 1/2 mile of the proposed alignments. By the year 2030, the population of Los Angeles County is projected to increase by roughly 22 percent. Population within the Study Area is projected to increase by 11 percent.

Population concentrated within a 1/2 mile of the proposed alternatives makes up a significant share of density within the Study Area as a whole. The population density of the Study Area in 2005 was roughly 13,300 persons per square mile; that number is projected to increase to almost 14,700 by the year 2030. In comparison, projections for the year 2030, suggest that population densities within a 1/2 mile of proposed alternatives range between 13,800 and 18,500 residents per square mile. This suggests that the alternatives under evaluation will capture some of the highest population densities within the Study Area, if not the county as a whole.

By the year 2030, the Wilshire HRT alternatives (Alternatives 1 and 14) would capture the highest levels of population densities (over 18,000 and 17,900 people per square mile, respectively). The Combined HRT alternatives (Alternatives 11 and 16) would both capture 17,700 persons per square mile. The one BRT alternative under evaluation (Alternative 17) would capture the lowest level of population density within the Study Area. Table 7-8, Figure 7-6, and Figure 7-7 provide a comparison of current and projected population and population density for each alternative under evaluation within the PSA. Figure 7-8 illustrates the link between population and employment density and ridership.

Table 7-8. Population and Population Density within ½ Mile of the Alignment

PERFORMANCE MEASURES				ALTERNATIVES						
Goal	Objective	Measure	Criteria	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
						17	1	14	11	16
A	4	a	**Population/Pop density within1/2 mile of each alignment (in thousands)**							
			2005/6 Population within 1/2 mile of Alignment	N.A.	N.A	305	195	204	275	277
			2030 Population within 1/2 mile of Alignment	N.A.	N.A	336	216	225	303	302
			2005/6 Average Population Density per Square Mile within 1/2 mile of Alignment	N.A.	N.A	12.5	16.5	16.2	16.1	16.3
			2030 Average Population Density per Square Mile within 1/2 mile of Alignment	N.A.	N.A	13.8	18.3	17.9	17.7	17.7

Figure 7-6. 2005/06 and 2030 Population within ½ mile of Alignment

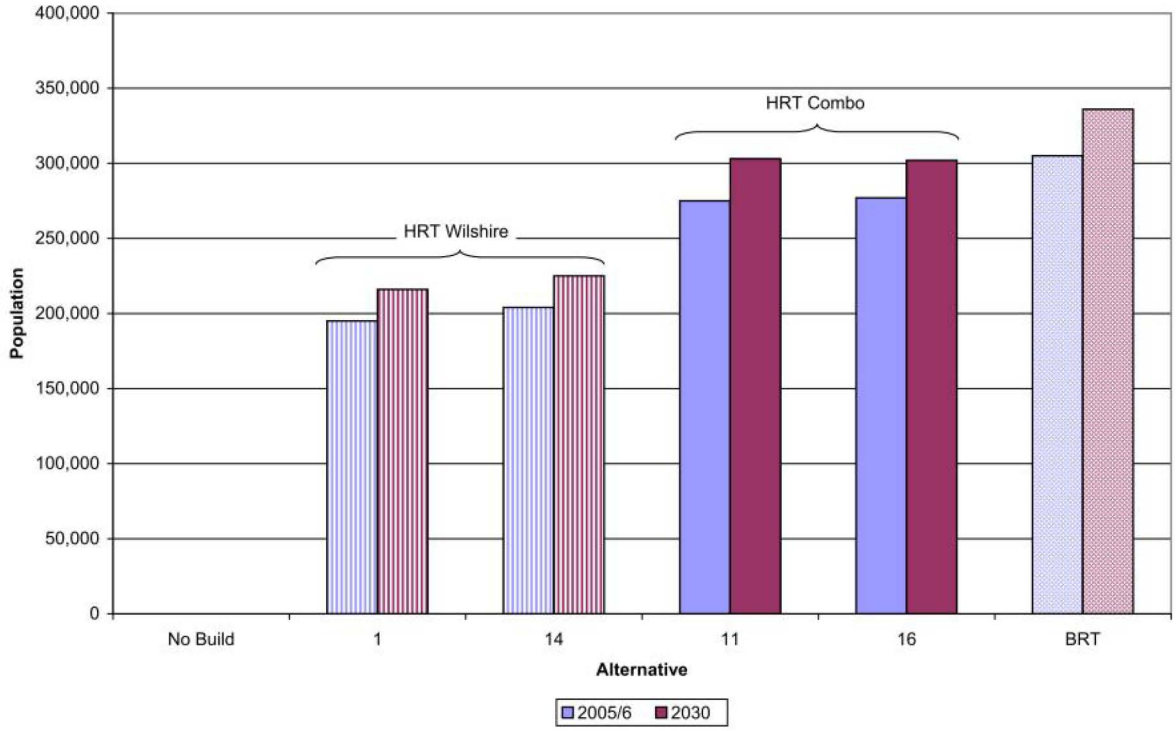


Figure 7-7. 2005/06 and 2030 Average Population Density per Square Mile within ½ Mile of the Alignment

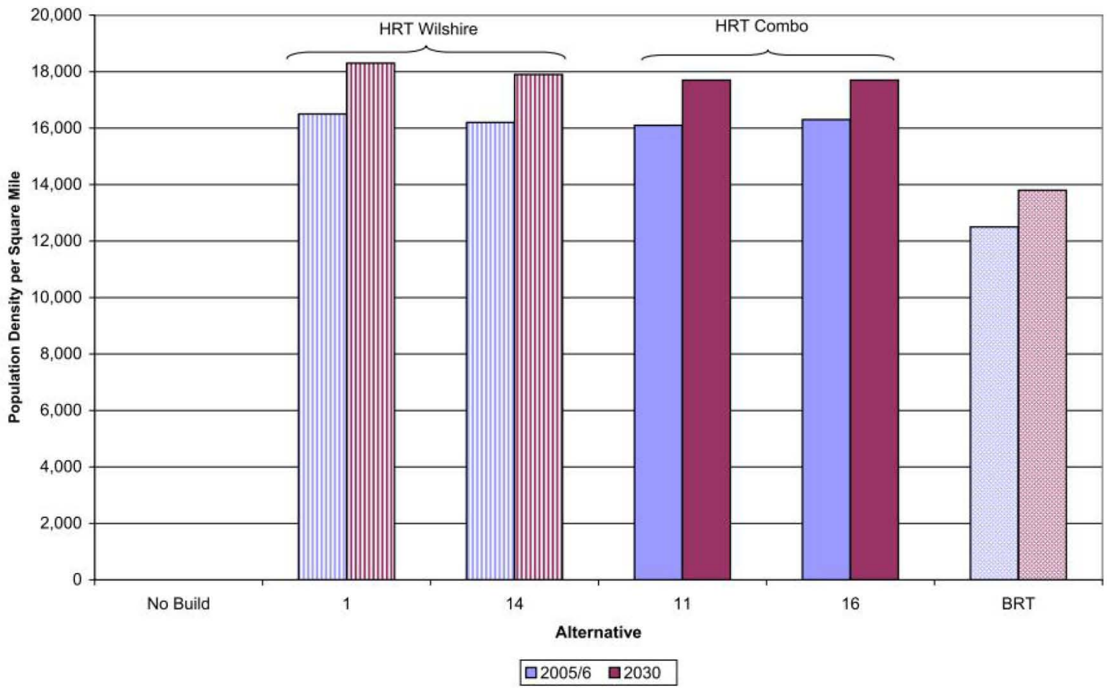
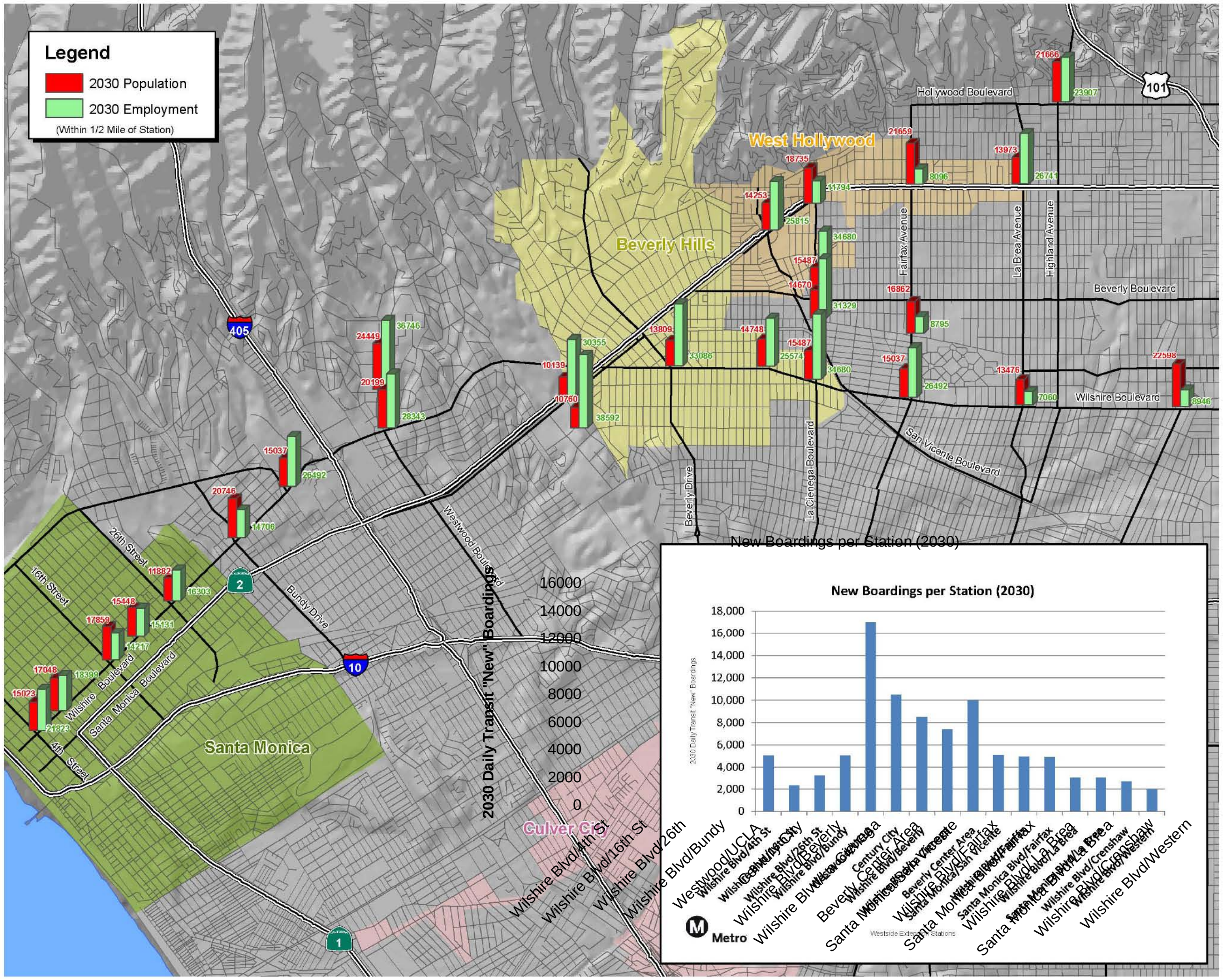


Figure 7-8. Population and Employment Densities Drive Ridership



7.3.4.2 Employment

Employment and employment density are additional measures to evaluate the ability of an alternative to maximize transit ridership; the closer an alternative is to employment centers and higher employment densities, the more an alternative has the opportunity to attract and maximize ridership.

The Westside Extension Study Area captures a significant share of regional employment. There are a number of employment centers within the Study Area, specifically near Mid-Wilshire, Hollywood, Century City, Westwood, and Santa Monica. In 2005, the number of employees in the study area constituted 10 percent of all employment within L.A. County. By the year 2030, the Study Area will grow to include approximately 82,000 additional employees.

Over the next 25 years employment density is projected to grow in the Study Area. In 2005, employment density within the study area was about 12,600 employees per square mile. By 2030, this number is expected to increase to almost 14,800. The Wilshire HRT and the Combined HRT Alternatives are projected to capture the highest levels of employment density, with over 21,000 employees per square mile for Alternatives 1 and 14, and around 20,000 employees per square mile for Alternatives 11 and 16 (see Table 7-9, Figure 7-9, and Figure 7-10). The BRT Alternative (Alternative 17) captures the least amount, with 15,900 employees per square mile.

Table 7-9. Employment and Employment Density within ½ Mile of the Alignment

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17*	1	14	11	16
A	4	b	**Employment/Employment Density within 1/2 mile of Each Alignment (in thousands)**							
			2005/6 Employment within 1/2 mile of Alignment	N.A.	N.A	332	221	235	293	293
			2030 Employment within 1/2 mile of Alignment	N.A.	N.A	387	258	274	342	334
			2005/6 Average Employment Density per Square Mile within 1/2 mile of Alignment	N.A.	N.A	13.6	18.7	18.7	17.1	17.2
			2030 Average Employment Density per Square Mile within 1/2 mile of Alignment	N.A.	N.A	15.9	21.9	21.8	20.0	19.7

* Removes 2 lanes of traffic

Figure 7-9. 2005/06 and 2030 Employment within ½ Mile of Alignment

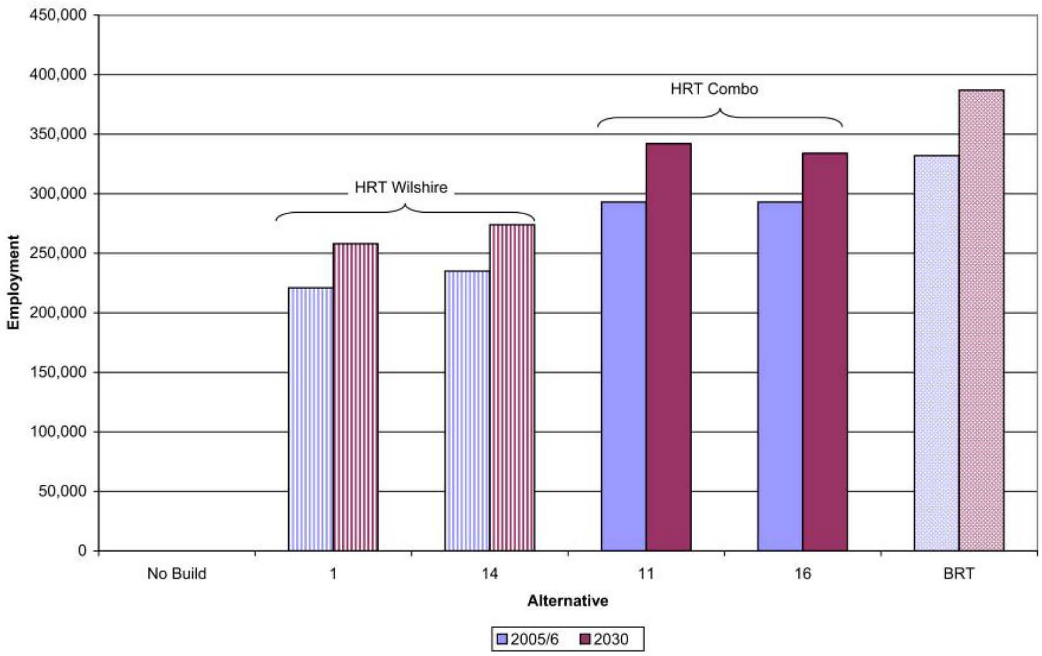
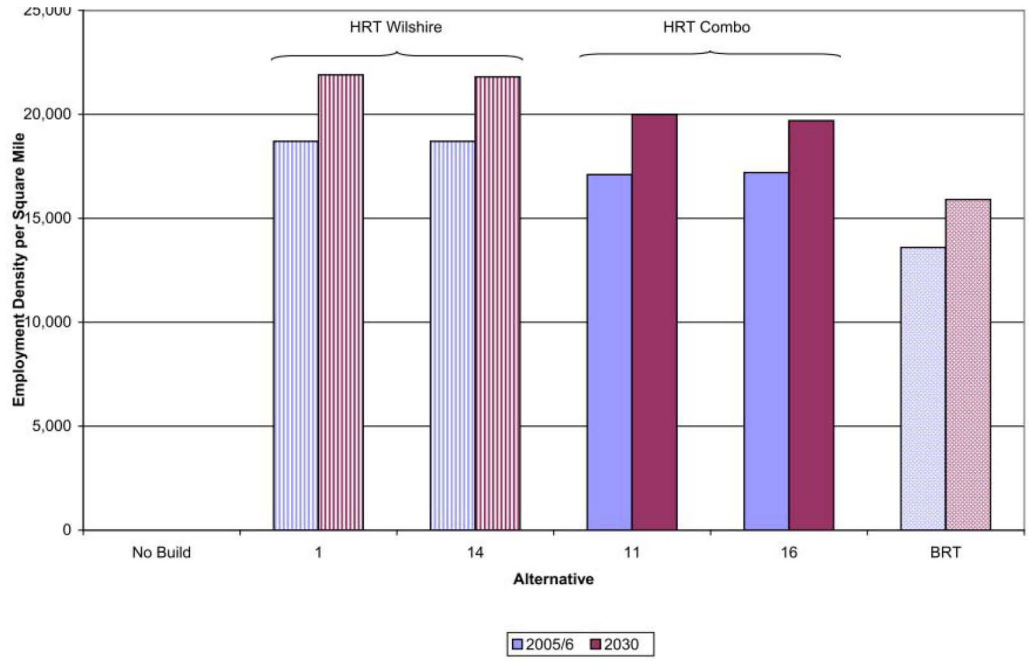


Figure 7-10. 2005/06 and 2030 Average Employment Density
per Square Mile within ½ Mile of Alignment



7.3.4.3 Transit Dependent Populations

The location of transit-dependent populations is another measure of the potential for transit ridership to be maximized; the closer an alternative is to those individuals who are dependent upon transit, the more an alternative has the opportunity to attract those riders and maximize overall transit ridership.

The following series of maps illustrates characteristics associated with transit dependent populations including: age distribution, low income households, individuals who report using public transportation to work, and the number of vehicles per household.

Figure 7-11 and Figure 7-12: Age Distribution- the young and elderly generally do not drive personal vehicles and, therefore, rely more on public transit. The following maps illustrate the concentration of residents (Figure 7-11) under the age of 18 and (Figure 7-12) over the age of 65.

Figure 7-13 and Figure 7-14: Low Income Households- lower income households are more likely to rely on public transportation as a primary mode of transportation. (Figure 7-13) 2005 and (Figure 7-14) 2030. See also Table 7-10.

Table 7-10. Number of Low Income Households within ½ Mile of Alternatives *

PERFORMANCE MEASURES				ALTERNATIVES						
Goal	Objective	Measure	Criteria	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
						17	1	14	11	16
A	4	c	Number of low income HH within 1/2 mile of each alternative (in thousands)	39.8	39.8	39.8	18.7	18.6	25.9	26.0

*Total number of households identified as low income by US Census Bureau, Federal Poverty Status

Figure 7-15: Public Transportation Commuters- the census identifies individuals who report using public transportation as their primary mode of transportation to work.

Table 7-11 and Figure 7-16: Zero Car Households- the census provides data on households that report not owning a vehicle. These households are more likely to rely on public transportation as their primary mode of travel.

Table 7-11. Competitive Speeds

PERFORMANCE MEASURES				ALTERNATIVES						
Goal	Objective	Measure	Criteria	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
						17	1	14	11	16
A	4	d	Ability for transit to be competitive with the auto in speed for key OD pairs	C	C	C	S	S	S	S

** C = Comparable Speed to Auto, Transfers Req.; S = Much Higher Speed than Auto,

Figure 7-11. Age Distribution - Age 18 and Under (2000 Census)

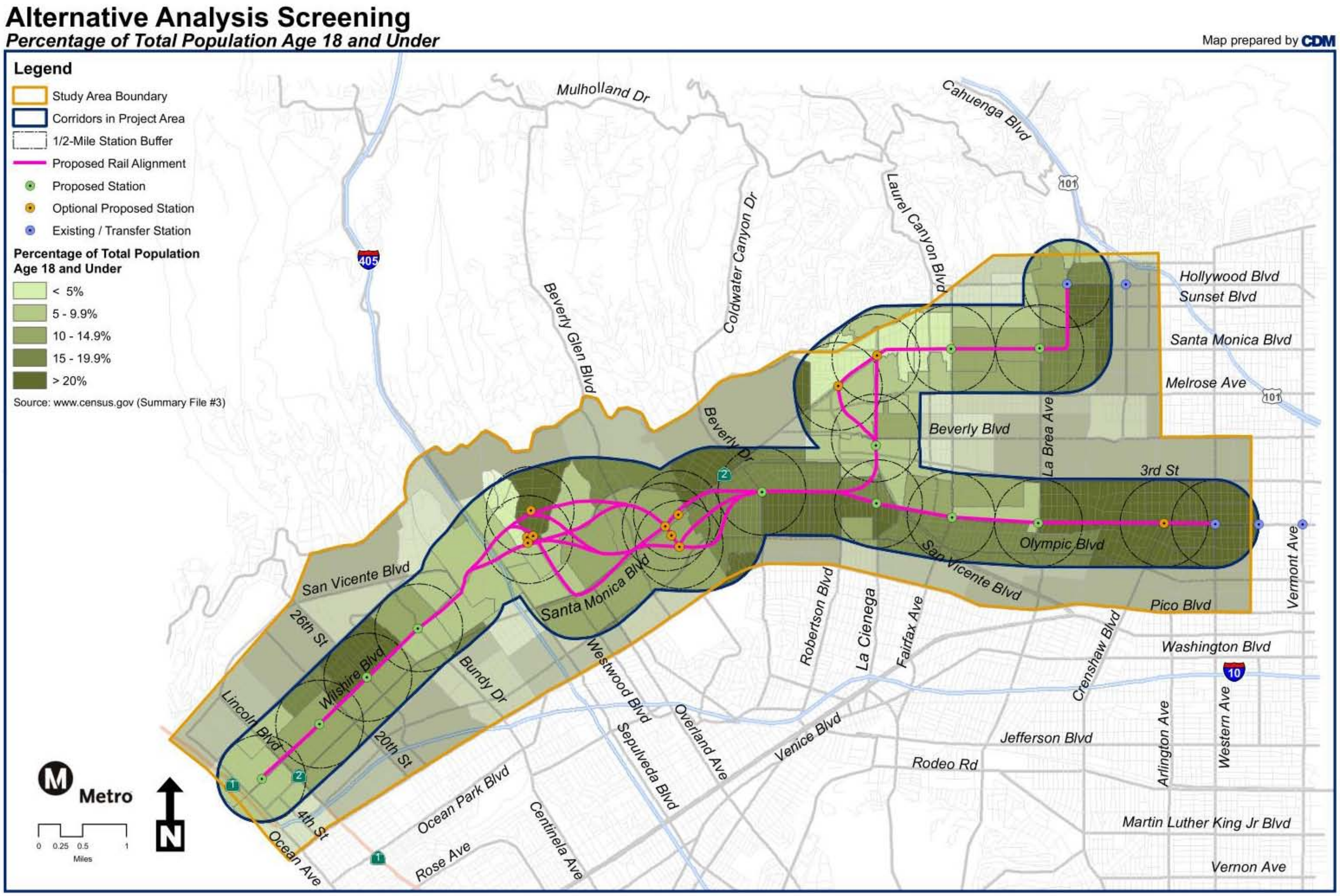


Figure 7-12. Age Distribution - Age 65 and Older (2000 Census)

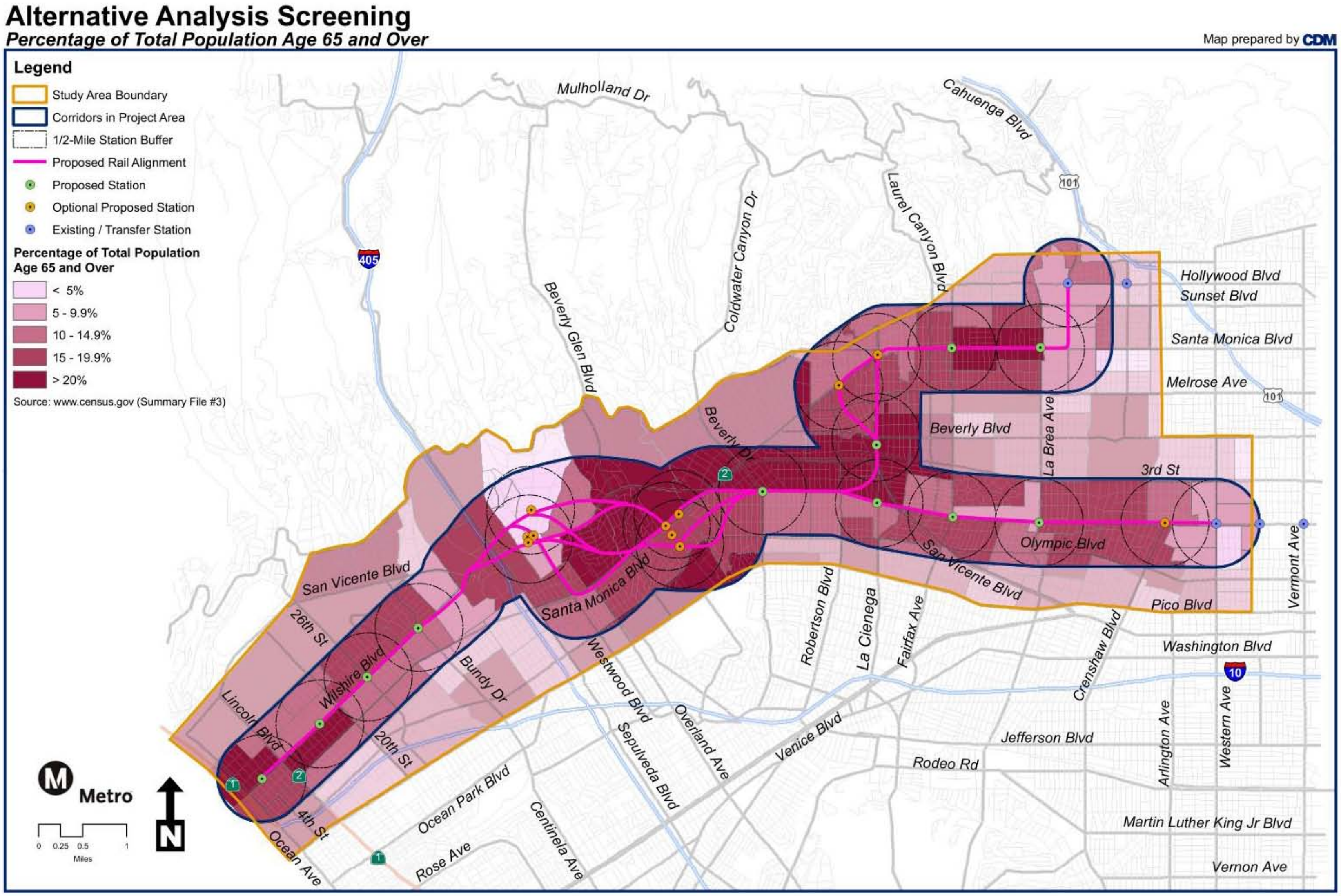
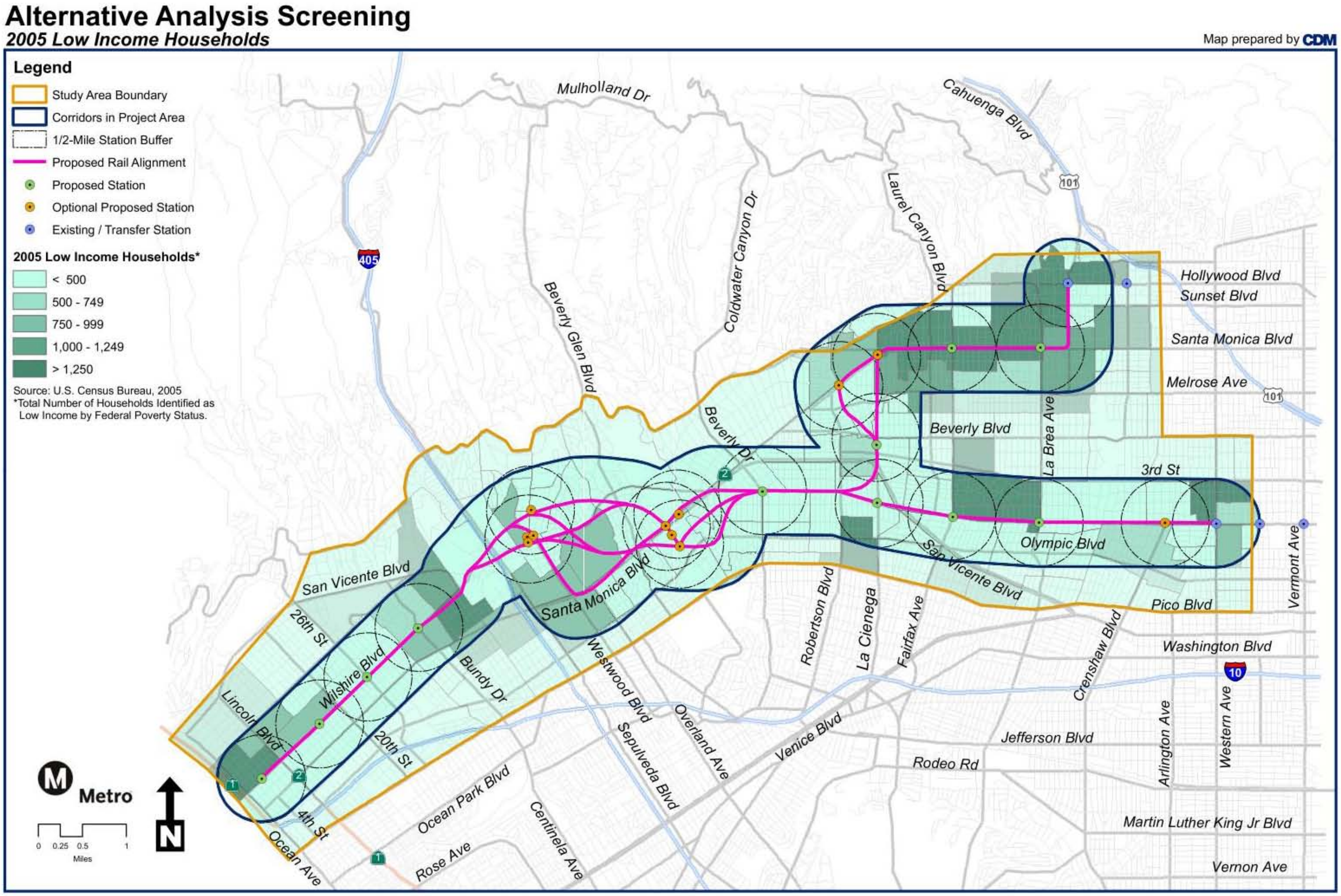


Figure 7-13. 2005 Low Income Households



WESTSIDE EXTENSION TRANSIT CORRIDOR STUDY

Figure 7-14. 2030 Low Income Households

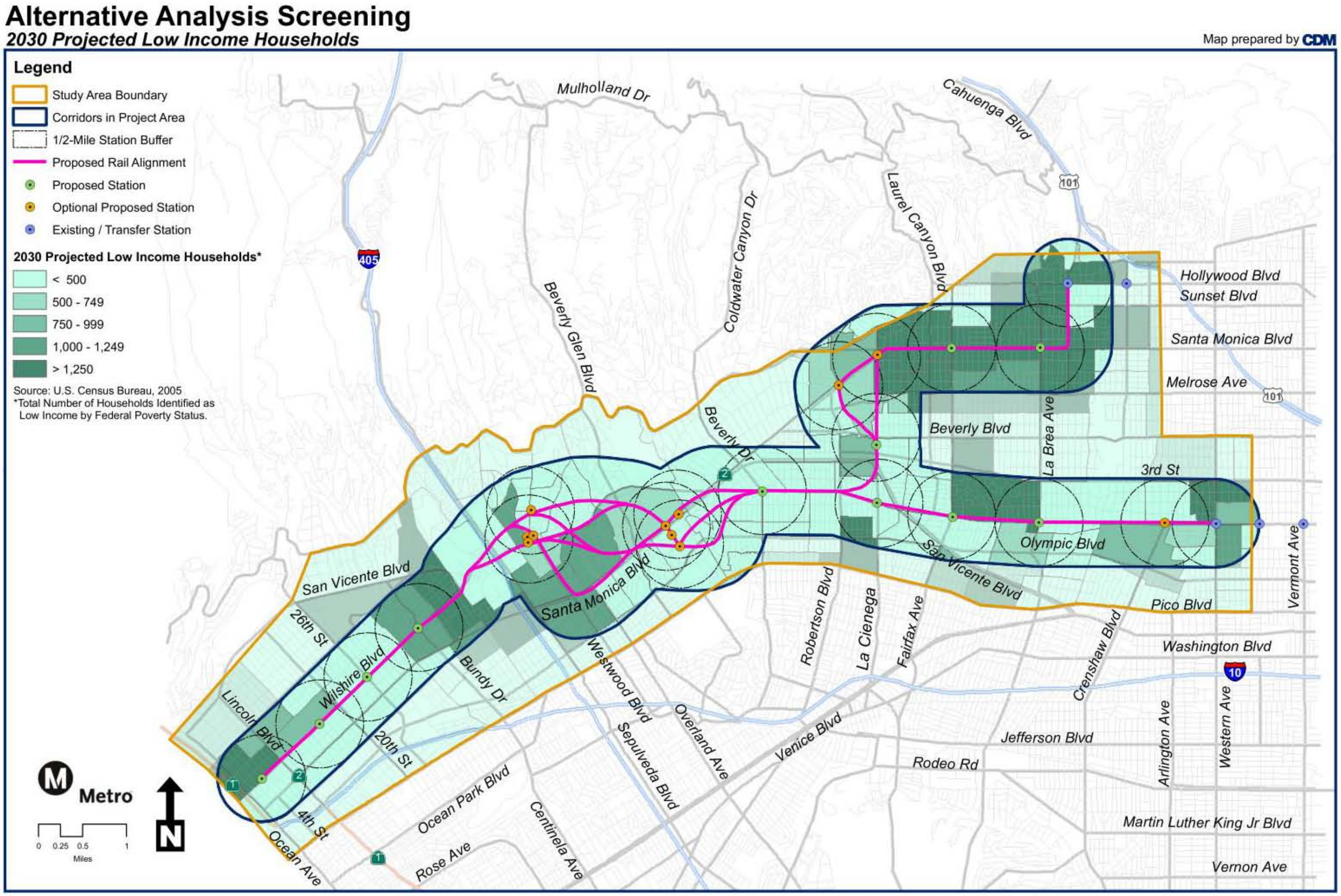


Figure 7-15. Public Transportation Commuter (2000 Census)

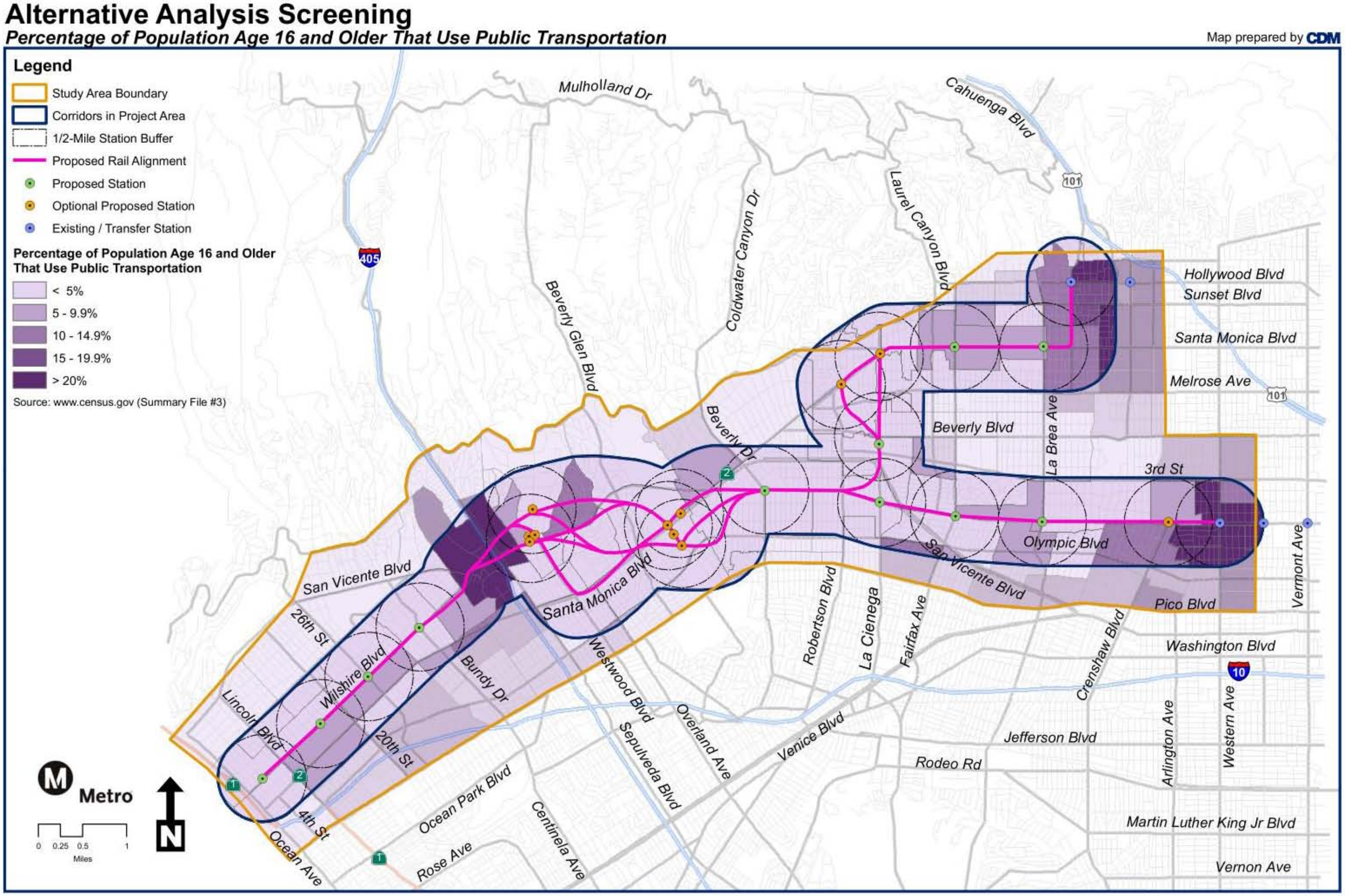
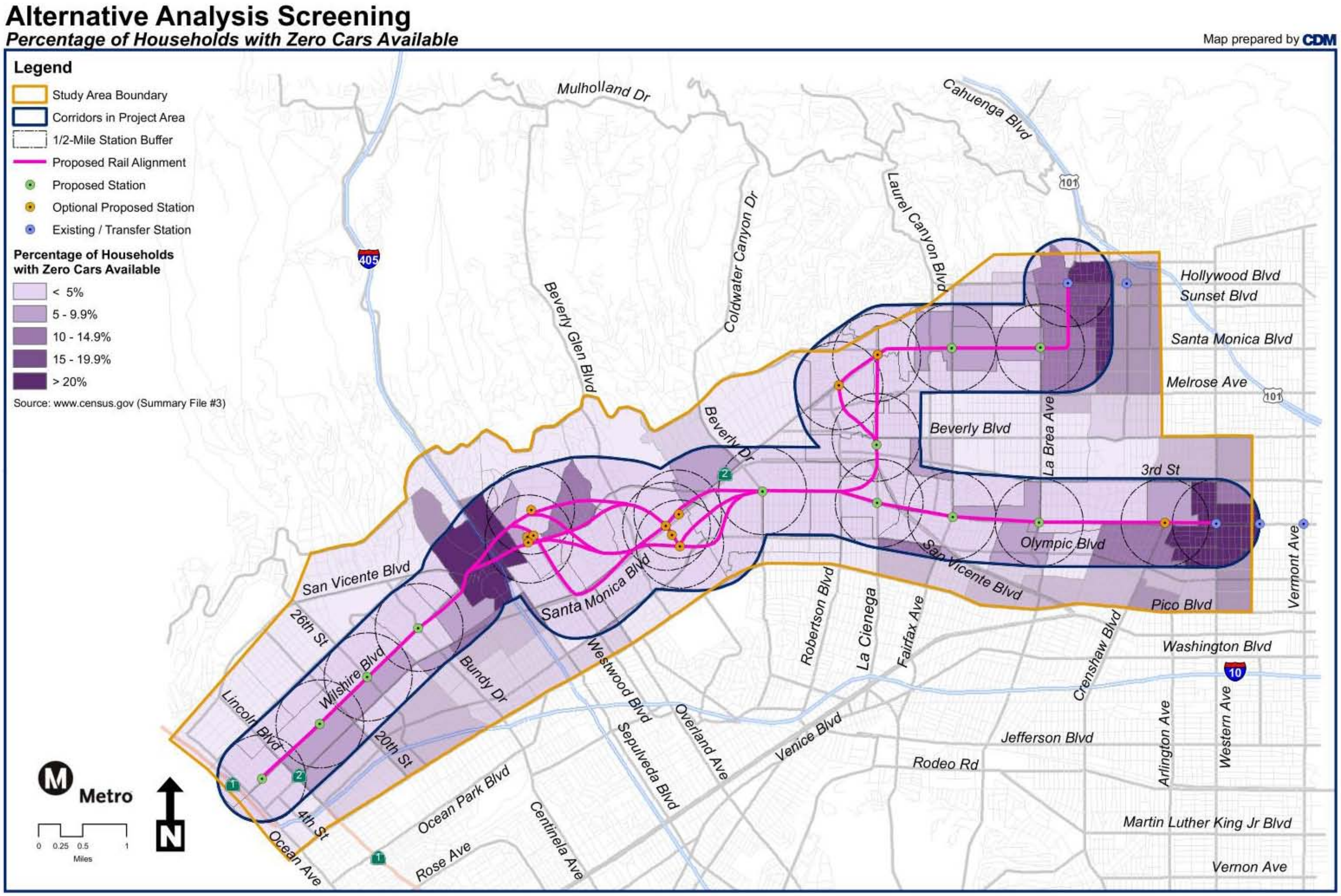


Figure 7-16. Zero Car Households (2000 Census)



7.3.4.4 Competitive Speeds

Transit speeds that are competitive with the automobile is another measure of the potential for transit ridership to be maximized; if the average speed traveling by transit is higher than that traveling by automobile, then transit has the potential to be a more attractive option and ridership has the potential to be maximized. As previously shown in Figure 7-1, average operating speeds is affected by transfers, horizontal alignment, and mode. Therefore, differences among alternatives would be expected.

Auto travel speeds were calculated for 2030 AM peak period using the Metro Travel Demand Model. As Table 7-11 indicates, the Wilshire HRT Alternatives (Alternatives 1 and 14) and the Combined HRT Alternatives (Alternatives 11 and 16) had much higher speeds than the automobile. The BRT Alternative, and the No Build and TSM Alternatives had comparable speeds with the automobile for westbound and eastbound speeds for specified origin-destination points.

7.3.5 Enhance Linkages to Transportation System

Enhancing linkages to the transportation system, as well as linkages to major trip attractors and generators within the corridor, is another objective of mobility improvement. System connectivity is the criteria used to address this objective. Measures used to evaluate linkages to the transportation system include: (a) the extension of existing Metro service (e.g., one seat ride); (b) the number of direct connections (within 1/8 mile walk) to designated transfer points/transit nodes (Metro Red or Purple Lines, major north-south bus routes); (c) the number of transfers required to access regional rail service (Metrolink, Amtrak); and (d) the number of direct connections (within 1/8 mile walk) to key activity centers within the corridor study area.

As shown in Table 7-12, the Wilshire Boulevard HRT Subway Alternatives (Alternatives 1 and 14) and Combined HRT Alternative 16 have a high ability of one seat service through the corridor. One seat service occurs when a transit rider can go from their origin to their destination without a transfer. The Combined HRT Alternative 11 and the BRT Alternative have a medium ability of one seat service through the corridor.

Table 7-12. Enhancing Linkages and Major Trip Attractors/Generators Within the Corridor

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
A	5	a	Ability of alts to continue a one seat ride	L	L	M	H	H	M	H
A	5	b	Number of direct connections within 1/8 mile walk to other lines, NS bus routes, etc	12	12	12	7	8	10	11
A	5	c	Number of transfers required to access regional rail - Metrolink, Amtrak	2	2	2	1	1	1	1
A	5	d	Number of direct connections to key activity centers within 1/8 mile walk	10	10	10	7	9	10	12

* L = Low; M = Medium; Md = Moderate; H = High

With twelve connections, the BRT alternative has the highest number of direct connections within, 1/8 mile walk, to other designated transit nodes and key activity centers, as shown in Table 7-12 and Figure 7-17. The Combined HRT Subway alternative has the second highest number of direct transit node connections and key activity centers.

The Combined HRT Subway groups of alternatives require the least number of transfers to access Metrolink commuter rail and Amtrak intercity rail service. The at-grade BRT alternative requires the most number of transfers to access regional rail service, as shown in Table 7-12.

7.4 Transit Supportive Land Use Policies and Conditions

This goal is intended to evaluate the extent to which an alternative is in areas with existing or future transit supportive land use polices and conditions.

Objectives for this goal include:

- Provide transit service to areas with transit supportive land uses and policies; and
- Integrate with local redevelopment plans and policies.

These objectives, and the criteria developed to measure them, are discussed below.

7.4.1 Transit Supportive Land Uses and Policies

Transit supportive land uses is a criteria used to address this objective. This criterion is measured by analyzing the number of existing high density / mixed use activity centers within 1/2 mile of the proposed alignment (e.g., universities, major retail centers, employment hubs).

Mixed Use Activity Centers

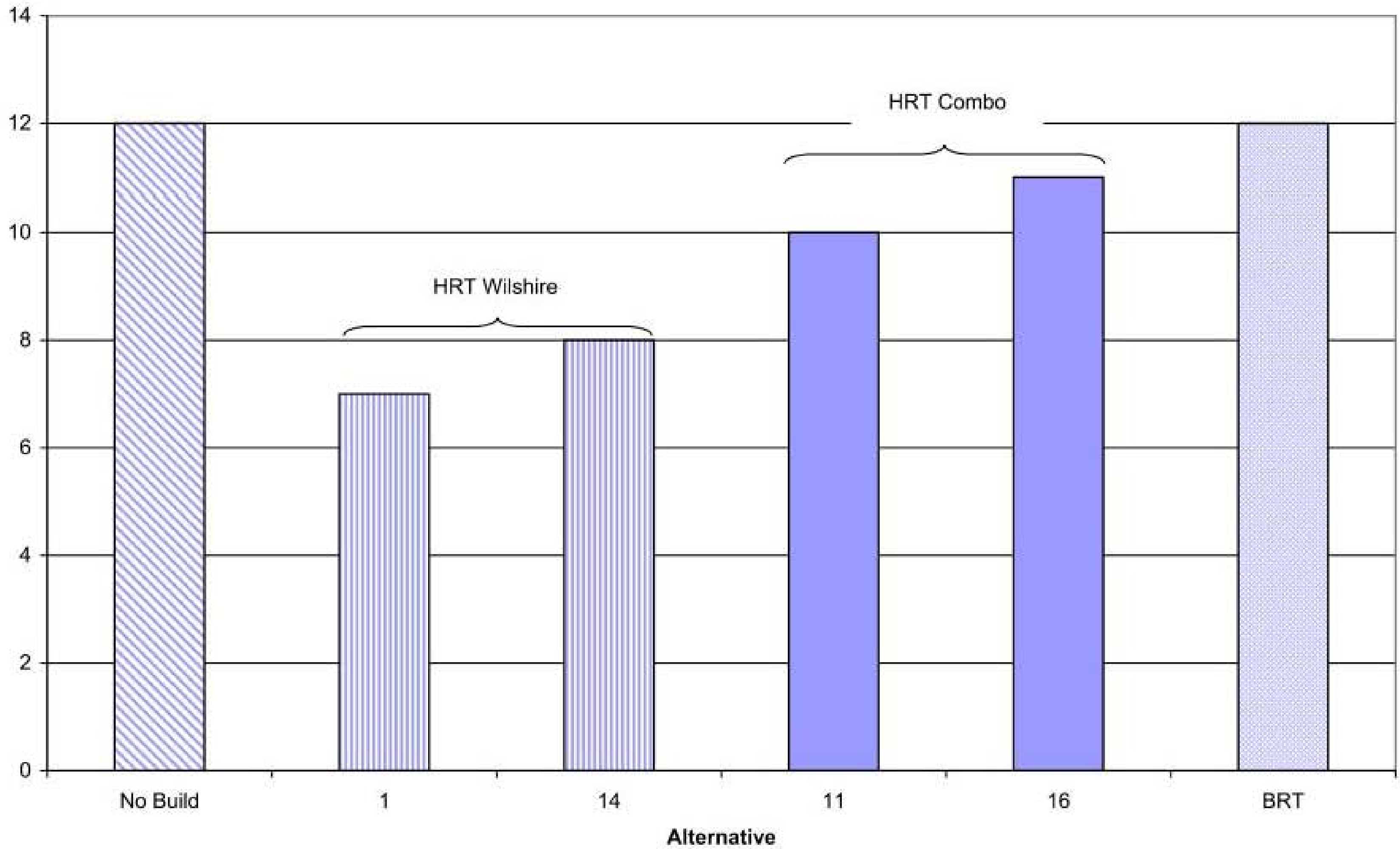
Mixed use activity centers create a focal point for activity and visual interest. These areas provide an opportunity for people to walk and interact. Activity centers feature a mixture of land uses all in proximity, including higher density residential condominiums, townhomes and apartments, and retail uses to allow for pedestrian travel. They physically connect to adjacent neighborhoods and to parks and open space, and they often include internal public spaces. As shown in Table 7-13, the Combined HRT Subway group of alternatives has the greatest number of existing high density mixed use activity centers with 14 to 17 within a 1/2 mile walk. The Wilshire Boulevard HRT Subway group of alternatives has the lowest number of existing high density mixed use activity centers with 9 to 12 high density mixed use activity centers.

Table 7-13. Number of High Density Mixed Use Activity Centers Within ½ Mile of Each Alignment

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
B	1	a	Number of high density mixed use activity centers within 1/2 mile of each alignment	17	17	17	9	12	14	17

Note: Mixed Use Activity Centers are feature a mixture of land uses such as residential and commercial, and typically provide retail uses that encourage pedestrian travel.

Figure 7-17. Number of Direct Connections within 1/8 mile walk to other lines, NS Bus Routes, etc.



Transit Oriented Development

Cities within the Study Area maintain specific Transit Oriented Development (TOD) provisions or are receptive to TOD provisions as defined in their general plans, community plans or specific plans (see Chapter 5.0 Land Use). There are two City of Los Angeles Community Redevelopment Agency (CRA) Redevelopment Areas served by the proposed grade-separated alternatives, the Wilshire Center/Koreatown area and the Hollywood area. The Redevelopment Plans set forth an array of goals promoting business retention and expansion, attracting new businesses and developing public improvements. Key aspects of these plans related to TOD include pedestrian and transit improvements, urban design guidelines encouraging economic development, and expanding housing.

The Wilshire Center/Koreatown Recovery Redevelopment Project Area encompasses 1,207 acres and is generally bounded by Fifth Street on the north, 12th Street on the south, Hoover Street on the east, and Eastern Avenue and Wilton Place on the west. It also includes the Vermont Avenue Corridor to the Hollywood Freeway and Western Avenue to Melrose Avenue. The 1,107-acre Hollywood Redevelopment Project is generally bounded by Franklin Avenue on the north, Serrano Avenue on the east, Santa Monica Boulevard and Fountain Avenue on the south and La Brea Avenue on the west. The grade separated alternatives would serve these areas. Both areas are currently partially served by high capacity public transit via the Metro Red and Purple Lines, and have demonstrated transit oriented development adjacent to transit stations.

7.4.2 Integrate with Local Redevelopment Plans and Policies

This objective is measured through the criterion of economic benefit. The measure used to evaluate the economic benefit is analyzing the number of "high opportunity areas" for redevelopment within 1/2 mile of the proposed alignment.

High opportunity areas are defined as locations where major commercial activity and mixed uses occur. For the Westside Extension Transit Corridor, the following areas were identified as high opportunity areas for new development or redevelopment that can be supported by mass transit:

- the Hollywood area including Highland Avenue from Hollywood to Santa Monica Boulevards;
- the area in close proximity to Santa Monica and San Vicente Boulevards;
- the area in close proximity to Fairfax Avenue and 3rd Street (the Grove);
- the area in proximity to Wilshire Boulevard and Western Avenue;
- the Civic uses at Wilshire Boulevard and Fairfax Avenue;
- Century City in proximity to Avenue of the Stars and Constellation Boulevard;
- the area in proximity to Westwood and Santa Monica Boulevards;
- Westwood at Wilshire and Westwood Boulevards;
- Downtown Santa Monica; and
- Beverly Center Area.

Table 7-14 shows a comparison of the redevelopment areas along each alternative.

Table 7-14. Number of High Opportunity Areas for Redevelopment Within ½ Mile of Each Alignment

PERFORMANCE MEASURES				ALTERNATIVES						
Goal	Objective	Measure	Criteria	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
						17	1	14	11	16
B	2	a	Number of high opportunity areas for redevelopment within 1/2 mile of each alignment	N.A.	N.A.	N.A.	W	W	W & H	W & H

Note: All Cities within Study Area maintain specific TOD provisions or are receptive to TOD provisions as defined in their general plans, community plans or specific plans
** W: City of Los Angeles CRA Redevelopment Area in Wilshire Center/Koreatown; H: City of Los Angeles CRA Redevelopment Area in Hollywood

7.5 Cost Effectiveness

This goal is to evaluate whether the costs of the alternative, both capital and operating, are commensurate with its benefits. The objective for this goal is to provide solutions with benefits commensurate with their costs. Measures used to evaluate cost-effectiveness include: (a) capital cost; (b) estimated capital cost per (route) mile; (c) Metro system operations and maintenance costs; and (d) estimated annualized cost per hour of transit system user benefit.

As shown in Table 7-15, Figure 7-19, and Figure 7-20, the Combined HRT Subway groups of alternatives has the highest capital cost; the BRT alternative has the lowest capital cost. Figure 7-21 illustrates the cost-effectiveness of the alternatives; the blue overlay indicates the range of cost-effectiveness necessary to compete for federal funds. Cost-effectiveness is calculated by dividing the transit system project cost by the transit system user benefits. The FTA New Starts program evaluates projects across the country using the cost-effectiveness measure. Figure 7-22 illustrates the transit user benefits in daily hours.

The cost-effectiveness of the proposed alternatives is particularly critical when applying for FTA New Starts funding. Figure 7-18 illustrates where Alternative 1 and Alternative 11 currently stand in comparison with current FTA standards. In general, projects advancing into the FTA PE phase of project development must achieve a cost-effectiveness measure of below $25 per hour of travel time savings. Alternative 1 is currently measured at $34, and Alternative 11 is currently measured at $43. The cost-effectiveness of each alternative is expected to be reduced in the next phase of evaluation based on lower construction costs and refined ridership projections.

Figure 7-18. Cost Effectiveness

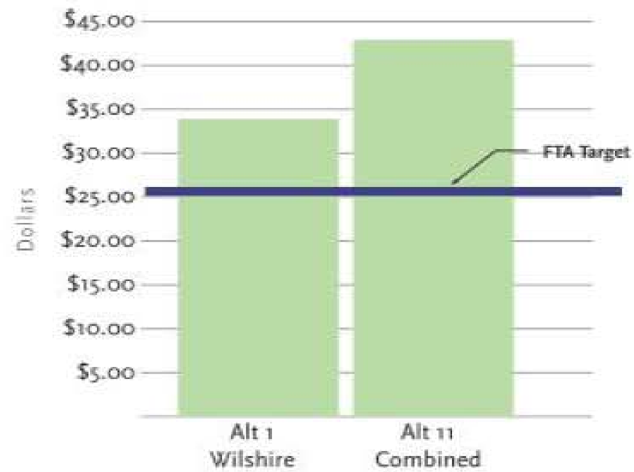


Figure S-41 Cost Effectiveness

Table 7-15. Cost-Effectiveness

C	1	a	Order of Magnitude Capital Cost ($ Billions, 2008)	$0.00	$0.134	$1.082	$6.063	$6.997	$9.057	$9.448
C	1	a	Order of Magnitude Capital Cost (10 years) ($ Billions, YOE)	$0.00	$0.172	$1.387	$7.771	$8.968	$11.610	$12.111
C	1	b	Capital Cost Per Route Miles ($ Millions, 2008)	$0	N.A.	$34	$475	$489	$509	$507
C	1	b	Capital Cost Per Route Miles ($ Millions, YOE)	$0	N.A.	$44	$609	$627	$652	$650
C	1	c	Order of Magnitude Annual O&M Cost ($ Millions, 2008)	$1,363	$1,378	$1,369	$1,459	$1,473	$1,518	$1,530
C	1	d	Daily Hour of Transit User Benefit compared to No Build	N.A.	1,700	13,800	39,300	37,000	47,800	44,900
C	1	d	Cost per hour of transit system user benefits for selected representative alternatives compared to No Build (CEI)	N.A.	$53	$17	$34	$44	$43	$51

Figure 7-19. Capital Cost ($ Billions, 2008)

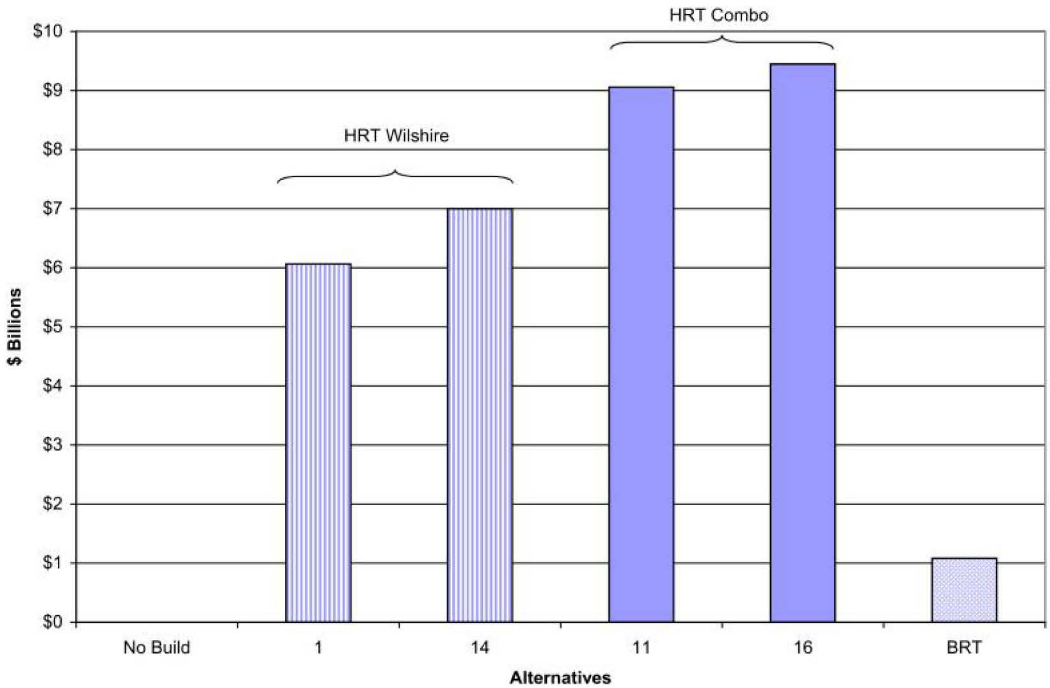


Figure 7-20. Capital Cost ($ Billions, YOE)

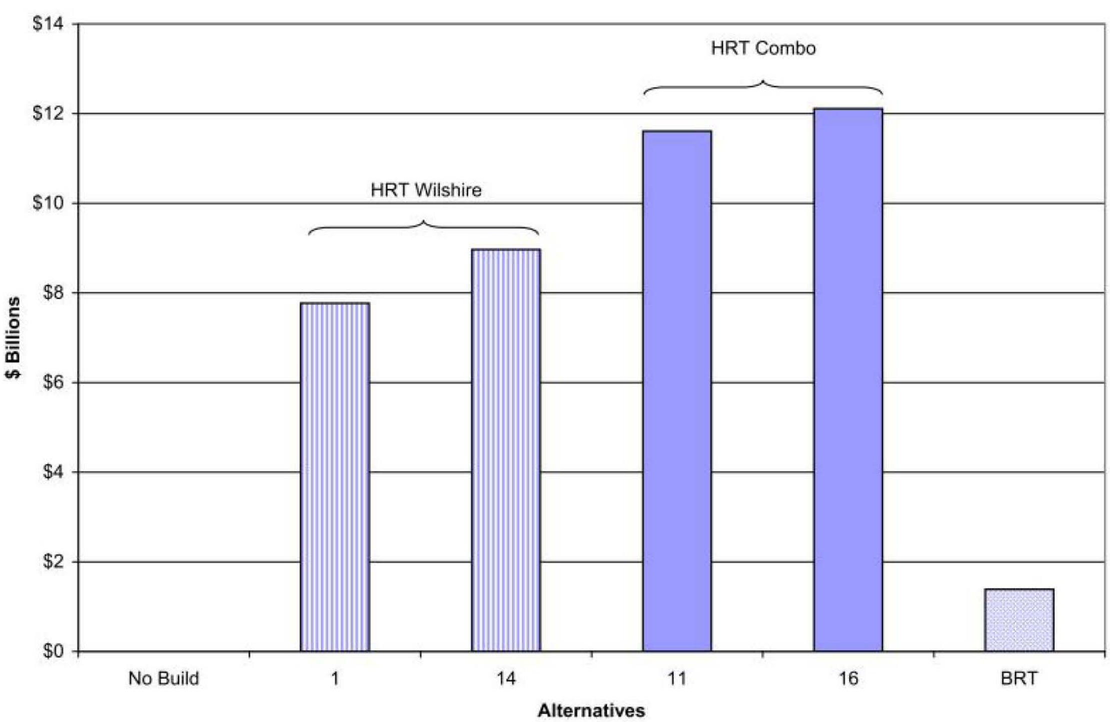


Figure 7-21. Cost-Effectiveness (Compared to No Build) in $ per Hour

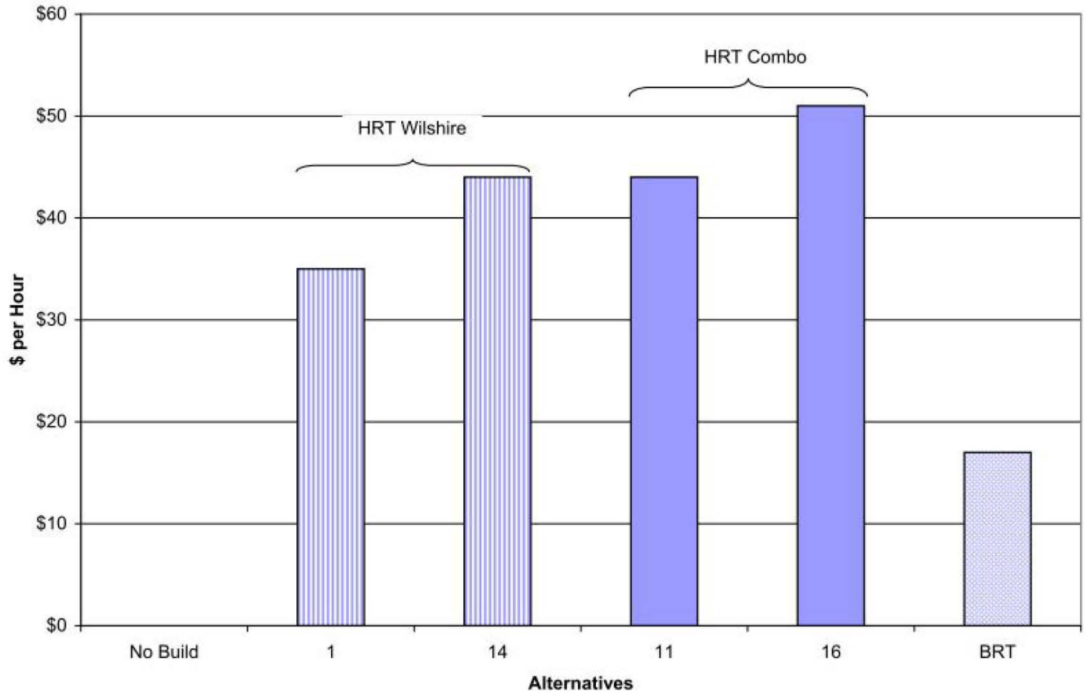
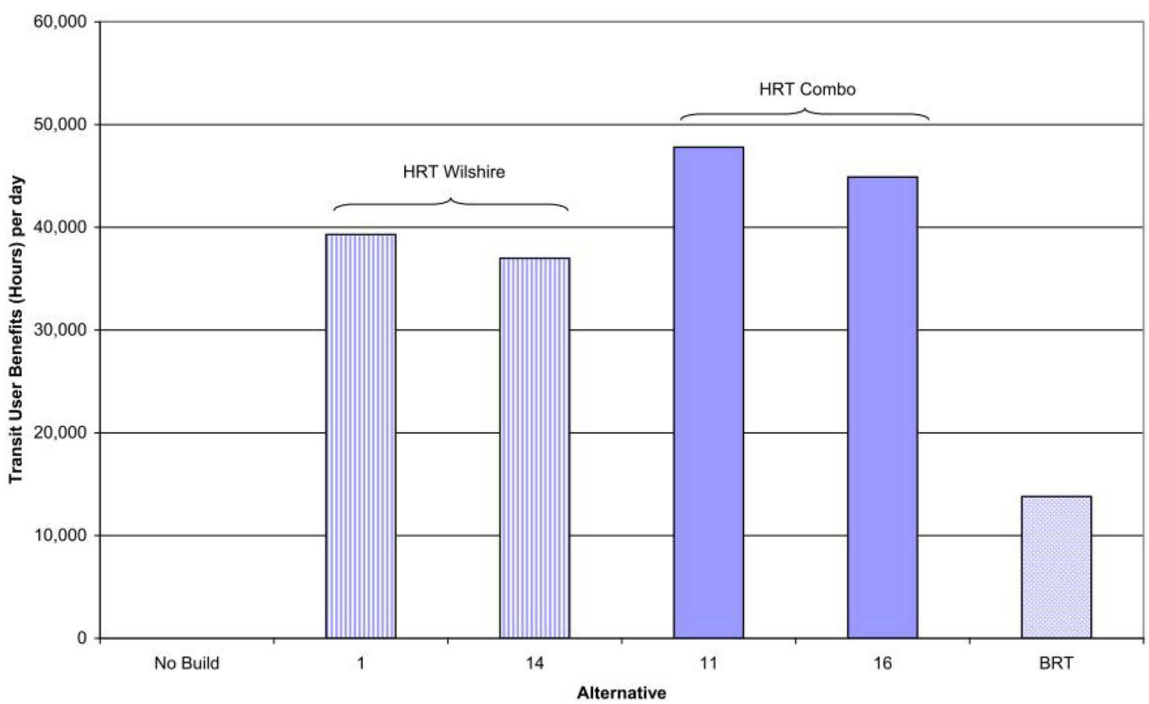


Figure 7-22. Transit User Benefits (Daily Hours)



7.6 Project Feasibility

This goal is to provide transportation solutions that are financially feasible. Measures used to evaluate project feasibility include: (a) assessment of the relative eligibility of the alternative for Federal New Starts Funding; and (b) level of consistency with the goals of Metro's Long Range Transportation Plan and Board financial direction.

As seen in Table 7-16 below, the BRT has a relatively high eligibility opportunity for New Starts funding. Both the Wilshire Boulevard HRT Subway and the Combined HRT Subway groups of alternatives have relatively medium eligibility opportunities for New Starts funding. Only the at-grade BRT alternative is consistent with the Metro's Long Range Transportation Plan (LRTP) and financial direction. None of the HRT alternatives are currently included in the 2001 LRTP Constrained Financial Plan or the baseline 2008 Draft LRTP. Since Measure R passed, adding a ½ cent sales tax for LA County transportation, it is anticipated that this project will be added to Metro's LRTP.

Table 7-16. Financial Feasibility

PERFORMANCE MEASURES				ALTERNATIVES						
Goal	Objective	Measure	Criteria	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
						17	1	14	11	16
D	1	a	Relative eligibility of alts for new starts funding*	L	L	H**	M	M	M	L
D	1	b	Consistency with Metro's LRTP and financial direction***	C	C	C	C ****	C ****	C ****	C ****

* L = Low; M = Medium; H = High; VH= Very High
**If traffic lanes must be replaced, then increase to Medium.
*** C = Consistent; N = No
**** Assumes that LRTP will be amended to include projects in voter-approved Measure R

7.7 Equity

This goal is to ensure costs and benefits are distributed fairly across different population groups, with particular emphasis on serving transit dependent communities. The objectives to evaluate this goal include:

- Improve transit service available to transit dependent communities, especially access to job opportunities; and
- Provide solutions that distribute both economic and environmental costs and benefits fairly across different population groups.

These are discussed below.

7.7.1 Transit Dependents Mobility Improved

One of the objectives of equity is to improve transit services available to transit dependent communities; especially access to job opportunities is one of the objectives of equity. Mobility for Transit Dependents is a criterion used to address this objective. A measure used to evaluate mobility for transit dependents assesses the number of low income households within 1/2 mile of proposed alignment (existing and future). Figure 7-23 illustrates the households that report not owning a vehicle in the 2000 census (Zero Car Households).

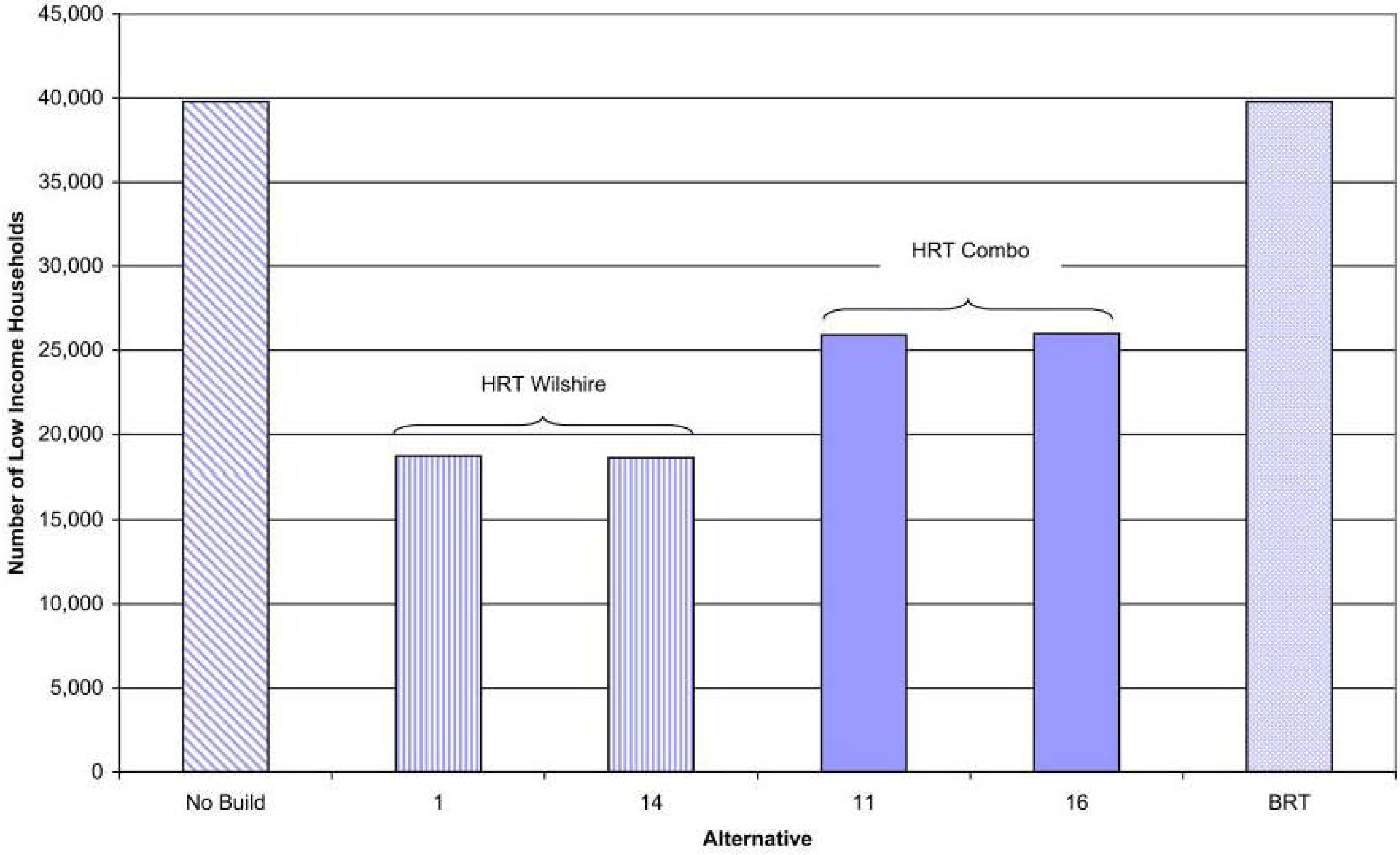
As shown in Table 7-17 below, the alternatives with the highest number of current low income households (HH) within 1/2 mile of each alternative are the Combined HRT Subway alternatives with approximately 26,000 households.

Table 7-17. Equity

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
E	1	a	Number of low income HH within 1/2 mile of each alternative (in thousands)	39.8	39.8	39.8	18.7	18.6	25.9	26.0
E	2	a	**Local jurisdiction/communities directly impacted - displacements, construction**							
				City of SM	City of SM	City of SM	City of SM	City of SM	City of SM	City of SM
				City of BH	City of BH	City of BH	City of BH	City of BH	City of BH	City of BH
				City of WH	City of WH	City of WH	City of LA (7)	City of LA (8)	City of WH	City of WH
				City of LA (8)	City of LA (8)	City of LA (8)	LAC	LAC	City of LA (8)	City of LA (9)
				LAC	LAC	LAC			LAC	LAC
			Total jurisdictions/ communities	12	12	12	10	11	12	13
E	2	b	**Number of residents within 1/2 mile by ethnic group/minority populations**							
E	2	b	Black	15,123	15,123	15,123	9,836	9,781	11,390	11,279
E	2	b	Amer Indian/Eskimo	1,030	1,030	1,030	521	554	720	694
E	2	b	Asian	47,951	47,951	47,951	35,528	35,358	38,356	38,620
E	2	b	Hawaiian/Pacific Islander	354	354	354	208	210	249	241
E	2	b	Other-Non-Hispanic	1,201	1,201	1,201	750	690	862	807
E	2	b	2+Races Non-Hispanic	13,180	13,180	13,180	7,977	7,713	9,679	9,450
E	2	b	Hispanic	47,041	47,041	47,041	21,837	22,012	27,021	27,048

* Removes two lanes of traffic
Abbreviations: City of SM =City of Santa Monica; City of BH = City of Beverly Hills; City of WH = City of West Hollywood; City of LA = City of Los Angeles; LAC = Los Angeles County.

Figure 7-23. Number of Low Income Households within ½ Mile of Alignment, present



7.7.2 Equitable Distribution of Costs and Benefits

A second objective is to provide solutions that distribute both economic and environmental costs and benefits fairly across different population groups. Equity is a criterion used to address this objective. Measures used to evaluate the economic benefit include: (a) direct impacts (e.g., potential displacements, amount of construction impacts) categorized by local jurisdiction / community; and (b) the number of residents within 1/2 mile walking distance of proposed alternative by major ethnic groups/minority populations.

Local jurisdiction/communities directly impacted by displacements or construction include the City of Santa Monica, City of Beverly Hills, City of West Hollywood, City of Los Angeles, and Los Angeles County. Table 7-17 shows which jurisdiction / community correspond with the appropriate alternative. Additionally, the table also indicates the population distribution for major ethnic groups / minority populations in each alternative.

7.8 Environmental Considerations (Impacts)

The goal of environmental considerations (impacts) is to develop solutions which protect environmental resources and communities within the study area.

Objectives for environmental considerations include:

- Minimize the displacement of homes and businesses.
- Minimize impacts to the traffic and circulation system.
- Minimize impacts to the character of the community.
- Provide for the safety and security of pedestrians and transit users.
- Minimize impacts on sensitive and protected environmental resources.
- Reduce, not add to, tailpipe emissions / non-renewable fuel consumption.

7.8.1 Minimize Home and Business Displacement

Right-of-way (ROW) impacts is a criterion used to address minimizing the displacement of homes and businesses. A measure used to evaluate ROW impacts is to estimate the level of right-of-way impact based on the proposed footprint of the alternatives.

As shown in Figure 7-24 and Table 7-18, the BRT (Alternative 17) has the greatest estimated ROW impact with 1,335,000 square feet of the alternative. The Combined HRT Subway group of alternatives has the next greatest estimated ROW impact based on proposed alternative footprint of between 550,000 and 570,000 square feet. The Wilshire Boulevard HRT Subway group of alternatives requires between 420,000 and 480,000 square feet.

7.8.2 Minimize Traffic and Circulation System Impacts

Traffic and Circulation is a criterion used to address how to minimize impacts to the traffic and circulation system. Measures used to evaluate these impacts include: (a) the lane-miles of traffic lanes removed or impacted; and (b) the lane-miles of parking lanes removed.

Figure 7-24. Estimated Right of Way Impact Based on Proposed Alternative Footprint

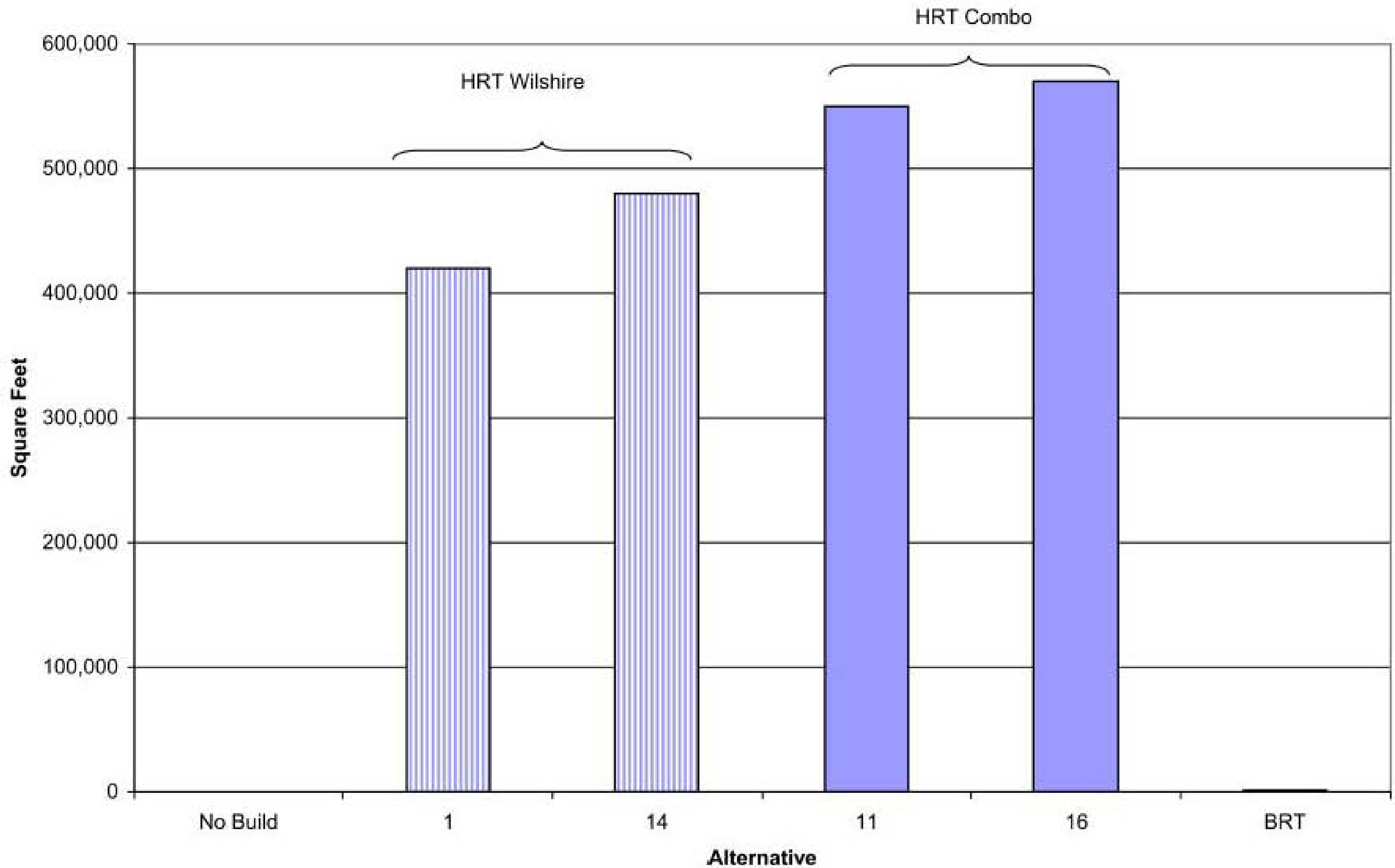


Table 7-18. Estimated ROW Impact

PERFORMANCE MEASURES				ALTERNATIVES						
Goal	Objective	Measure	Criteria	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
						17	1	14	11	16
F	1	a	Estimated ROW impact based on proposed alt footprint (thousands of square feet)	None	Mn	1,335	420	480	550	570

Mn = Minimal

Lane Miles of Traffic Lanes Impacted

Assumptions for minimizing impacts to the traffic and circulation system using lane-miles traffic lane removal or impacts as a measure include post construction evaluation.

Assumptions were developed to calculate the potential impact to traffic lanes. The Wilshire HRT and Combined HRT Alternatives do not take any lane miles of parking or travel lanes. Therefore, the assumptions below are applied only to the BRT Alternative. The assumptions include that the BRT would impact the following:

- 2 travel lanes between the intersections of Wilshire/Western and Wilshire/Barrington (9.2 mi) on Wilshire Boulevard
- 2 travel or parking lanes between the intersections of Wilshire/Barrington and Wilshire/4th (4.1 mi) on Wilshire Boulevard
- 2 travel or parking lanes between the intersections of Hollywood/Highland and Santa Monica/Highland (0.75 mi) on Highland Avenue
- 2 travel or parking lanes between the intersections of Santa Monica/Highland and Santa Monica/4th (7.6 mi) on Santa Monica Boulevard
- 2 travel or parking lanes between the intersections of Santa Monica/Westwood and Wilshire/Westwood (0.75 mi) on Westwood Boulevard

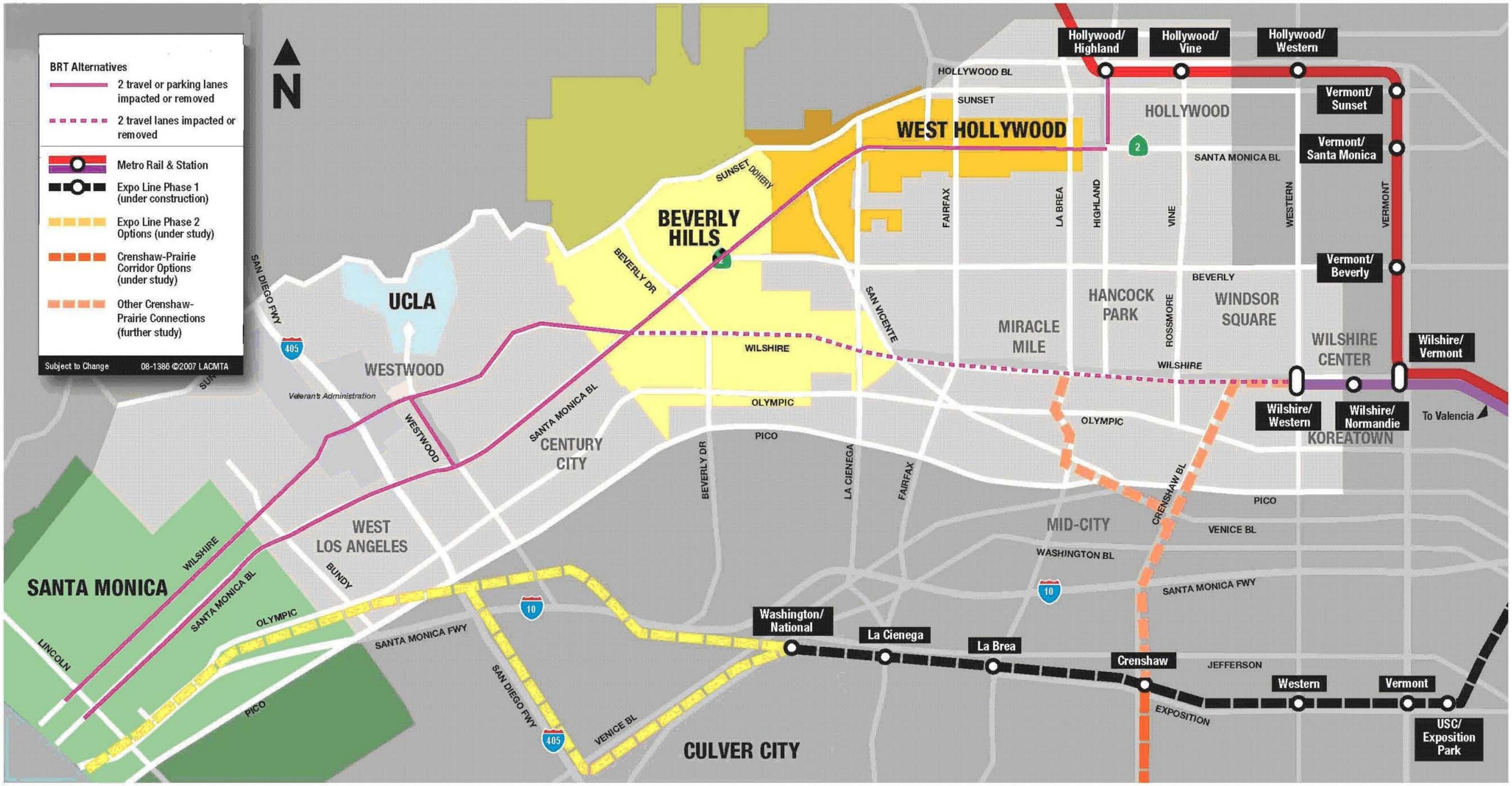
As shown in Table 7-19 and Figure 7-25, the BRT has the greatest impact to traffic lanes. The Combined HRT Subway and Wilshire HRT alternatives have no traffic lanes impact after construction.

Table 7-19. Impacts to Traffic Circulation in Lane Miles

PERFORMANCE MEASURES				ALTERNATIVES						
Goal	Objective	Measure	Criteria	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
						17	1	14	11	16
F	2	a	Lane miles of traffic lanes removed or impacted	0	0	44.8	0	0	0	0
F	2	b	Lane miles of parking lanes removed or impacted	0	0	26.4	0	0	0	0

* Removes two lanes of traffic

Figure 7-25. Impact to Traffic Lanes by BRT Alignments



Lane Miles of Parking Lanes Impacted

Assumptions were developed to calculate the potential impact to parking lanes. The Wilshire HRT and Combined HRT Alternatives do not take lane miles. Therefore, the assumptions below are applied only to the BRT Alternative. The assumptions include that the BRT would impact the following:

- 2 travel or parking lanes between the intersections of Wilshire/Barrington and Wilshire/4th (4.1 mi)
- 2 travel or parking lanes between the intersections of Hollywood/Highland and Santa Monica/Highland (0.75 mi)
- 2 travel or parking lanes between the intersections of Santa Monica/Highland and Santa Monica/4th (7.6 mi)
- 2 travel or parking lanes between the intersections of Santa Monica/Westwood and Wilshire/Westwood (0.75 mi)

As shown in Table 7-19, the BRT has the greatest impact to parking lanes. There is no impact to parking lanes with the Wilshire HRT Subway and the Combined HRT Subway groups of alternatives.

7.8.3 Minimize Community Character Impacts

Visual / Noise and Vibration is a criterion used to address how to minimize impacts to the character of the community. Measures used to evaluate these impacts include: (a) estimating the level of visual impact to the surrounding neighborhoods / community; and (b) estimating the level of potential noise and vibration impact.

Visual Impacts

As shown in Table 7-20, there is low visual impact to the surrounding neighborhoods and community in the at-grade BRT alternative. Moderate levels of visual impacts exist in the Wilshire Boulevard HRT Subway and Combined HRT Subway groups of alternatives. Visual impacts for underground alternatives include stations and associated structures.

Table 7-20. Estimated Visual and Noise Impacts

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
F	3	a	Estimated level of visual impacts to surrounding neighborhoods	None	None	L	Md	Md	Md	Md
F	3	b	Potential noise & vibration impact - Operational Impacts	0	0	0	0	0	0	0

** L = Low; Mn = Minimal, Md = Moderate; H = High, VH = Very High
*** Total amount of acreage, 2 hospitals and 5 schools

Noise and Vibration Impacts

A determination of a noise impact for this project was based on the criteria defined in the FTA guidance manual *Transit Noise and Vibration Impact Assessment* (FTA Report DOT-T-95-16, April 1995). The FTA noise impact criteria are founded on well-documented research on community reaction to noise and are based on change in noise exposure using a sliding scale. Although more transit noise was allowed in neighborhoods with high levels of existing noise, smaller increases in total noise exposure were allowed with increasing levels of existing noise. The FTA Noise Impact Criteria group noise sensitive land uses into the following three categories:

- Category 1: Buildings or parks, where quiet is an essential element of their purpose.
- Category 2: Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.
- Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches and active parks.

Day-Night Sound Level (DNL)[1] was used to characterize noise exposure for residential areas (Category 2). For other noise sensitive land uses, such as outdoor amphitheaters and school buildings (Categories 1 and 3), the maximum 1-hour L_{eq} during the facility's operating period was used.

There would be no airborne noise and a minimal amount of vibration due to operation of the subway portions of the line on noise sensitive land uses in the area of the project proposed alignments. While the vibration is expected to be felt in only the most noise sensitive land uses located adjacent to the selected right of way, there is the potential for some buildings, such as concert halls, recording studios and theaters, which are very sensitive to vibration, and which fall outside of the three noise sensitive categories, to exist along one or more of the proposed routes.

As shown in Table 7-20, there are no potential noise and vibration operational impacts in the BRT, the Combined HRT, or the Wilshire HRT Alternatives.

7.8.4 Pedestrian and Transit Users Safety and Security

Safety and Security is a criterion used to address how to provide for the safety and security of pedestrians and transit users. Measures used to evaluate these impacts include: (a) the ability to provide emergency exits and evacuation; and (b) the extent of new vehicular/transit or pedestrian/transit conflicts associated with rights-of-way that are not fully protected.

[1] DNL: Day-Night Sound Level: based on sound levels measured in relative intensity of sound, or decibels (dB), on the "A" weighted scale (dBA). The "A" weighted scale most closely approximates the response characteristics of the human ear to sound. The higher the number on the scale, the louder is the sound. DNL represents noise exposure events over a 24-hour period. To account for human sensitivity to noise between the hours of 10 p.m. and 7 a.m., noise events occurring during these hours receive a "penalty" when the DNL is calculated. Each nighttime event is measured as if ten daytime events occurred.

Emergency Exits and Evacuation

As shown in Table 7-21, the ability to provide for emergency exits and evacuation is moderate in the Wilshire Boulevard HRT Subway and Combined HRT Subway groups of alternatives. The ability to provide for emergency exits and evacuation is not applicable in the at-grade BRT alternative.

Table 7-21. Emergency Exits and Evacuation

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
F	4	a	Ability to provide for emergency exits and evacuation	N.A.	N.A.	N.A.	Md	Md	Md	Md

* L = Low; Mn = Minimal; Md = Moderate; H = High; VH = Very High

Extent of Conflicts with Right-of-Way

As shown in Table 7-22, the extent of new vehicular/transit or pedestrian/transit conflicts associated with right-of-way that is not fully protected is low in all of the alternatives except for the at-grade BRT alternative. In this alternative, the extent is low to moderate.

Table 7-22. Vehicle/Transit/Pedestrian Conflicts

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
F	4	b	Extent of vehicle/transit/ pedestrian conflicts that are not fully protected	Md	Md	L-M	L	L	L	L

* Removes two lanes of traffic
** L = Low; Mn = Minimal; Md = Moderate; H = High; VH = Very High

7.8.5 Minimize Impacts on Sensitive and Protected Environmental Resources

Natural and Cultural Resources is a criterion used to address how to minimize impacts on sensitive and protected environmental resources. A measure used to evaluate these impacts is to estimate the number of cultural or natural resources directly impacted by implementation/operation of the proposed alternative (e.g., cemeteries, schools, parks and recreational facilities, known historic or archaeological resources, water resources).

On December 20, 2007 URS staff archaeologist (Laurie Solis, M.A.) conducted an archaeological sites inventory search at the South Central Coastal Information Center at California State University Fullerton, for the presence of known archaeological resources identified along the proposed project alignments, as well as within 500 feet of the proposed alignments. For historic resources (structures), a thorough search of the City of Los Angeles Historic-Cultural Monument List from the City of Los Angeles, Department of City Planning, the National Register of Historic Places (for individual structures and districts), and the California Register of Historical Resources, was conducted to identify the number of listed historic properties and districts along the proposed alignments. For public parks, recreation areas, refuges, and historic sites (also known as Section 4(f) properties[2]) and properties containing human remains, the above sources were utilized, as well as the most recent Thomas Guide maps for the proposed alternatives. For paleontological resources, the USGS Dibblee, Los Angeles and Hollywood quadrangle, which illustrate the known subsurface stratum and their potential to yield fossil deposits, were utilized.

Section 106 (6 United States Code [USC] 470s) of the National Historic Preservation Act requires Federal agencies to take into account the effects of their undertakings on historic properties (including cultural and natural resources) and afford stakeholders the opportunity to comment on such undertakings.

While all alternatives would have some impacts to cultural and natural resources (Section 106[3]), Alternative 11 would have the greatest impact. These impacts would include, but are not limited to, impact to historic structures through noise and vibration impacts during construction, as well as destabilization from underground excavation; disturbance to known and as yet unknown archaeological resources of a historic and prehistoric age; paleontological impacts to Pleistocene age terrestrial deposits, especially that excavation which will traverse along Wilshire Boulevard within the Miracle Mile section of the City; and disturbance to human remains including those without formal burials, especially the proposed routes which are in the vicinity of the Los Angeles National Cemetery and Westwood Memorial Park in Westwood. As alternatives are studied further, alternatives will be designed to avoid these burial grounds.

In addition, there may be a number of historic period structures that have not undergone formal evaluation for historic significance. In order to assess this, formal evaluation would need to be undertaken, which may increase the number of historic properties affected by the project.

The estimated number of cultural or natural resources directly impacted for each grouping of alternatives is shown below in Table 7-23 Figure 7-26.

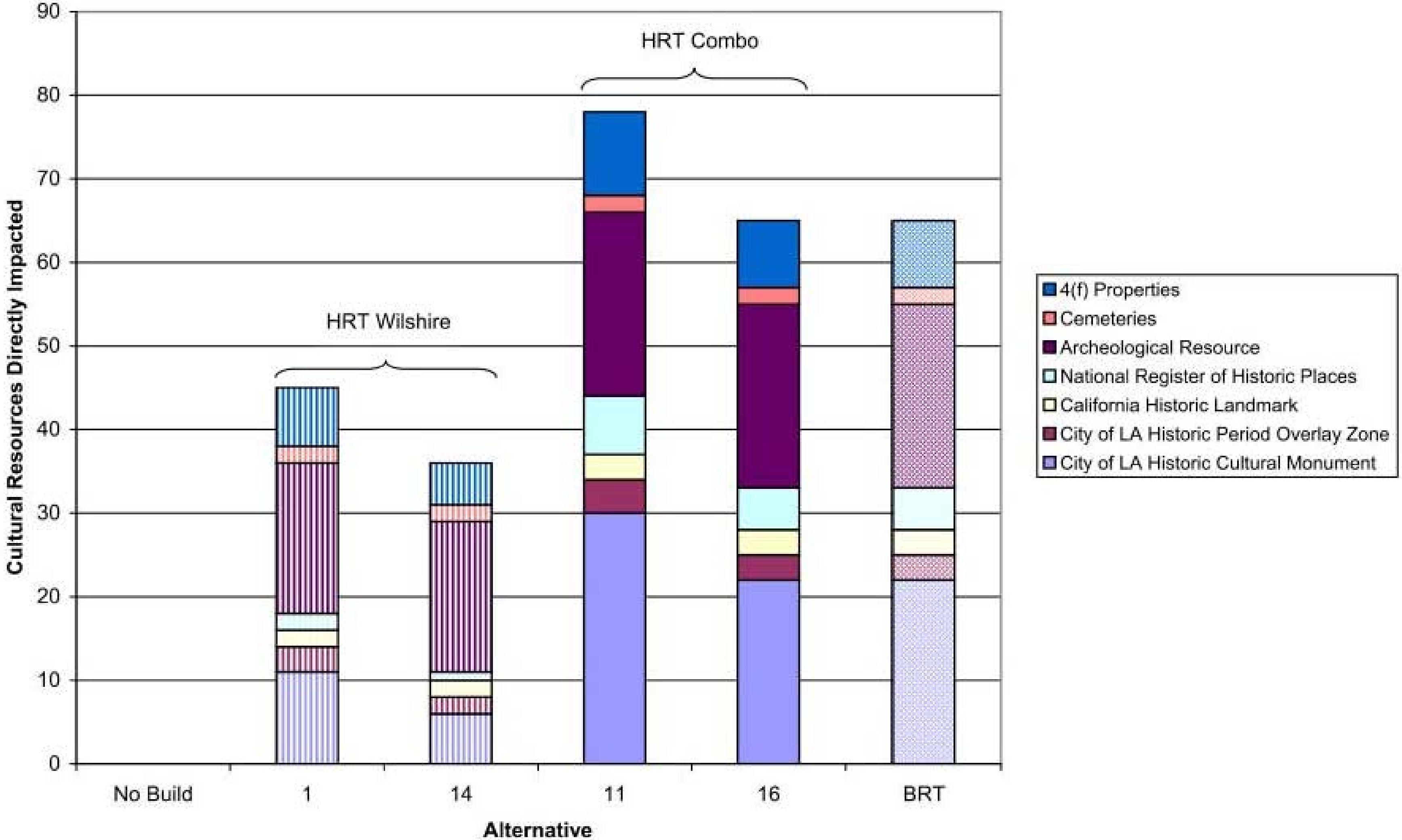
Table 7-23. Impacts on Sensitive and Protected Environmental Resources

PERFORMANCE MEASURES				ALTERNATIVES						
						BRT	Wilshire HRT		Combined HRT	
Goal	Objective	Measure	Criteria	No Build	TSM	17	1	14	11	16
F	5	a	Estimated Number of Cultural or Natural Resources Directly Impacted	N.A.	N.A.	65	45	36	78	65
F	5	a	City of LA Historic Cultural Monument (HCM)	N.A.	N.A.	22	11	6	30	22
F	5	a	City of LA Historic Period Overlay Zone (HPOZ)	N.A.	N.A.	3	3	2	4	3
F	5	a	California Historic Landmark (CaHL)	N.A.	N.A.	3	2	2	3	3
F	5	a	National Register of Historic Places (NRHP)	N.A.	N.A.	5	2	1	7	5
F	5	a	Archeological Resource (AR)	N.A.	N.A.	22	18	18	22	22

* Removes two lanes of traffic

2 Section 4(f) of the Department of Transportation Act, as amended, 49 U.S.C. 303
3 Section 106 of the National Historic Preservation Act, as amended, 6 U.S.C. 470s

Figure 7-26. Estimated Number of Cultural Resources Directly Impacted



7.8.6 Reduce Tailpipe Emissions/Non-Renewable Fuel Consumption

Air Quality/Sustainability is a criterion used to address how to reduce tailpipe emissions/non-renewable fuel consumption. A screening measure used to evaluate these impacts is to estimate the reduction in vehicle miles traveled (VMT) in the study area based on selected representative alternatives.

Vehicle miles traveled is a common measurement used in evaluating transportation programs. An increase in VMT in the city generally indicates a heavy reliance on motor vehicles. This reliance on motor vehicles can worsen air quality, contribute to water and soil pollution, and reflect increased road congestion. Generally, traffic traveling at slower speeds, caused by congestion, emits greater levels of pollutants per mile driven.

As shown in Table 7-24 and Figure 7-27, the estimated Daily 2030 daily reduction in VMT (Study Area) compared to No Build is greatest in the Combined HRT Subway and the Wilshire Boulevard HRT Subway group of alternatives follows.

Table 7-24. 2030 Estimated Reduction in VMT

PERFORMANCE MEASURES				ALTERNATIVES						
Goal	Objective	Measure	Criteria	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
						17	1	14	11	16
F	6	a	Estimated Daily 2030 Daily Reduction in VMT (Study Area) Compared to No Build (in thousands)	N.A.	6	23	61	55	73	71

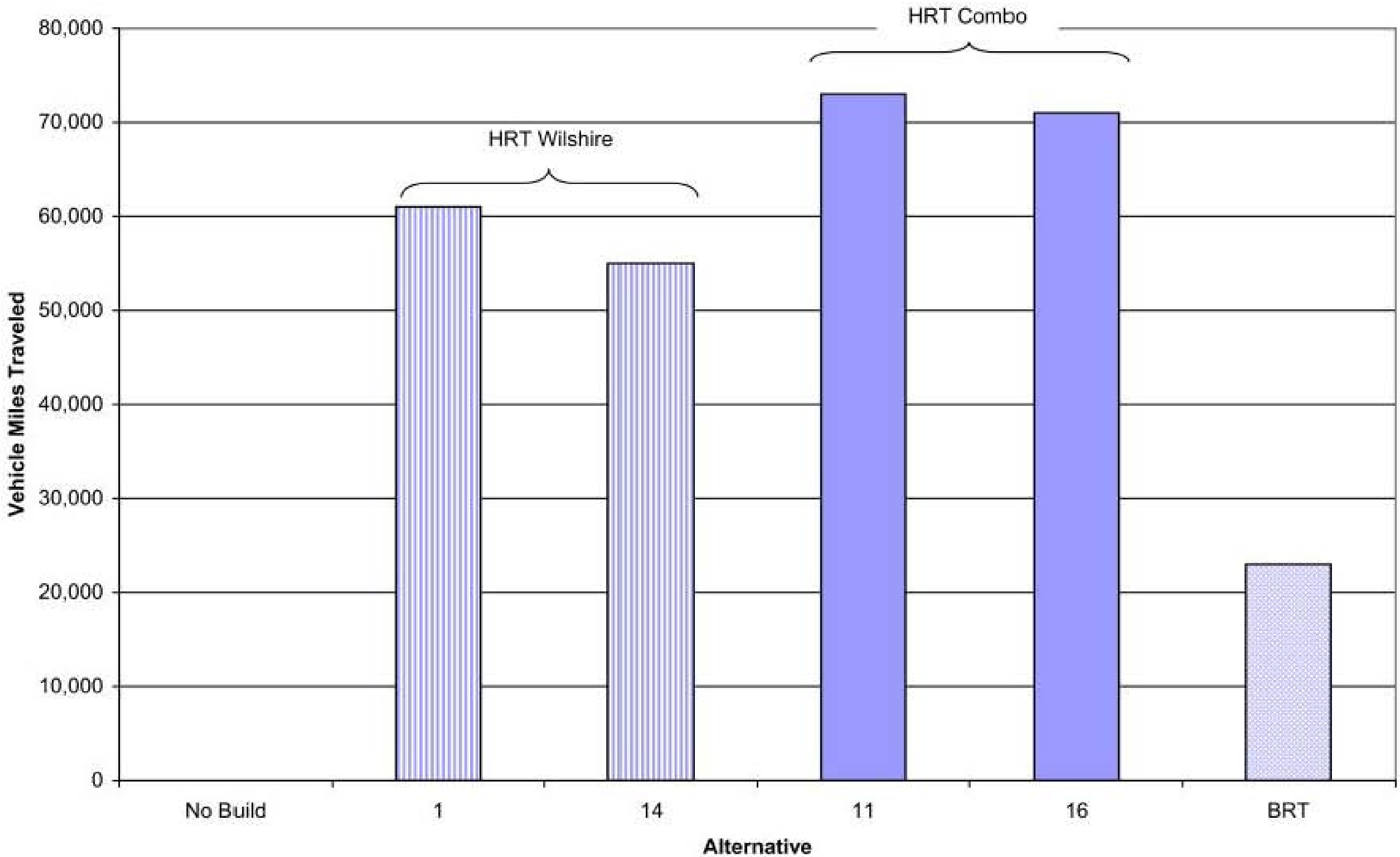
* Removes two lanes of traffic

7.9 Community Involvement Response

Over the past 30 years tremendous population and employment growth, worsening congestion, changing land uses and traffic patterns, as well as Metro's challenge to meet transit demand, have led to the need to improve mobility in the Westside Corridor. Against this background, in the fall of 2007 the Metro Board of Directors authorized an Alternatives Analysis Study for the Westside Extension Transit Corridor to look at ways to address the region's growing mobility challenges. The study considered various modes, including BRT with dedicated bus lanes, as well as at-grade, below-grade, and above-grade rail options, and at least two alignments respectively along Wilshire and Santa Monica Boulevards.

This chapter of the Alternatives Analysis study recaps the early scoping process and ongoing community outreach utilized during the Westside Extension Transit Corridor Study. It provides documentation of the scoping process, an archive of public scoping and community meetings as well as comments received as input to the development of alternatives for further study. In short, this chapter documents how the public involvement effort informed the development and refinement of the alternatives recommended for further study during the environmental process.

Figure 7-27. Estimated Daily Reduction in VMT (Region) Compared to No Build



The Metro Westside Extension study enjoyed considerable stakeholder interest and support over the approximately 12-month Alternatives Analysis Study. The community outreach effort successfully raised awareness about the study, engaged stakeholders on an ongoing basis and, most importantly, garnered public input at key decision points that demonstrated widespread consensus about the study recommendations that require Board approval in order to move forward into the environmental process.

Recognizing the size and diversity of the study area, Metro employed a thorough yet creative approach to ensuring an inclusive and transparent outreach effort. Elements of this outreach program included though were not limited to:

- Public meetings, including one series of early public and agency scoping meetings, and three series of public update meetings (17 meetings in total) at key study milestones
- Targeted stakeholder meetings to address specialized issues and localized concerns
- Multi-lingual outreach to include Korean, Russian, Farsi and Spanish-speaking stakeholders
- Multi-tiered meeting notifications including direct mail, print and broadcast media, advertisements, internet based distribution via e-mail and onboard Metro buses and trains
- Employment of “new” media tolls such as blogs, social networks and other internet or web-based tools to involve a wider audience in the decision-making process

Through the early scoping process, the project team learned that the overwhelming majority of stakeholders supported the need for a transit improvement in the Westside Extension Transit Corridor study area, with a Wilshire Boulevard subway identified as the most favored route and mode. While the Santa Monica alignment also received noticeable support, many stakeholders suggested that Metro consider a project that would include both a Wilshire Boulevard and a Santa Monica Boulevard alignment. In many cases, where the public was in favor of both these alignments, most thought that the Wilshire alternative should take precedence. Limited backing was voiced for aerial/monorail, light rail or bus rapid transit modes.

After completion of the early scoping meetings, Metro conducted three subsequent series of community meetings to keep stakeholders informed of the project’s progress at each decision-making milestone. At these subsequent public update meetings, Metro consistently heard from stakeholders that their preferred mode of transit is a subway, with over 90 percent of comments received favoring a Wilshire alignment.

7.10 Summary Matrix of Key Comparative Measures

The results of the detailed analysis, using the goals, objectives, specific evaluation criteria, and performance measures developed for this project, are presented in Table 7-25.

Table 7-25. Summary Matrix

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
Peak Period Travel Times (minutes) between Major Origin-Destination Pairs											
A	1	a	**Transit Peak Period Travel Time (AM Peak) (minutes) – Between Del Mar Station (Gold Line) and:**								
			Century City	80	92	92	80	48	53	48	53
			Santa Monica/San Vicente (WeHo)	72	83	83	64	60	65	55	55
			Wilshire/Beverly (BH)	78	90	90	65	46	51	46	51
			Wilshire/Westwood (UCLA)	82	94	94	75	50	55	50	55
			4th/Wilshire (Santa Monica)	112	129	129	91	57	62	57	62
			Transit Peak Period Travel Time (AM Peak) (minutes) – Between Pershing Square Station (Red Line) and:								
			Century City	48	55	55	47	20	25	20	25
			Santa Monica/San Vicente (WeHo)	49	56	56	37	35	40	28	28
			Wilshire/Beverly (BH)	42	48	48	35	18	23	18	23
			Wilshire/Westwood (UCLA)	54	62	62	45	23	28	23	28
			4th/Wilshire (Santa Monica)	70	81	81	65	29	34	29	34
			Transit Peak Period Travel Time (AM Peak) (minutes) – Between Florence Station (Blue Line) and:								
			Century City	60	69	69	74	41	46	41	46
			Santa Monica/San Vicente (WeHo)	69	79	79	57	53	58	47	47
			Wilshire/Beverly (BH)	64	74	74	56	39	44	39	44
			Wilshire/Westwood (UCLA)	76	87	87	66	44	49	44	49
			4th/Wilshire (Santa Monica)	99	114	114	86	50	55	50	55
			Transit Peak Period Travel Time (AM Peak) (minutes) - Between Reseda Station (Orange Line) and:								
			Century City	72	83	83	66	66	71	45	45
			Santa Monica/San Vicente (WeHo)	83	95	95	57	77	82	41	41
			Wilshire/Beverly (BH)	80	92	92	71	64	69	58	58
			Wilshire/Westwood (UCLA)	59	68	68	71	68	73	47	47
			4th/Wilshire (Santa Monica)	97	112	112	86	75	80	54	54
A	1	a	**Transit Peak Period Travel Time (AM Peak) (minutes) - Between Covina Station (Metrolink) and:**								
			Century City	94	108	108	92	67	72	67	72
			Santa Monica/San Vicente (WeHo)	99	114	114	87	79	84	69	69
			Wilshire/Beverly (BH)	98	113	113	82	65	70	65	70
			Wilshire/Westwood (UCLA)	99	114	114	93	69	74	69	74
			4th/Wilshire (Santa Monica)	119	137	137	108	76	81	76	81

Table 7-25. Summary Matrix (continued)

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
			Transit Peak Period Travel Time (AM Peak) (minutes) - Between Wilshire/Western Station (Purple Line) and:								
			Century City	35	40	40	34	10	15	10	15
			Santa Monica/San Vicente (WeHo)	30	35	35	30	22	27	17	22
			Wilshire/Beverly (BH)	23	26	26	19	8	13	8	13
			Wilshire/Westwood (UCLA)	36	41	41	31	13	18	13	18
			4th/Wilshire (Santa Monica)	51	59	59	47	19	24	19	24
			Transit Peak Period Travel Time (AM Peak) (minutes) - Between North Hollywood Station (Red Line) and:								
			Century City	58	67	67	35	39	44	26	26
			Santa Monica/San Vicente (WeHo)	51	59	59	26	51	56	18	18
			Wilshire/Beverly (BH)	49	56	56	45	37	42	25	25
			Wilshire/Westwood (UCLA)	61	70	70	43	42	47	29	29
			4th/Wilshire (Santa Monica)	77	89	89	55	48	53	35	35
Average End-to-End Transit Operating Speeds (mph)											
A	1	b	Avg end to end transit operating speed in mph (Between Union Station/Downtown and 4th/Wilshire, SM)	14	12	12	16	32	30	32	30
Note: Some alternatives (11, 16) require transfer(s) to travel between Union Station and Santa Monica											
Percentage of Transit Alignment Operating in Mixed Flow Traffic											
A	2	a	% of transit alignment operating in mixed flow traffic by operation type	NA	100	100	100	0	0	0	0
* Removes 2 lanes of traffic											

Table 7-25. Summary Matrix (continued)

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
Number of Transfers between Select Origin-Destination Pairs											
A	2	b	**Transfers Required (AM Peak) - Between Del Mar Station (Gold Line) and :**								
			Century City	1	1	1	1	1		1	
			Santa Monica/San Vicente (WeHo)	1	1	1	2	2		2	
			Wilshire/Beverly (BH)	1	1	1	2	1		1	
			Wilshire/Westwood (UCLA)	1	1	1	2	1		1	
			4th/Wilshire (Santa Monica)	1	1	1	2	1		1	
			Transfers Required (AM Peak) - Between Pershing Square Station (Red Line) and :								
			Century City	0	0	0	1	0		0	
			Santa Monica/San Vicente (WeHo)	0	0	0	1	1		1	
			Wilshire/Beverly (BH)	0	0	0	0	0		0	
			Wilshire/Westwood (UCLA)	0	0	0	0	0		0	
			4th/Wilshire (Santa Monica)	0	0	0	0	0		0	
			Transfers Required (AM Peak) - Between Florence Station (Blue Line) and :								
			Century City	1	1	1	2	1		1	
			Santa Monica/San Vicente (WeHo)	1	1	1	2	2		2	
			Wilshire/Beverly (BH)	1	1	1	1	1		1	
			Wilshire/Westwood (UCLA)	1	1	1	1	1		1	
			4th/Wilshire (Santa Monica)	1	1	1	1	1		1	
			Transfers Required (AM Peak) - Between Reseda Station (Orange Line) and:								
			Century City	1	1	1	2	2		1	
			Santa Monica/San Vicente (WeHo)	2	2	2	2	3		1	
			Wilshire/Beverly (BH)	2	2	2	3	2		1	
			Wilshire/Westwood (UCLA)	1	1	1	2	2		1	
			4th/Wilshire (Santa Monica)	2	2	2	2	2		1	
			Transfers Required (AM Peak) - Between Covina Station (Metrolink) and:								
			Century City	1	1	1	2	1		1	
			Santa Monica/San Vicente (WeHo)	1	1	1	2	2		2	
			Wilshire/Beverly (BH)	1	1	1	2	1		1	
			Wilshire/Westwood (UCLA)	2	2	2	2	1		1	
			4th/Wilshire (Santa Monica)	2	2	2	2	1		1	

Table 7-25. Summary Matrix (continued)

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT 17	Wilshire HRT 1	Wilshire HRT 14	Combined HRT 11	Combined HRT 16
A	2	b	**Transit Peak Period Travel Time (AM Peak) - Between Wilshire/Western Station (Purple Line) and:**								
			Century City	1	1	1	1	0		0	
			Santa Monica/San Vicente (WeHo)	1	1	1	1	1		1	
			Wilshire/Beverly (BH)	0	0	0	0	0		0	
			Wilshire/Westwood (UCLA)	0	0	0	0	0		0	
			4th/Wilshire (Santa Monica)	0	0	0	0	0		0	
			Transfers Required (AM Peak) - Between North Hollywood Station (Red Line) and:								
			Century City	1	1	1	1	1		1	
			Santa Monica/San Vicente (WeHo)	1	1	1	1	2		1	
			Wilshire/Beverly (BH)	1	1	1	2	1		1	
			Wilshire/Westwood (UCLA)	1	1	1	1	1		1	
			4th/Wilshire (Santa Monica)	1	1	1	1	1		1	
Provide Sufficient Transit Capacity											
A	3	a	Estimated maximum capacity (in thousands) of new EW transit service (Passengers per hour) (Assuming 18 trains per hour or 30 buses per hour)	N.A	3	3	3	18	18	18	18
A	3	b	Potential for capacity expansion beyond 2030	L	L	L	Md	H	H	H	H
* L = Low; M = Medium; Md = Moderate; H = High											
Transit Ridership											
			Daily New Transit Trips (Change from No Build) in thousands		N.A.	1.9	13.8	39.3	37.0	47.8	44.9
			Change in Urban Rail Boardings (Change from No Build) in thousands		N.A.	-0.8	13.3	95.5	88.3	117.0	109.0
			"New Stations" Urban Rail Boardings in thousands		0	0	0	61.5	59.9	80.0	77.1
Population and Population Density within ½ Mile of the Alignment											
A	4	a	Population/Pop density within 1/2 mile of each alignment (in thousands)								
			2030 Population within 1/2 mile of Alignment		N.A.	N.A	336	216	225	303	302
			2005/6 Average Population Density per Square Mile within 1/2 mile of Alignment		N.A.	N.A	12.5	16.5	16.2	16.1	16.3
			2030 Average Population Density per Square Mile within 1/2 mile of Alignment		N.A.	N.A	13.8	18.3	17.9	17.7	17.7

Table 7-25. Summary Matrix (continued)

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
Employment and Employment Density within ½ Mile of the Alignment											
A	4	b	**Employment/Employment Density within 1/2 mile of Each Alignment (in thousands)**								
			2005/6 Employment within 1/2 mile of Alignment		N.A.	N.A	332	221	235	293	293
			2030 Employment within 1/2 mile of Alignment		N.A.	N.A	387	258	274	342	334
			2005/6 Average Employment Density per Square Mile within 1/2 mile of Alignment		N.A.	N.A	13.6	18.7	18.7	17.1	17.2
			2030 Average Employment Density per Square Mile within 1/2 mile of Alignment		N.A.	N.A	15.9	21.9	21.8	20.0	19.7
* Removes 2 lanes of traffic											
Transit Dependent Populations											
A	4	c	Number of low income HH within 1/2 mile of each alignment – present (in thousands)		39.8	39.8	39.8	18.7	18.6	25.9	26.0
Competitive Speeds											
A	4	d	Ability for transit to be competitive with the auto in speed for key OD pairs		C	C	C	S	S	T	T
** C = Comparable Speed to Auto, Transfers Req.; S = Much Higher Speed than Auto, No Transfer; T = Much Higher Speed than Auto, Transfers Req.											
Enhancing Linkages and Major Trip Attractors/Generators Within the Corridor											
A	5	a	Ability of alts to continue a one seat ride		L	L	M	H	H	M	H
A	5	b	Number of direct connections within 1/8 mile walk to other lines, NS bus routes, etc		12	12	12	7	8	10	11
A	5	c	Number of transfers required to access regional rail - Metrolink, Amtrak		2	2	2	1	1	1	1
A	5	d	Number of direct connections to key activity centers within 1/8 mile walk		10	10	10	7	9	10	12
* L = Low; M = Medium; Md = Moderate; H = High											
Number of High Density Mixed Use Activity Centers Within ½ Mile of Each Alignment											
B	1	a	Number of high density mixed use activity centers within 1/2 mile of each alignment		17	17	17	9	12	14	17
Note: Mixed Use Activity Centers are feature a mixture of land uses such as residential and commercial, and typically provide retail uses that encourage pedestrian travel.											

Table 7-25. Summary Matrix (continued)

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
Number of High Opportunity Areas for Redevelopment Within ½ Mile of Each Alignment											
B	2	a	Number of high opportunity areas for redevelopment within 1/2 mile of each alignment		N.A.	N.A.	N.A.	W	W	W H	W'H
Note: All Cities within Study Area maintain specific TOD provisions or are receptive to TOD provisions as defined in their general plans, community plans or specific plans ** W: City of Los Angeles CRA Redevelopment Area in Wilshire Center/Koreatown; H: City of Los Angeles CRA Redevelopment Area in Hollywood											
Cost-Effectiveness											
C	1	a	Order of Magnitude Capital Cost ($ Billions, 2008)		$0.00	$0.134	$1.082	$6.063	$6.997	$9.057	$9.448
C	1	a	Order of Magnitude Capital Cost (10 years) ($ Billions, YOE)		$0.00	$0.172	$1.387	$7.771	$8.968	$11.610	$12.111
C	1	b	Capital Cost Per Route Miles ($ Millions, 2008)		$0	N.A.	$34	$475	$489	$509	$507
C	1	b	Capital Cost Per Route Miles ($ Millions, YOE)		$0	N.A.	$44	$609	$627	$652	$650
C	1	c	Order of Magnitude Annual O&M Cost ($ Millions, 2008)		$1,363	$1,378	$1,369	$1,459	$1,473	$1,518	$1,530
C	1	d	Daily Hours of Transit User Benefit compared to No Build		N.A.	1,700	13,800	39,300	37,000	47,800	44,900
C	1	d	Cost per hour of transit system user benefits for selected representative alternatives compared to No Build (CEI)		N.A.	$53	$17	$35	$44	$44	$51
* Removes 2 lanes of traffic											
Financial Feasibility											
D	1	a	Relative eligibility of alts for new starts funding**		L	L	H	M	M	M	L
D	1	b	Consistency with Metro's LRTP and financial direction***		C	C	C	N	N	N	N
** L = Low; M = Medium; H = High; vh = Very High *** C = Consistent; N = No ^If traffic lanes must be replaced, then increase to Medium.											

Table 7-25. Summary Matrix (continued)

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
Equity											
E	1	a	Number of low income HH within 1/2 mile of each alignment - present		39.8	39.8	39.8	18.7	18.6	25.9	26.0
E	2	a	**Local jurisdiction/communities directly impacted - displacements, construction**								
					City of SM	City of SM	City of SM	City of SM	City of SM	City of SM	City of SM
					City of BH	City of BH	City of BH	City of BH	City of BH	City of BH	City of BH
					City of WH	City of WH	City of WH	City of LA (7)	City of LA (8)	City of WH	City of WH
					City of LA (8)	City of LA (8)	City of LA (8)	LAC	LAC	City of LA (8)	City of LA (9)
					LAC	LAC	LAC			LAC	LAC
			Total jurisdictions/ communities		12	12	12	10	11	12	13
E	2	b	**Number of residents within 1/2 mile by ethnic group/minority populations**								
			Black		15,123	15,123	15,123	9,836	9,781	11,390	11,279
			Amer Indian/Eskimo		1,030	1,030	1,030	521	554	720	694
			Asian		47,951	47,951	47,951	35,528	35,358	38,356	38,620
			Hawaiian/Pacific Islander		354	354	354	208	210	249	241
			Other-Non-Hispanic		1,201	1,201	1,201	750	690	862	807
			2+Races Non-Hispanic		13,180	13,180	13,180	7,977	7,713	9,679	9,450
			Hispanic		47,041	47,041	47,041	21,837	22,012	27,021	27,048
* Removes two lanes of traffic Abbreviations: City of SM =City of Santa Monica; City of BH = City of Beverly Hills; City of WH = City of West Hollywood; City of LA = City of Los Angeles; LAC = Los Angeles County											
Estimated ROW Impact											
F	1	a	Estimated ROW impact based on proposed alt footprint (thousands of square feet)		None	Mn	1,335	420	480	550	570
Mn = Minimal											
Impacts to Traffic Circulation in Lane Miles											
F	2	a	Lane miles of traffic lanes removed or impacted		0	0	44.8	0	0	0	0
F	2	b	Lane miles of parking lanes removed or impacted		0	0	26.4	0	0	0	0
* Removes two lanes of traffic											

Table 7-25. Summary Matrix (continued)

PERFORMANCE MEASURES				ALTERNATIVES							
Goal	Objective	Measure	Criteria	Today	No Build	TSM	BRT	Wilshire HRT		Combined HRT	
							17	1	14	11	16
Estimated Visual and Noise Impacts											
F	3	a	Estimated level of visual impacts to surrounding neighborhoods		None	None	L	Md	Md	Md	Md
F	3	b	Potential noise & vibration impact - Operational Impacts		0	0	0	0	0	0	0
** L = Low; Mn = Minimal, Md = Moderate; H = High, VH = Very High *** Total amount of acreage, 2 hospitals and 5 schools											
Emergency Exits and Evacuation											
F	4	a	Ability to provide for emergency exits and evacuation		N.A.	N.A.	N.A.	Md	Md	Md	Md
* L = Low; Mn = Minimal; Md = Moderate; H = High; VH = Very High											
Vehicle/Transit/Pedestrian Conflicts											
F	4	b	Extent of vehicle/transit/ pedestrian conflicts that are not fully protected		Md	Md	L-M	L	L	L	L
* Removes two lanes of traffic ** L = Low; Mn = Minimal; Md = Moderate; H = High; VH = Very High											
Impacts on Sensitive and Protected Environmental Resources											
F	5	a	Estimated Number of Cultural or Natural Resources Directly Impacted		N.A.	N.A.	65	45	36	78	65
F	5	a	City of LA Historic Cultural Monument (HCM)		N.A.	N.A.	22	11	6	30	22
F	5	a	City of LA Historic Period Overlay Zone (HPOZ)		N.A.	N.A.	3	3	2	4	3
F	5	a	California Historic Landmark (CaHL)		N.A.	N.A.	3	2	2	3	3
F	5	a	National Register of Historic Places (NRHP)		N.A.	N.A.	5	2	1	7	5
F	5	a	Archeological Resource (AR)		N.A.	N.A.	22	18	18	22	22
* Removes two lanes of traffic											
2030 Estimated Reduction in VMT											
F	6	a	Estimated Daily 2030 Daily Reduction in VMT (Study Area) Compared to No Build (in thousands)		N.A.	6	23	61	55	73	71
* Removes two lanes of traffic											

7.11 Important Trade-offs Between Alternatives

Based on the technical information developed for the five Build Alternatives, the next step is to compare the merits of each alternative in order to recommend the most promising alternatives that will be carried into the next phase for full environmental review. The No Build and TSM Alternatives are required by the state and federal processes to be included in the environmental review.

Table 7-25 summarizes the key comparative evaluation using the seven goals identified for the evaluation framework. One of the first steps is to evaluate the Build Alternatives against Goal A – Mobility Improvement. As part of the Purpose and Need for the Westside Extension Transit Corridor Study, the major objectives are to reduce transit travel times, improve trip reliability, provide sufficient transit capacity to meet 2030 transit demand, maximize potential transit ridership, and to enhance linkages to the transportation system. Based on these objectives and the comparison to the HRT Alternatives, the Bus Rapid Transit Alternative 17 is not recommended to be carried into the next phase of analysis. The BRT Alternative is a good near-term solution, but does not provide sufficient capacity in the long term and does provide as a reliable trip time performance as the HRT Alternatives. Currently, within the City of Los Angeles, a federally sponsored program will provide peak period bus lanes as a quality near-term solution.

The next step in the comparative analysis is to compare the two “Wilshire” alternatives (HRT Alternatives 1 and 14). During Step 1 of the evaluation process, a “stand-alone” West Hollywood-Santa Monica Boulevard HRT alternative was eliminated from future consideration. Therefore, a West Hollywood connection between Wilshire Boulevard and the Hollywood/Highland Red Line Station must only be done in concert with a Wilshire alignment alternative. The process would be to first choose the “best” Wilshire alternative and then add the West Hollywood segment to the “best” Wilshire alternative to have the “best” combined alternative. In comparing HRT Alternatives 1 (straight out Wilshire) and 14 (a deviation to serve the 3rd/Fairfax and the Beverly Center areas), the most significant factors favoring Alternative 1 (straight out Wilshire) are lower initial capital cost (2 less stations and 1.5 miles shorter – almost $1 billion less cost); more new transit trips; higher rail transit usage; faster travel time by over 5 minutes; has more user benefits (a key Federal evaluation factor); and a Cost-Effectiveness Index which allows this alternative to be considered competitive for Federal New Starts funding. Based on all the evaluation factors presented in Table 7-10 and the discussion above, HRT Alternative 1 is recommended for future study in the next phase.

Based on the comparative evaluation, the selection of the best Combined HRT Alternative is straight forward. The combined HRT Alternative 16 includes the same alignment consideration as HRT Alternative 14 (Wilshire deviation). Therefore, Alternative 16 is recommended to be dropped from further consideration. This leaves HRT Alternative 11 as the best combined alternative to study in the next phase. Even though Alternative 11 has a high cost, it more closely meets the Purpose and Need of the Westside Extension Transit Corridor Study and merits further analysis and consideration in the next phase.

This comparative analysis recommends that the following alternatives be considered for future study in a Draft EIS/EIR process as the best alternatives that meet the Purpose and Need for the Westside Extension Transit Corridor Study and are the most competitive for possible Federal New Starts funding participation:

- No Build (required)
- Transportation Systems Management (required)

- HRT Alternative 1
- Combined HRT Alternative 11

During the EIS/EIR process the following issues will need to be studied leading to the selection of a Locally Preferred Alternative and preparation of an application to the Federal Transit Administration (FTA) for advancement into Preliminary Engineering:

- Decisions about optional station
- Details of station locations
- Physical alignments between stations
- Impacts identification and proposed mitigation measures
- Costs and possible phasing
- Evaluation of the cost effectiveness of project elements

8.0 PUBLIC INVOLVEMENT

8.1 Executive Summary

Over the past 30 years tremendous population and employment growth, worsening congestion, changing land use and traffic patterns, as well as Metro's challenge to meet transit demand, have led to the need to improve mobility in the Westside Corridor. Against this background, in the fall of 2007 the Metro Board of Directors authorized an Alternatives Analysis Study for the Westside Extension Transit Corridor to look at ways to address the region's growing mobility challenges. The study considered various modes, including Bus Rapid Transit (BRT) with dedicated bus lanes, as well as at-grade, below-grade, and above-grade rail options, and at least two alignments respectively along Wilshire and Santa Monica Boulevards.

This chapter of the Alternatives Analysis study recaps the early scoping process and ongoing community outreach utilized during the Westside Extension Transit Corridor Study. It provides documentation of the scoping process, an archive of public scoping and community meetings, as well as comments received as input to the development of alternatives for further study. In short, this chapter documents how the public involvement effort informed the development and refinement of the alternatives recommended for further study during the environmental process.

The Metro Westside Extension study enjoyed considerable stakeholder interest and support over the approximately 12-month Alternatives Analysis Study. The community outreach effort successfully raised awareness about the study, engaged stakeholders on an ongoing basis and, most importantly, garnered public input at key decision points that demonstrated widespread consensus about the study recommendations that require Board approval in order to move forward into the environmental process.

Recognizing the size and diversity of the study area, Metro employed a thorough yet creative approach to ensuring an inclusive and transparent outreach effort. Elements of this outreach program included though were not limited to:

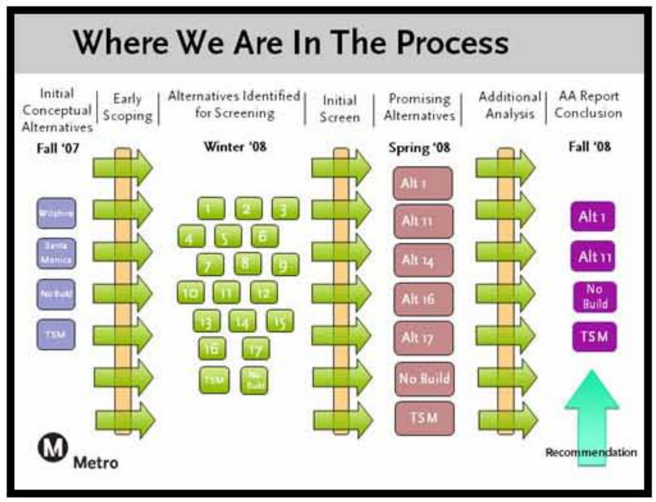
- Public meetings, including one series of early public and agency scoping meetings, and three series of public update meetings (17 meetings in total) at key study milestones
- Targeted stakeholder meetings to address specialized issues and localized concerns
- Multi-lingual outreach to include Korean, Russian and Spanish-speaking stakeholders
- Multi-tiered meeting notifications including direct mail, print and broadcast media, advertisements, internet based distribution via e-mail and on board Metro buses and trains
- Employment of "new" media tools such as blogs, social networks and other internet or web-based tools to involve a wider audience in the decision-making process

Through the early scoping process, the project team learned that the overwhelming majority of stakeholders supported the need for a transit improvement in the Westside Extension Transit Corridor study area, with a Wilshire Boulevard subway identified as the most favored route and mode. While the Santa Monica alignment also received noticeable support, many stakeholders suggested that Metro consider a project that would include both a Wilshire Boulevard and a Santa Monica Boulevard alignment. In many cases, where the public was in favor of both these alignments, most thought that the Wilshire alternative should take precedence. Limited backing was voiced for aerial/monorail, light rail or bus rapid transit modes.

After completion of the early scoping meetings, Metro conducted three subsequent series of community meetings to keep stakeholders informed of the project's progress at each decision-making milestone. At these subsequent public update meetings, Metro consistently heard from stakeholders that their preferred mode of transit is a heavy-rail subway, with over 90% of comments received favoring a Wilshire alignment.

The collateral material that accompanies the public involvement process (public notices, lists of locations where posters were displayed, media contacted for the study, blog entries, list of community organizations, notices sent to the Federal Register, etc.) can be found in the ***Public Involvement Report***.

8.2 Study Background



In the fall of 2007 the Los Angeles County Metropolitan Transportation Authority (Metro) initiated an Alternatives Analysis (AA) Study for the Westside Extension Transit Corridor. The successful completion of the Westside Extension AA Study will allow Metro to evaluate a range of alternative transit improvements for the Corridor and recommend the best alternative(s) to accommodate population growth and transit demand. These recommendations will be compatible with land use and future development opportunities in the region.

In order to define the appropriate range of issues and depth of analysis, Metro utilized an early public scoping process that was consistent with the Federal Transit Administration's requirements for an AA. This "early scoping" process was designed to solicit from stakeholders the variety of possibilities regarding the modes of transportation, potential alignments and station locations prior to their further analysis in the AA. Formal public scoping will be conducted again at the start of the environmental analysis after a decision is reached about the alternatives that will proceed into the next phase for further study. This report documents the early public scoping process and results for the Westside Extension Transit Corridor in support of the AA.

8.3 Historical Context

The Metro Red Line subway was opened in segments starting from Downtown Los Angeles at Union Station. It began operations to Wilshire and Western Avenue in Koreatown in 1996. The last segment connecting to North Hollywood in the San Fernando Valley began operations in 2000. The Wilshire/Western segment has since been renamed the "Purple Line".

In the 1980s and 1990s, extensive planning studies were conducted for a westward extension of the subway. This led to a Full Funding Grant Agreement with the federal government for a 2.3-mile extension of the subway from Wilshire/Western to Pico/San Vicente in 1994. In 1998, due to funding constraints, Metro suspended the project and focused its attention on developing bus and light rail transit options for the Westside. This ultimately resulted in a decision that the area was too big to be served by a single project. The Exposition Light Rail Transit (LRT) project, currently under construction, was planned for the "southern" portion of the Westside, with Wilshire BRT slated to serve the area's "northern" portion. Worsening traffic congestion and increased growth since then has prompted reconsideration of a possible rail extension to the Westside for the northern area.

In the fall of 2007, Metro initiated an AA Study for the Westside Extension Transit Corridor study to address these mobility challenges. Although the Westside Extension project has historically been defined as a heavy rail subway mode, various new alternatives emerging from the public scoping process could be considered. These could include looking at alignment options other than Wilshire and Santa Monica Boulevards. Other modes that may be considered include BRT with dedicated bus lanes, as well as at-grade, below-grade, and above-grade rail options. Additionally, funding constraints could dictate a series of phased extension segments that would need to be identified and evaluated with the goal of developing between two and four near-term operable segments.

8.4 The Study Area: Challenges and Opportunities

The Westside Extension Transit Corridor study area is in western Los Angeles County and encompasses a substantial geographic area of approximately 38 square miles. The study area is east-west oriented and includes portions of five jurisdictions: the cities of Beverly Hills, Los Angeles, Santa Monica and West Hollywood, as well as portions of unincorporated Los Angeles County. The boundaries of the study area generally extend north to the base of the Santa Monica Mountains along Hollywood, Sunset and San Vicente Boulevards, east to the Metro Rail stations at Hollywood/ Highland and Wilshire/Western, south to Pico Boulevard, and west to the Pacific Ocean. The size of the study area precluded an extensive direct mail effort and required that project notifications be distributed through multiple channels and outlets.

In addition to the multi-jurisdictional characteristics of the study area, it includes diverse populations, a number of ethnic enclaves and numerous languages that required targeted and, where practical, language specific outreach. The Westside Extension's study area also encompasses varying political, business, residential, economic and cultural interests where focused outreach was implemented to best engage these communities and stakeholder groups. Language needs of particular importance in portions of the study area were Korean (in Wilshire Center and the Miracle Mile), Russian (in West Hollywood) and Spanish (throughout the study area and beyond).

Another challenge to be addressed is the actual sphere of impact for this project. As a significant employment destination and jobs attractor, the benefits of the Westside Extension accrue far beyond the borders of the study area. Thus, outreach efforts included strategies for generating regional interest among all those likely to benefit from the project, including current and potential future transit users.

In addition to the outreach challenges posed by the size and diversity of the study area, there are some long-held perceptions about tunneling safety in mountainous, earthquake prone Southern California, as well as construction of a system in a geographic area known for high concentrations of potentially dangerous natural gases. Where appropriate, the outreach effort would address these concerns.

8.5 Community Outreach and Public Involvement Program

In order to ensure that all stakeholders were properly and actively engaged in the Westside Extension study and given numerous opportunities to provide necessary input at key milestones, a detailed Community Outreach and Public Involvement Plan was developed at the beginning of the project. This Plan included thorough stakeholder identification and database compilation efforts, communications protocols, public input tracking, and a proposed schedule for interfacing with the public and recommendations for how meetings should be conducted at various stages of the study. Additional recommendations for individual stakeholder briefings, inter-agency coordination, media involvement as well as creative ways to generate public interest and involvement were also addressed in the Plan.

8.6 Stakeholder Identification and Database Development

Comprehensive stakeholder identification efforts were initiated to coincide with the early scoping process. The size of the study area and changing communications methods suggested methods beyond a traditional radius mail to publicize the early scoping meetings. Efforts included the development of a comprehensive database for the purposes of targeted emails and direct mail, where recipients were asked to forward this information to their memberships, affinity groups, neighbors, friends and family to encourage widespread participation in the study. The database was inclusive of the following categories:

- Elected officials on the local, state and federal level
- Neighborhood Councils and other elected groups
- Homeowners Associations and Neighborhood Organizations
- Chambers of Commerce, BIDs and individual business leaders
- Community-based and civic organizations
- Key destinations and employers
- Transportation advocates and interest groups
- Print, broadcast and electronic media, including community-based publications and blogs
- Other interested groups and persons
- Individuals who attended public meetings or otherwise ask to be added to the database

This database was cross-referenced with information from the 2000 Mid-City/Westside Transit Corridor Study. Elected representatives were also requested to provide contact information for community and business organizations in their districts, which led to an additional 120 contacts added to the database. Further, the study team contacted many of these stakeholders to request their proprietary contact lists for the purposes of outreach to their memberships. Several of these stakeholder organizations were responsive to these requests which provided a significant enhancement to the baseline database. Where lists remained proprietary, direct mailers were supplied to the jurisdictions to distribute to their lists.

For the purposes of the outreach related to the Early Scoping meetings, the stakeholder list contained approximately 1,500 entries. The database is updated on an ongoing basis via requests to the information line, on the website, written requests and from sign-in sheets after each series of public or stakeholder meetings. The current database now includes 1,770 entries.

In addition, in the spring of 2008, Metro launched the "Metro Westside Extension" group on the Facebook social networking site. There are now more than 1,100 individuals who have joined this group and are informed about the Study progress and opportunities for input. Comments posted at the Facebook group are also part of the Study record.

8.7 Public Meetings

One series of 5 formal early scoping meetings, followed by three series of public update meetings (for a total of 17 AA public meetings) at key study milestones, were completed as part of the public outreach efforts during the Alternatives Analysis phase of the study. Meetings were held to coincide with each major project milestone; public comment informed the development and refinement of the alternatives recommended for further study in the environmental phase of the study.

8.8 Early Scoping Meetings

Early scoping meetings are the formal meetings required as part of the AA process. The early scoping process for the Westside Extension study included both identification of prospective participants and notification of the scoping meetings. The intention of public input during early scoping was to both inform the public about the study and to solicit feedback on whether transit improvements were necessary, what transit improvements should be studied and how transit improvements should be evaluated.

The early scoping process for the Westside Extension included one agency scoping meeting and five public scoping meetings where agency representatives and the general public were given the opportunity provide verbal and written comments. In addition those wishing to provide comments could view project information on Metro's website and respond in writing or by email.

At the early scoping meetings, participants received information about the Westside Extension Transit Corridor Study area, the region's transit needs, the range of transit modes considered and information about the two previously studied historical alignments (Wilshire Boulevard and Santa Monica Boulevard). During the early scoping process, stakeholders were invited to comment on transit modes, transit alignments, potential station locations, evaluation criteria and other general issues about the study. Nearly 400 comments were received as part of the early scoping outreach process.

8.9 Initiation of Scoping

The official notification process began with an early scoping notice published in *Federal Register* Volume 72 No. 189 on Monday October 1, 2007. An official scoping comment period of 30 days ended on November 1, 2007, but was extended until November 7, 2007 at the request of several stakeholders. Both the general public and agency representatives were notified of opportunities to attend public meetings and provide verbal and/or written comments through this *Federal Register* notice.

8.10 Early Scoping Meetings with Agencies & Jurisdictions

A series of meetings with stakeholders and elected officials were held prior to the public scoping and agency meetings conducted in October 2007. The meetings included:

- Meeting with Metro Board Deputies – August 30, 2007
- Meeting with Metro Chief Planning Officer and Westside Consultants' team – September 4, 2007
- Meeting at City of Los Angeles Mayor's office to brief elected officials and staff from throughout the Study area – September 6, 2007
- Meeting at West Hollywood City Hall to brief elected officials and staff from throughout the Study area – September 10, 2007

These meetings provided useful input as well as advanced notification and education about the Westside Extension AA to these stakeholders and elected officials.

8.11 Public Notices and Distribution

In addition to the Early Scoping Notice, a Public Notice was developed to notify the public about the Study, its associated Early Scoping Meetings as well as other opportunities for stakeholders to provide their input prior to the November 7, 2007 comment deadline.

The Public Notices were distributed in a number of ways:

- Via **email** to those with email addresses in the study database, and to those organizations distributing the Notice on Metro's behalf where their lists were proprietary. It is estimated that an additional 3,100 individuals were contacted through these proprietary lists. Approximately 700 individuals with email addresses are included in the stakeholder database. Emails notices were sent out on September 27, 2007, with follow-up reminders sent again on October 2, 2007. A final reminder to the community to submit written comments was delivered on October 30, 2007.
- Via **US mail** or direct mail where no email contacts were available. Over 600 notices were mailed to residents, agencies, and organizations in the study area: in West Hollywood, the City distributed a notice to neighborhood organizations, and to those sitting on City Commissions and Committees, or approximately 200 individuals; and, in Beverly Hills, the City distributed meeting notices to its list of elected officials and Commissioners. Meeting notices were mailed on September 27, 2007.
- Notices were posted online at the project website www.metro.net/westside.
- Poster sized versions of the flyer were distributed to 43 locations throughout the study area, including Metro Service Centers, offices of local elected officials, and at community, recreation and senior centers.

8.12 Media and Blog Outreach

A comprehensive list of 83 media outlets specific to the study area was developed which included mainstream, community-based and ethnic/foreign language print and broadcast outlets.

A press release, developed in coordination with Metro staff, was distributed to all 83 outlets; for the community-based and ethnic print media, a specific request was made for inclusion of Scoping Meeting information in their community calendars.

In addition, display advertisements for the Scoping Meetings were placed in eight (8) newspapers in the study area and were selected based on their geographic focus, language needs and audited circulation numbers.

Paid newspaper advertisements for the Scoping Meetings were placed in the following newspapers:

- Beverly Hills Courier: advertisement ran 10/5; circulation 43,000
- Century City News: advertisement ran 10/5, circulation 10,000
- Jewish Journal: advertisement ran 10/5; circulation 50,000
- Korean Central Daily (Korean language): advertisement ran 10/5; circulation 100,000.
- La Opinion (Spanish language): advertisement ran 10/5, circulation 124,784
- Park La Brea/Beverly Press: advertisement ran 10/4, circulation 12,000
- Santa Monica Daily Press: advertisement ran 10/3; circulation 19,000
- The Wave (Los Angeles/West Hollywood Independent): advertisement ran 10/11; circulation 240,000

To ensure that the study addressed the growing prevalence of "new" media in this region, outreach was also conducted to "blogs" which are best described as an online continual open conversation. The Southern California region is host to thousands of blogs, and after some research, 34 key websites were located that discuss transit, traffic, community development, and neighborhood issues.

All of the 34 bloggers identified were sent a copy of Metro's press release and the Public Notice — for the purposes of this study, bloggers were treated as if they were a typical media outlet. As far as we know, this is the first time that blogs have been considered as a part of the media outreach for a transit corridor study of this magnitude.

Many of these blogs posted comments about the study, and lively on-line "conversations" were initiated. Although it is difficult to ascertain how many "hits" each blog received about the study, the online conversation did contribute to raising awareness about the project and to generating turnout at the community meetings. Articles and comments posted on the blogs provided the study team with additional insight into public sentiment about the study.

8.13 Community Group and Agency Follow-Up

Individuals in the study database either received two (2) email notices about the Scoping Meetings i.e., an initial notice followed by a reminder, or one (1) piece of direct mail. The offices of local, state and federal elected officials representing portions of the project study area were also contacted and alerted about the meetings.

Multiple organizations were contacted requesting that they forward invitations to the Scoping Meetings to their memberships or constituents. These organizations included transportation advocacy groups, neighborhood and business organizations, civic groups, and academic institutions.

Follow-up calls were also made to agencies inviting them to attend the Agency Scoping Meeting. Calls were made to approximately 70 agencies between October 5 and 10, 2007.

8.14 Agency Scoping Meeting

One Public Agency Scoping Meeting was scheduled as follows:

- Thursday, October 10, 2007; 3:00 - 4:30 p.m.
  Los Angeles County Sheriff's Substation Briefing Room
  720 N. San Vicente Boulevard, West Hollywood

In attendance were 18 individuals representing the following agencies and jurisdictions:

- City of Beverly Hills
- California Public Utilities Commission
- Federal Transit Agency
- City of Los Angeles
- University of California, Los Angeles
- City of West Hollywood
- City of Los Angeles: Bureau of Street Lighting
- City of Los Angeles: Community Redevelopment Agency
- City of Santa Monica: Police Department
- City of Santa Monica: Big Blue Bus
- City of Beverly Hills: Fire Department
- City of Culver City: Fire Department
- City of Culver City: Community Development
- Los Angeles County: Sheriff's Department
- City of West Hollywood: Transportation Department

8.15 Public Scoping Meetings

A series of five (5) Early Scoping Meetings was scheduled for October 2007, ahead of the November 7 deadline for receipt of public comment. Locations were selected to reflect equitable geographic coverage, proximity to public transportation and to minimize overlap with other meetings scheduled in the study area.

The meeting format was as follows:

6:00 – 6:30 p.m.	Open House
6:30 – 7:00 p.m.	Presentation
7:00 – 8:00 p.m.	Public Comment

The public comment period was moderated, and speakers were asked to limit their comment to 2 minutes.

A total of 358 attended these meetings with 175 comments received at the meetings.

The Early Public Scoping Meetings were scheduled as follows:

- Scoping Meeting #1: Century City/Westwood area
  Tuesday, October 9, 2007; 6:00 - 8:00 p.m.
  Emerson Middle School
  1650 Selby Avenue, Los Angeles

  77 people signed in at this meeting, and 21 individuals elected to speak. Metro received 16 written comments at the end of this meeting.

- Scoping Meeting #2: West Hollywood, Hollywood and Fairfax District areas
  Thursday, October 11, 2007; 6:00 - 8:00 p.m.
  Pan Pacific Park Recreation Center
  7600 Beverly Boulevard, Los Angeles

  58 people signed in at this meeting, and 18 individuals elected to speak. Metro received 19 written comments at the end of this meeting.

- Public Scoping Meeting #3: Mid-Wilshire, Wilshire Center, Koreatown and Hancock Park/Windsor Square areas
  Tuesday, October 16, 2007; 6:00 p.m. to 8:00 p.m.
  Wilshire United Methodist Church
  4350 Wilshire Boulevard, Los Angeles

  73 people signed in at this meeting, and 17 individuals elected to speak. Metro received 10 written comments at the end of this meeting.

- Public Scoping Meeting #4: City of Beverly Hills
  Wednesday, October 17, 2007; 6:00 - 8:00 p.m.
  City of Beverly Hills Public Library
  444 N Rexford Drive, Beverly Hills

  69 people signed in at this meeting, and 17 individuals elected to speak. Metro received 13 written comments at the end of this meeting.

- Public Scoping Meeting #5: City of Santa Monica
  Thursday, October 18, 2007; 6:00 - 8:00 p.m.
  City of Santa Monica Public Library
  601 Santa Monica Boulevard, Santa Monica

  81 people signed in at this meeting, and 29 individuals elected to speak. Metro received 15 written comments at the end of this meeting.

8.16 Other Community Meetings during Early Scoping Period

Several meetings were scheduled during the Early Scoping phase and before the official closing date of the public comment period where community input was accepted. These include:

- City of West Hollywood Supplemental Community Meeting
  Monday, October 29, 2007; 6:00 - 8:00 p.m.
  Plummer Park
  7377 Santa Monica Boulevard, West Hollywood

  111 people signed in at this meeting, and 31 individuals elected to speak. Metro received 14 written comments at the end of this meeting.

In addition to the supplemental meeting, Metro conducted a series of meetings with project stakeholders during the early scoping period which are summarized in Table 8-1:

Table 8-1. Stakeholder Group/Association Meetings

Organization	Meeting Details	Key Issues	Follow-Up
Beverly Hills and Greater Los Angeles Association of Realtors	Special Meeting: October 26 Attendance: 70	Support for system expansion along both alignments. Would like to review information regarding how transit availability impacts property values.	None required at this juncture
Century City Chamber of Commerce	Study Update: September 20 Attendance: 25	Employers in Century City want improved transit service after peak hours to assist with employee retention. Support subway and want a Century City station. Interested in building a coalition to support the subway extension.	None required at this juncture
Hollywood Chamber of Commerce Legislative Committee.	Study Update: September 13 Attendance: 15	Support subway expansion. Has provided positive impacts to Hollywood.	None required at this juncture
Metro Westside/Central Governance Council	Study Update: October 10 Attendance: 25	Interest in following study progress and outcomes.	Provide periodic updates.
Outpost Estates Homeowners Association	Study Update: October 30 Attendance: 69	Overwhelming support for subway extension, especially west from Hollywood & Highland. Some interest in LRT, but most preferred subway to avoid at-grade intersections. Little concern about cost as "politicians would find the money because this project has tremendous public support". Explore developer fees to help cover cost.	Provide periodic updates..

Table 8-1. Stakeholder Group/Association Meetings (continued)

Organization	Meeting Details	Key Issues	Follow-Up
Southern California Transit Advocates	Study Update: October 29 Attendance: 25	Support for system expansion, however, the group questioned why Santa Monica Boulevard was being considered as a potential alignment. Additional questions about the construction process, tunneling techniques, and impacts of each mode and alignment. The group did not have a final recommendation on mode, alignment, or stations.	None required at this juncture
Traffic Committee, West Los Angeles Community Police Advisory Board	Study Update: September 11 Attendance: 35	Interest in improving transportation and transit options on the Westside and opportunities to participate.	Provide periodic updates.
Westside Cities Council of Governments (COG) & COG Transportation Committee	August 9: Transportation Committee: Study update and like meeting schedule September 20: COG: Study update and upcoming meeting schedule October 11: Transportation Committee, Study update and meeting status November 15: Study update and report on meeting participation Attendance: Varies	Support subway extension west: it's their second key priority after Exposition LRT.	Ongoing attendance at COG meetings.
Westside Transportation Partners	Study Update: August 28 Attendance: 30	Supportive of improved transit on the Westside. Key issues are connectivity to key business/employment centers. Also received presentation from Wilshire Monorail advocates.	Interested in periodic updates.

8.17 Summary of Early Scoping Public Comment

The overwhelming majority of comments received supported the urgent need for transit improvements on the Westside. A potential Wilshire heavy-rail subway alignment was the most favored route and mode, with nearly as many people advocating for subways on both the Wilshire and Santa Monica Boulevard alignments. In many cases, where the public supported both the Wilshire and the Santa Monica alignments, most thought that the Wilshire alignment should take precedence. Some support was expressed for aerial/monorail, light rail, or bus rapid transit modes.

The community greatly supported a potential subway mode i.e. heavy rail below grade. Most of those in favor of a subway did not give a reason for their preference. Those that did express a reason for this mode indicated speed of travel, ability to move large numbers of people, and limited impact to road traffic. Those favoring options other than subway cited cost and length of time to construct. Those preferring monorail or light rail expressed the view that these modes were less expensive and quicker to build. The public was presented with two potential alignment options, generally following Wilshire and Santa Monica Boulevards. In addition, 4 media outlets attended the meetings to report on the progress of the Westside Extension study. These included print, broadcast and online media. Overall, a Wilshire Boulevard alignment, extending westward from the Metro Purple Line at Wilshire/Western received the greatest amount of support. In summary, the public input received in the early scooping process strongly favors a subway extension along Wilshire Boulevard.

Prior to the close of the comment period 484 comments were received in five different ways:

- 133 Verbal comments at Public Scoping Meetings
- 87 Written comments at Public Scoping Meetings
- 152 Written comments and 1 digital audio comment via email
- 108 Written comments via US mail and hand delivered
- 4 Verbal comments on the Telephone Information Line

8.17.1 Comments Related to Purpose and Need

Public comments were received from 133 speakers at the five early scoping meetings. Comments focused on the difficulty associated with traveling by car or bus on the Westside due to extreme and often all-day congestion, and the growing recognition of the need for a mass transit alternative. There was also discussion of the need for local connections and shuttles as well as north-south connections and improvements to make the transit system more accessible to a wider range of residential and employment areas. A need for enhanced nighttime service, given the entertainment venues in the corridor was also expressed.

Comment forms were completed by 87 people and submitted at the early scoping meetings or returned to Metro after the meetings. The types of comments made with regard to the Purpose and Need for transit improvements in the study area focused on traffic congestion and extended travel times on existing bus transit routes including Rapid and Rapid Express lines.

Email comments were received from 152 people during the early scoping period. The types of comments made with regard to the Purpose and Need for transit improvements in the study area focused on existing traffic congestion and the need for system connectivity.

Letters were received from 108 persons and/or agencies. These letters focused on the alternatives to be studied and issues of concern to the authors, with little comment on the Purpose and Need for the project. The fact that the majority of the letter writers supported one or more of the alignments and modes, however, indicates that they perceive a need to provide a transit improvement in the study area.

The 4 messages left on the telephone information line did not reflect comments about the study's Purpose and Need.

8.17.2 Comments Related to Alternatives

Comments related to alternatives addressed preferred modes, potential station locations, and possible route alignments.

8.17.3 Comments Related to Modes

The comments provided by speakers at the early scoping meetings strongly supported the subway mode. Fifty speakers expressed a preference for the subway, with only two opposed. Eleven speakers spoke in favor of a potential monorail elevated alternative and one person was opposed to the monorail. Four people mentioned support for light rail transit and three were opposed to it, largely due to concerns about traffic congestion with an at-grade mode. Several of the people speaking in favor of either monorail or light rail indicated they felt these were less expensive alternatives and could therefore be built more quickly. Four people expressed a preference for additional bus rapid transit service, but ten people were opposed to dedicated bus lanes.

Comment forms submitted by meeting attendees indicated a strong preference for the subway mode. Of those who expressed a mode preference, 85 percent (59 people) supported the subway mode. Three people were opposed to the subway. Six expressed a preference for the aerial/monorail mode, one person suggested light rail and three supported bus rapid transit. Light rail was opposed by three people and bus rapid transit was opposed by eight.

Comments received via email were overwhelmingly in favor of the subway mode. Seventy-three people expressed support for the subway and only three were opposed to the subway mode. Support was expressed for light rail in 10 emails, with two people opposing light rail. The BRT mode with dedicated lanes was supported in five and opposed in three emails. Only one person emailed in support of a monorail alternative.

Almost 90 percent of the letter writers who expressed a preference for a mode supported the subway alternative. Seventy-one letters supported the subway mode, with only four supporting aerial/monorail, three in favor of light rail and two advocating bus rapid transit. Letter writers did not offer opinions in opposition to modes, rather only support for their preferred mode, which was overwhelmingly subway.

8.17.4 Comments Related to Stations

People who spoke at the Early Scoping Meetings generally supported the potential station locations that were shown on a board representing potential alignments and stations and on the PowerPoint presentation slide. However, some attendees suggested some additional stations as well. Five speakers suggested that a station near Cedars-Sinai Hospital and the Beverly Center was needed. Three people commented that the station in Century City should be south of Santa Monica Boulevard, closer to the center of Century City. There was support from two speakers for a station on the University of California Los Angeles (UCLA) campus, or located close to campus at Westwood and Le Conte. Two submitted comments supporting placement of a station by the I-405 overpass, or close to the Veterans' Administration Hospital. Two others supported a station located at The Grove/Farmers Market. There were also comments in favor of a station on Wilshire at Bundy and on Wilshire between 17th and 20th Streets near the UCLA/Santa Monica Hospital. Opposition was also expressed by several speakers to a station on Wilshire at Crenshaw or elsewhere in the Park Mile area of Wilshire Boulevard.

The comment forms included a map on the reverse side of the form and suggested that commenter's sketch their preferred alignment and station locations. The station areas most frequently indicated on the comment forms included Century City (7), UCLA (6), Santa Monica (6) Beverly Hills (5), Los Angeles International Airport (LAX) or Burbank Airports (5), and a connection to the Expo Light Rail Line (4). The only station area for which opposition was expressed was a station at Sunset/Fairfax.

Comments received via email mentioned many potential station locations. Those locations that were mentioned in more than one email included: Century City (5), UCLA (5), Westwood/Wilshire (5), Beverly Hills (4), West Hollywood (3), VA Hospital (2), Sunset/Fairfax (2), Beverly Center (2), The Grove/Farmers Market (2), and LAX (2). One email expressed opposition to a station at Sunset/Fairfax.

The station location most frequently mentioned in letters received by Metro was a Century City station. Nineteen letters mentioned the need for a station in Century City. The next most-mentioned station location was UCLA (10 comments), followed by the need for a connection to the Exposition LRT Corridor.

8.17.5 Comments Related to Alignments

Speakers at the early scoping meetings generally favored the Wilshire alignment, many expressed support for the Santa Monica alignment or a combination of both Wilshire and Santa Monica alignments.

Speakers also suggested several north-south alignments. These included an alignment from the San Fernando Valley to LAX, a connection from Hollywood & Highland to the Exposition Corridor, and Burbank Airport to LAX via Hollywood & Highland. There were also comments suggesting an alignment under Burton Way, continuing east below Santa Monica Boulevard to Downtown, following Sunset Boulevard to La Cienega, and connections to the Exposition Line either via the Third Street Promenade or near the Water Garden on 26th Street in Santa Monica. A group of speakers from the community just east of Fairfax Avenue, between Hollywood and Sunset Boulevards, advocated an alignment under Fairfax as they were concerned potential tunneling would damage their 1920s era homes.

Persons who completed comment forms preferred the Wilshire alignment. Twenty-two comments supported Wilshire, but almost as many (17) expressed support for both the Wilshire and Santa Monica alignments. Eight comment cards indicated Santa Monica Boulevard as the preferred alignment. Some comments indicated the need for north-south connections.

The Wilshire Boulevard alignment was the preference for the majority of persons who commented by email. Thirty-four people expressed a preference for the Wilshire alignment and only one person was opposed to that alignment. Fifteen emails supported the Santa Monica Boulevard alignment and one opposed the Santa Monica alignment. Support was expressed for both alignments in eight emails and nine opposed building both. Several emails suggested the need for north-south connections, including an alignment on La Brea to serve LAX and in the I-405 corridor. Two emails suggested an alignment along Olympic Boulevard.

Letter writers strongly supported the Wilshire alignment as their first choice. Twenty-eight letters supported the Wilshire alignment. Twelve were received in support of studying the Santa Monica alignment. Eight letters suggested that both alignments were appropriate for inclusion in this alternatives analysis. Other corridors that were mentioned included an alignment under Sunset Boulevard, Highland Avenue, San Vicente Boulevard, Lincoln, and Olympic Boulevards.

8.17.6 Comments Related to Evaluation Criteria

There were not very many speakers at the early scoping meetings who addressed specific evaluation criteria that they felt should be used to assess the alternatives. Those that did mention evaluation criteria expressed the need to assess community benefits, particularly for young people, the ability of the alternatives to absorb the growth from additional demand over time, accommodate pedestrians, affect on green house gas emissions, and the ability to generate ridership on other parts of the transit system. The overall capacity of the alternatives and the speed of the alternatives were also mentioned. The impacts of alternatives on bicycle safety were suggested as evaluation criteria, as was construction safety in earthquake zones.

Persons who completed comment cards suggested the need to evaluate noise and vibration of alternatives during construction and operations. Some also suggested that economic development opportunities and density around stations be considered.

Comments that were received in emails suggested that environmental concerns be key evaluation criteria. They also suggested that noise and vibration be considered in evaluating alternatives.

Evaluation criteria mentioned in letters included assessment of the area served by the alternative, noise and vibration, station area congestion, system connectivity, opportunities for additional land use.

8.17.7 Comments Related to Scope of the Analysis

Some of the issues that speakers at the scoping meetings said need to be addressed in the alternatives analysis included:

- The need for parking at stations
- Parallel arterials – their capacity and the affect of diverting traffic to them with dedicated bus lanes
- The affect of tunneling under homes, particularly older/historic homes
- Joint development potential and impacts of joint development
- Safety of drilling in the methane gas zones
- Evaluate segmentation that may be required due to funding constraints
- Consider the external costs (accidents, health) associated with the No Project Alternative
- Shadow and visual impacts associated with elevated structures
- Seismic safety

Some of the issues identified on comment forms as important to address in the alternatives analysis included:

- Bicycle access and amenities
- Americans with Disabilities Act (ADA) accessibility

- Effects on property values
- Congestion caused by buses
- Parking at stations and park-and-ride lots
- Ease of transfers
- Power/energy requirements

Some of the issues identified in emails as important to address in the alternatives analysis included:

- Availability and timeliness of transit service
- Noise and vibration
- Economic development opportunities
- Need for system connectivity
- Need for bicycle amenities
- Potential for express service

The issues that were cited in letters included the following:

- Pedestrian and bicycle accessibility
- Affect on congestion, including around stations
- Crime (safety issues)
- Noise and vibration impacts
- Need for late night service
- Need for express service
- Construction impacts
- Street closures and impacts on community events
- Parking supply and demand
- Impacts on geology and ground water
- Impacts on underground utilities

8.17.8 Applicability of the Comments to the Alternatives Analysis

A significant majority of the comments received during the early scoping period were supportive of the Westside Extension Transit Corridor Study with participants expressing a high degree of knowledge with regard to the transportation needs in the study area and potential transit solutions.

From a transit mode perspective, it was clear that below grade heavy rail transit (HRT) (i.e., subway) is the overwhelming preference of all respondents. At the same time, there were some comments supporting consideration of other technologies including LRT, BRT and monorail. Suggestions for station locations also received considerable attention in the comments received. In addition to the station locations presented at the meetings, a number of other activity centers both within and outside the study area were identified and documented for possible consideration. For the most part, those station locations identified outside the study area were intended to suggest a need for connections to the regional system as a whole. From an alignment perspective, the suggested Wilshire alignment had considerable support, but there was also positive support for a Santa Monica alignment and for a combination Wilshire and Santa Monica alignment. Stakeholders also expressed interest in a series of north-south alignments which are intended to link the study area with the San Fernando Valley, the Exposition corridor, and LAX and Burbank airports. The desire to serve these north-south linkages was also echoed in the station location suggestions.

There was general agreement on the list of potential evaluation criteria. Some comments indicated a desire to place special emphasis on air quality, system connectivity, safety, expandability to accommodate future demand, user safety (especially for bicyclists and pedestrians) and construction safety in earthquake zones.

All comments were considered in the subsequent analysis of alternatives. The alternatives for study in the next screening included modes, alignments and stations consistent with the comments received. The potential alternatives were evaluated with the criteria as presented, with comments added and results presented taking full note of the issues raised. The public was also given the opportunity to review the screened results and then provide further comment.

8.18 Community Update #1

Following the scoping meetings, Metro continued to engage the public on an ongoing basis during the Alternatives Analysis. In January and February 2008, Metro completed a first series of community meetings to update the public on its progress with the Alternatives Analysis for the Westside Extension Transit Corridor Study. The purpose of these meetings was to keep the public informed at key study milestones about how their comments were incorporated into the decision-making process as alternatives were developed and refined.

8.18.1 Pre-Meeting Activities

Prior to the January/February community update meetings, a series of briefings for elected officials and their staff was held. Information presented at the briefings included a preview of the public presentation and a new project fact sheet.

8.18.1.1 Elected Official Briefings

Two briefings were hosted for local elected officials and their staff as follows:

- Wednesday, January 23, 2008; 10:00 to 11:30 a.m.
  City of Beverly Hills, City Hall, Municipal Gallery
  455 N. Rexford, Beverly Hills

  Representatives from the following jurisdictions attended this briefing:

  - City of Santa Monica: Councilman Kevin McKeown
  - State of California: Office of State Senator Sheila Kuehl
  - State of California: Office of Assemblyman Mike Feuer

- United States: Office of Congressman Henry Waxman
- United States: Office of Senator Dianne Feinstein
- City of Beverly Hills: Transportation Department

- Friday, January 25, 2008; 1:00 to 2:30 p.m.
  City of Los Angeles, City Hall, Mayor's Conference Room, 3rd Floor
  200 N Spring St, Los Angeles

  Representatives from the following offices attended this briefing:

  - City of Los Angeles: Office of Mayor Villaraigosa
  - City of Los Angeles: Office of Councilman LaBonge
  - City of Los Angeles: City Planning Department
  - City of Los Angeles: Office of Councilman Weiss
  - City of Los Angeles: Community Redevelopment Agency
  - City of Los Angeles: Department of Transportation
  - City of Los Angeles: Office of Councilman Parks
  - City of West Hollywood: Department of Transportation
  - State of California: Office of Assembly Speaker Bass

Representatives from the elected offices continued to be supportive of the study, and were interested to learn about potential funding sources and phasing. City of Santa Monica Councilman McKeown expressed his interest in seeing the project ultimately serve that city.

8.18.1.2 Community Notices

Direct Mail

A postal mailer was distributed January 22, 2008 to approximately 1,040 addresses. Offices of local elected officials, governmental agencies, as well as individuals who previously submitted their mailing address were included in the distribution.

Email

The electronic distribution of the meeting notices was sent to 753 email addresses three times prior to the meetings. "Save the date" notices were distributed on January 18th and 21st, 2008. An additional distribution of the meeting notice took place January 30th. The content of the email was identical to the postal mailer. As in the past, Metro relied extensively on email distribution, requesting that email contacts forward meeting information to their memberships, friends and colleagues.

Media

Metro distributed a media release on January 22, 2008. The media release was then forwarded to a number of media contacts that had been made over the course of the project, including study area print media and on-line blogs.

8.18.2 Summary of Public Comment at Community Update Meeting #1

8.18.2.1 Summary of Comments

In January/February 2008 a second series of meetings was held to present the preliminary set of 17 build alternatives developed in response to comments heard during the early scoping period. These alternatives included various alignment options for a subway along the Wilshire Boulevard corridor, a subway along the Santa Monica Boulevard corridor, a combined subway along both the Wilshire and Santa Monica Boulevard corridors, some aerial options (including elevated heavy rail, light rail & monorail), and a Bus Rapid Transit (BRT) option. Metro is also required to study a No Build alternative as well as a Transportation Systems Management alternative that provides basic improvements to the existing transit system.

Approximately 327 people attended the community meetings in January and February, with about 116 people submitting either verbal or written comments. 150 comments were submitted outside of the community update meetings. Comments were submitted via postal mail, email, and through the project webpage. There was almost unanimous support to move forward with the study, even with noise and vibration concerns from Westwood and Spaulding Square residents. Submitted comments emphasized the need for transit connections to the Exposition Light Rail Transit line currently under construction to Culver City. In addition, 4 media outlets attended the meetings to report on the progress of the Westside Extension study. These included print, broadcast and online media.

The Community Update Meetings were scheduled as follows:

- Meeting #1: Mid-City
  Los Angeles County Museum of Art – West
  5905 Wilshire Boulevard, Los Angeles
  Thursday, January 31, 2008; 6:00 to 8:00 p.m.
  113 people signed in at this meeting, and 29 individuals elected to speak. Metro received 15 written comments at the end of this meeting.

- Meeting #2: Westwood
  Westwood Presbyterian Church
  10822 Wilshire Boulevard, Los Angeles
  Tuesday, February 5, 2008; 6:00 to 8:00 p.m.
  106 people signed in at this meeting, and 25 individuals elected to speak. Metro received 15 written comments at the end of this meeting.

- Meeting #3: West Hollywood
  Plummer Park
  7377 Santa Monica Boulevard, West Hollywood
  Wednesday, February 6, 2008; 6:00 to 8:00 p.m.
  108 people signed in at this meeting, and 23 individuals elected to speak. Metro received 9 written comments at the end of this meeting.

8.18.2.2 Comments Related to Purpose and Need

The types of comments made with regard to the Purpose and Need for transit improvements in the Westside Extension Transit Corridor Study Area focused on the difficulty associated with traveling by car or bus on the Westside due to extreme and often all-day congestion, and the growing recognition of the need for a mass transit alternative.

8.18.2.3 Comments Related to Alternatives

The majority of comments supported the Combined Wilshire/Santa Monica Boulevard alignments (Alternatives 11 and 16). There was support for multi-modal transit connections, particularly connections to the Exposition Light Rail Transit line and to the San Fernando Valley. Many of the comments that voiced support for the combined alignments noted a clear priority for the Wilshire Boulevard alignment over the Santa Monica Boulevard alignment provided funding both projects is not possible.

8.18.2.4 Comments Related to Modes

There was strong support for heavy rail transit to be located below grade.

8.18.2.5 Comments Related to Stations

The majority of comments received supported Alternatives 1, 11, and 16. These alternatives include connections to Cedars-Sinai, the Beverly Center and the Grove and Farmers Market shopping area. A few people commented on the need for a Crenshaw station and/or a north south connection to Wilshire Boulevard from the Crenshaw corridor.

Transit stops were recommended at Federal, Wilshire/Western, Wilshire/La Brea, Wilshire/Fairfax, Wilshire/San Vicente, Wilshire/La Cienega, and Cedars Sinai.

8.18.2.6 Comments Related to Alignments

The majority of those who commented on the project supported alignments that follow both Wilshire and Santa Monica Boulevards. Both lines would extend respectively from the Wilshire/Western Purple line and Hollywood/Highland Red line. One person favored the alignment traveling through the Cahuenga pass to help San Fernando Valley commuters.

8.18.2.7 Comments Related to Evaluation Criteria

Residents of the Westwood/Comstock Hills and Spaulding Square communities expressed concerns regarding noise and vibration during construction and operation of a below-grade system.

There were no additional concerns directly related to the evaluation criteria.

8.18.2.8 Comments Related to Scope of the Analysis

There was overwhelming support for a heavy rail subway system for the Westside. From the speaker comments as well as the written comments received in support of the subway, about half of the people supported a subway alignment down Wilshire Boulevard (Alternative 1), while the other half wanted a combination alignment that would provide service to both Wilshire as well as Hollywood/West Hollywood (Alternatives 11 or 16). Of those supporting only the Wilshire alignment, most stated that this was due to funding challenges, and the need to get something built and operating relatively quickly. Of those supporting the combination alignment, it was well-understood that the Wilshire segment would likely have to be constructed first.

8.19 Community Update #2

8.19.1 Pre-Meeting Activities

Briefings for elected officials, their staff and city agencies were held prior to the May community meetings.

8.19.1.1 Elected Official Briefings

Two briefings were hosted for local elected official and their staff as follows:

- Monday, April 28, 2008; 1:00 to 2:30 p.m.
  City of Beverly Hills, City Hall, Municipal Gallery
  455 N. Rexford, Beverly Hills

  Representatives from the following jurisdictions attended the April 28th briefing:

  - State of California: Office of State Senator Sheila Kuehl
  - State of California: Office of Assemblyman Mike Feuer
  - United States: Office of Congressman Henry Waxman
  - United States: Office of Senator Dianne Feinstein
  - City of Beverly Hills: Transportation Department

- Wednesday, April 30, 2008; 1:00 to 2:30 p.m.
  City of Los Angeles, City Hall, Mayor's Conference Room, 3rd Floor
  200 N Spring St, Los Angeles

  Representatives from the following offices attended the April 30th briefing:

  - City of Los Angeles: Office of Mayor Villaraigosa
  - City of Los Angeles: Office of Councilman LaBonge
  - City of Los Angeles: City Planning Department
  - City of Los Angeles: Office of Councilman Weiss
  - City of Los Angeles: Community Redevelopment Agency
  - City of Los Angeles: Department of Transportation
  - City of Los Angeles: Office of Councilman Parks
  - City of West Hollywood: Department of Transportation

8.19.1.2 Community Notices

Direct Mail

A postal mailer was distributed April 16, 2008 to approximately 1,001 addresses. Offices of local elected officials, governmental agencies, as well as individuals who previously submitted their mailing address at community meetings were included in the distribution.

Email

The electronic distribution of the meeting notices was sent to 801 email addresses two times prior to the meetings. A "save the date" was distributed on April 16, 2008. An additional distribution of the meeting notice took place April 28th. The content of the email was identical to the postal mailer. As in the past, Metro relied extensively on email distribution, requesting that email contacts forward meeting information to their memberships, friends and colleagues.

Media

Metro distributed a media release April 16, 2008. The media release was then forwarded to a number of media contacts that had been made over the course of the project, including study area print media and on-line blogs.

Facebook

By this time, Metro had established the "Metro Westside Extension" group on the social networking site, Facebook. Each of the 4 community meetings was added as an event on this site.

8.19.2 Summary of Comments

Metro continued to refine its project alternatives from the initial 17 identified for study after the scoping process to the seven alternatives presented to the public in May 2008. The five highest performing build alternatives were refined based on evaluation criteria which includes mobility improvements, transit-supportive land uses, cost effectiveness, feasibility, equity, environmental considerations and, very importantly, public acceptance. These alternatives have been narrowed to encompass two Wilshire Boulevard subway alternatives, two Combined Wilshire/Santa Monica Boulevard alternatives, Bus Rapid Transit (BRT) along with the required the Transportation System Management (TSM) and no-build alternatives.

The second round of Community Update Meetings was scheduled as follows:

- Meeting #1: Mid-City
  Los Angeles County Museum of Art – West
  5905 Wilshire Boulevard, Los Angeles
  Monday, May 5, 2008; 6:00 to 8:00 p.m.
  70 people signed in at this meeting, and 19 individuals elected to speak. Metro received 6 written comments at the end of this meeting.
- Meeting #2: Westwood
  Westwood Presbyterian Church
  10822 Wilshire Boulevard, Los Angeles
  Tuesday, May 6, 2008; 6:00 to 8:00 p.m.
  47 people signed in at this meeting, and 8 individuals elected to speak. Metro received 4 written comments at the end of this meeting.
- Meeting #3 Santa Monica:
  Santa Monica Public Library – Multipurpose Room, 2nd Floor
  601 Santa Monica Boulevard, Santa Monica
  Thursday, May 8, 2008; 6:00 to 8:00 p.m.
  64 people signed in at this meeting, and 20 individuals elected to speak. Metro received 11 written comments at the end of this meeting.

- Meeting #4 West Hollywood
  Plummer Park
  7377 Santa Monica Boulevard, West Hollywood
  Monday, May 12, 2008; 6:00 to 8:00 p.m.
  69 people signed in at this meeting, and 19 individuals elected to speak. Metro received 8 written comments at the end of this meeting.

Approximately 250 people attended the May community update meetings. Public comments were provided by 66 speakers at four community update meetings.

Comment forms were completed by 29 people and submitted at the community update meetings or returned to Metro after the meetings. The types of comments made with regard to the Purpose and Need for transit improvements in the Westside Extension Transit Corridor Study Area focused on traffic congestion and extended travel times on existing bus transit routes including Rapid and Rapid Express lines.

Email comments were received from 141 people during the community update meetings. Typical comments focused on existing traffic congestion and the need for system connectivity. Four comments related to the project study were received via Facebook. These comments were in favor of the project, and in most cases cited support for Alternatives 11 and 16. In addition, 4 media outlets attended the meetings to report on the progress of the Westside Extension study. These included print, broadcast and online media.

8.19.2.1 Comments Related to Purpose and Need

The types of comments made with regard to transit improvements in the Westside Extension Transit Corridor Study Area focused on the difficulty associated with traveling by car or bus on the Westside due to extreme and often all-day congestion, and the growing recognition of the need for a mass transit alternative. There was also discussion of the need for local connections and shuttles to make the transit system more accessible to a wider range of residential and employment areas. Also mentioned was the need for enhanced nighttime service, given the entertainment venues in the study area.

8.19.2.2 Comments Related to Alternatives

The majority of comments continued to support the combined Wilshire/Santa Monica Boulevard alignments (Alternatives 11 and 16). Many of the comments that voiced support for the combined alignments noted a clear priority for the Wilshire Boulevard alignment over the Santa Monica Boulevard alignment, if funding both projects was not possible. If funding for both projects was not possible, Alternative 1 was the preferred alternative.

8.19.2.3 Comments Related to Modes

Consistently throughout the study, there has been nearly unanimous support for the chosen alignment to be located below grade.

8.19.2.4 Comments Related to Stations

There was agreement that stations identified during the alternatives analysis should satisfy the needs of the community. There was more support for a station at Cedars-Sinai Hospital and Beverly Center than for the Grove and Farmers Market. There was concern that if both stations were included, or only the Grove/Farmers Market had a station that travel times could be compromised.

The Crenshaw/Wilshire potential station received more support than criticism. Advocates for a Crenshaw/Wilshire station highlighted the need for system connectivity, and the potential ridership for the station. Those not in support of the station cited concerns that a station would overwhelm the lower-density nature of the neighborhood.

The community noted a need for two stations to accommodate transit users in the Westwood neighborhoods close to UCLA. There were requests for stations to be located close to the UCLA campus as well as one at Wilshire/Westwood.

Finally, there were requests from the community to have the subway extension terminus at Ocean Boulevard in Santa Monica.

8.19.2.5 Comments Related to Alignments

The majority of those who commented on the project continued to support alignments that follow both Wilshire and Santa Monica Boulevards, extending respectively from the Wilshire/Western Purple line and Hollywood/Highland Red line stations.

8.19.2.6 Comments Related to Evaluation Criteria

Of the comments received, the community felt that creating more system connections should be a top priority for Metro. They would like to see a project that uses the most effective alignment and station locations to move the most amount of people as quickly as possible.

Concerns regarding noise and vibration during construction and operation remained. Residents are concerned about the potential impact of tunneling below their homes, and would like more information about possible mitigation measures.

8.19.2.7 Comments Related to Scope of the Analysis

There continues to be a tremendous amount of community support for the overall project. The community understands the need for the project as traffic congestion continues to be problematic throughout the project study area. The majority of those submitting comments prefer that extensions from both the Red and Purple lines take place. However, given that funding may only be available for one project, the community appears to prefer the Purple line be extended first.

Additionally, there were several comments received regarding the need to support a ½ cent sales tax increase to raise revenue to build the subway and that could be utilized as matching local funds to secure federal funding. Comments also noted support for station amenities, north-south connectors, and a station at Crenshaw (which is currently considered optional). Further comments noted competition for funding with the Exposition Light Rail line, support for a connection between the subway and the Exposition Light Rail line, and the need to service employment and shopping areas at Cedars-Sinai, the Grove and the Beverly Center. Westwood also was mentioned as possibly needing additional stops to serve both the employment areas and the UCLA campus. Tunneling through the Santa Monica Mountains on the Westside was also mentioned. Several people felt that ridership would increase with access to the Westside by people living in the San Fernando Valley who would benefit with a connection to the existing Red Line.

8.20 Community Update #3

8.20.1 Pre-Meeting Activities

Prior to the September community update meetings, a series of briefings for elected officials and their staff was held. A preview of the PowerPoint presentation was shared and Metro obtained feedback from the various cities and elected officials involved related to their preferred alignments, station locations, and parking. All of the elected officials, their staff and city staff in attendance were supportive of the project.

8.20.1.1 Elected Official Briefings

Two meetings were held for elected officials, their deputies and city staff as follows:

August 21, 2008; 1:30 to 3:00 p.m.
West Hollywood City Hall, Emergency Operations Center
8300 Santa Monica Boulevard, West Hollywood

Tuesday, August 26, 2008; 1:30 to 3:00 p.m.
City of Los Angeles, City Hall, Mayor's Conference Room, 3rd Floor
200 N Spring St, Los Angeles

Representatives from the August 21st meeting included the following:

- City of West Hollywood
- City of Beverly Hills
- Office of Representative Henry Waxman
- Office of Speaker Karen Bass
- Office of Metro Board Member Pam O'Connor
- Office of City of Los Angeles Councilmember Jack Weiss
- Office of California Senator Mark Ridley Thomas
- Office of US Senator Diane Feinstein

Representatives from the August 26th meeting included the following:

- City of Los Angeles (Community Redevelopment Agency, Department of Transportation)
- Office of City of Los Angeles Councilmember Jack Weiss
- Office of City of Los Angeles Councilmember Bill Rosendahl
- Office of the Mayor, City of Los Angeles
- Office of City of Los Angeles Councilmember Bernard Parks

8.20.1.2 Community Notices

Direct Mail

On August 20th, 2008 an invitation to attend a meeting announcing the Alternatives Analysis results was mailed to approximately 1,000 addresses. Included in the mailing were local elected officials, government agencies, as well as individuals who previously submitted their mailing address at community meetings were included in the distribution.

Email

The electronic distribution of the meeting notices was sent to 1,084 email addresses. In mid-August a save the date notice was sent out and on August 20th, a more detailed notice was e-mailed to both the project database as well as the databases of key organizations and elected officials that are actively participating in the project.

Media

Metro distributed a media release April 20, 2008. The media release was then forwarded to a number of media contacts that had been made over the course of the project, including study area print media and on-line blogs.

Facebook

Metro posted information about all five of the community update meetings as events on "Metro Westside Extension" group on the social networking site Facebook.

8.20.2 Summary of Comments

In September, 2008, Metro held the final round of community meetings for the Alternatives Analysis phase of the Westside Extension study to provide stakeholders with its preliminary recommendations based on public input and technical analysis conducted over the past 12 months. Most public input was in support of Alternative 1 and Alternative 11 which will be presented to the Metro Board of Directors in fall 2008 to obtain approval for moving into the next Draft Environmental Impact Report/Draft Environmental Impact Study phase of the project.

Approximately 330 people attended the 5 workshops held throughout the study area on September 3, 4, 6, 8 and 10. Public comments were made verbally at the meetings by 92 speakers and 38 people submitted written comments at the meetings, while an additional 13 people submitted their comments via e-mail and over 100 people sent in their comments via regular mail. In addition, 10 media outlets attended the meetings to report on the progress of the Westside Extension study. These included print, broadcast and online media. Two comments were left on Facebook while over one hundred others signed up to join the Metro Westside Extension Facebook Group. Comments focused on stakeholders' alignment preferences, station locations and connectivity issues. In addition, there were numerous comments in support of building the project as soon as possible because of the extreme congestion faced by Westside residents and commuters, as well as many comments related to the need for this project to make Los Angeles a more competitive destination with other large cities throughout the world that have efficient transit systems.

The public meetings were held as follows:

- Meeting #1: City of Santa Monica
  Wednesday, September 3, 6 – 8 p.m.
  Santa Monica Public Library, Auditorium, 1st Floor
  601 Santa Monica Boulevard, Santa Monica

  75 people signed into the Santa Monica meeting; there were 17 speakers and 13 written comments submitted.

- Meeting #2: City of West Hollywood
  Thursday, September 4, 6 – 8pm
  Plummer Park
  7377 Santa Monica Boulevard, West Hollywood

  66 people signed into the West Hollywood meeting; there were 18 speakers and 5 written comments submitted.

- Meeting #3: City of Beverly Hills
  Saturday, September 6, 2 – 4 p.m.
  Beverly Hills Public Library – Auditorium, 2nd Floor
  444 N Rexford Drive, Beverly Hills

  52 people signed into the Beverly Hills meeting; there were 18 speakers and 6 written comments turned in.

- Meeting #4: Wilshire/Fairfax area
  Monday, September 8, 6 – 8 p.m.
  Los Angeles County Museum of Art (LACMA) West - Terrace Room, 5th Floor
  5905 Wilshire Boulevard, Los Angeles

  66 people signed into the LACMA meeting; there were 18 speakers and 5 written comments submitted.

- Meeting #5: Westwood area
  Wednesday, September 10, 6 – 8 p.m.
  Westwood Presbyterian Church
  10822 Wilshire Boulevard, Los Angeles

  71 people signed into the Westwood meeting; there were 21 speakers and 9 written comments submitted.

8.20.2.1 Comments Related to Purpose and Need

Westside residents, and those traveling to the Westside for work or pleasure, repeatedly asked for the Westside Extension project to be built quickly. They reiterated how the congestion on this side of town is unmanageable and that this project would provide options for those who wish to get out of their cars. In addition, stakeholders believe that since Los Angeles is the second largest city in the United States, an efficient public transit system is needed in order for the City and the County to continue to attract jobs, tourists and other economic drivers of the local economy.

8.20.2.2 Comments Related to Alternatives

Support for both Alternative 1 and 11 were provided at the public meetings. While most community members are in favor of both alignments being built, they recognize that it makes more sense to build Alternative 1 before proceeding with Alternative 11. Still other community members were interested in seeing both alignments built simultaneously.

8.20.2.3 Comments Related to Modes

Most all of the stakeholders that provided comment were in agreement that Metro had narrowed the modes to subway only. Stakeholders overwhelmingly supported that this is the only option that could effectively manage Westside congestion, and is the system needed by a world class city such as Los Angeles. However, there were a few select stakeholders who were still interested in seeing Personal Rapid Transit, monorail and Bus Rapid Transit being carried through the environmental study process.

8.20.2.4 Comments Related to Stations

Stakeholders frequently commented on providing stations that make the most sense for north and south connections to the line. Many stated that a connection with the Crenshaw area was necessary as well as a connection to Los Angeles International Airport (LAX). Metro received mixed comments about parking at the stations. Some were very interested in seeing parking at stations to allow residents who couldn't walk or easily take a bus to the line to have access, while others believe that the Westside is congested enough and that providing parking would only increase congestion. In addition, participants provided their personal preferences for a variety of stations.

8.20.2.5 Comments Related to Alignments

Community members were significantly in favor of moving both Alternative 1 and Alternative 11 forward into the environmental process and would like to have both alignments built. Attendees felt that ridership on both alignments is extremely high. Others commented on the need for having an alignment that goes to LAX and alignments that plan for future growth of the Metro rail system.

8.20.2.6 Comments Related to Evaluation Criteria

The evaluation criteria which were used to narrow the Alternatives have remained the same throughout the study. No additional comments related to evaluation criteria were mentioned in this round of meetings.

8.20.2.7 Comments Related to Scope of the Analysis

Community members were pleased overall with the progress that Metro has made in the Alternatives Analysis Study. Most all individuals were in favor of subway and in favor of one of the Alternatives or both Alternative 1 and 11. They commented that they were pleased Metro had listened to what they had been saying throughout the study process and it was reflected in the Alternatives Analysis results. Community members also commented on the regional benefits that this project would bring to all of Los Angeles County and they stressed how important it is to move it forward as quickly as possible.

Many community members commented on the need for Measure R, the ½ sales tax initiative on the November 2008 ballot, to provide funding for this as well as other transit projects in Los Angeles

County. Most everyone who commented was in favor of Measure R, though there were a few community members who were in opposition of Measure R.

In addition, various comments were received related to the need for north and south connections to this subway and there were mixed comments about the need for parking at stations.

8.21 Collateral Materials

In order to inform and update stakeholders about the project's progress, the outreach team developed numerous pieces of collateral materials for distribution through various channels and mediums of communication. All collateral materials are posted to the project website and updated on an as-needed basis.

The following collateral materials have been developed to date:

- Frequently Asked Questions – The FAQs provide stakeholders with a project description and basic project facts.
- Project Schedule – A project schedule was developed to keep stakeholders apprised of the study's progress and key milestones.
- Summary Newsletters – One newsletter summarizing the results of the study will be developed and circulated at the culmination of the AA providing stakeholders with the results of the process and a schedule for next steps.

Fact Sheets – Metro has developed three Fact Sheets and will develop a fourth Fact Sheet for the Study as follows:

- Fact Sheet # 1 is a summary of background, purpose and need for the Westside Extension, a project overview and schedule for the study period.
- Fact Sheet # 2 is a summary of the early scoping process, including the public meetings, and comments received at the meetings.
- Fact Sheet #3 presents a re-cap of the project thus far and sets for the schedule for narrowing the alternatives and details of the analysis process.
- Fact Sheet #4 will present a recap of the study, its conclusions and the alternatives recommended for further study.

Business Cards – Small, informational and easily distributed business cards containing the project's website address, info-line telephone number and Facebook group name were produced and distributed at both public update and stakeholder meetings.

8.22 Project Website

The project website www.metro.net/westside serves as a central clearing house where the public can go to obtain all project-related information. The website is updated frequently and also contains maps of the alignments being studied and graphics of how the potential routes and stations may appear. All collateral materials can be found at the website as well as the scoping report, scoping comments and PowerPoint presentations made at public meetings. The website also contains a

"Contact Us" section where people can give their input to the Study, ask questions, and have themselves added to the Study data base to be notified of future meetings and Study progress.

8.23 Project Information Line

In addition to the other forms of communication made available to stakeholders, such as e-mail, regular mail and the internet, a project telephone information line was set up for the public. This telephone line is available to English, and Spanish speaking callers and checked on a daily basis. Calls and requests are returned promptly upon receiving a message. A log of all incoming calls, subject of the calls and responses to the callers is being maintained. The project line is 213.922.6934.

8.24 Project Video

A 16-minute video featuring Metro staff was developed to coincide with and reflect the content of the early scoping meetings. This video provides historical background on the study, its need and purpose as well as explains the Alternatives Analysis process. It also solicits stakeholders' opinions and encourages them to submit comments on the project modes and alignments. This video was posted on Metro's website during the early scoping meetings and may be viewed on Metro's website at www.metro.net/westside

8.25 Media Relations

8.25.1 Print and Broadcast Media

Prior to each series of scoping and public update meetings, press releases were sent out to over 100 media outlets made up of regional and local print media, broadcast media and online media including blogs. In addition, advertisements were placed in local and ethnic media throughout the Westside Extension Corridor and posted in community calendars when available. For the second and third public update meetings, Metro used Facebook to publicize its meetings among the Metro Westside Extension (MWE) group members.

Around key study milestones, there was generally a pronounced up-tick in news stories. Because of the nature of online media and blogs, these stories generated significant online discussion from the public. Monitoring this "virtual" discussion allowed Metro to see how the public was reacting to Study developments in real time. As warranted, Metro would participate in these online discussions if an important technical correction was needed. However, we noted that members of the public were usually quick to provide the accurate information from the Study. As the Study progressed, Metro participated with greater frequency in these discussions to invite participants to view the official Study material on the Metro website, send their views and questions in to be part of the official Study record, to become part of the Study data base, and to invite them to join the Metro Westside Extension group on the social networking site Facebook.

8.25.2 New Media

New media is an ever-changing but widely used medium for communicating vital information quickly and effectively. Utilizing new media broadens public awareness and participation, and allows the efficient engagement of its stakeholders on familiar territory. In addition to blogs, tech savvy stakeholders are employing online tools such as Facebook to disseminate information.

Recognizing that the use of new media tools is relatively new to many government agencies, Metro committed itself to exploring and pursuing appropriate online media to proactively engage a full range of stakeholders. To this end, Metro established the Metro Westside Extension (MWE) Facebook group designed to reach out to a relatively untapped audience of college students and young adults. Facebook is a prime example of a communications need meeting a technological opportunity. Launched in April 2008, the MWE Facebook site has registered over 1,100 unique users that are actively engaged in conversation about the project.

Facebook is a social network that connects people with friends and others who work, study and live around them. People use Facebook to keep up with friends, upload an unlimited number of photos, share links and videos, and learn more about the people they meet. Facebook has served as an online compliment to the Study website. Additionally, this new media element of outreach expands current visibility encouraging any demographic we target to access/join.

Assigned administrators updated the site with events, reports, videos and presentations. The Facebook group is monitored daily by the project team and all comments left on group's "discussion board," "wall," and on links provided were captured in a tracking matrix as well as page PDFs. The content was refreshed frequently to ensure our viral stakeholders were provided with the most accurate information possible. Members of the MWE were also able to RSVP to Metro events such as the community update meetings and converse with each other about the project.

APPENDIX A

LIST OF ACRONYMS

APPENDIX A LIST OF ACRONYMS

Acronym	Description
AA	Alternatives Analysis
AADT	Annual Average Daily Traffic
AB	Assembly Bill
ADA	Americans with Disabilities Act
APE	Area of Potential Effects
APTA	American Public Transportation Association
bgs	Below Ground Surface
BMPs	best management practices
BRT	Bus Rapid Transit
CalTrans	California Department of Transportation
CARB	California Air Resources Board
CBD	Central Business District
CCTV	Closed Circuit Television
CDMG	California Division of Mines and Geology
CEQA	California Environmental Quality Act
CGS	California Geological Survey
CH_4	Methane
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
COG	Council of Governments
CORE	Congressionally Ordered Re-Engineering
CRA	Community Redevelopment Agency
DEIR	Draft Environmental Impact Report
DNL	Day-Night Sound Level
DWR	California Department of Water Resources
EDR	Environmental Data Resources
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EPB	Earth Pressure Balance
FTA	Federal Transit Administration
GHG	Greenhouse Gas
GIS	Geographic Information System
HDPE	High-Density Polyethylene
HH	Households
HOV	High-Occupancy Vehicle Lane

Acronym	Description
HRT	Heavy Rail Transit
HVAC	Heating, Ventilating and Air Conditioning
ITS	Intelligent Transportation Systems
LACMA	Los Angeles County Museum of Art
LACMTA	Los Angeles Metropolitan Transportation Authority
LACTC	Los Angeles County Transportation Commission
LADOT	Los Angeles Department of Transportation
LAX	Los Angeles International Airport
LEL	Lower Explosive Limit
LOS	Level of Service
LPA	Locally Preferred Alternative
LQG	Large-Quantity Generators
LRT	Light Rail Transit
LRTP	Long Range Transportation Plan
MDE	Maximum Design Earthquake
Metro	Los Angeles County Metropolitan Transportation Authority
Metrolink	Southern California Regional Rail Authority
MGLEE	Metro Gold Line Eastside Extension
MIS	Major Investment Study
mm/yr	millimeters/year
MOS	Minimum Operating Segment
mph	Miles per Hour
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
MSA	Metropolitan Statistical Area
MTA	Los Angeles County Metropolitan Transportation Authority
MTBE	Methyl Tert-Butyl Ether
M*w*	Moment Magnitude Scale
N_2O	Nitrous Oxide
NaOH	Sodium Hydroxide
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OD	Origin-Destination
ODE	Operating Design Earthquake
OSHA	Occupational Safety and Health Administration
PA	Public Announcement

Acronym	Description
PFM	Pressure Face Machine
PHT	Puente Hills Blind-Thrust fault system
PPE	Personal Protective Equipment
ppm	Parts per Million
PSA	Project Study Area
psi	Pounds per Square Inch
PTEL	Passenger Assistance Telephones
RCRA	Resource Conservation and Recovery Act
ROW	Right-of-Way
RTAA	Regional Transit Alternatives Study
RTP	Regional Transportation Plan
SAV	Stand Alone Validators
SCAG	Southern California Association of Governments
SCAQMD	Southern Coast Air Quality Management District
SCAQMD	South Coast Air Quality Management District (
SF TBM	Slurry-Shield Tunneling Boring Machine
SFM	Slurry Face Machine
SL	Short Line
SMFZ	Santa Monica Fault Zone
SQG	Small-Quantity Generators
SWPPP	Storm Water Pollution Prevention Plan
TAZ	Traffic Analysis Zone
TBM	Tunnel Boring Machines
TDM	Travel Demand Management
TOD	Transit Oriented Development
TPIS	Transit Passenger Information System
TRB	Transportation Research Board
TSM	Transportation System Management
TVM	Ticket Vending Machines
UCLA	University of California, Los Angeles
USC	United States Code
USEPA	United States Environmental Protection Agency
USEPA	US Environmental Protection Agency
UST	Underground Storage Tank
V/C	Volume-to-Capacity Ratio
VMS	Variable Message Signs

Acronym	Description
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound

APPENDIX B

LIST OF TECHNICAL DOCUMENTS

APPENDIX B LIST OF TECHNICAL DOCUMENTS

Study Task	Report Name	Completion Date
2.2	Final Corridor Study Definition Report	3/7/08
2.4/2.6	Final Westside Mobility Problem Definition Report & Purpose and Need Statement	3/7/08
2.5	Final Analysis Methodology Report	11/27/08
3.1	Final Preliminary Definition of Alternatives Report	2/15/08
3.2	Final Notice of Preparation and Notice of Intent	10/5/07
3.3	Final Project Scoping Report	2/10/08
3.4	Final Initial Alternatives Screening Report	7/14/08
4.1	Final Summary of Available Documentation	11/13/07
4.2	Final Geological Evaluation and Tunnel Technology Recommendations	4/4/08
4.3	Final Tunnel Alignment and Station Location Alternative Definition Report	10/7/08
4.4	Final Tech Memo, Renderings	12/12/08
4.5	Final Tunneling Environmental Issues Report	8/19/08
4.6	Final Tunneling Real Estate and ROW Issues Report	12/5/08
4.7	Final Tunneling Alternatives Cost Methodology and Issues	1/9/09
4.8	Final Tunneling Alternatives Operating & Maintenance Costs	10/9/08
5.0	Final Proposed TDM Methodology	4/4/08
5.1	Final Aggregate Ridership Forecast Report	9/30/08
5.3	Final AA Study Travel Demand Forecast Report	11/13/08
5.4	Final Travel Demand Model Uncertainties Report	12/11/08
5.5	New Starts Templates – Final	11/26/08
5.6	Final SUMMIT Presentation Report	12/4/08
5.8	Final Travel Demand Model Methodology & Forecasts Report	1/16/09
6.2	Final Drawings and Conceptual Engineering Design	1/5/09
6.3	Final Urban Design Concept Report	1/9/09
6.4	Final Operating Plans & System Support Report	9/8/08
6.5	Final Staged Planning for Construction Report	8/7/08
6.6.1	Final Cost Methodology Report	8/11/08
6.6.2	Final Capital Costs Report	9/15/08
6.6.3	Final O&M Cost Estimates Report	9/22/08
7.1	Final Re-evaluation/Alternative Analysis Report (AA Study Report)	1/5/09
7.2	Final Preferred Investment Strategy/Locally Preferred Alternative Technical Report	1/5/09

APPENDIX C

REFERENCES

APPENDIX C REFERENCES

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APPENDIX D

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