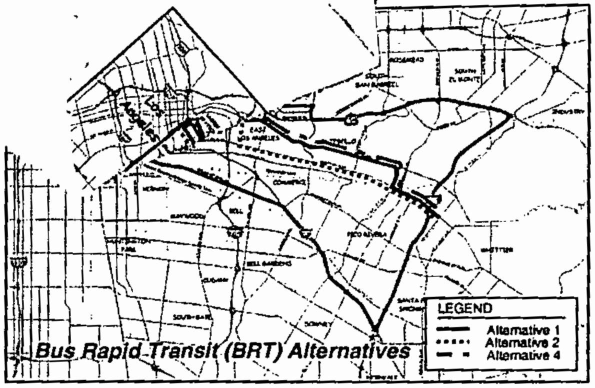
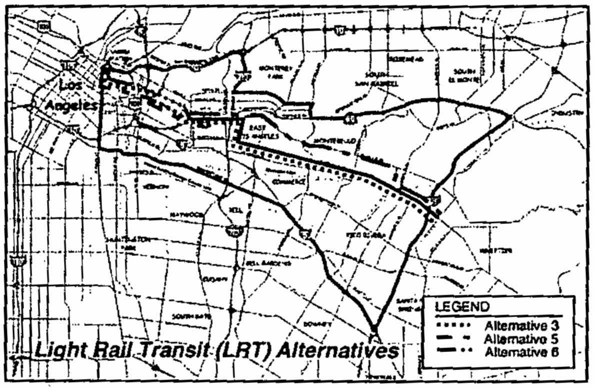


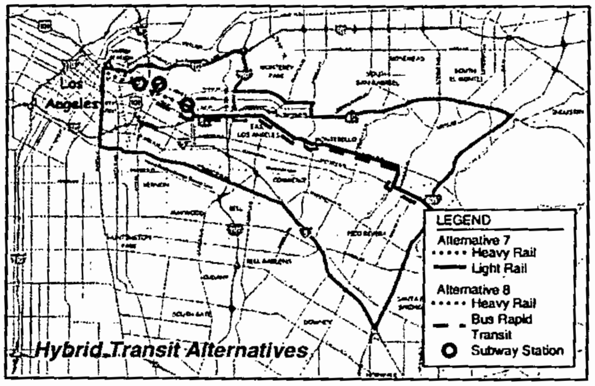
Eastside Transit Corridor Study

Los Angeles, California



Re-Evaluation/ Major Investment Study (MIS)

Draft Report



Prepared for:
Los Angeles County
Metropolitan Transportation Authority

Prepared by:
Eastside Corridor Transit Consultants

February 24, 2000

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1 PURPOSE AND NEED

This chapter presents the background of this Eastside Transit Corridor Study, a description of the need for a fixed guideway transit investment in the Eastside Corridor, and the role of this Re-Evaluation/Major Investment Study (MIS).

1.1 DESCRIPTION OF THE STUDY CORRIDOR

1.1.1 Eastside Corridor Study Area

The Eastside Corridor study area is shown in Figure 1-1, extending from Alameda Street in Central Los Angeles east through the Boyle Heights community in the City of Los Angeles and the City Terrace, Belvedere and East Los Angeles communities of unincorporated Los Angeles County. South and east of the East Los Angeles area, the corridor study area includes major portions of the cities of Montebello, Pico Rivera and Commerce, and areas that include portions of Monterey Park, Downey, Santa Fe Springs and Whittier.

1.1.2 Regional Context

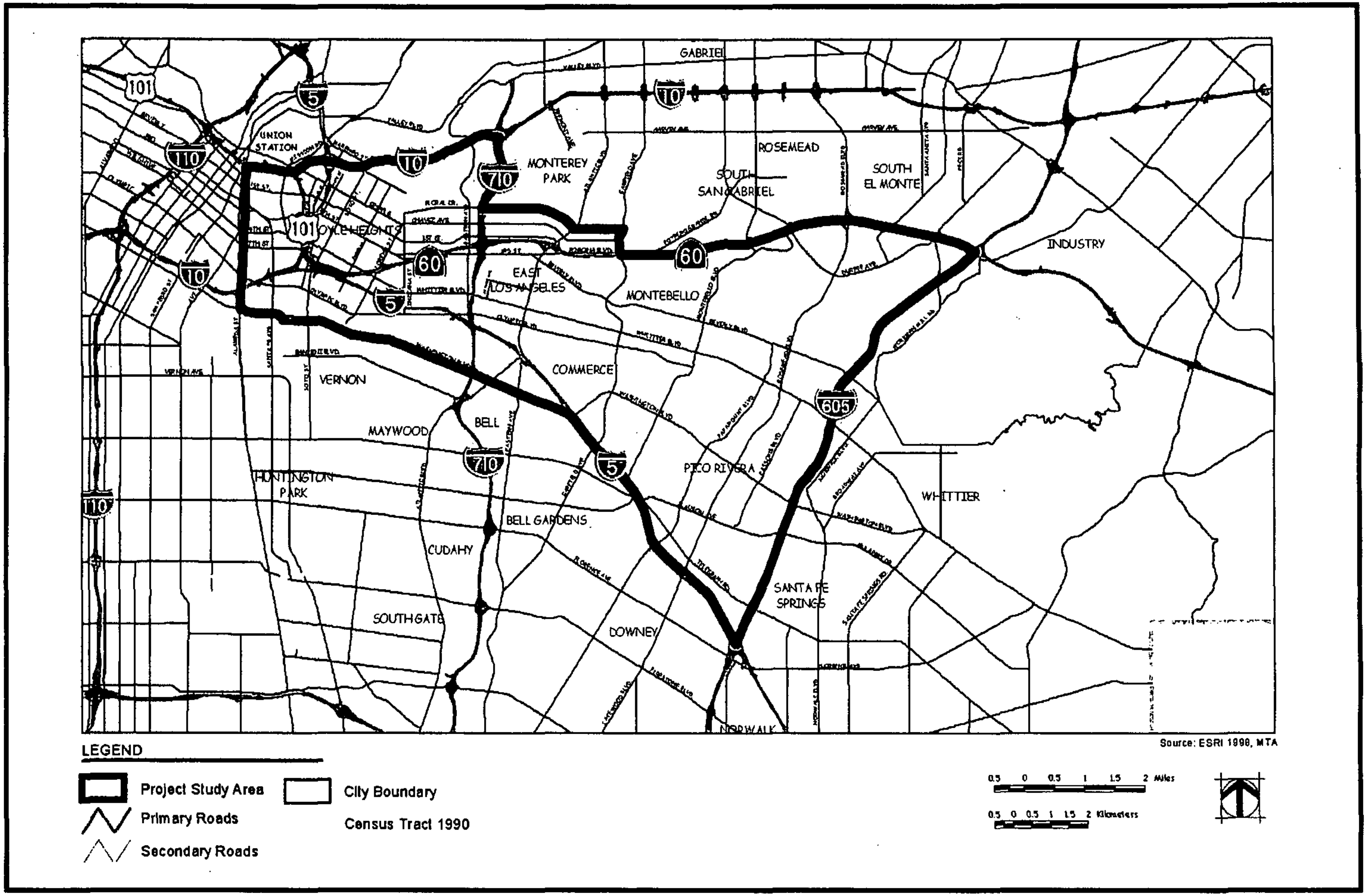
The Los Angeles Rail Rapid Transit Project (Metro Red Line) is an 18-mile rail rapid transit subway project extending from Union Station to North Hollywood. Construction will be complete and the project will be in the full operation by summer, 2000.

Work on planned Eastside and Mid-City extensions of the Metro Red Line subway was suspended by MTA in January 1998 due to financing difficulties. The MTA Restructuring Plan adopted in May 1998 called for the MTA to study "viable and effective options" for all parts of Los Angeles County, with an emphasis on the corridors in which rail projects had been suspended. Within the Eastside and Westside corridors, this necessitated the examination of alternative fixed guideway options to heavy rail subway.

Based on the results of the November 1998 draft Regional Transit Alternatives Analysis (RTAA Study), the MTA Board approved the concept of a rapid bus plan in March 1999, which included a rapid bus demonstration project on the Eastside. The Board also reaffirmed its commitment to fund fixed guideway transit improvements beyond rapid bus in the suspended rail corridors. The Board subsequently authorized the preparation of this Reevaluation/Major Investment Study and Draft and Final Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/SEIR) for the suspended Metro Red Line Eastside Transit Corridor Project.

1.1.3 The Mobility Problem

The East Los Angeles Transit Corridor Technical Report was prepared by SCAG in July 1998 and provides an overview of community transit needs for the area.



Eastside Transit Corridor Study

Project Study Area

Eastside Corridor Transit Consultants

Figure 1-1

The Eastside Corridor communities of Little Tokyo/Art District, Boyle Heights, and East Los Angeles are characterized by a large and growing population (over 212,000 according to the 1990 census, 275,000 expected by 2020) of predominantly Latino ethnic origin, a high percentage of low income households, and relatively high rates of transit use and transit dependence. In these communities, over 19 percent of workers use the bus system on their journey to work (as compared to 6.8 percent for Los Angeles County as a whole), and rates of carpooling and walking to work are higher than the County average.

In the City of Montebello, Beverly and Whittier Boulevards are the two significant east-west thoroughfares. Olympic Boulevard, which is located south of Whittier Boulevard, is a secondary highway that terminates at 4th Street on the east. Generally, residential uses are located north of Olympic Boulevard, and industrial uses are located to the south. Significant north-south connectors in the City of Montebello include Garfield, Avenue, Wilcox Avenue, Garfield Avenue, and Montebello Boulevard. Several community commercial hubs exist on Beverly Boulevard at Wilcox Avenue and Montebello Boulevard and on Whittier Boulevard at Montebello Boulevard and Wilcox Avenue. Strip-type office, medical clinics and retail uses extend along the entire stretch of Beverly Boulevard, and strip-type retail uses are located along the balance of Whittier Boulevard. The City of Montebello contains a concentrated industrial sector that is located generally west of Greenwood Boulevard extending from south of Olympic Boulevard to the I-5 Freeway.

The City of Pico Rivera is predominantly a single-family residential community. Medium density residential uses generally exist north and south of the City's commercial hub at Whittier and Rosemead Boulevards, along portions of Rosemead Boulevard, and south of the commercial hub of Slauson Avenue between Rosemead Boulevard and Passons Boulevard. Significant north-south streets in the City of Pico Rivera include Paramount Boulevard, Rosemead Boulevard, and Passons Boulevard. The City contains a large extended commercial shopping area that stretches for three-quarters of a mile along Whittier Boulevard, between Paramount Boulevard and Passons Boulevard. The City also contains three industrial clusters that are located east and west of the San Gabriel River and north of Whittier Boulevard; between Paramount Boulevard and the Rio Hondo River; and south of Washington Boulevard, between the Rio Hondo River and Rosemead Boulevard.

The unincorporated Southwest Whittier Community is generally located south of Whittier Boulevard and east of the San Gabriel River. Westerly of Norwalk Boulevard, the community consists predominantly of one and two family dwellings. The City of Whittier located north of Whittier Boulevard is predominantly single-family residential uses with some medium density uses along portions of Norwalk Boulevard and Pioneer Boulevard. Both of these jurisdictions share some strip type commercial uses along Whittier Boulevard.

East Los Angeles and Boyle Heights are served by a significant number of bus routes, primarily operated by the Los Angeles County MTA and the City of Montebello, and generally organized in a grid pattern. There are approximately 40,000 weekday transit boardings in the area with several heavily used bus transit corridors that include Soto Street, Cesar Chavez Avenue, First Street, Whittier Boulevard, and Olympic Boulevard. The heaviest bus routes carry passengers in an east-west direction. The average speed for all bus routes in the area is 12.9 MPH, and the average passenger trip length for users ranges from one to three miles.

Major deficiencies in the existing bus system include overcrowding on many routes during peak periods and the underutilization of other routes during peak as well as off-peak periods. There may be a serious mismatch between the locations of high transit demand and the provision of transit services. Most person trips to key activity centers within the study area require at least one transfer. This results in longer travel times, less convenience, and an ultimate compromise in mobility for the traveler.

1.1.4 Eastside Corridor Alternatives

The Re-Evaluation/Major Investment Study will identify and analyze a range of fixed guideway transit service extensions, including heavy rail, light rail and bus alternatives. The primary study objective is to identify, refine and environmentally clear a Locally Preferred Alternative (LPA) for the Eastside Corridor.

Although considerable heavy rail engineering design has been completed for the previously adopted Locally Preferred Alternative, virtually no engineering analysis has been conducted for light rail and bus rapid transit alternatives in the Eastside Corridor. Therefore, the emphasis of the Re-Evaluation/Major Investment Study will focus upon the analysis and evaluation of corridor options other than the previously adopted LPA.

1.2 PLANNING CONTEXT AND BACKGROUND

The Metro Red Line East Side Extension has been an integral element of local, regional and federal transportation planning since the early 1990's. Eastward from the Los Angeles Central Business District (LACBD) to just east of Atlantic Boulevard, the East Side Extension has been the subject of in-depth technical studies and extensive community involvement during this period.

In June 1993, the Los Angeles County Metropolitan Transportation Authority (MTA) Board of Directors selected the Locally Preferred Alternative (LPA) for the Los Angeles Eastside Corridor following extensive public review of the transit alternatives presented in the April 1993 AA/DEIS/DEIR. The Final EIS/EIR dated June 1994 for the Eastside Corridor was adopted by the MTA Board in December 1994. In 1994, the MTA adopted Locally Preferred Alternatives (LPA) for the Metro Red Line Segment 3 Eastside and Mid-City Corridors. Full Funding Grant Agreements were executed with the Federal Transit Administration (FTA) and the projects were transitioned into the construction phase. Since that time the Eastside Extension Project has been augmented and refined as a result of continuing design studies.

In January 1998, the MTA suspended work on extensions of the Metro Red Line subway project, including the Eastside Extension segment from Union Station to First/Lorena. The MTA Restructuring Plan adopted in May 1998 called for the agency to study "viable and effective options" for all parts of Los Angeles County, with an emphasis on the corridors in which the rail lines had been suspended. Within the Eastside and Westside Corridors, this necessitated the examination of alternative fixed guideway options to heavy rail subway.

Based on the results of the November 1998 draft Regional Transit Alternatives Analysis (RTAA Study), the MTA Board approved the concept of a rapid bus plan in March 1999, which included a rapid bus demonstration project for the Eastside. The Board also reaffirmed its commitment to fund fixed guideway transit improvements beyond rapid bus in the suspended rail corridors. The Board subsequently authorized the preparation of this Re-Evaluation/Major Investment Study and Draft and Final Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/SEIR) for the suspended Metro Red Line Eastside Transit Corridor Project.

1.2.1 Regional Transportation Plan

The current Regional Transportation Plan (RTP) for the six-county Southern California region was prepared by the Southern California Association of Governments (SCAG) and adopted on April 16, 1998. The RTP incorporates the East Los Angeles Transit Corridor Project, consistent with the MTA Locally Preferred Alternative for the Eastside and Corridors. The RTP recommends the following actions:

- Construct exclusive transit corridors to minimize travel time and achieve certain ridership goals (a 76,000 daily ridership goal was shown in the RTP for the East Los Angeles Transit Corridor).

- Perform Major Investment Studies on Potential Transit Corridors

The MTA has also prepared a comprehensive long range planning document to guide the development of the countywide transportation system. The MTA's 30-Year Integrated Transportation Plan identified the East Side Extension of the Metro Red Line as a high priority funded and committed rail project. An updated Long Range Plan (LRP) is presently being prepared by the MTA, reflecting the Eastside Corridor transit planning currently being undertaken for the Eastside Re-Evaluation/Major Investment Study.

1.2.2 Systems Planning

The initial systems planning background and context for this study was developed in the *Metro Red Line Extension System Planning Study* prepared by SCAG in 1989, as well as in the *Los Angeles Metro Orange Line Extension: Transitional Analysis* prepared by the Los Angeles County Transportation Commission in 1990. These reports document the historical framework for the definition of the Eastside/Santa Ana Transit Corridor and other corridors. They provide the background systems analysis that was used to justify the need for major capital expenditures in these corridors. The results of the two studies are summarized in the following sections.

SCAG System Planning Study

The August 1989 Metro Red Line Extension System Planning Study was prepared by SCAG for the Los Angeles County Transportation Commission (LACTC) to evaluate future extensions of the original 18-mile Metro Red Line subway line between Union Station and North Hollywood. The Extension Study evaluated travel corridor characteristics, reviewed existing transit operations and analyzed the proposed corridor for consistency with the adopted regional plan. Based on the analysis, the Systems Planning Study identified proposed corridor extensions as shown in Figure 1-2 which meet federal criteria for current ridership, projected transit demand and consistency with the adopted regional plan.

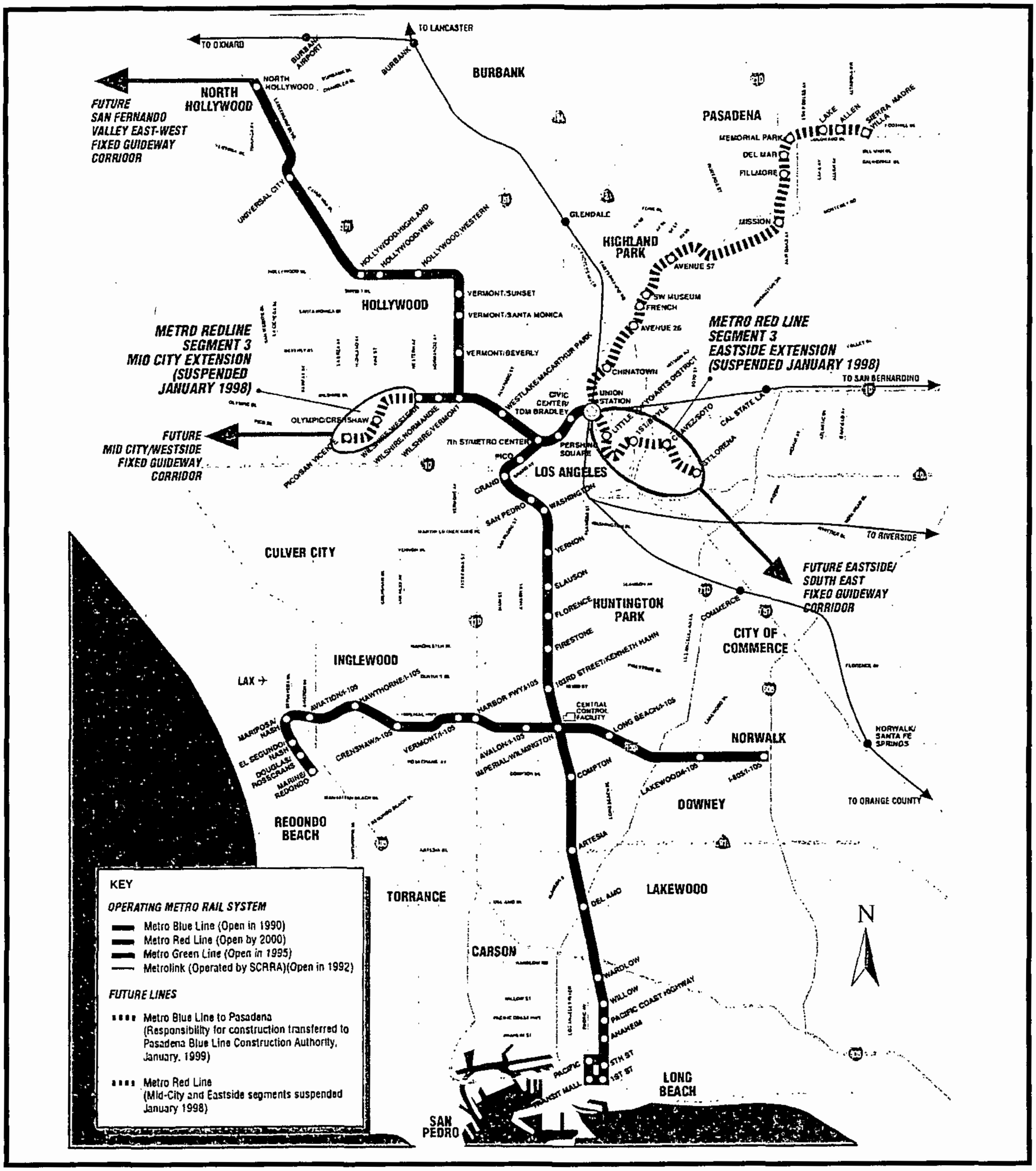
LACTC Transitional Analysis

Based on the 1989 System Planning Study, a Central East/West Corridor was identified as the highest priority for a Metro Red Line LPA heavy rail extension. The 1990 Transitional Analysis was undertaken to demonstrate that an extension to the east and west could meet federal cost-effectiveness thresholds and provide the basis for proceeding with an Alternatives Analysis/Draft Environmental Impact Statement. Based on conservative assumptions for the ridership projections, the total cost per new rider was determined to be under the federal threshold. This supported the decision to proceed with a full Alternatives Analysis/DEIS for the east-west corridor extension.

1.2.3 Corridor Planning

Eastside Corridor planning for the Red Line Extension was initiated in 1990 through the Alternative Analysis/DEIS/DEIR process. Following extensive public review of the ten alternatives presented in the April 1993 Alternative Analysis/DEIS/DEIR document, the MTA Board of Directors in June 1993 selected the Locally Preferred Alternative (LAP) for the Los Angeles Eastside Corridor. Selection of the LPA was documented in a Preferred Alternative Report. The LPA was subsequently incorporated into SCAG's Regional Mobility Element (RME) planning process and included as part of the regional Air Quality Management Plan. The East Side Extension Preferred Alternative was identified as a heavy rail subway line from Union Station to Whittier/Atlantic Boulevard, to be implemented in two phases.

The Final EIS/EIR for the Eastside Corridor was completed in June 1994. It evaluated the LPA to ensure that all significant environmental consequences and all reasonable and feasible mitigation measures were considered in its selection. The Record of Decision was signed on December 1994. Full Funding Grant Agreements were subsequently executed with the Federal Transit Administration and the projects were transitioned into the construction phase.



Eastside Transit Corridor Study

Metro Red Line
System Context Map

Eastside Corridor Transit Consultants

Figure 1-2

In January 1998, the MTA suspended work on extensions of the Metro Red Line heavy rail subway project, including the initial 3.7-mile segment of the Eastside LPA from Union Station to First/Lorena. Since the suspension, several planning initiatives have provided further guidance for the development of Eastside transit alternative improvements.

MTA Restructuring Plan

The MTA Restructuring Plan titled: *Analysis and Documentation of the MTA's Financial and Managerial Ability to Complete North Hollywood Rail Construction and Meet the Terms of the Bus Consent Decree*, was adopted by the MTA Board of Directors on May 13, 1998 and subsequently approved by the FTA on July 2, 1998. The Restructuring Plan documented that the MTA did not have sufficient local matching funds to finance heavy rail subway projects in the Eastside and Mid-City corridors as anticipated in the original Full Funding Grant Agreements for those projects. At the same time, the Restructuring Plan called for the MTA to study "viable and effective options" for transit in all parts of Los Angeles County, with an emphasis on the corridors in which the rail lines had been suspended.

Within the Eastside and Westside corridors, this necessitated the examination of alternative fixed guideway options to heavy rail subway. It also committed the MTA to a reevaluation of the financial capacities of the agency to undertake new start, fixed guideway projects. To that end, the Board authorized the Regional Transit Alternatives Analysis (RTAA) Study that commenced in July 1998 and was completed in November 1998.

Regional Transit Alternatives Analysis

The RTAA Study accomplished several important objectives for the MTA. The study identified the amount of funding available for new projects between FY1999 and FY2004. It 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 corridors.

The study included a preliminary evaluation of fixed guideway alternatives in the three corridors. The study did not make recommendations with regard to preferred fixed guideway transit modes or configurations, but recommended that a Major Investment Study (MIS) level of analysis be conducted to provide more information regarding these choices.

Results of the RTAA Study were presented to the MTA Board on November 9, 1998. At that meeting, the Board approved the concept of a recommended rapid bus system serving the Eastside, Westside and San Fernando Valley. The Board also reaffirmed its commitment to fund fixed guideway transit improvements beyond rapid bus in the suspended rail corridors. A priority funding commitment of $220 million through

FY2004 was made to the Eastside and Mid-City areas from remaining uncommitted funds.

TEA-21 Redefinition of Metro Red Line - Segment 3

In a step made to obtain greater flexibility in project definition for the project corridors, the MTA sought to expand the definition of Metro Red Line Segment 3. Segment 3 was defined in both the Intermodal Surface Transportation and Efficiency Act (ISTEA) and the Segment 3 Full Funding Grant Agreement as a "heavy rail subway" project. With the cooperation and assistance of the Los Angeles congressional delegation, the MTA obtained revised definitional language in the Transportation Equity Act for the Twenty-first Century (TEA-21), which was signed into law by the President on June 9, 1998. This action was taken with the intent to have the option available to utilize the Segment 3 funding balance in the future for any type of fixed guideway project in the Eastside and other corridors. The TEA-21 legislation expanded the definition of the Segment 3 project to include "any fixed guideway project" (not necessarily heavy rail subway) in the transportation corridors to be served by the three extensions of Segment 3. It also authorized the start of final design and construction for the Segment 3 project during the FY1998-2003 funding cycle under FTA section 5309 (new starts funding).

Proposition A Ballot Initiative (Subway Funding Prohibition)

A 1998 ballot initiative sponsored by County Supervisor Zev Yaroslavsky, referred to as the Metropolitan Transportation Authority Reform and Accountability Act, was approved (and became effective) on November3, 1998. The most significant provision of the new law stipulates that no local Proposition A or C sales tax monies will be used to fund the planning, design, construction, or operation of any New Subway. The term "New Subway" is defined to mean any subway project (a rail line which is in a tunnel below grade) other than the 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 Eastside or Mid-City/Westside corridors.

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 in the Eastside, or other areas of Los Angeles County. Nor does this initiative prevent the MTA from using State or Federal revenues or local revenues other than sales tax, to design and construct a new subway in the Eastside or areas.

Eastside Corridor Fixed Guideway Project Status

Based on the above events and actions, the MTA has expressed to the FTA its intent to explore more cost-effective ways to construct Eastside and Westside project extensions. The MTA has further requested that the FTA preserve the outstanding Segment 3 funding balances for use by the MTA fixed guideway projects in the suspended corridors, including the Eastside.

East Los Angeles Transit Corridor and Technology Study

Additional information on corridor transit needs was developed in the *East Los Angeles Transit Corridor and Technology Study*[1]. This study referenced a recent SCAG report that indicated that there are an estimated 212,000 people living in East Los Angeles based on the 1990 census and that the population is expected to grow to 275,000 by the year 2020. It was also estimated that almost 20 percent of the population use the bus system on their journey to work. This rate of bus usage is three times higher than the county average of 6.8 percent. East Los Angeles and Boyle Heights are served by a substantial number of MTA bus routes. The study indicated that there are 40,000 daily transit boardings with several heavily used bus transit corridors operating on Soto Street, Cesar Chavez Avenue, Whittier Boulevard, and Olympic Boulevard.

Based on the above factors, the study found that the East Los Angeles population is heavily transit dependent and recommended that planning and implementation of proposed public transportation systems in East Los Angeles should support the basic community needs of the local population.

The study identified ways that the East Los Angeles transit dependent community can effectively access jobs, health services, and education. The study stated that substantial "quality of life" growth within this community could be initiated with a balanced and comprehensively planned transit system improvement conducted within available funding sources.

Once the transit infrastructure plan is in place, opportunities may develop for enhancing community amenities and stimulating economic development within the corridor. The plan will identify areas where enhancements could be facilitated within the context of the community.

Interstate 5 Corridor Improvement Project

Additional data on Corridor transportation needs were developed in the 1998 I-5 Corridor Improvement Project[2]. The study area for this corridor extends from SR91 northwest along the I-5 corridor to Soto Street. The I-5 Corridor Study concluded that an effective multimodal transportation network within the I-5 study area is necessary to meet the mobility needs of residents and businesses in southeast Los Angeles County by providing vital intra-and inter-regional linkages and services.

The I-5 study area currently has severe mobility problems, and these problems are projected to worsen by the year 2015. These problems are manifest as extensive congestion on the freeway and on the arterial network. The entire freeway segment is projected to be operating at level of service F3 (greater than three hours of congestion per

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[1] *East Los Angeles Transit Corridor and Technology Study,* prepared for Supervisor Gloria Molina, County of Los Angeles, First Supervisorial District; ACG Environments; October 29, 1998.
[2] *I-5 Corridor Improvement Project, Final Evaluation Report;* Parsons Brinckerhoff, 1998.

day), and more than 28 percent of the major intersections will be operating below level of service E by the year 2015.

In addition, a significant proportion of the population in the study area does not have access to a private automobile and must rely on the public transportation system and/or other alternative transportation options to meet their basic travel needs.

1.3 CORRIDOR CONDITIONS AND NEEDS

The following sections provide an overview of the existing Eastside transportation system and transit services, including system performance, deficiencies and community factors related to corridor transportation needs.

1.3.1 Roadway Conditions

The Eastside Corridor study area is served by several freeways that connect to neighboring communities and other parts of the Southern California metropolitan region. The San Bernardino Freeway (I-10), with twelve general purpose traffic lanes and two high-occupancy vehicle (HOV) lanes, runs east-west along the northern edge of the study area west of the Long Beach Freeway (I-710). To the south, the Pomona Freeway (SR-60), with ten general purpose traffic lanes, also runs east-west. Both freeways connect the study area with the Los Angeles Central Business District (LACBD) to the west and San Bernardino and Riverside Counties to the east.

The Santa Ana Freeway (I-5 and US-101), with six to ten general purpose traffic lanes, runs in a northwest-southeast orientation and connects the study area to the LACBD and Orange County to the south. This major regional freeway connects with the Pomona (SR-60), Santa Monica (I-10), and Golden State (I-5) freeways at the East Los Angeles interchange. The Long Beach Freeway (I-710), with six general traffic lanes, runs north-south and connects the study area with Alhambra to the north and Long Beach to the south. It has interchanges with the San Bernardino (I-10), Pomona (SR-60) and Santa Ana (I-5) freeways.

The Eastside Corridor contains a developed network of major arterial and neighborhood collector streets. The major east-west arterials include Cesar Chavez Avenue, 1st Street, 4th/3rd Streets, Beverly Boulevard, Whittier Boulevard, and Olympic Boulevard running. The major north-south arterials include Soto Street, Eastern Avenue, Atlantic Boulevard, Garfield Avenue, Montebello Boulevard, and Rosemead Boulevard. The older western sections of the corridor (Boyle Heights and East Los Angeles) have narrower streets and greater levels of congestion than the more suburban eastern section (Montebello and Pico Rivera). The following Table 1-1 shows the approximate daily traffic volumes for several of the major arterial streets in the Corridor. Table 1-2 shows lanes configurations for major and minor arterial streets in the Corridor.

Table 1-1 Selected Daily Traffic Volumes

No.	Location	EB	WB	NB	SB	Total
1	Cesar Chavez @ Boyle	6,100	8,500			14,600
2	Cesar Chavez @ Soto	13,700	10,500	13,200	11,500	48,900
3	Cesar Chavez @ Ford	8,900	8,600			17,500
4	Cesar Chavez @ Mednik	7,600	6,500			14,100
5	Cesar Chavez @ Eastern	14,000	10,800			24,800
6	1st Street @ Boyle	8,200	7,800			16,000
7	1st Street @ Lorena	10,500	10,100	6,800	5,000	32,400
8	1st Street @ Indiana	6,100	5,800			11,900
9	1st Street @ Eastern	5,200	5,400			10,600
10	1st Street @ Ford	5,400	5,000			10,400
11	1st Street @ Mednik	5,000	4,700			9,700
12	4th Street @ Boyle	10,600	10,800			21,400
13	4th Street @ Hewit	11,000	11,500			22,500
14	4th Street @ Lorena			6,700	5,900	12,600
15	4th Street @ Indiana	4,400	8,300			12,700
16	3rd Street @ Eastern	12,400	11,300			23,700
17	Whittier @ Lorena	13,600	15,300	10,400	9,000	48,300
18	Whittier @ Indiana	9,700	10,600			20,300
19	Whittier @ Eastern	11,700	11,900			23,600
20	Whittier @ Ford	10,800	10,900			21,700
21	Whittier @ Arizona	11,000	10,500	4,600	4,100	30,200
22	Whittier @ Atlantic	9,800	8,700	20,000	15,300	53,800

source: County and City of Los Angeles (1993-1997)

Table 1-2 Lane Configurations of Arterial Streets

No.	Street	Street Orientation	No. of Lanes	On-Street Parking	Pk Hr Parking Restrictions
1	Cesar Chavez	E-W	5-6	Yes	Yes
2	1st Street	E-W	6	Yes	Yes
3	4th Street	E-W	6	Yes	Yes
4	3rd Street	E-W	6	Yes	Yes
5	Beverly Boulevard	E-W	7	Yes	No
6	Whittier Boulevard	E-W	6-7	Yes	Yes
7	Olympic Boulevard	E-W	7	Yes	No
8	Alameda Street	N-S	7-8	No	No
9	Soto Street	N-S	6	Yes	Yes
10	Lorena Street	N-S	6	Yes	No
11	Indiana Street	N-S	4	Yes	No
12	Arizona Street	N-S	7	Yes	No
13	Atlantic Boulevard	N-S	7	Yes	Yes

source: Field Survey and SCAG Land Use Data Base

Congestion Management Plan

The Congestion Management Program (CMP) For Los Angeles County includes a program for monitoring major arterial, freeway and transit system conditions in the county. For freeways, the traditional Level of Service (LOS) scale of A to F is expanded to include LOS designations F0, F1, F2 and F3, which correspond to the length of time that a freeway segment experiences level of service F. The F3 designation represents the worst conditions, with level of service F conditions (severe congestion and speeds less than 20 MPH) experienced for three hours or more per day. Table 1-3 summarizes the results of CMP freeway monitoring in the study area.

Table 1-3 CMP Freeway Monitoring Results

		Northbound/Eastbound		Southbound/Westbound	
Freeway	Location	AM LOS	PM LOS	AM LOS	PM LOS
I-5	Arizona Avenue	F1	D	C	F0
I-10	Indiana Street	C	D	D	C
SR-60	Indiana Street	B	F2	F2	B
SR-60	I-605	C	F2	F0	D
I-605	Telegraph Road	E	F2	F1	F3
I-605	SR-60	C	F0	F1	D
I-710	3rd Street	D	E	E	E

source: 1997 Congestion Management Program for Los Angeles County

The monitoring results indicate that most freeways experience LOS F0 or worse during the AM or PM peak period in at least one direction, and in both directions at two of the four monitoring stations. The CMP data clearly indicate that the PM peak period is the worst time period, with severe congestion on the freeways in the eastbound direction on I-10 and SR-60 (the outbound evening commute flow from Los Angeles). During the AM peak period, congested conditions exist on both I-10 and SR-60 in the westbound direction.

Congested Corridor Action Plan

MTA completed a draft Congested Corridor Action Plan in 1993 which provides a summary of mobility indicators in eleven of the most congested corridors in the County as well as potential strategies to address the mobility problems. The Red Line Eastern Extension study area represents the western portion of congested corridor 1B, which extends from downtown Los Angeles east to the San Bernardino County Line. Throughout the entire corridor (including the portion which overlaps the Eastern Extension study area), the Action Plan indicated that approximately 58 percent of the arterial intersections and 85 percent of the freeway monitoring locations were operating at level of service F or worse during peak periods. Transit vehicles were estimated to travel at an average speed of 19 miles per hour with an average of 39 passengers per vehicle. These findings were based on CMP data, and indicate extensive surface roadway and freeway congestion not only in the study area, but also in the entire I-10/SR-60 corridor east of the LACBD.

1.3.2 Transit Services

The Eastside Corridor has one of the most extensive networks of bus routes in the County. The corridor's transit routes generally follow a grid pattern and include many express and local routes and one limited service route. Six public agencies operate bus service in the Eastside Corridor. They include the Los Angeles County Metropolitan Transportation Authority, Montebello Transit, Whittier Transit, Norwalk Transit, the City of Monterey Park, and the City of Commerce. Table 1-4 lists all the current bus transit routes operated in the corridor with the limits of their service.

Most of the heavily used routes are those that run in an east-west direction. These include bus routes that operate on Cesar Chavez Avenue, 1st Street, Whittier Boulevard, and Olympic Boulevard. Soto Street and Atlantic Boulevard are two north-south streets on which heavily used bus routes operate. Although north-south travel is constricted into two main through bus lines on Soto and Atlantic, the predominant flow of transit passengers in the corridor is in an east-west orientation. Severe overcrowding occurs regularly on many of these routes during peak periods. A service allocation mismatch is evident in the fact that some bus lines are overcrowded and others are underutilized during various periods of the day. Table 1-5 shows the service frequency (headways) for all the bus lines in the corridor. This is illustrative of the very high demand for service on many of the lines, particularly on MTA lines 30/31 and 66 where headways during the morning peak period average 3-4 minutes. This is indicative of transit service with very high demand in those particular corridors along 1st Street and Olympic Boulevard.

Table 1-4 Bus Transit Routes in the Eastside Corridor

Operator	Line(s)	Destinations
Commerce	Blue	Community Circulator (Commerce)
Commerce	Green	Community Circulator (Commerce)
Commerce	Orange	Community Circulator (Commerce)
Commerce	Red	Community Circulator (Commerce)
Commerce	Yellow	Community Circulator (Commerce)
Montebello	10	East LA College-Pico Rivera
Montebello	20	Rosemead-South Montebello
Montebello	40	Downtown LA-Whittier
Montebello	60	Pico Rivera North to South
Montebello	70	Montebello-Montebello Towne Ctr
Montebello	341,342,343	Downtown LA-Montebello EXPRESS
Monterey Park	1	Community Circulator (Monterey Park)
Monterey Park	2	Community Circulator (Monterey Park)
Monterey Park	5	Community Circulator (Monterey Park)
MTA	18	Wilshire Center-Montebello
MTA	65	Downtown LA-CSULA
MTA	66	Wilshire Center-Montebello
MTA	68	West LA Transit Ctr-Montebello Towne Ctr
MTA	250	LAC+USC-Boyle Heights
MTA	251	Cypress Park-Watts
MTA	252	El Sereno-Lynwood
MTA	253	LAC+USC-Boyle Heights
MTA	254	LAC+USC-Willowbrook
MTA	255	Montecito Heights-East LA
MTA	256	Altadena-East LA
MTA	258	Alhambra-South Gate
MTA	259	El Sereno-South Gate
MTA	260	Altadena-Compton
MTA	262	Alhambra-South Gate
MTA	265	Pico Rivera-Lakewood
MTA	266	East Pasadena-Lakewood
MTA	318	Wilshire Center-Whittier
MTA	605	LAC+USC-Boyle Heights
MTA	620	LAC+USC-Boyle Heights
MTA	30,31	Mid City-East LA College
Norwalk	1	Bassett (Industry)-Bellflower
Whittier	1	Community Circulator (Whittier)
Whittier	2	Community Circulator (Whittier)

source: 1998-1999 MTA, Montebello, Norwalk, Monterey Park, and Commerce bus timetables.

Table 1-5 Frequency of Transit Service in the Eastside Corridor								
			6-9am	9-3pm	3-7pm	7-11pm	11-6am	
Operator	Line	Days	AM Peak	Midday	PM Peak	Evening	Owl	Hours of Service
Commerce	Red	Weekday	60	60	60			6am-6pm
		Saturday	60	60	60			6am-6pm
	Blue	Weekday		60	60			9am-6pm
		Saturday		60	60			9am-6pm
	Green	Weekday	60	60	60			6am-9:30pm
		Saturday	60	60	60			6am-9:30pm
	Orange	Weekday	60	60	60			5:30am-6pm
	Yellow	Weekday	60	60	60			6am-9am
Montebello	10	Weekday	8	10	10	15		5am-11pm
		Saturday	20	10	10	20		5am-11pm
		Sunday	20	10	10	20		5am-11pm
	20	Weekday	15	15	15	15		5:30am-10:30pm
		Saturday	15	15	15	15		5:30am-10:30pm
		Sunday	15	15	15	15		5:30am-10:30pm
	40	Weekday	10	12	10	30		5am-11pm
		Saturday	15	15	15	30		5am-12mid
		Sunday	20	20	20	20		5am-11pm
	60	Weekday	35	35	35	70		6am-9:30pm
		Saturday	70	70	70	70		6am-9:30pm
	70	Weekday	30	30	30	30		5:30am-8:30pm
	341	Weekday	30		30			7-9:30am,3-6pm
	342	Weekday	180		180			6-7am,5-6pm
	343	Weekday	30		30			6-8am,5-7pm
Monterey Park	1	Weekday	40	40	40			6:30am-6pm
		Saturday	40	40	40			6:30am-6pm
	2	Weekday	40	40	40			6:30am-6pm
		Saturday	40	40	40			6:30am-6pm
	5	Weekday	50	30	30			6:30am-6pm
Norwalk	1	Weekday	15	30	30			6am-7pm
		Saturday		60	60			9am-5pm
		Sunday		60	60			9am-5pm
Whittier	1	Weekday	60	60	60			6am-6:30pm
		Saturday		60	60			6am-6:30pm

Table 1-5 Frequency of Transit Service in the Eastside Corridor								
			6-9am	9-3pm	3-7pm	7-11pm	11-6am	
Operator	Line	Days	AM Peak	Midday	PM Peak	Evening	Owl	Hours of Service
	2	Weekday	60	60	60			6:30am-7pm
		Saturday		60	60			6:30am-7pm
MTA	18	Weekday	10	15	10	15	60	24 hours
		Saturday	15	12	15	20	60	24 hours
		Sunday	20	30	15	30	60	24 hours
MTA	30 / 31	Weekday	4	7.5	5	15	60	24 hours
		Saturday	7	7	12	30	60	24 hours
		Sunday	12	7	8	30	60	24 hours
	65	Weekday	15	30	25	50		5:30am-10pm
		Saturday	60	60	60	60		6am-8pm
		Sunday		60	60	60		8am-8pm
	66	Weekday	3	8	7	30		4:30am-1:30am
		Saturday	4	10	15	30		5am-1:30am
		Sunday	15	12	12	30		5am-1am
	68	Weekday	8	12	12	40		4am-12:30am
		Saturday	15	10	15	40		4am-12:30am
		Sunday	40	15	20	40		4:30am-12:30am
	250	Weekday	40	40	40			6am-7pm
	251 / 252	Weekday	5	12	10	30	60	24 hours
		Saturday	15	15	12	30	60	24 hours
		Sunday	30	20	20	30	60	24 hours
	253	Weekday	40	40	40			6am-8pm
		Saturday	40	40	40			6am-7:30pm
		Sunday		40	40			8am-6:30pm
	254	Weekday	35	55	30	60		4:30am-8:30pm
		Saturday	60	60	60			6:30am-7:30pm
		Sunday	60	60	60			7:30am-7:30pm
	255	Weekday	45	50	45			5am-8:30pm
		Saturday	45	45	45			5:30am-8:30pm
		Sunday		45	45			5:30am-8:30pm
	256	Weekday	35	50	35	50		6am-10:30pm
		Saturday	60	60	60	60		5:30am-9pm
		Sunday	60	60	60	60		5:30am-9pm
	258 / 259	Weekday	20	30	30			5am-8pm
	260	Weekday	12	15	15	60		4am-11:30pm
		Saturday	30	25	20	60		5am-12m
		Sunday	50	25	25	60		6am-12m

Table 1-5 Frequency of Transit Service in the Eastside Corridor								
			6-9am	9-3pm	3-7pm	7-11pm	11-6am	
Operator	Line	Days	AM Peak	Midday	PM Peak	Evening	Owl	Hours of Service
	262	Weekday	40	45	45	60		5am-11:30pm
		Saturday	60	40	60	60		5:30am-11:30pm
		Sunday	60	40	60	60		5:30am-11:30pm
	265	Weekday	65	50	60			5:30am-7:30pm
	266	Weekday	30	40	30	60		4:30am-11:30pm
		Saturday	60	40	45	60		5am-11:30pm
		Sunday	60	40	45	60		5:30am-10:30pm
	275	Weekday	65	50	50			5:30am-7:30pm
	318	Weekday	8	15	10			5:30am-8pm
		Saturday	15	12.5	17			6am-8pm
		Sunday	30	15	30			6:30am-7:30pm
	362	Weekday	20	30	25	60		5am-11:30pm
		Saturday	50	60	60	60		5am-11:30pm
		Sunday	50	60	60	60		5am-11:30pm
	605	Weekday	15	30	15	30		6am-7:30pm
		Saturday	30	30	30			6am-7:30pm
		Sunday	30	30	30			6am-7:30pm
MTA	620	Weekday		12	12			9am-6:30pm

source: 1998-1999 MTA, Montebello, Norwalk, Monterey Park, Whittier, and Commerce bus timetables.

1.3.3 Transportation System Performance

Although many arterial streets in the corridor currently operate below their design capacity during the peak period, several key street segments exceed their design level of service (LOS) C capacity during the evening peak period. The following segments of the arterial street network exceed their level of service (LOS) C capacity during the evening peak period: Atlantic Boulevard south of 1st Street, Cesar Chavez west of Lorena Street, 3rd Street west of I-710, and Whittier Boulevard east of I-710. Level of service designations are determined by the ratio of a roadway's traffic volume and its design capacity.

An analysis of the surface arterial roadway system shows moderate, but acceptable, levels of congestion at many of the corridor's intersections. Intersection levels of service (LOS) on most of the busiest streets in the corridor remain in the acceptable A to D range during the heaviest hour of the evening peak period. Previous analysis shows that three intersections in the western sector of the corridor operate at a LOS of E or F, which is considered unacceptable from a transportation systems performance perspective. The intersection of Alameda Street and 1st Street operates at LOS E during the morning peak (which is worse than the evening peak LOS), and the two ramp intersections of the

Pomona Freeway (SR-60) with Atlantic Boulevard operate at a LOS of F during the evening peak period. The evening peak period is generally considered to be the more congested of the two peaks of the day. Projected future traffic issues and impacts are discussed in Chapter 3, section 3.2.1.

As mentioned in the previous section, the frequency of transit service on many of the corridor's bus lines reveals the problem of overcrowding and the insufficient service of high demand bus corridors during peak periods. An overcrowded bus system combined with the existence of a grid-based system of service provision makes transit less convenient and inefficient for many of the transit-dependent residents of the corridor. A single trip to a corridor activity often requires at least one transfer to another bus line, and overcrowding makes the connection to other services unreliable. Transit speed reliability is another factor that hinders the mobility of the transit passenger. On MTA lines that run through the Corridor, average speeds range from 7.8 to 15.7 miles per hour. On the most heavily used lines, speeds average 12-14 mph. During congested peak periods on the major arterial streets, travel speeds decrease during the same time period where passenger loads are the highest. This creates a situation where the greatest number of people is being served at a level far below what would be considered an acceptable standard of service. The existing system of bus lines in the Eastside Corridor does not sufficiently serve the daily needs for mobility of those that are dependent on the system of public transit services.

1.3.4 Community Factors

The Eastside Corridor study area contains a low- to moderate-income population, which is expected to grow by 30 percent to 275,000 in 2020. The Eastside corridor contains a dense concentration of households, particularly in the western portion of the study region.

Access to employment opportunities is one of the major mobility problems that affect Eastside Corridor residents. The 1990 Census analysis of the study area work force revealed a breakdown of home-based work trips generated from the Eastside Corridor area. Nine percent of work trips were destined for the Los Angeles CBD, 36 percent for areas north and west of the CBD, 13 percent for the South Bay region of the County, 24 percent for locations within the corridor and 18 percent for areas in the remainder of the County.

Forecast data for the year 2020 show an increase in the number of trips generated in the Eastside Corridor study area as the population grows. The forecast results indicate that there will be less reliance on the Los Angeles CBD and a greater number of trips being made to other sub-areas of the Los Angeles region. Trip tables prepared for this report divide the Eastside into two zones, the first from Alameda Street to Garfield Avenue and the second from Garfield to the I-605 freeway. Work trips to the Westside are projected to increase by 57% and 20% respectively from each of the two Eastside zones, and work trips to the southern part of the County are expected to increase by 42% and 300% respectively. While work trips to the San Fernando Valley are expected to decrease by

46%, work trips to the San Gabriel Valley are expected to increase by 100% for the Eastside zone west of Garfield Avenue. The Eastside zone east of Garfield is expected to have no change in the number of work trips made to the San Fernando Valley while there will be a slight decrease (17%) to destinations in the San Gabriel Valley. Work trips destined for Orange County are expected to increase by 50% and 100% respectively from the two Eastside zones. As employment and activities in the region decentralize, greater reliance will be placed upon modes of travel that provide relatively convenient and timely service, especially in light of the increase in the amount of traffic congestion and resulting public transit delays that will be experienced in the coming 20 years.

The Eastside Corridor's mobility problems are exacerbated by socioeconomic factors. As reported in the 1990 Census, the percentage of occupied dwelling units in the corridor whose residents did not have access to an automobile was approximately 25 percent, which is almost 70 percent greater than the figure for the City of Los Angeles (15 percent). Many of the area's residents were young, with 23 percent between the ages of 6 and 18 years, and only 8 percent being elderly (over 65 years). About one-third of the housing units were owner-occupied, and vacancy rates were generally low, averaging three percent. Most of the housing units were single-family houses with an average household size of 4.1 persons, which is about 40 percent higher than the City and County of Los Angeles averages of 2.9 and 2.8 persons per household, respectively. The ethnic composition of the Eastside Corridor in 1990 was 94 percent Latino. Given the growing population and the income level of the residents of the Eastside Corridor, reliance on public transportation will not decrease, but will likely increase in the future.

1.4 GOALS AND OBJECTIVES

The goals and objectives of the Los Angeles Eastside Transit Corridor Study have been developed out of the extensive corridor and systems planning studies carried out over the past ten years, including the Eastside Alternative Analysis/DEIS/DEIR process and public reviews leading to selection of the Locally Preferred Alternative.

Based on these planning and community involvement activities, the following goals and objectives listed are proposed. They are based on established transportation and land use goals and objectives of the major government jurisdictions along the corridor, including the City of Los Angeles and the County of Los Angeles. These goals and objectives will be utilized in the development and evaluation of Eastside Corridor transit alternatives.

1. Improve access and mobility for residents, employees, and visitors to the Eastside Corridor.
    - Provide direct service to employment opportunities
    - Provide direct service to education, medical, shopping, and cultural opportunities
    - Minimize total travel times
    - Maximize transit ridership
    - Minimize transfers and changes of mode by integrating the system

- Provide convenient access and improve connectivity to the regional transit system
- Provide for the long term expansion of the future transit system

2. Support land use and development goals as stated in City of Los Angeles and County of Los Angeles plans for:
   - Community plan consistency
   - Regional plan consistency
   - Joint development opportunities
   - Increased land use intensity in transit station areas
   - Mixed-use commercial/residential development
   - Create a pedestrian-oriented environment
   - Enhance urban design features
3. Achieve local consensus by ensuring that the process is responsive to the community and policy-makers.
   - Define the desired transit system attributes from a community perspective
   - Maximize the opportunities for community and resident input
   - Enhance the public image of the proposed transit improvements
   - Build community and political support through effective communication and integration with local and regional plans
4. Provide a transportation project that is compatible with and enhances the physical environment wherever possible.
   - Implement an alternative that minimizes adverse impacts on the environment
   - Minimize air pollution
   - Minimize noise pollution
   - Minimize vibration impacts
   - Minimize the disturbance of public facilities
   - Minimize impacts on cultural resources, such as those that are historic, archaeological, or involve parkland
   - Conform to all local, state, and federal environmental regulations
5. Provide a transportation project that minimizes adverse impacts on the community.
   - Minimize business and residential dislocations, community disruptions, and damage to property
   - Avoid creating physical barriers, destroying neighborhood cohesion, or diminishing the quality of the human environment
   - Minimize traffic and parking impacts
   - Minimize impacts during periods of construction
6. Provide a transportation project that is reasonably within budget constraints for both capital and operating expenses.
   - Ensure adequate local funding commitments to secure federal and state contributions
   - Ensure adequate operating funds
   - Ensure fiscal consistency with the MTA's current financial plan
   - Minimize right-of-way costs by using land previously acquired by the MTA

- Provide for the ability of the project to be built in phases over time

1.5 MOBILITY PROBLEM SUMMARY

Travel demand forecasts prepared by SCAG and the MTA over the past decade have identified the need for major transit improvements in the Southern California region, especially in Los Angeles County, to meet the mandates of the federal Clean Air Act and address the increasing mobility needs of the region. Current freeway and surface arterial street facilities cannot be expanded sufficiently to handle the forecasted demand for mobility. The latest regional forecasts for the year 2010 estimate that person trips will increase by over 40 percent in the region and by almost 30 percent in Los Angeles County. The MTA, in the development and adoption of its 1992 30-Year Integrated Transportation Plan, addressed the mobility deficiency issues identified in the regional plan developed by SCAG. Subsequent travel demand forecasting conducted for the update of the MTA Long Range Plan has confirmed the continuing need for improvements in mobility.

All major freeways serving the Eastside Corridor area are currently operating above their design capacities during peak periods and for significant durations during the off-peak periods. No major improvements to existing freeways in the study area are identified in the current SCAG Regional Transportation Plan except for the extension of the I-710 freeway north to Pasadena. During previous project scoping and community meetings, residents of the Eastside Corridor expressed their desire for improved transit service because many are transit-dependent and need improved access to the region's educational, employment and cultural opportunities. Current meetings with Eastside Corridor elected officials have confirmed the need for improved transit service and connections to the regional system, especially in light of community initiatives for revitalization, employment opportunities, and economic development on the Eastside.

1.6 ROLE OF THIS RE-EVALUATION/MIS

Two objectives of this Re-Evaluation/MIS study are to (1) develop alternatives to the Suspended Project, and (2) to identify the corridor long term transportation needs to be addressed in the MTA Long Range Plan. This Re-Evaluation/MIS Report will provide the public and MTA Board of Directors the technical information needed in order to make an informed decision related to selecting an alternative or alternatives that satisfy the needs of the Eastside Corridor. The selected alternatives will then be subject to the next phase of analysis which is the preparation of a Supplemental Draft Environmental Impact Statement/Supplemental Draft Environmental Impact Report (SDEIS/SDEIR). Based on the SDEIS/SDEIR the MTA Board of Directors could select the Eastside fixed guideway project that would be subject to Preliminary Engineering and Final Environmental Impact Statement/Final Environmental Impact Report (FEIS/FEIR). The final actions before final design and construction could begin would be a Record of Decision by the Federal Transit Administration and an agreement on a financing plan between the FTA and LACMTA. The above process from the time a decision is make by MTA on this Report until a Record of Decision and financing plan is agreed upon would be approximately eighteen months to two years. After that time final design and subsequent construction activities could begin.

2 ALTERNATIVES CONSIDERED

This chapter contains discussion of the screening and selection process used to determine which alternatives would be considered in this Major Investment Study (MIS), plus a definition of the alternatives in terms of their physical and operating characteristics along with examples of their urban context.

2.1 SCREENING AND SELECTION PROCESS

2.1.1 Previous Studies

As discussed in Chapter 1, this MIS is being conducted to re-evaluate and analyze fixed guideway transit alternatives in the Eastside Corridor. This analysis is to include not only alignments but three different transit modes: Bus Guideway (also called Bus Rapid Transit or Busway and predominately at-grade or surface running); Light Rail Transit (mainly at-grade or surface running) and Heavy Rail Transit (mainly subway). The first task was to assemble and document the alternatives that had been considered over the last 10 years. Six major relevant studies (listed below) have been conducted in the Eastside Corridor.

1. Regional Transit Alternatives Analysis, November 1998, MTA.
2. East Los Angeles Study for 1st District, October 1998, ACG Environments.
3. 1998 RTP Transit Restructuring Evaluation, East Los Angeles, Transit Corridor Technical Report, July 1998, SCAG.
4. Los Angeles East Side Extension, FEIS/FEIR, September 1994, MTA.
5. Route 10/60 Corridor Preliminary Planning Study, June 1993, MTA.
6. Los Angeles Eastside Corridor, AA/DEIS/DEIR, April 1993, MTA.

From these six studies as well as input from the public and staff, 47 alternatives were identified. The goal was to reduce the identified alternatives to eight fixed guideway alternatives for analysis in the MIS in addition to the No Build and Transportation Systems Management (TSM) alternatives. The eight alternatives had to consider the three possible modes of fixed guideway transit and service the full length of the Eastside Corridor.

2.1.2 MTA/FTA Scoping

As part of the Federal and local project development and environmental clearance process, a local and Federal process called "scoping" was initiated in addition to a very aggressive public involvement program. The scoping process was initiated with the cooperation of the Federal Transit Administration (FTA) and was properly noticed through a Federal Notice of Intent (August 13, 1999) and the State required Notice of Preparation (August 10, 1999) by MTA. The purpose of the intensive scoping process is to invite interested individuals, organizations, and Federal, State, and local agencies to participate in defining the alternatives to be evaluated in the Re-Evaluation Major

Investment Study (MIS) and the subsequent environment impact statement and report and identifying any significant social, economic, or environmental issues related to the alternatives. The study area was defined in the scoping information booklets and the 47 alternatives were shown at the scoping meetings.

Three official community scoping meetings were noticed and conducted on August 24, 1999; August 26, 1999; and September 2, 1999 plus seven major follow-up community meeting were conducted over the course of the study. Over 270 persons attended the three community scoping meetings and the comments are fully documented in the Scoping Meeting Summary Report dated September 24, 1999. In addition to the three community scoping meetings a separate governmental agency scoping meeting was conducted on August 25, 1999 at MTA Headquarters. Their comments are also documented in the Scoping Meeting Summary Report.

To further enhance the initial community outreach program for this study, meetings with the MTA Review Advisory Committee (RAC) for the Eastside were conducted on July 21, 1999; August 4, 1999; and August 18, 1999. These meetings brought the committee up to date on the efforts that had been initiated by MTA and presented the study process and schedule leading to a decision for an Eastside fixed guideway transit project by the MTA Board of Directors. The meeting agendas, distributed materials, and meeting minutes are also included in the Scoping Meeting Summary Report.

In addition to the above meetings with the community, meetings were held with the MTA Elected Officials Committee (representing the Eastside communities) and a number of community ad-hoc meetings were conducted during the scoping period.

2.1.3 Screening Criteria

In order to reduce the number of identified alternatives, the first task was to identify a list of screening evaluation criteria that could be applied to the 47 plus alternatives. This was a very difficult and controversial undertaking by the staff and consultant team. A number of staff and consultant team work sessions were undertaken after scoping to identify the eight fixed guideway alternatives to be analyzed. Some 32 measures or criteria, listed below, were used in the first round of screening.

1. Alternative considered in formal MTA study process.
2. Scoping meetings input – support.
3. Right-of-way acquired by the MTA is not used.
4. Alternative eliminated by previous studies.
5. Alternative does not penetrate the corridor.
6. Alternative does not serve major activity centers.
7. Section 4(f) or 106 properties potentially affected.
8. Parking for businesses is removed.
9. Sensitive resources are affected by noise, vibration, etc.
10. Connections with existing transit facilities are non existent.
11. Access is provided to high-density areas.

12. Major right of way impacts anticipated
13. Major traffic impacts anticipated resulting in slow travel times.
14. Redevelopment/development potential low.
15. Major impacts on utilities.
16. Construction implementation difficult.
17. Major new structures or other high cost items are needed.
18. Major existing structures will be impacted.
19. Community supports the alternative.
20. Elected officials support for the alternative.
21. Equity is an issue.
22. Major visual impacts on surroundings.
23. Potential high contaminated lands affected (from previous studies)
24. Geotechnical/seismic issues.
25. Lane miles of traffic lanes removed.
26. Lane miles of parking lanes removed.
27. Provisions for north-south bus interface connections (major MTA, Montebello, and other community bus systems).
28. Cultural resources potentially impacted; schools, parks, churches, hospitals and cemeteries.
29. Street curb-to-curb width.
30. Street right of way width.
31. Serves the study goals and objectives.
32. Conceptual preliminary cost within reason

From the 47 alternatives some 15 alternatives were identified after the first round of evaluation.

A second round of evaluation was conducted in order to reduce the number of alternatives to eight. The eight alternatives were based on a review of previous alternatives and studies, three fixed guideway technologies (Bus Rapid Transit, Light Rail Transit, and Heavy Rail Transit), a workshop by the Consultant team to consider the initial screening criteria in reducing the number of alternatives, discussion with the MTA/Consultant study team, identification of logical termini (Union Station and Whittier/Norwalk Boulevards) to serve the identified study area, and the basic objective to recommend eight build alternatives for analysis in the Re-Evaluation/MIS Report.

Other assumptions included the provision that no traffic lanes would be replaced for the at-grade alignments, as much on-street parking would be retained as possible, and that the fixed guideway technologies would operate on exclusive rights-of-way. In addition, a key assumption was that the alternatives presented be implementable, even though they may have impacts and capable of being constructed in phases over time based on the resources available.

The eight alternatives that were identified for further analysis are listed below:

1. Bus Rapid Transit (BRT), At-Grade. 1st/Alameda to Union Station (northside) to Whittier and Norwalk Boulevards via Cesar Chavez, 4th, 3rd, Beverly, and Whittier.
2. Bus Rapid Transit, At-Grade. Union Station (southside) to Whittier and Norwalk Boulevards via Alameda, 1st, 4th, 3rd, and Whittier.
3. Light Rail Transit (LRT), At-Grade. Union Station (southside) to Whittier and Norwalk Boulevards via Alameda, 1st, 4th, 3rd, and Whittier.
4. Bus Rapid Transit, At-Grade. Union Station (southside) to Whittier and Norwalk Boulevards via Alameda, 1st, 4th, 3rd, Beverly, and Whittier.
5. Light Rail Transit, At-Grade. Union Station (southside) to Whittier and Norwalk Boulevards via Alameda, 1st, 4th, 3rd, Beverly, and Whittier.
6. Light Rail Transit. At-grade Union Station (southside) to 1st/Boyle. LRT (subway) 1st/Boyle to 1st/Lorena. LRT (at-grade) from 1st/Lorena to Whittier and Norwalk Boulevards via Alameda, 1st, 4th, 3rd, and Whittier.
7. Heavy Rail and Light Rail. Heavy Rail (subway) from Union Station to 1st/Lorena subway station with a subway station at 1st/Boyle and 1st/Lorena. Light Rail Transit (at-grade) from 1st/Lorena to Whittier and Norwalk Boulevards via Indiana, 4th, 3rd, Beverly, and Whittier.
8. Heavy Rail and Bus Rapid Transit. Heavy Rail (subway) from Union Station to Chavez/Soto subway station with a subway station at 1st/Boyle. Bus Rapid Transit (at-grade) from Chavez/Soto to Whittier and Norwalk Boulevards via Soto, 4th, 3rd, Beverly, and Whittier.

Also to be evaluated are the No-Build and Transportation System Management (TSM) Alternatives. The No-Build Alternative includes an increase in frequency of bus service as defined by MTA, and no major transit physical facilities would be constructed. The TSM Alternative includes an increased frequency of bus service beyond that of the No-Build Alternative, including one rapid bus route on Whittier Boulevard (starting at Garfield Avenue) connected to Wilshire Boulevard on the westside, and few or no physical facilities would be constructed.

2.1.4 Evaluation Criteria Development

Early on in the study process, it was important to develop the evaluation criteria by which the proposed fixed guideway investment alternatives could be evaluated. These criteria help form the technical analyses that need to be conducted and inform the public and decision-makers as the type of information that will be available. At the outset it was stated that information would be available related to costs, ridership, and impacts of each alternative that would be subject to analysis in the MIS. The question was asked, "What information do you need to know about the alternatives being studied to make an informed recommendation or decision?"

After extension discussion with community groups, the Elected Officials Committee, technical staffs, and the consultant team, a list of major evaluation criteria was agreed upon. The list of criteria and measures by category are shown in Table 2-1. The major categories are: (1) Costs; (2) Effectiveness or Transportation System Performance; (3) Efficiency or Cost-Effectiveness; (4) Potential Environmental Issues/Concern; (5) Environmental Justice Issues; and (6) Community Acceptance.

The criteria and measures would be developed (with available data) for each of the alternatives selected for analysis.

2.1.5 Second Round of Community Meetings

Based on the comments received during the scoping process, the initial screening of alternatives, and the development of the evaluation criteria and measures, a second round of communities meetings were conducted to review the potential alternatives to be studied.

The three community meetings were held on October 20, 1999; October 21, 1999; and October 25, 1999. The meetings were held to review the study schedule, the alternative routes and transit modes, and the configuration of the alternatives within the Eastside streets. In addition to the three community meetings numerous meetings were held with community leaders, residents, business and property owners, community-based organizations, elected officials, and the faith community. A summary of the second round of community meeting is included in the Second Round of Community Meetings Summary Report dated October 30, 1999.

In general, the public supported the alternatives proposed for analysis but many of the Eastside residents and businesses still supported the previous subway project as their preferred project, but understood the funding limitations and the reasons for studying lower cost and maybe more cost-effectiveness transit options for the Eastside communities.

2.2 MIS ALTERNATIVES

Based on the community, technical staff, and consultant team inputs, eight fixed guideway build alternatives, the no build alternative, and the TSM alternatives were developed for technical analysis in the study. The alternatives are described in more detail in the following section but are summarized below.

The No Build Alternatives includes all highway and transit projects and operations that the region and MTA expect to be in place in the year 2020 (the future analysis year for this MIS). These include improvements to the local bus system and the completion of the Red Line to North Hollywood and the Pasadena Blue Line to Sierra Madre Villa in Pasadena.

Table 2-1
Evaluation Criteria and Measures

- Costs*
  - Capital cost (1999 $)*
  - Operating and maintenance cost (1999 $)*

- Effectiveness (Transportation System Performance - Mobility)(Year 2020 estimates)
  - Corridor Oriented Measures
    - Daily and annual corridor fixed guideway boardings
    - Corridor daily person trips
    - Corridor daily transit trips
    - Corridor daily transit mode share
    - Level of service on selected major arterials and freeway segments (LOS)
    - Level of service at selected major intersections (LOS)
    - Population within ½ mile of each transit station
    - Jobs within ½ mile of each transit station
    - Number of low income households within ½ mile of each transit station*
  - Regionally Oriented Measures
    - Daily and annual transit trips*
    - Daily and annual new transit trips compared to No Build
    - Daily and annual new transit trips compared to TSM
    - Daily and annual vehicle trips
    - Daily and annual vehicle miles traveled
    - Daily and annual passenger miles traveled

- Efficiency (Cost-Effectiveness) (1999 Cost Dollars and 2020 Ridership Estimates)
  - Annual operating and maintenance cost*
  - Total equivalent annual capital cost*
  - Total annualized cost*
  - Total annualized cost per transit rider
  - Total annualized cost per new transit rider* (compared to No Build and TSM alternatives)
  - Total annualized cost per passenger mile (compared to No Build and TSM alternatives)
  - Operating cost per passenger mile*

- Potential Environmental Issues/Concerns
  - Natural environment (air quality; disturbances to floodplain and wetlands; major utilities; threatened and endangered wildlife and vegetation; etc.)
    - Change in regional pollutant emissions*
      - Tons per day of CO*
      - Tons per day of NO_x*
      - Tons per day of O_3*
      - Tons per day of PM_{10}*

Table 2-1
Evaluation Criteria and Measures

    - Tons per day of CO_2*
  - Current Regional Air Quality Designation by the EPA*
    - Ozone*
    - Carbon Monoxide*
    - Particulate Matter*
    - Nitrogen Oxides*
  - Energy savings (annual BTU's reduced) compared to No Build and TSM alternatives*
  - Number of short-term and permanent jobs created
  - Impacts on utilities during construction
  - Number of potential acres of floodplain affected by the alignments
  - Number of potential acres of wetlands affected by the alignments
  - Number of water crossings the alignments
  - Percentage of alignment with potential for liquefaction
  - Percentage of alignment with potential for inundation
  - Number of fault crossing along the alignments
  - Number of potential pre-existing contaminated locations along the alignments
  - Number of potential sensitive noise and vibration receptors along the alignments

- Socioeconomic environment (land acquisition and displacements; cultural resources; station areas impacts; compatibility with local community plans and zoning; etc.)
  - Number of potential cultural resources along the alignments
  - Number of potential National and State Register cultural resource sites along the alignments
  - Number for fossil sites and remains being encountered during construction
  - Number of parks and recreations areas along the alignments
  - Number of potential residential units and businesses displaced along the alignments
  - Number of potential on-street parking spaces displaced along the alignments
  - Number of potentially impacted major intersections along the alignments (LOS)
  - Number of potentially impacted major arterial links along the alignments (LOS)
  - Compatibility with local community plans and policies
  - Number of potential visually affected sensitive receptors along the alignments
  - Number of redevelopment/revitalization areas served
  - Number of acres needed for park-and-ride facilities

- Environmental Justice Measures
  - Number of low income households within ½ mile of each transit station*
  - Number of corridor daily person trips
  - Number of corridor daily transit trips

Table 2-1
Evaluation Criteria and Measures

- Corridor transit daily mode share
- Minority population within ½ miles of each transit station
- Number of zero-car households with ½ mile of each transit station
- Number of workers using public transportation within ½ mile of each transit station
- Percentage of total rail capital expenditures since 1980 for the Eastside Corridor study area

- Financial Feasibility*
  - Existing capital revenue sources (local, state, Federal)*
  - Capital revenue shortfall*
  - Potential new capital revenue sources (local, state, Federal)*
  - Existing operating and maintenance revenue sources (local, state, Federal)*
  - Operating and maintenance revenue shortfall*
  - Potential new operating and maintenance revenue sources (local, state, Federal)*
  - Financial feasibility of the alternative (stability and reliability of the capital and operating financing plan)*

- Community Acceptability

* FTA Section 5309 New Start Criteria and Measures

The Transportation System Management (TSM) Alternative is defined by the Federal Transit Administration (FTA) as the no build alternative plus lower cost transit capital and operational improvements that are intended to enhance the performance of the transportation system within the study corridor. Compared with the "build" alternatives should be a relatively low cost approach to addressing the transportation problems. The TSM should represent the best that can be done to improve transit mobility in the corridor without the construction of major new transit facilities. The TSM alternative for the Eastside Corridor includes additions in bus service frequencies to the major east-west and north-south existing transit routes as well as the implementation of the Whittier/Wilshire Rapid Bus line from Whittier and Garfield (Montebello) to Colorado and Ocean (Santa Monica). This Rapid Bus Line has been approved for implementation in June 2000 and would provide a combined operating frequency of 1.75 minutes during the peak periods and 5 minutes during the off-peak periods. There are 24 stops along the route with six on the stops within the Eastside Corridor study area. This service would provide a strong linkage (no transfers) between a portion of the Eastside Corridor study area to Downtown, Mid-Wilshire, and the far westside of Los Angeles. The TSM also includes improved frequency of service to the Metro Red Line.

The eight fixed guideway build alternatives are listed below (Figures 2-1 through 2-8) and described in detail in the next section.

1. Bus Rapid Transit (BRT), At-Grade. 1st/Alameda to Union Station (northside) to Whittier and Norwalk Boulevards via Cesar Chavez, Soto, 4th, 3rd, Beverly, and Whittier.

2. Bus Rapid Transit, At-Grade. Union Station (southside) to Whittier and Norwalk Boulevards via Alameda, 1st, Soto, 4th, 3rd, and Whittier.

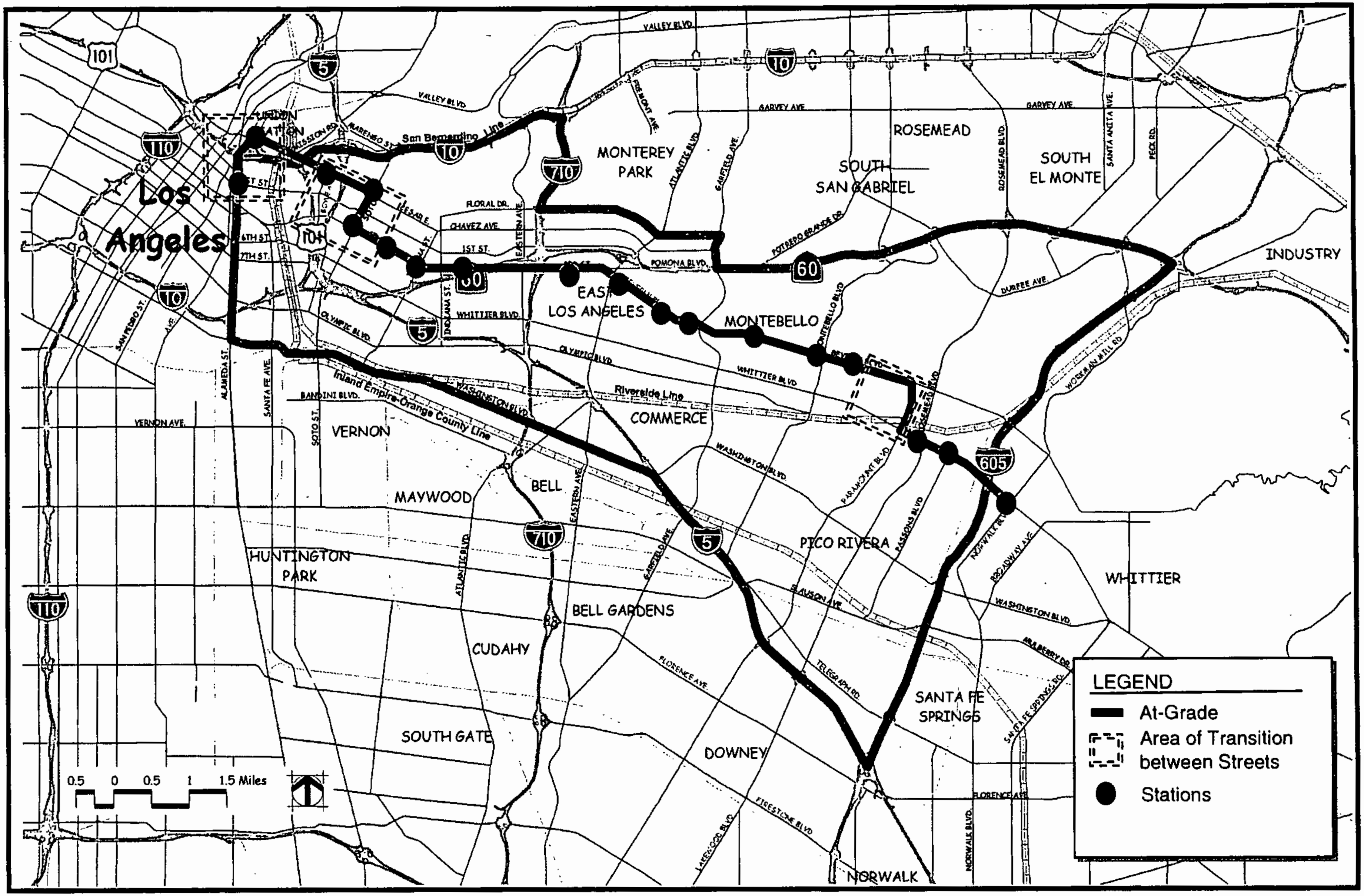
3. Light Rail Transit (LRT), At-Grade. Union Station (southside) to Whittier and Norwalk Boulevards via Alameda, 1st, Soto, 4th, 3rd, and Whittier.

4. Bus Rapid Transit, At-Grade. Union Station (southside) to Whittier and Norwalk Boulevards via Alameda, 1st, Soto, 4th, 3rd, Beverly, and Whittier.

5. Light Rail Transit, At-Grade. Union Station (southside) to Whittier and Norwalk Boulevards via Alameda, 1st, Soto, 4th, 3rd, Beverly, and Whittier.

6. Light Rail Transit. At-grade Union Station (southside) to 1st/Boyle. LRT (subway) 1st/Boyle to 1st/Lorena. LRT (at-grade) from 1st/Lorena to Whittier and Norwalk Boulevards via Alameda, 1st, Indiana, 4th, 3rd, and Whittier.

7. Heavy Rail and Light Rail. Heavy Rail (subway) from Union Station to 1st/Lorena subway station with a subway station at 1st/Boyle and 1st/Lorena. Light Rail Transit (at-grade) from 1st/Lorena to Whittier and Norwalk Boulevards via Indiana, 4th, 3rd, Beverly, and Whittier.



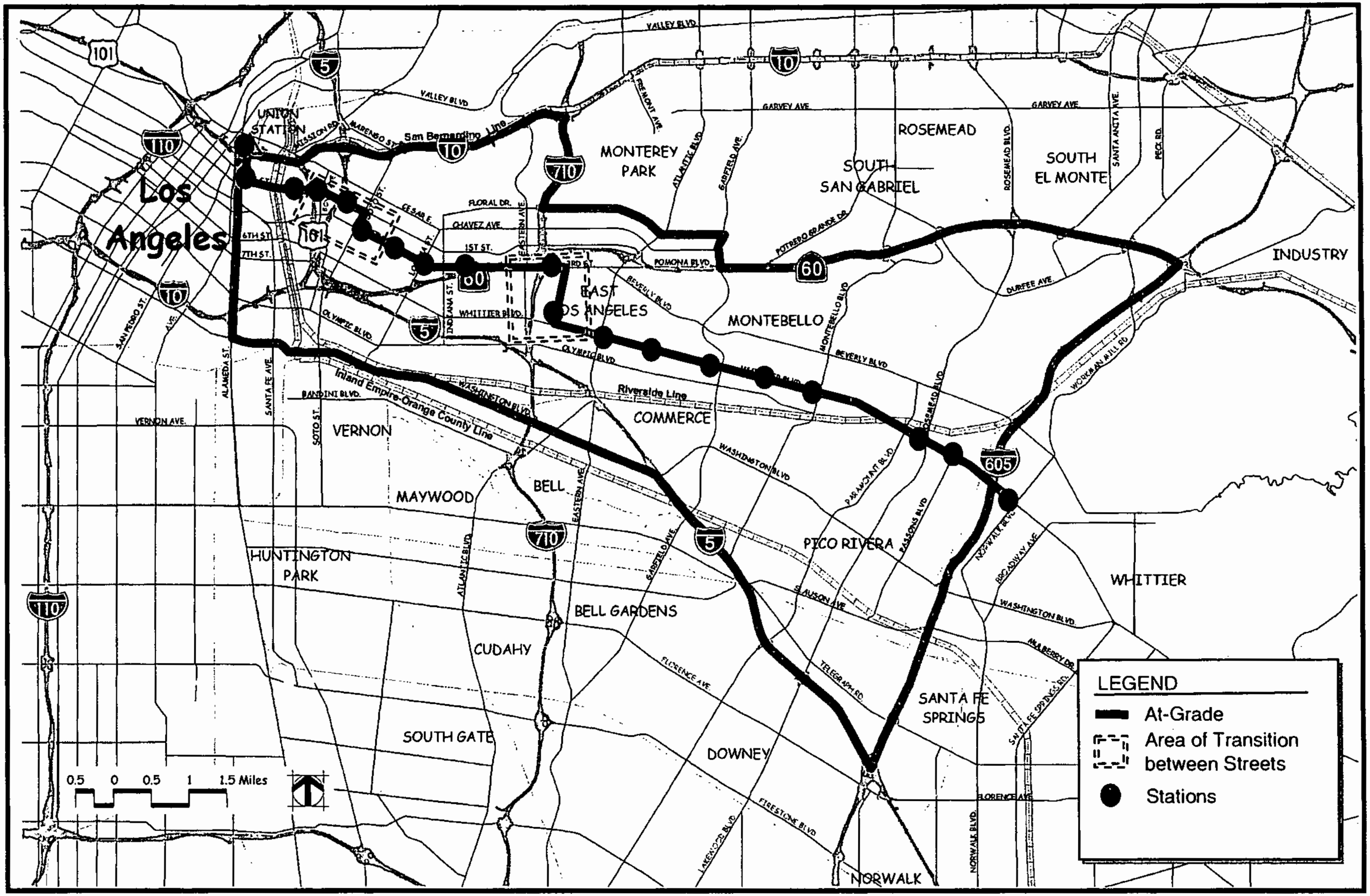
Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Alternative 1

Bus Rapid Transit (Dedicated Busway), At-Grade
Union Station to Whittier/Norwalk via Beverly

Figure 2-1



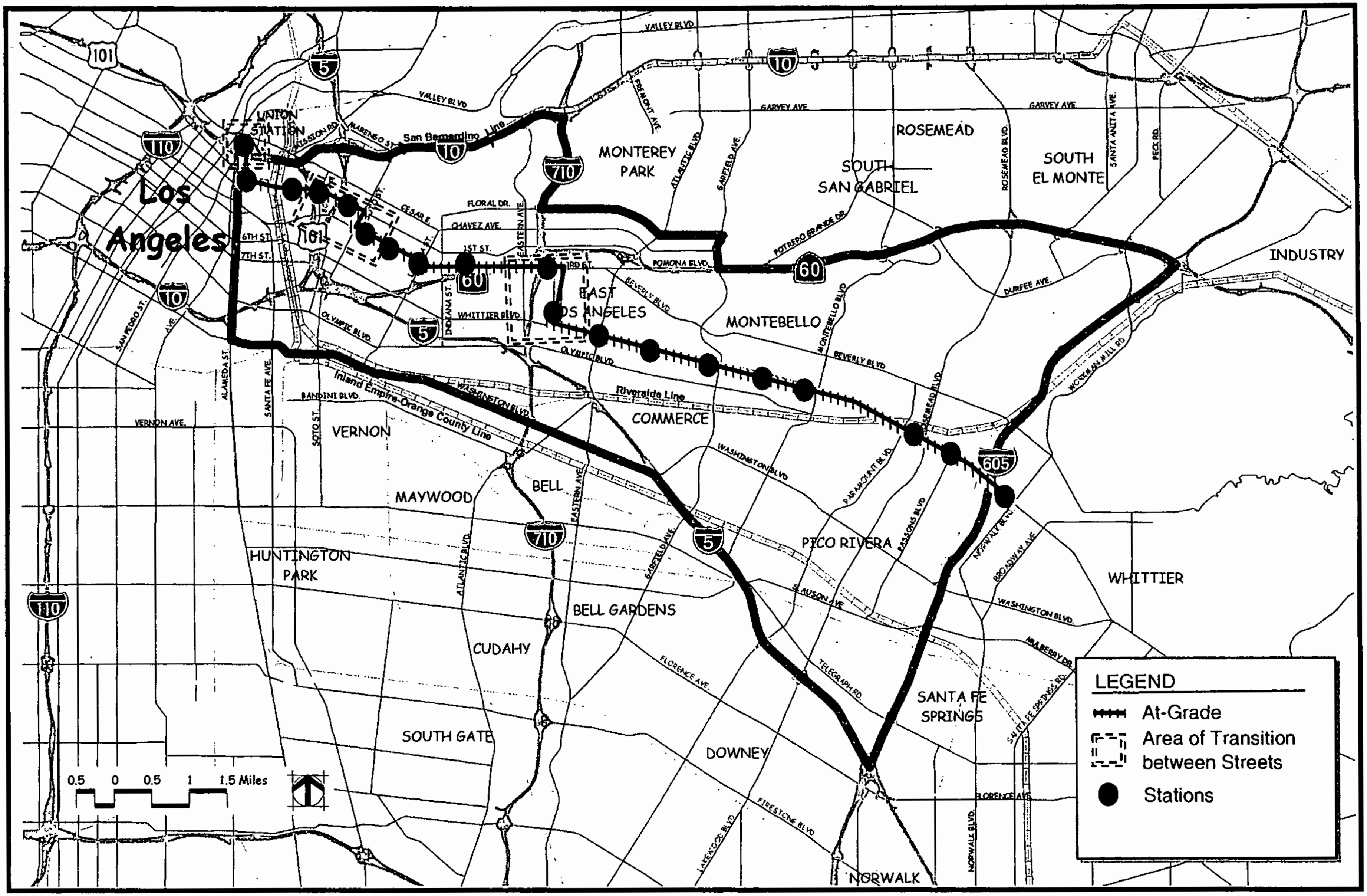
Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Alternative 2

Bus Rapid Transit (Dedicated Busway), At-Grade
Union Station to Whittier/Norwalk via Whittier

Figure 2-2



Eastside Transit Corridor Study

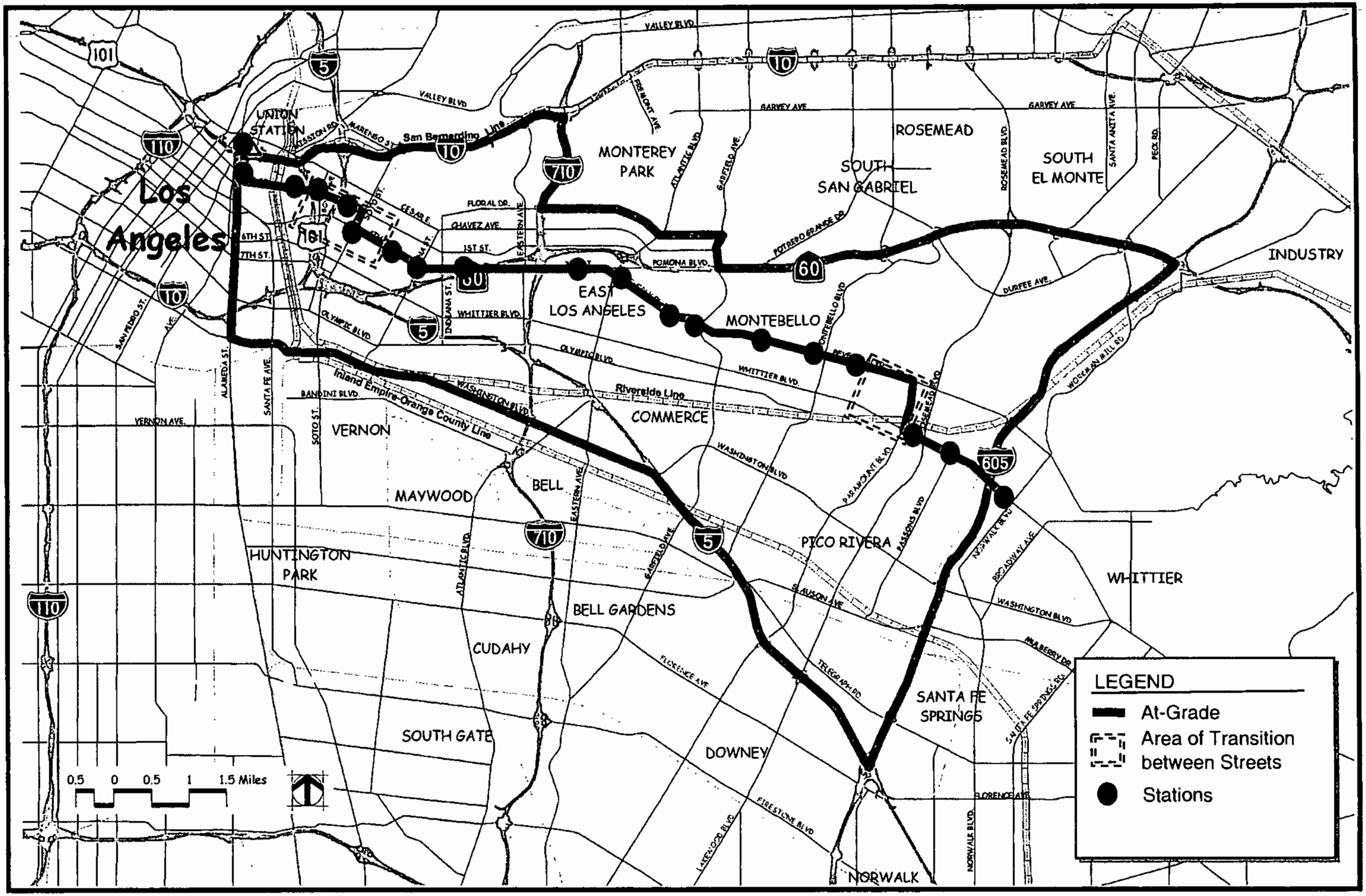
Eastside Corridor Transit Consultants

Alternative 3

Light Rail, At-Grade

Union Station to Whittier/Norwalk via Whittier

Figure 2-3



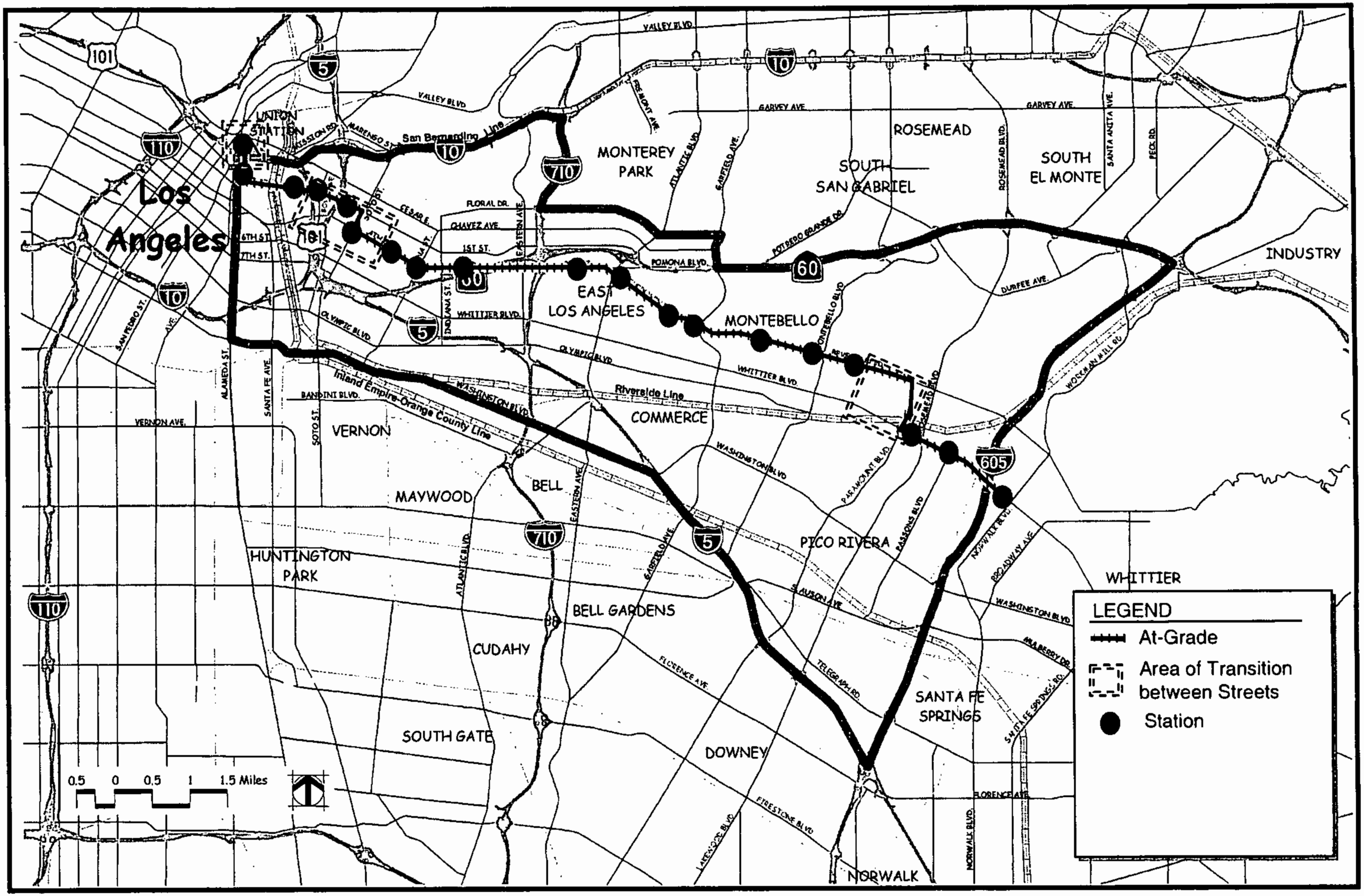
Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Alternative 4

Bus Rapid Transit (Dedicated Busway), At-Grade
Union Station to Whittier/Norwalk via Beverly

Figure 2-4



Eastside Transit Corridor Study

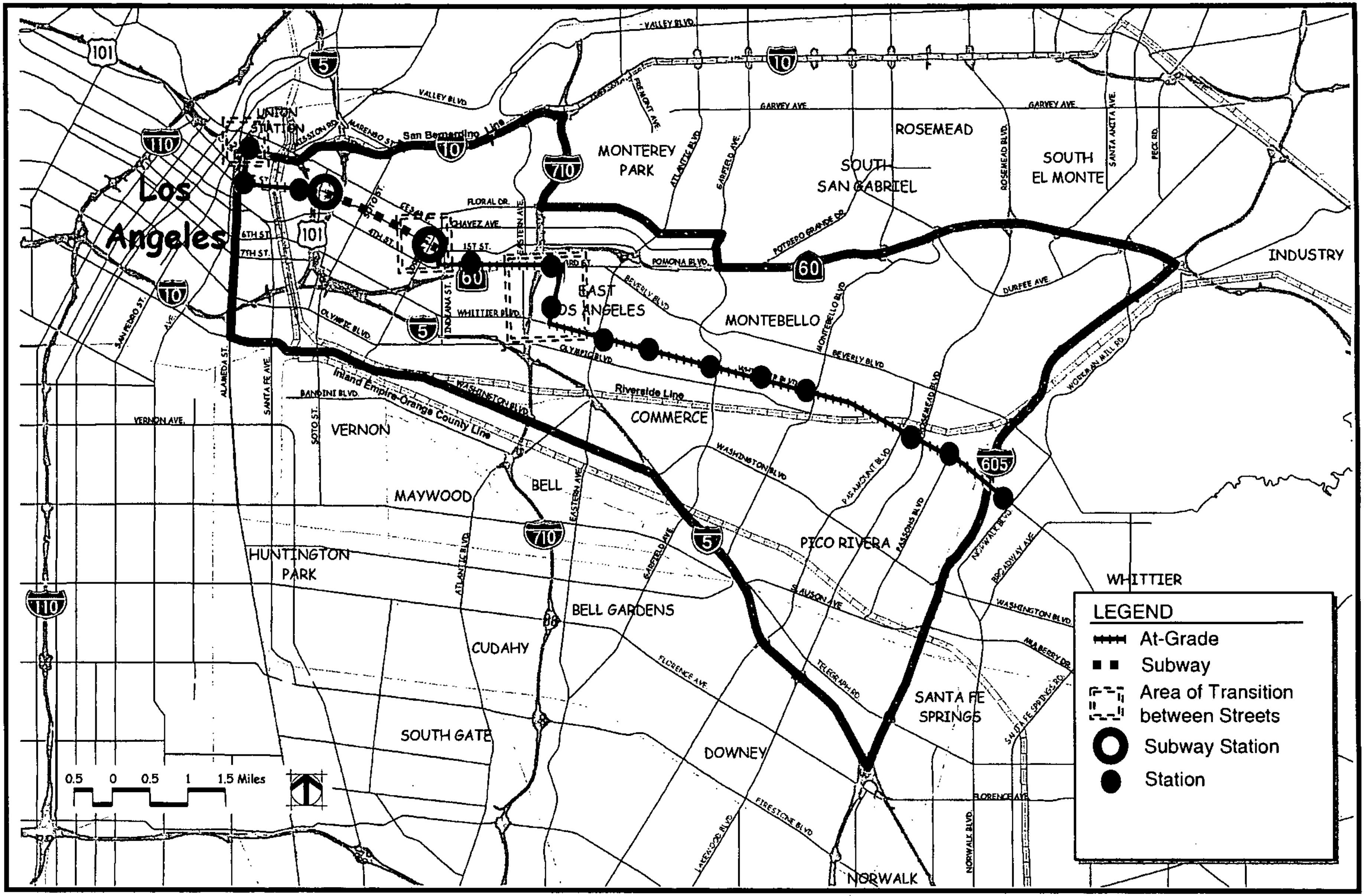
Eastside Corridor Transit Consultants

Alternative 5

Light Rail, At-Grade

Union Station to Whittier/Norwalk via Beverly

Figure 2-5

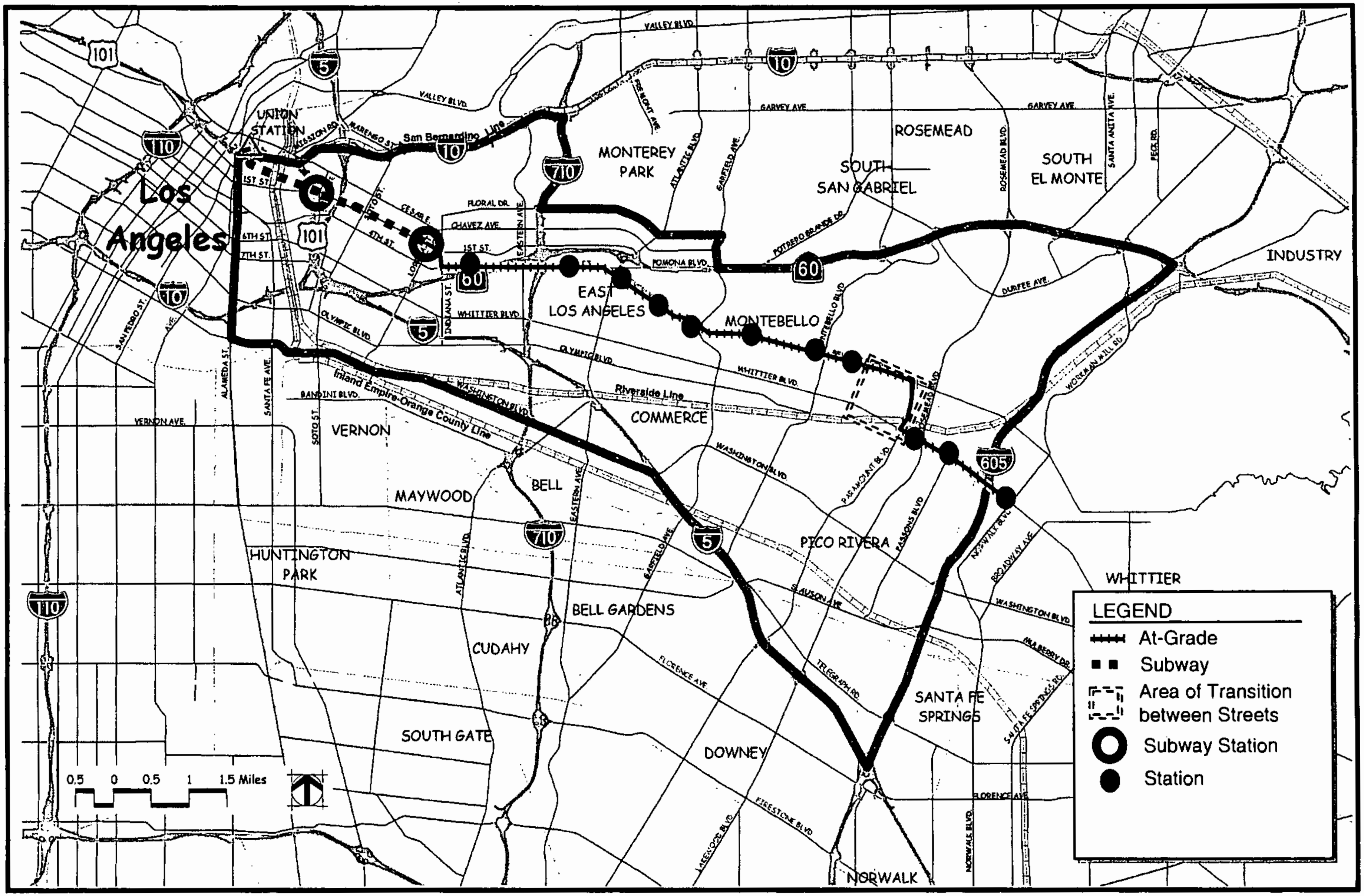


Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Alternative 6

Light Rail, At-Grade-Union Station to 1st/Boyle
Light Rail Subway-1st/Boyle to 1st/Lorena
Light Rail At-Grade - 1st/Lorena to Whittier/Norwalk via Whittier
Figure 2-6



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

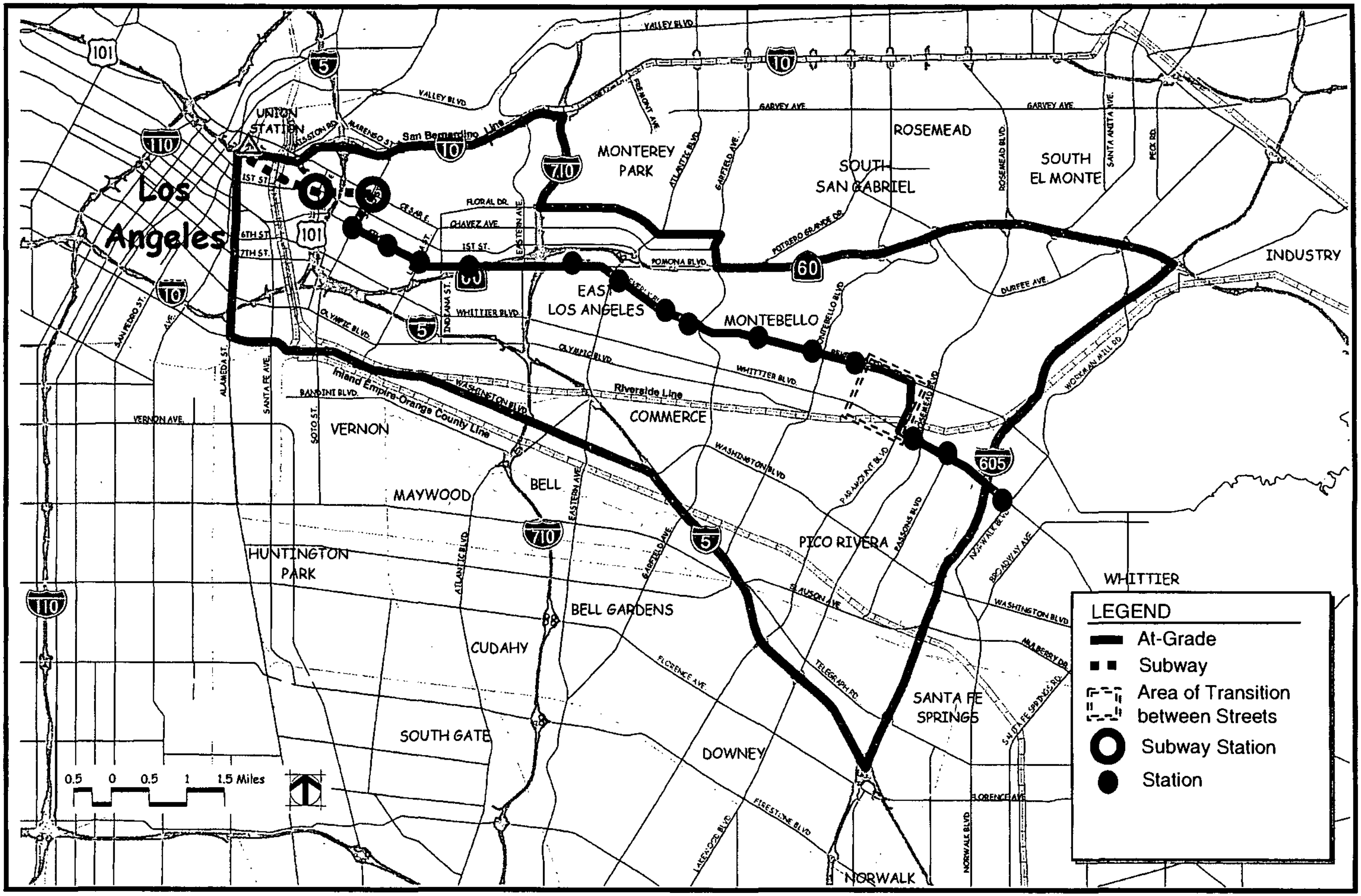
Alternative 7

Heavy Rail and Light Rail

Heavy Rail Subway-Union Station to 1st/Lorena

Light Rail At-Grade - 1st/Lorena to Whittier/Norwalk via Beverly

Figure 2-7



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Alternative 8

Heavy Rail and Bus Rapid Transit (Dedicated Busway)
Heavy Rail Subway-Union Station to Chavez/Soto
Bus Rapid Transit At-Grade - Chavez/Soto to Whittier/Norwalk via Beverly

Figure 2-8

8. Heavy Rail and Bus Rapid Transit. Heavy Rail (subway) from Union Station to Chavez/Soto subway station with a subway station at 1st/Boyle. Bus Rapid Transit (at-grade) from Chavez/Soto to Whittier and Norwalk Boulevards via Soto, 4th, 3rd, Beverly, and Whittier.

2.3 DEFINITION OF ALTERNATIVES

This section provides a description of the physical and operating characteristics of each alternative being studied and reported on in this report. The transit modes and vehicle types being considered in the alternatives include standard transit buses, Bus Rapid Transit, Light Rail Transit, Heavy Rail Transit. The physical details of each build alternative (plans, profiles, typical plan views and elevations, urban design concepts, and urban design guidelines) are included in the Conceptual Engineering Report dated January 3, 2000; Urban Design Concept Report dated December 1999; Proposed Urban Design Guidelines dated December 1999 and operating plan details are included in the Operating Plans Report dated November 3, 1999.

The Bus Rapid Transit mode utilizes articulated low-floor transit buses (see Figure 2-9) operating on a dedicated travel lane within the street right of way and with special station stops. This mode can provide a high quality, high frequency of service within the study corridor. There are also under development a number of advanced design buses which could be considered.

The Light Rail Transit mode considered for the Eastside Corridor utilizes the new low-floor or street level access type vehicle (see Figure 2-10) that is used throughout Europe and recently placed into service in Portland, Oregon. This light rail transit concept would be different than is currently in operation (high floor access vehicles requiring high level boarding platforms) on the Long Beach Blue Line, the Green Line, and the proposed Pasadena Blue Line. The low-floor street-level access design provides a much better fit with the streets and communities in the Eastside Corridor.

The Heavy Rail Transit mode would use the current Red Line vehicles (see Figure 2-11) and design concepts including full grade separation requirements.

2.3.1 No Build

The No Build Alternative as defined by FTA should represent the baseline case consisting of existing and committed elements of the region's transportation plan, excluding the proposed fixed guideway transit investments for the study corridor. The No Build Alternative was defined for all three corridor studies to be the same and includes all highway and transit projects and operations that the region and MTA expect to be in place by the year 2020. These include improvements to the local bus systems and the completion and operation of the Red Line to North Hollywood, the Pasadena Blue Line to Sierra Madre Villa in Pasadena, and the Centerline Rail Project in central Orange County.

Eastside Transit Corridor Study

Bus Rapid Transit Vehicle

Eastside Corridor Transit Consultants

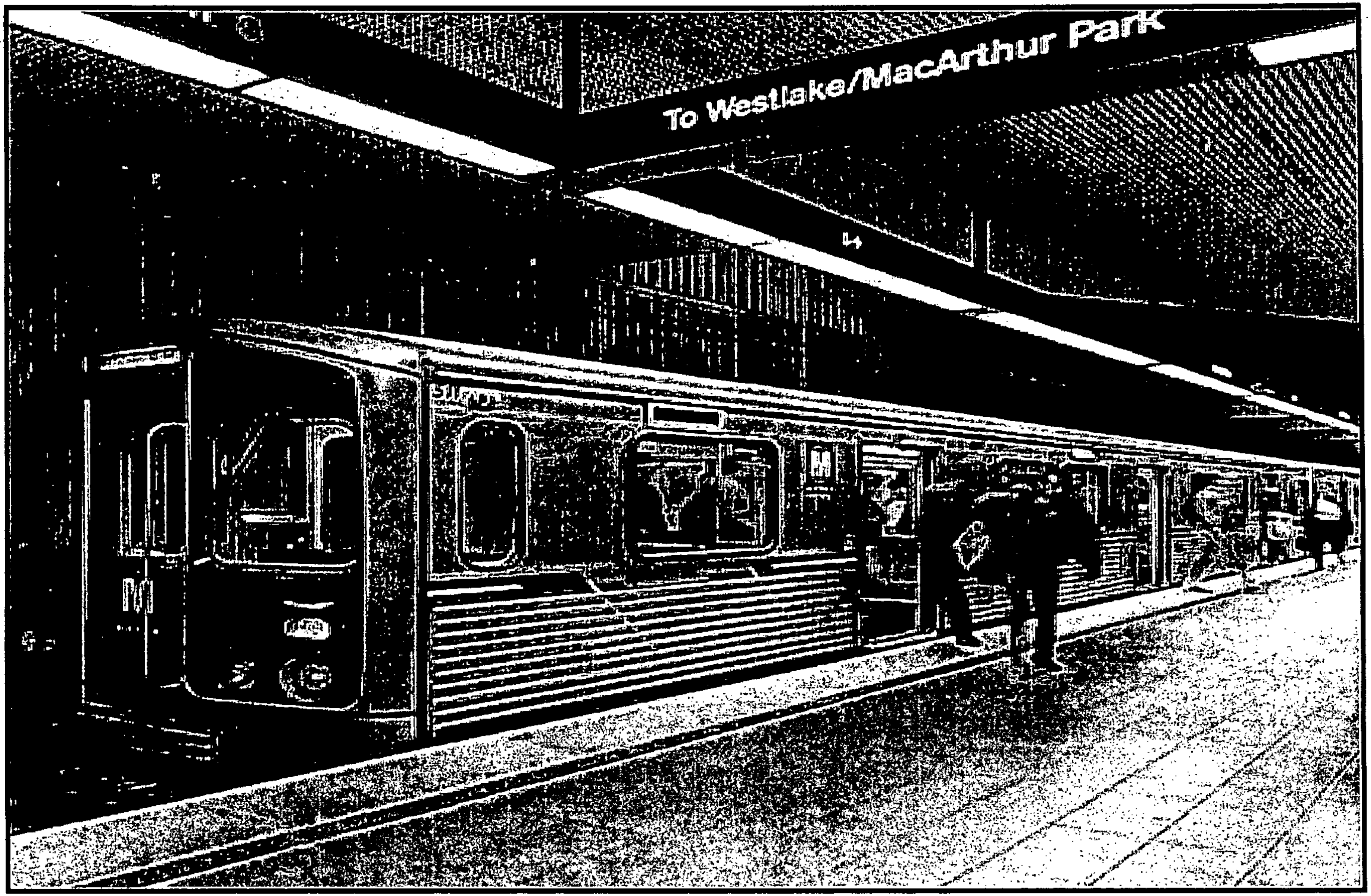
Figure 2-9

Eastside Transit Corridor Study

Light Rail Transit Vehicle

Eastside Corridor Transit Consultants

Figure 2-10



Eastside Transit Corridor Study

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Heavy Rail Transit Vehicle
Metro Red Line Subway
Los Angeles, CA

Figure 2-11

The forecast year is 2020 for all the alternatives and SCAG's current demographic forecasts for that year were used in all the analyses. This provides for comparisons and consistency to the current Regional Transportation Plan efforts conducted by SCAG.

The existing transit fare structure was also retained for the MIS study to allow for comparative analysis of the alternatives and to be consistent with regional planning efforts by SCAG.

Table 2-2 shows the transit service frequencies (daily peak and off-peak) of the bus routes within the Eastside Corridor and for the rail lines for all the alternatives including the No Build Alternative. The table also shows the existing (fall 1998) service frequencies. This table allows for a comparison of the assumed transit service supply across and between each alternative.

2.3.2 Transportation System Management (TSM)

The Transportation System Management (TSM) Alternative is defined by the Federal Transit Administration (FTA) as the no build alternative plus lower cost transit capital and operational improvements that are intended to enhance the performance of the transportation system within the study corridor. Compared with the "build" alternatives the TSM Alternative should be a relatively low cost approach to addressing the transportation problems. It should be represent the best that can be done to improve transit mobility in the corridor without the construction of major new transit facilities.

The TSM alternative for the Eastside Corridor includes additions in bus service frequencies to the major east-west and north-south existing transit routes as well as the implementation of the Whittier/Wilshire Rapid Bus line from Whittier and Garfield (Montebello) to Colorado and Ocean (Santa Monica). This Rapid Bus Line has been approved for implementation in June 2000 and would provide a combined operating frequency of 1.75 minutes during the peak periods and 5 minutes during the off-peak periods. There are 24 stops along the route with six on the stops within the Eastside Corridor study area. This service would provide a strong linkage (no transfers) between a portion of the Eastside Corridor study area to Downtown, Mid-Wilshire, and the far westside of Los Angeles.

Increased service frequencies (lower headways) are assumed for MTA Routes 30/31 (Pico/1st/Floral), 65 (Olympic/Indiana/Gage), 250/251 (Soto), 253 (Evergreen/Euclid), 254 (Lorena), 255 (Rowan), 256 (Ford/Eastern), 258/259 (Arizona/Eastern), 262 (Garfield), 265 (Paramount), 266 (Rosemead), and improvements to services operated by Commerce, Montebello, and Whittier as shown in Table 2-2.

In addition the two Metro Red Lines (North Hollywood to Union Station and Wilshire/Western to Union Station) were assumed to operate 4 minute frequencies in the peak and 8 minute frequencies in the off-peak. This would provide 2-minute peak frequencies between Vermont/Wilshire and Union Station. This is almost twice the level of service provided today. This service frequency for the Metro Red Line would stay the

Table 2-2
EASTSIDE TRANSIT CORRIDOR STUDY
ROUTES WITHIN STUDY AREA
PEAK HEADWAYS

ROUTE	OPERATOR	Dir	STREET	DESCRIPTION	EXISTING PEAK HEADWAYS	No Build	TSM	Alt 1 BRT	Alt 2 BRT	Alt 3 LRT	Alt 4 BRT	Alt 5 LRT	Alt 6 LRT	Alt 7 HRT/LRT	Alt 8 HRT/BRT
MTA 18	MTA	E	WHITTIER BLVD.	WHITTIER/GARFIELD-6TH/WILTON	7	6.5	6	6	10	10	6	6	10	6	6
MTA 18	MTA	E	WHITTIER BLVD.	WHITTIER/GARFIELD-6TH/VIRGIL	13	12.7	12	12	15	15	12	12	15	12	12
MTA 318	MTA	E	WHITTIER BLVD.	LA BREA MALL-6TH/VIRGIL	60	17.1	15	15	15	15	15	15	15	15	15
MTA 30	MTA	E	PICO/1ST/FLORAL	PICO/RIMPAU-DOZIER/ROWAN	6	5.5	6	6	6	6	6	6	6	6	6
MTA 30	MTA	E	PICO/1ST/FLORAL	PICO/RIMPAU-ATLANTIC/RIGGIN	15	15	12	12	12	12	12	12	12	12	12
MTA 31	MTA	E	PICO/1ST	PICO/RIMPAU-ATLANTIC/RIGGIN	12	12	8	8	8	8	8	8	8	8	8
MTA 40	MTA	E	BROADWAY/HAWTHORNE	UNION STATION - HAWTHORNE/ARTESIA	6	12	12	12	12	12	12	12	12	12	12
MTA 42	MTA	E	BROADWAY/MLK	UNION STATION - LAX	22	22	22	22	22	22	22	22	22	22	22
MTA 65	MTA	E	OLYMPIC/INDIANA/GAGE	WASHINGTON/FIGUEROA-CSULA	12	12	10	6	6	6	6	6	6	6	6
MTA 66	MTA	E	8TH/OLYMPIC	6TH/WILTON-WHITTIER/GARFIELD	9	9	8	8	8	8	8	8	8	8	8
MTA 66	MTA	E	8TH/OLYMPIC	8TH/WESTERN-ATLANTIC/OLYMPIC	9	9	8	8	8	8	8	8	8	8	8
MTA 68	MTA	E	WASHINGTON/CESAR CHAVEZ	WSHGTON/FAIRFAX-ATLANTIC/RIGGIN	20	20	20	20	12	12	12	12	12	12	12
MTA 68	MTA	E	WASHINGTON/CESAR CHAVEZ	WSHGTON/FAIRFAX-GARFIELD/RIGGIN	20	20	20	20	12	12	12	12	12	12	12
MTA 68	MTA	E	WASHINGTON/CESAR CHAVEZ	WSHGTON/FAIRFAX-MONTEBELLO MALL	20	20	20	20	12	12	12	12	12	12	12
MTA 70	MTA	E	CESAR CHAVEZ/GARVEY	11TH/FIGUEROA-EL MONTE TRANSIT CNTR	8	7	7	7	7	7	7	7	7	7	7
MTA 250	MTA	N	BOYLE	USC MED CTR-OLYMPIC/BOYLE	40	40	30	20	20	20	20	20	20	20	20
MTA 251	MTA	N	SOTO	AV26/FIGUEROA-103RD/GRAHAM	23	23.4	15	20	20	20	20	20	20	20	12
MTA 251	MTA	N	SOTO	AV26/FIGUEROA-SOUTH GATE PLAZA	23	23.4	20	20	20	20	20	20	20	20	12
MTA 252	MTA	N	SOTO	HUNTINGTON/MONTEREY-LB GREEN LINE	12	11.7	10	12	12	10	12	10	10	10	12
MTA 253	MTA	N	EVERGREEN/EUCLID	USC MED CTR-8TH/LORENA	40	40	30	20	20	20	20	20	20	20	20
MTA 254	MTA	N	LORENA	USC MED CTR-WILMINGTON/120TH	40	40	30	10	10	10	10	10	10	10	10
MTA 255	MTA	N	ROWAN	AVE43/FIGUEROA-HERBERT/WHITTIER	45	45	30	10	10	10	10	10	10	10	10
MTA 256	MTA	N	FORD/EASTERN	MENDOCINO/LAKE-TRIGGS/EASTERN	30	30	20	20	20	20	20	20	20	20	20
MTA 258	MTA	N	ARIZONA/EASTERN	GARFIELD/MAIN-GARFIELD/FIRESTONE	40	40	30	10	10	10	10	10	10	10	10
MTA 259	MTA	N	ARIZONA/EASTERN	HUNT/MONT-GARFIELD/FIRESTONE	40	40	30	10	10	10	10	10	10	10	10
MTA 260	MTA	N	ATLANTIC	ALTADENA/LAKE-ARTESIA BLUE LINE STA	9	6.1	6	8	8	5	8	5	5	5	8
MTA 262	MTA	N	GARFIELD	HUNT/LOS ROBLES-GARFIELD/FIRESTONE	35	35	20	10	10	6	10	6	6	6	10
MTA 265	MTA	N	PARAMOUNT	BEVERLY/DURFEE-LAKEWOOD MALL	60	60	30	30	30	30	30	30	30	30	30
MTA 266	MTA	N	ROSEMEAD	MICHILLINDA/FOOTHILL-LAKEWOOD MALL	30	29.9	20	10	10	10	10	10	10	10	10
MTA 270	MTA	N	WORKMAN MILL	FOOTHILL/PRIMROSE-I-605/I-105 METRO STA	25	25	25	25	25	25	25	25	25	25	25
MTA 434	MTA	E	SANTA MONICA FWY	UNION STATION - TOPANGA CYN/PCH	40	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5
MTA 436	MTA	E	VENICE BLVD.	UNION STATION - MAIN/PICO	25	25	25	25	25	25	25	25	25	25	25
MTA 442	MTA	E	I-110/MANCHESTER	UNION STATION - HAWTHORNE/ARTESIA	15	15	15	15	15	15	15	15	15	15	15
MTA 445	MTA	N	I-110	UNION STATION - 21ST/PACIFIC	45	45	45	45	45	45	45	45	45	45	45
MTA 460	MTA	E	BOYLE/SOTO/I-5	L.A. CONV. CTR -DISNEYLAND	15	15	15	15	15	15	15	15	15	15	15
MTA 466	MTA	E	SANTA ANA FWY.	UNION STATION - LAMIRADA/SANTA GERT.	35	35	35	35	35	35	35	35	35	35	35
MTA 605	MTA	N	LORENA	USC MED CTR-OLYMPIC/GRANDE VISTA	15	15	15	15	15	15	15	15	15	15	15
MTA 620	MTA	N	BOYLE/SOTO/CESAR CHAVEZ	BOYLE HEIGHTS SHUTTLE	-	-	10	10	10	10	10	10	10	10	10
OCTA 721	OCTA	E	6TH/BOYLE/I-5	5TH/BEAUDRY-ORANGETHORPE/MGNLIA	30	30	30	30	30	30	30	30	30	30	30
DASH A	LADOT	N	ALAMEDA/1ST	LITTLE TOKYO/CONVENTION CENTER	5	5	5	5	5	5	5	5	5	5	5
DASH B	LADOT	N	ALAMEDA/TEMPLE	CHINATOWN/FINANCIAL DISTRICT	5	5	5	5	5	5	5	5	5	5	5
DASH D	LADOT	N	TEMPLE/VIGNES/CENTER	SOUTH PARK	5	5	5	5	5	5	5	5	5	5	5
COMMERCE BLUE	COMMERCE	N	ATLANTIC	TELEGRAPH/FORD-ATLANTIC/WSHTON.	60	60	30	30	20	20	30	30	20	30	30
COMMERCE GREEN	COMMERCE	N	GARFIELD	GOODYEAR/ATLANTIC-GARFIELD/SLAUSON	60	60	30	30	20	20	30	30	20	30	30
COMMERCE ORANGE	COMMERCE	N	GARFIELD	GOODYEAR/ATLANTIC-GARFIELD/SLAUSON	60	60	30	30	20	20	30	30	20	30	30
COMMERCE RED	COMMERCE	N	ATLANTIC	TELEGRAPH/FORD-ATLANTIC/WSHTON	60	60	30	30	20	20	30	30	20	30	30
COMMERCE YELLOW	COMMERCE	N	GARFIELD	GOODYEAR/ATLANTIC-GARFIELD/SLAUSON	60	60	30	30	20	20	30	30	20	30	30
MONTEBELLO 10	MONTEBELLO	E	WHITTIER BLVD	ATLANTIC/RIGGIN-WHITTIER/PASSONS	8	8	8	8	10	10	8	8	10	8	8
MONTEBELLO 20	MONTEBELLO	N	MONTEBELLO	SAN GABRIEL/GARVEY-SLAUSON/TLGRAPH	30	30	30	15	15	15	15	15	15	15	15
MONTEBELLO 40	MONTEBELLO	E	4TH/BEVERLY	5TH/BEAUDRY-BEVERLY/NORWALK	12	12	10	20	12	12	20	20	12	20	20
MONTEBELLO 60	MONTEBELLO	N	PASSONS	DURFEE/WOODFORD-TLGRAPH/SERAPIS	60	60	60	30	30	30	30	30	30	30	30

Table 2-2
EASTSIDE TRANSIT CORRIDOR STUDY
ROUTES WITHIN STUDY AREA
PEAK HEADWAYS

ROUTE	OPERATOR	Dir	STREET	DESCRIPTION	EXISTING PEAK HEADWAYS	No Build	TSM	Alt 1 BRT	Alt 2 BRT	Alt 3 LRT	Alt 4 BRT	Alt 5 LRT	Alt 6 LRT	Alt 7 HRT/LRT	Alt 8 HRT/BRT
MONTEBELLO 70	MONTEBELLO	N	WILCOX/MONTEBELLO	MONTEBELLO STA -GREENWOOD/TLGRAPH	30	30	20	15	15	15	15	15	15	15	15
MONTEBELLO 341	MONTEBELLO	E	4TH/BEVERLY	5TH/BEAUDRY-MONTEBELLO/LINCOLN	60	60	60	60	60	60	60	60	60	60	60
MONTEBELLO 342	MONTEBELLO	E	4TH/BEVERLY	5TH/BEAUDRY-BEVERLY/NORWALK	30	30	30	30	30	30	30	30	30	30	30
MONTEBELLO 343	MONTEBELLO	E	4TH/BEVERLY	5TH/BEAUDRY-GREENWOOD/TELEGRAPH	30	30	30	30	30	30	30	30	30	30	30
NORWALK 1	NORWALK	N	NORWALK	RIO HONDO-BELLFLOWER/ALONDRA	30	30	30	15	15	15	15	15	15	15	15
WHITTIER 1	WHITTIER	N	BEVERLY	BEVERLY/NORWALK-WHITTIER/1ST	60	60	30	15	15	15	15	15	15	15	15
WHITTIER 2	WHITTIER	N	BEVERLY	BEVERLY/NORWALK-WHITTIER/1ST	60	60	30	15	15	15	15	15	15	15	15
RAIL															
RED LINE	MTA	E	DOWNTOWN SEGMENT	WILSHIRE/WESTERN-UNION STATION	10	7.5	4	4	4	4	4	4	4	0	0
RED LINE	MTA	N	HOLLYWOOD SEGMENT	HOLLYWOOD/VINE-UNION STATION	10	7.5	4	4	4	4	4	4	4	0	0
BLUE LINE	MTA	N	LONG BEACH	7TH/FLOWER-1ST/PACIFIC	12	10	10	10	10	10	10	10	10	10	10
BLUE LINE	MTA	N	LONG BEACH	7TH/FLOWER-WILLOW	12	10	10	10	10	10	10	10	10	10	10
BLUE LINE	MTA	N	PASADENA	UNION STATION - SIERRA MADRE VILLA	-	5	5	5	5	5	5	5	5	5	5
GREEN LINE	MTA	E	I-105	EL SEGUNDO - NORWALK	8	5	5	5	5	5	5	5	5	5	5
RIVERSIDE LINE	METROLINK	E	RIVERSIDE	RIVERSIDE - UNION STATION	60	60	60	60	60	60	60	60	60	60	60
RIVERSIDE LINE	METROLINK	E	RIVERSIDE	UNION STATION - RIVERSIDE	60	60	60	60	60	60	60	60	60	60	60
ORANGE CO LINE	METROLINK	E	ORANGE COUNTY	SAN CLEMENTE - UNION STATION	60	60	60	60	60	60	60	60	60	60	60
ORANGE CO. LINE	METROLINK	E	ORANGE COUNTY	IRVINE - UNION STATION	45	45	45	45	45	45	45	45	45	45	45
ORANGE CO. LINE	METROLINK	E	ORANGE COUNTY	UNION STATION - SAN CLEMENTE	60	60	60	60	60	60	60	60	60	60	60
FULLERTON-RIVERSIDE	METROLINK	E	FULLERTON-RIVERSIDE	UNION STATION - RIVERSIDE	60	60	60	60	60	60	60	60	60	60	60
BRT 1 TRUNK ROUTE		E	CHAVEZ, 4TH, 3RD, BEVERLY	1ST/ALAMEDA - WHITTIER/NORWALK				4							
BRT 2 TRUNK ROUTE		E	1ST,4TH,3RD, WHITTIER	UNION STATION - WHITTIER/NORWALK				0	4						
BRT 4 TRUNK ROUTE		E	1ST,4TH,3RD, BEVERLY	UNION STATION - WHITTIER/NORWALK				0			4				
BRT 8 TRUNK ROUTE		E	SOTO,4TH,3RD,BEVERLY	CHAVEZ/SOTO - WHITTIER/NORWALK				0							4
CONNECTOR 1		N	NORWALK	NORWALK/FLORENCE - UNION STATION				15	15		15				15
CONNECTOR 2		N	WHITTIER	WHITTIER/S. GERTRUDES - UNION STATION				15	15		15				15
CONNECTOR 3		N	ROSEMEAD	ROSEMEAD/TELEGRAPH - UNION STATION				15	15		15				15
CONNECTOR 4		N	GARFIELD	GARFIELD/SLAUSON - UNION STATION				15	15		15				15
CONNECTOR 5		N	GARFIELD	GARFIELD/GARVEY - UNION STATION				15	15		15				15
CONNECTOR 6		N	ATLANTIC	ATLANTIC/GARVEY - UNION STATION				15	15		15				15
CONNECTOR 7		N	EASTERN	EASTERN/GAGE - UNION STATION				15	15		15				15
CONNECTOR 8		N	ATLANTIC	ATLANTIC/GAGE - UNION STATION				15	15		15				15
CONNECTOR 9		N	SOTO	SOTO/HUNTINGTON - UNION STATION				15	15		15				
CONNECTOR 10		N	SOTO	SOTO/GAGE - UNION STATION				15	15		15				
CONNECTOR 11		N	GERHART	BEVERLY/GERHART TO ELACC				6			6	6		6	6
RAPID BUS 1		E	WHITTIER	GARFIELD TO OCEAN (SANTA MONICA)			3.5	7	7	7	7	7	7	7	7
LRT 3		E	WHITTIER, 3RD, 1ST	UNION STATION - WHITTIER/NORWALK						5					
LRT5		E	BEVERLY,3RD, 1ST	UNION STATION - WHITTIER/NORWALK								5			
LRT 6		E	WHITTIER, 3RD, 1ST	UNION STATION - WHITTIER/NORWALK									5		
LRT 7		E	1ST, 3RD, BEVERLY	1ST/LORENA - WHITTIER/NORWALK										5	
RED LINE (ALT 7)		E	DOWNTOWN SEGMENT	WILSHIRE/WESTERN - 1ST/LORENA										4	
RED LINE (ALT 7)		N	HOLLYWOOD SEGMENT	NORTH HOLLYWOOD - 1ST/LORENA										4	
RED LINE (ALT 8)		E	DOWNTOWN SEGMENT	WILSHIRE/WESTERN - CHAVEZ/SOTO											4
RED LINE (ALT 8)		N	HOLLYWOOD SEGMENT	NORTH HOLLYWOOD - CHAVEZ/SOTO											4

Table 2-2
EASTSIDE TRANSIT CORRIDOR STUDY
ROUTES WITHIN STUDY AREA
OFF-PEAK HEADWAYS

ROUTE	OPERATOR	Dir	STREET	DESCRIPTION	EXISTING OFF-PEAK HEADWAYS	No Build	TSM	Alt 1 BRT	Alt 2 BRT	Alt 3 LRT	Alt 4 BRT	Alt 5 LRT	Alt 6 LRT	Alt 7 HRT/LRT	Alt 8 HRT/BRT
MTA 18	MTA	E	WHITTIER BLVD	WHITTIER/GARFIELD-6TH/WILTON	8	8	8	8	15	15	8	8	15	8	8
MTA 18	MTA	E	WHITTIER BLVD.	WHITTIER/GARFIELD-6TH/VIRGIL	-	-	20	20			20	20		20	20
MTA 318	MTA	E	WHITTIER BLVD.	LA BREA MALL-6TH/VIRGIL	60	43	43	43	43	43	43	43	43	43	43
MTA 30	MTA	E	PICO/1ST/FLORAL	PICO/RIMPAU-DOZIER/ROWAN	15	15	12	12	12	12	12	12	12	12	12
MTA 30	MTA	E	PICO/1ST/FLORAL	PICO/RIMPAU-ATLANTIC/RIGGIN	30	30	20	20	20	20	20	20	20	20	20
MTA 31	MTA	E	PICO/1ST	PICO/RIMPAU-ATLANTIC/RIGGIN	20	20	15	15	15	15	15	15	15	15	15
MTA 40	MTA	E	BROADWAY/HAWTHORNE	UNION STATION - HAWTHORNE/ARTESIA	20	20	20	20	20	20	20	20	20	20	20
MTA 42	MTA	E	BROADWAY/MLK	UNION STATION - LAX	24	24	24	24	24	24	24	24	24	24	24
MTA 65	MTA	E	OLYMPIC/INDIANA/GAGE	WASHINGTON/FIGUEROA-CSULA	45	45	30	20	20	20	20	20	20	20	20
MTA 66	MTA	E	8TH/OLYMPIC	6TH/WILTON-WHITTIER/GARFIELD	12	12	12	12	12	12	12	12	12	12	12
MTA 66	MTA	E	8TH/OLYMPIC	8TH/WESTERN-ATLANTIC/OLYMPIC	-	12	12	12	12	12	12	12	12	12	12
MTA 68	MTA	E	WASHINGTON/CESAR CHAVEZ	WSHGTON/FAIRFAX-ATLANTIC/RIGGIN	21	21	22	22	15	15	15	15	15	15	15
MTA 68	MTA	E	WASHINGTON/CESAR CHAVEZ	WSHGTON/FAIRFAX-GARFIELD/RIGGIN	-	-									
MTA 68	MTA	E	WASHINGTON/CESAR CHAVEZ	WSHGTON/FAIRFAX-MONTEBELLO MALL	21	21	22	22	15	15	15	15	15	15	15
MTA 70	MTA	E	CESAR CHAVEZ/GARVEY	11TH/FIGUEROA-EL MONTE TRANSIT CNTR	14	14	14	14	14	14	14	14	14	14	14
MTA 250	MTA	N	BOYLE	USC MED CTR-OLYMPIC/BOYLE	40	40	30	30	30	30	30	30	30	30	30
MTA 251	MTA	N	SOTO	AV26/FIGUEROA-103RD/GRAHAM	24	24	20	20	20	20	20	20	20	20	15
MTA 251	MTA	N	SOTO	AV26/FIGUEROA-SOUTH GATE PLAZA	-	-									
MTA 252	MTA	N	SOTO	HUNTINGTON/MONTEREY-LB GREEN LINE	24	24	20	20	20	20	20	20	20	20	15
MTA 253	MTA	N	EVERGREEN/EUCLID	USC MED CTR-8TH/LORENA	40	40	30	30	30	30	30	30	30	30	30
MTA 254	MTA	N	LORENA	USC MED CTR-WILMINGTON/120TH	60	60	40	20	20	20	20	20	20	20	20
MTA 255	MTA	N	ROWAN	AVE43/FIGUEROA-HERBERT/WHITTIER	50	50	40	20	20	20	20	20	20	20	20
MTA 256	MTA	N	FORD/EASTERN	MENDOCINO/LAKE-TRIGGS/EASTERN	50	50	40	40	40	40	40	40	40	40	40
MTA 258	MTA	N	ARIZONA/EASTERN	GARFIELD/MAIN-GARFIELD/FIRESTONE	60	60	40	20	20	20	20	20	20	20	20
MTA 259	MTA	N	ARIZONA/EASTERN	HUNT/MONT-GARFIELD/FIRESTONE	60	60	40	20	20	20	20	20	20	20	20
MTA 260	MTA	N	ATLANTIC	ALTADENIA/LAKE-ARTESIA BLUE LINE STA	20	12 9	10	12	12	10	12	10	10	10	12
MTA 262	MTA	N	GARFIELD	HUNT/LOS ROBLES-GARFIELD/FIRESTONE	45	45	30	20	20	15	20	15	15	15	20
MTA 265	MTA	N	PARAMOUNT	BEVERLY/DURFEE-LAKEWOOD MALL	60	60	30	30	30	30	30	30	30	30	30
MTA 268	MTA	N	ROSEMEAD	MICHILLINDA/FOOTHILL-LAKEWOOD MALL	40	40	30	20	20	20	20	20	20	20	20
MTA 270	MTA	N	WORKMAN MILL	FOOTHILL/PRIMROSE-I-605/I-105 METRO STA	60	60	60	60	60	60	60	60	60	60	60
MTA 434	MTA	E	SANTA MONICA FWY	UNION STATION - TOPANGA CYN/PCH	60	60	60	60	60	60	60	60	60	60	60
MTA 436	MTA	E	VENICE BLVD	UNION STATION - MAIN/PICO	-	-									
MTA 442	MTA	E	I-110/MANCHESTER	UNION STATION - HAWTHORNE/ARTESIA	-	-									
MTA 445	MTA	N	I-110	UNION STATION - 21ST/PACIFIC	-	-									
MTA 460	MTA	E	BOYLE/SOTO/I-5	L.A. CONV. CTR -DISNEYLAND	30	30	30	30	30	30	30	30	30	30	30
MTA 466	MTA	E	SANTA ANA FWY.	UNION STATION - LAMIRADA/SANTA GERT.	-	-									
MTA 605	MTA	N	LORENA	USC MED CTR-OLYMPIC/GRANDE VISTA	30	30	15	15	15	15	15	15	15	15	15
MTA 620	MTA	N	BOYLE/SOTO/CESAR CHAVEZ	BOYLE HEIGHTS SHUTTLE	13	14	12	12	12	12	12	12	12	12	12
OCTA 721	OCTA	E	6TH/BOYLE/I-5	5TH/BEAUDRY-ORANGETHORPE/MGNLIA	-	-									
DASH A	LADOT	N	ALAMEDA/1ST	LITTLE TOKYO/CONVENTION CENTER	5	5	5	5	5	5	5	5	5	5	5
DASH B	LADOT	N	ALAMEDA/TEMPLE	CHINATOWN/FINANCIAL DISTRICT	5	5	5	5	5	5	5	5	5	5	5
DASH D	LADOT	N	TEMPLE/VIGNES/CENTER	SOUTH PARK	5	5	5	5	5	5	5	5	5	5	5
COMMERCE BLUE	COMMERCE	N	ATLANTIC	TELEGRAPH/FORD-ATLANTIC/WSHTON.	60	60	30	30	20	20	30	30	20	30	30
COMMERCE GREEN	COMMERCE	N	GARFIELD	GOODYEAR/ATLANTIC-GARFIELD/SLAUSON	60	60	30	30	20	20	30	30	20	30	30
COMMERCE ORANGE	COMMERCE	N	GARFIELD	GOODYEAR/ATLANTIC-GARFIELD/SLAUSON	60	60	30	30	20	20	30	30	20	30	30
COMMERCE RED	COMMERCE	N	ATLANTIC	TELEGRAPH/FORD-ATLANTIC/WSHTON	60	60	30	30	20	20	30	30	20	30	30
COMMERCE YELLOW	COMMERCE	N	GARFIELD	GOODYEAR/ATLANTIC-GARFIELD/SLAUSON	60	60	30	30	20	20	30	30	20	30	30
MONTEBELLO 10	MONTEBELLO	E	WHITTIER BLVD	ATLANTIC/RIGGIN-WHITTIER/PASSONS	12	12	12	12	15	15	12	12	15	12	12
MONTEBELLO 20	MONTEBELLO	N	MONTEBELLO	SAN GABRIEL/GARVEY-SLAUSON/TLGRAPH	30	30	30	20	20	20	20	20	20	20	20
MONTEBELLO 40	MONTEBELLO	E	4TH/BEVERLY	5TH/BEAUDRY-BEVERLY/NORWALK	20	20	20	30	20	20	30	30	20	30	30
MONTEBELLO 60	MONTEBELLO	N	PASSONS	DURFEE/WOODFORD-TLGRAPH/SERAPIS	60	60	60	45	45	45	45	45	45	45	45

Table 2-2
EASTSIDE TRANSIT CORRIDOR STUDY
ROUTES WITHIN STUDY AREA
OFF-PEAK HEADWAYS

ROUTE	OPERATOR	Dir	STREET	DESCRIPTION	EXISTING OFF-PEAK HEADWAYS	No Build	TSM	Alt 1 BRT	Alt 2 BRT	Alt 3 LRT	Alt 4 BRT	Alt 5 LRT	Alt 6 LRT	Alt 7 HRT/LRT	Alt 8 HRT/BRT
MONTEBELLO 70	MONTEBELLO	N	WILCOX/MONTEBELLO	MONTEBELLO STA -GREENWOOD/TLGRAPH	30	30	20	20	20	20	20	20	20	20	20
MONTEBELLO 341	MONTEBELLO	E	4TH/BEVERLY	5TH/BEAUDRY-MONTEBELLO/LINCOLN	-	-									
MONTEBELLO 342	MONTEBELLO	E	4TH/BEVERLY	5TH/BEAUDRY-BEVERLY/NORWALK	-	-									
MONTEBELLO 343	MONTEBELLO	E	4TH/BEVERLY	5TH/BEAUDRY-GREENWOOD/TELEGRAPH	-	-									
NORWALK 1	NORWALK	N	NORWALK	RIO HONDO-BELLFLOWER/ALONDRA	30	30	30	30	30	30	30	30	30	30	30
WHITTIER 1	WHITTIER	N	BEVERLY	BEVERLY/NORWALK-WHITTIER/1ST	60	60	30	30	30	30	30	30	30	30	30
WHITTIER 2	WHITTIER	N	BEVERLY	BEVERLY/NORWALK-WHITTIER/1ST	60	60	30	30	30	30	30	30	30	30	30
RAIL															
RED LINE	MTA	E	DOWNTOWN SEGMENT	WILSHIRE/WESTERN-UNION STATION	12	10	8	8	8	8	8	8	8		
RED LINE	MTA	N	HOLLYWOOD SEGMENT	HOLLYWOOD/VINE-UNION STATION	12	10	8	8	8	8	8	8	8		
BLUE LINE	MTA	N	LONG BEACH	7TH/FLOWER-1ST/PACIFIC	12	12	12	12	12	12	12	12	12	12	12
BLUE LINE	MTA	N	LONG BEACH	7TH/FLOWER-WILLOW	-	-									
BLUE LINE	MTA	N	PASADENA	UNION STATION - SIERRA MADRE VILLA	-	12	12	12	12	12	12	12	12	12	12
GREEN LINE	MTA	E	I-105	EL SEGUNDO - NORWALK	13	12	12	12	12	12	12	12	12	12	12
RIVERSIDE LINE	METROLINK	E	RIVERSIDE	RIVERSIDE - UNION STATION	-	-									
RIVERSIDE LINE	METROLINK	E	RIVERSIDE	UNION STATION - RIVERSIDE	60	60	60	60	60	60	60	60	60	60	60
ORANGE CO LINE	METROLINK	E	ORANGE COUNTY	SAN CLEMENTE - UNION STATION	-	-									
ORANGE CO LINE	METROLINK	E	ORANGE COUNTY	IRVINE - UNION STATION	-	-									
ORANGE CO. LINE	METROLINK	E	ORANGE COUNTY	UNION STATION - SAN CLEMENTE	-	-									
FULLERTON-RIVERSIDE	METROLINK	E	FULLERTON-RIVERSIDE	UNION STATION - RIVERSIDE	-	-									
BRT 1 TRUNK ROUTE		E	CHAVEZ, 4TH, 3RD, BEVERLY	1ST/ALAMEDA - WHITTIER/NORWALK	-	-		10							
BRT 2 TRUNK ROUTE		E	1ST,4TH,3RD, WHITTIER	UNION STATION - WHITTIER/NORWALK	-	-			10						
BRT 4 TRUNK ROUTE		E	1ST,4TH,3RD, BEVERLY	UNION STATION - WHITTIER/NORWALK	-	-					10				
BRT 8 TRUNK ROUTE		E	SOTO,4TH,3RD,BEVERLY	CHAVEZ/SOTO - WHITTIER/NORWALK	-	-									10
CONNECTOR 1		N	NORWALK	NORWALK/FLORENCE - UNION STATION	-	-		30	30		30				30
CONNECTOR 2		N	WHITTIER	WHITTIER/S. GERTRUDES - UNION STATION	-	-		30	30		30				30
CONNECTOR 3		N	ROSEMEAD	ROSEMEAD/TELEGRAPH - UNION STATION	-	-		30	30		30				30
CONNECTOR 4		N	GARFIELD	GARFIELD/SLAUSON - UNION STATION	-	-		30	30		30				30
CONNECTOR 5		N	GARFIELD	GARFIELD/GARVEY - UNION STATION	-	-		30	30		30				30
CONNECTOR 6		N	ATLANTIC	ATLANTIC/GARVEY - UNION STATION	-	-		30	30		30				30
CONNECTOR 7		N	EASTERN	EASTERN/GAGE - UNION STATION	-	-		30	30		30				30
CONNECTOR 8		N	ATLANTIC	ATLANTIC/GAGE - UNION STATION	-	-		30	30		30				30
CONNECTOR 9		N	SOTO	SOTO/HUNTINGTON - UNION STATION	-	-		30	30		30				
CONNECTOR 10		N	SOTO	SOTO/GAGE - UNION STATION	-	-		30	30		30				
CONNECTOR 11		N	GERHART	BEVERLY/GERHART TO ELACC	-	-		12			12	12		12	12
					-	-									
RAPID BUS 1		E	WHITTIER	GARFIELD TO OCEAN (SANTA MONICA)	-	-	5	12	12	12	12	12	12	12	12
					-	-									
LRT 3		E	WHITTIER, 3RD, 1ST	UNION STATION - WHITTIER/NORWALK	-	-				12					
LRT5		E	BEVERLY,3RD, 1ST	UNION STATION - WHITTIER/NORWALK	-	-						12			
LRT 6		E	WHITTIER, 3RD, 1ST	UNION STATION - WHITTIER/NORWALK	-	-							12		
LRT 7		E	1ST, 3RD, BEVERLY	1ST/LORENA - WHITTIER/NORWALK	-	-								12	
					-	-									
RED LINE (ALT 7)		E	DOWNTOWN SEGMENT	WILSHIRE/WESTERN - 1ST/LORENA	-	-								8	
RED LINE (ALT 7)		N	HOLLYWOOD SEGMENT	NORTH HOLLYWOOD - 1ST/LORENA	-	-								8	
RED LINE (ALT 8)		E	DOWNTOWN SEGMENT	WILSHIRE/WESTERN - CHAVEZ/SOTO	-	-									8
RED LINE (ALT 8)		N	HOLLYWOOD SEGMENT	NORTH HOLLYWOOD - CHAVEZ/SOTO	-	-									8
					-	-									
					-	-									

same for the eight build alternatives in order to properly compare the proposed fixed guideway transit investments in the Eastside Corridor.

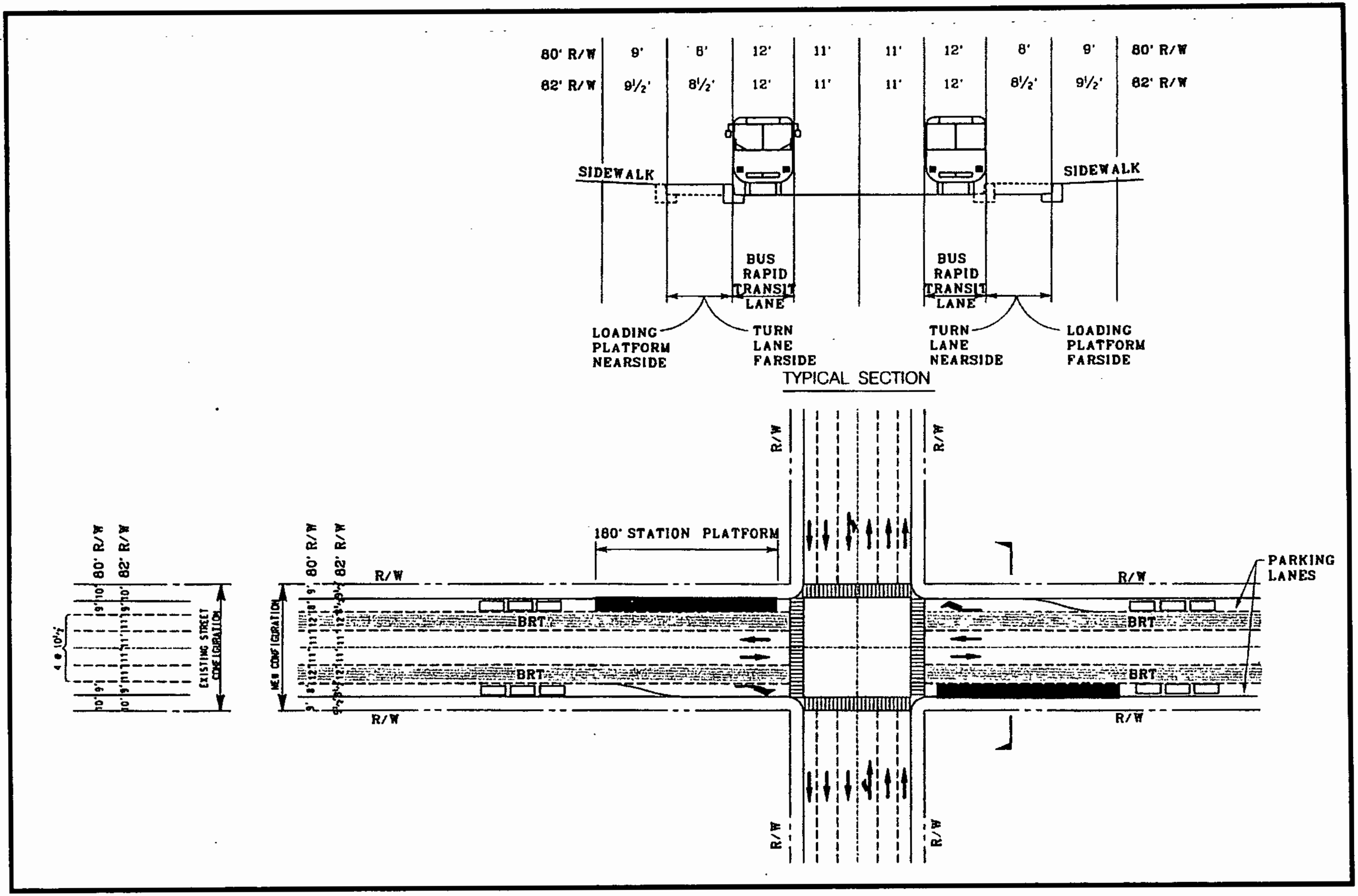
2.3.3 Alternative 1 – Bus Rapid Transit on Cesar Chavez, 4th, 3rd, Beverly, and Whittier

This alternative introduces the Bus Rapid Transit (BRT) mode to the Eastside Corridor. The following discussion is applicable to all the BRT oriented alternatives and not just to Alternative 1. The BRT fixed guideway concept would dedicate a travel lane on the chosen alignment that is adjacent to the parking lane and would provide for generally far side BRT stations. All BRT concepts would operate on existing arterial streets and would require the removal of one general purpose travel lane in each direction. That travel lane would be reconstructed and converted to a dedicated Bus Rapid Transit fixed guideway. Figure 2-12 (80' to 82' right of way) and Figure 2-13 (100' right of way) illustrate the concept used on the typical streets of the Eastside Corridor.

The operation of the BRT will be a new and unique operating and traffic arrangement scheme for the Eastside Corridor alignments. As shown on Figures 2-12 and 2-13 the BRT buses (dedicated service route along the bus lane as well as special BRT routes serving areas adjacent to the dedicated bus lane) as well as other local buses would operate in the dedicated Bus Rapid Transit Lane. The BRT and local buses would stop at the special BRT Stations shown (usually a far side bus stop). The BRT Station stop (approximately 180 feet long) would entail extending the sidewalk the width of the parking lane so that the buses would not have to leave the dedicated lane when loading and unloading passengers. The local buses will make other stops between the BRT Stations and would move to the curb lane just as they do today. It is also assumed that the buses operating on these dedicated lanes will have traffic signal preemption to allow them to operate at the posted speed limits between stops. It is expected that from 30 to 75 buses would operate in one direction in the peak hours depending on the location within the Eastside Corridor (less buses per hour the further east you go). The BRT buses would be completely a new style (40' to 60') attractive bus as was shown in Figure 2-9. These new style buses are much more attractive to the neighborhoods, easier to load (low floor accessibility), and would met MTA's clean fuel policy.

Automobiles and delivery vehicles will operate in a much different fashion than they do now. If you are parking (the spaces will be made larger to allow easier entry and exit) on the street you will have to enter the dedicated bus lane and park in a safe manner. It is expected that a number of on-street parking spaces will be lost with these alternatives and replacement parking would have to be provided within the immediate area. The frequency of parking entries and exits may eventually affect the operating speed of the dedicated bus lane. Over time more off-street parking may have to be developed to maintain a quality operation on the dedicated bus lane.

Also private vehicles that wish to make right turns must move into and cross the dedicated bus lane in order to make a right turn. Also when turning onto the dedicated bus lane street the driver will need to be sure to enter into the proper travel lane which will not be the standard right lane. It is also expected that the streets with the dedicated

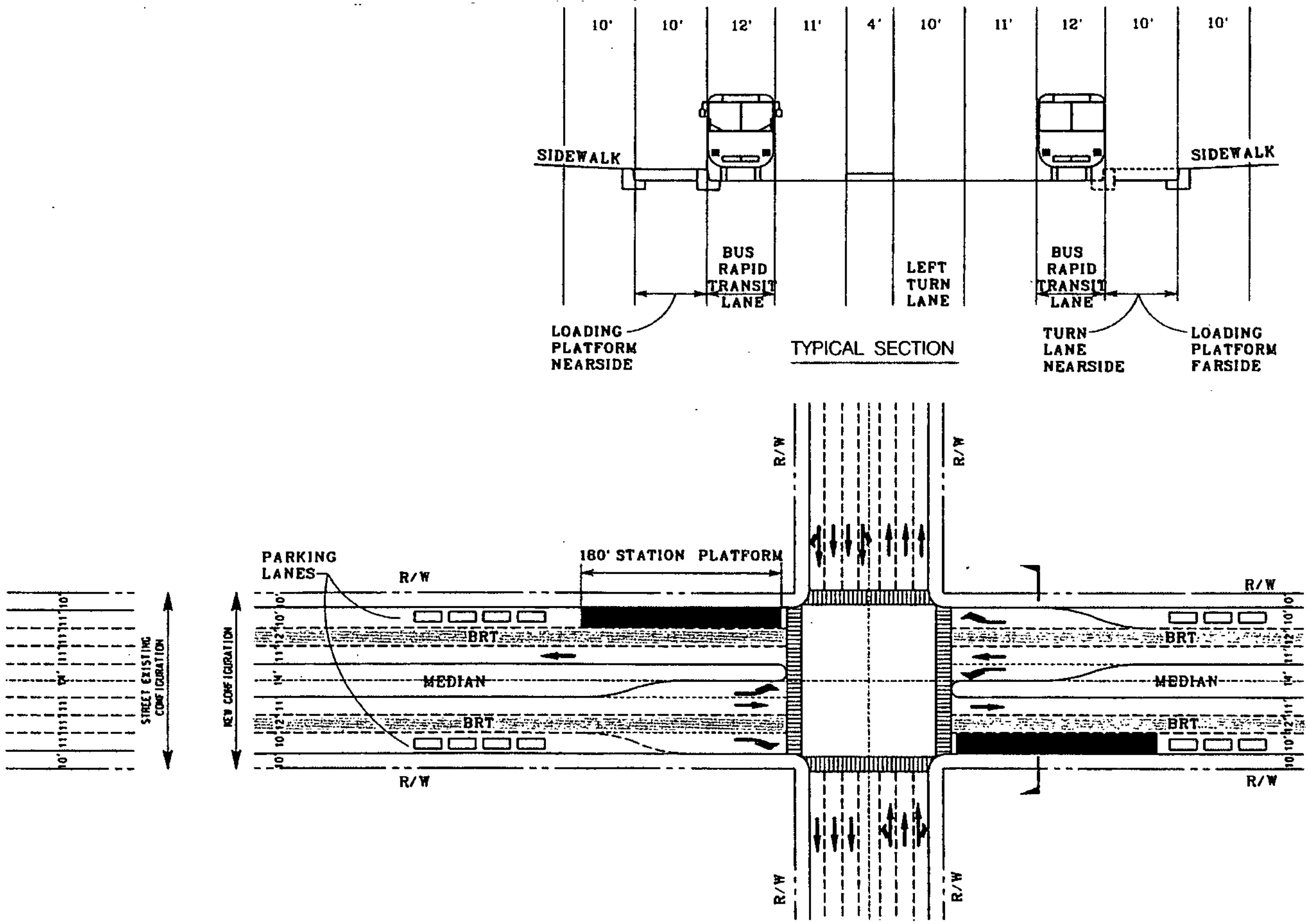


Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Bus Rapid Transit
Typical Split Platform
80' and 82' Street R/W

Figure 2-12



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Bus Rapid Transit
Typical Split Platform
100' Street R/W

Figure 2-13

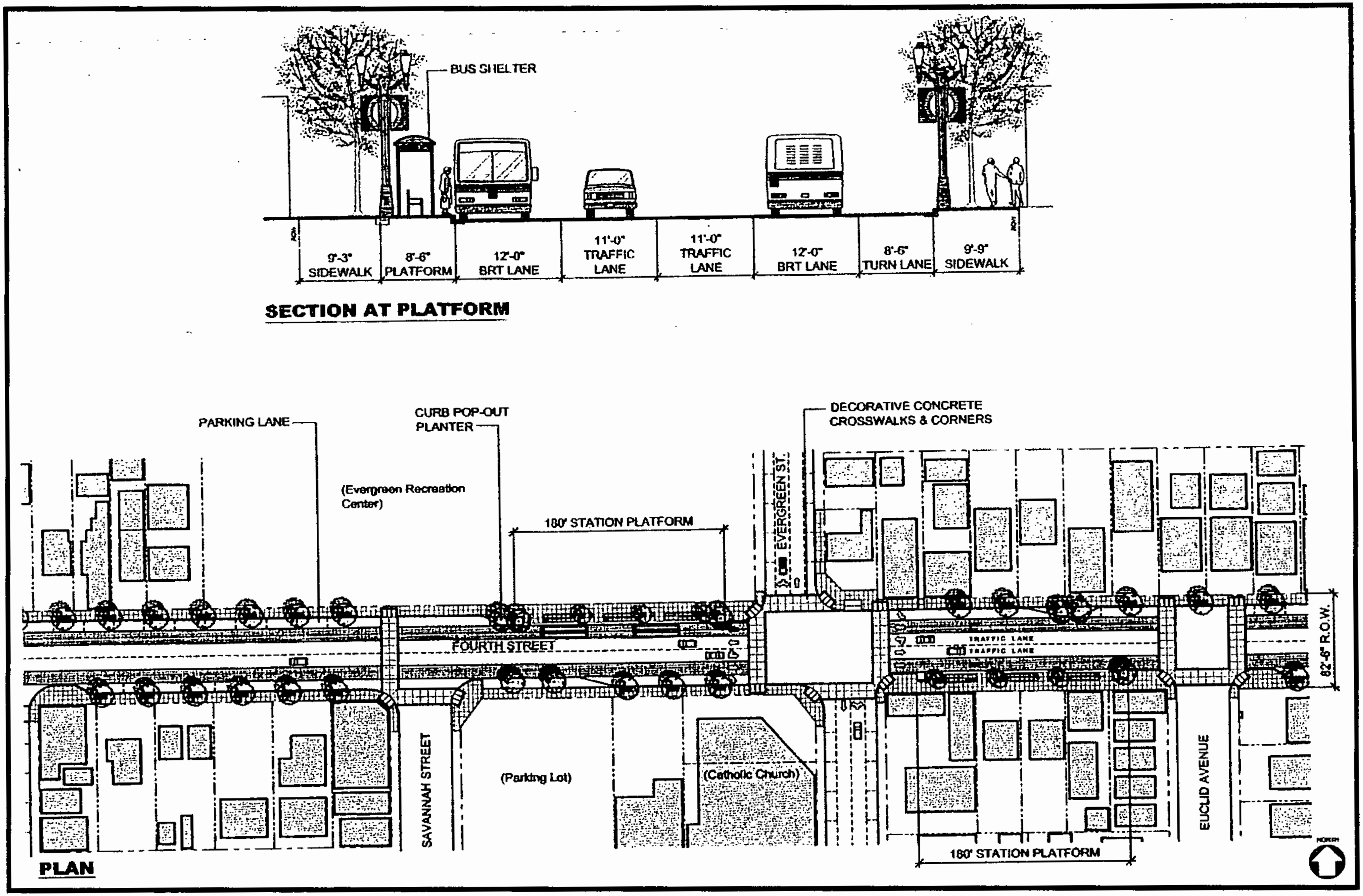
bus lane will become more "transit" oriented and through traffic will be reduced and directed to other streets within the corridor. On the narrower streets left-turns may have to be restricted at certain intersections during certain portions of the day (probably peak periods) because of the lack of space for a dedicated left turn pocket. The reduction of one traffic lane in each direction will impact the level of service and possible ease of access to commercial businesses and other public activities. It is expected over time that traffic would re-orient itself because most of the streets in the western portion of the Eastside Corridor have some available capacity and might accept more traffic and still be acceptable.

Figures 2-14 and 2-15 taken from the Urban Design Concept Report show how the BRT concept would fit into the urban fabric of the neighborhoods and streets it would serve. Through the use of attractive paving, landscaping, signing, and other decorative features it could be made to "fit".

Alternative 1 is the first of three exclusive BRT alternatives identified for study. The alignment of Alternative 1 is shown in Figure 2-1 and in the referenced Conceptual Engineering Report. Alternative 1 is approximately 13.2 miles long with 18 stations from 1st/Alameda through Union Station and to Whittier and Norwalk Boulevards via Cesar Chavez, Soto, 4th, 3rd, Beverly, Paramount, and Whittier. Table 2-3 further describes the station locations, whether the station has an assumed park-and-ride lot (five stations plus existing Union Station), and the local bus routes that interface with each station.

The BRT operating plan is designed to maximize the use of the dedicated bus lane and to optimize the operating characteristics and flexibility of a bus system operation. The operating plan was also designed to provide an equivalent capacity to the LRT at-grade alternatives that are being studied. The BRT operating plan for this Alternative and the other BRT alternatives is comprised of three components. These are (1) a major BRT Trunk line operating between Whittier/Norwalk Boulevards and 1st/Alameda with 4 minute peak service and 10 minute off-peak service; (2) Ten BRT (Routes 1 to 10) connecting routes as shown on Figure 2-16 operating with 15 minute peak service and 30 minute off-peak service – these routes provide a one-seat ride for example from Washington/Rosemead (BRT Connector Route 3) to all points west of Whittier/Rosemead; and (3) local bus connecting routes to all stations along the BRT line. The BRT running time using the dedicated bus lane with stops at each station is estimated to be 34 minutes from Whittier/Norwalk to 1st/Alameda. The Wilshire/Whittier Rapid Bus line is included in this and all the Build alternatives, but the peak period service frequency was reduced to 7 minutes and the off-peak frequency to 12 minutes. Table 2-2 shows the assumed service frequencies for each bus and rail route for this alternative.

Based on the assumed operating plans described above the number of buses per hour in the peak direction on the dedicated bus lane would vary from 24 (23 BRT, 1 local) at Passons and Whittier to approximately 70 (55 BRT, 15 local) at Chavez and Boyle as shown on Figure 2-16.

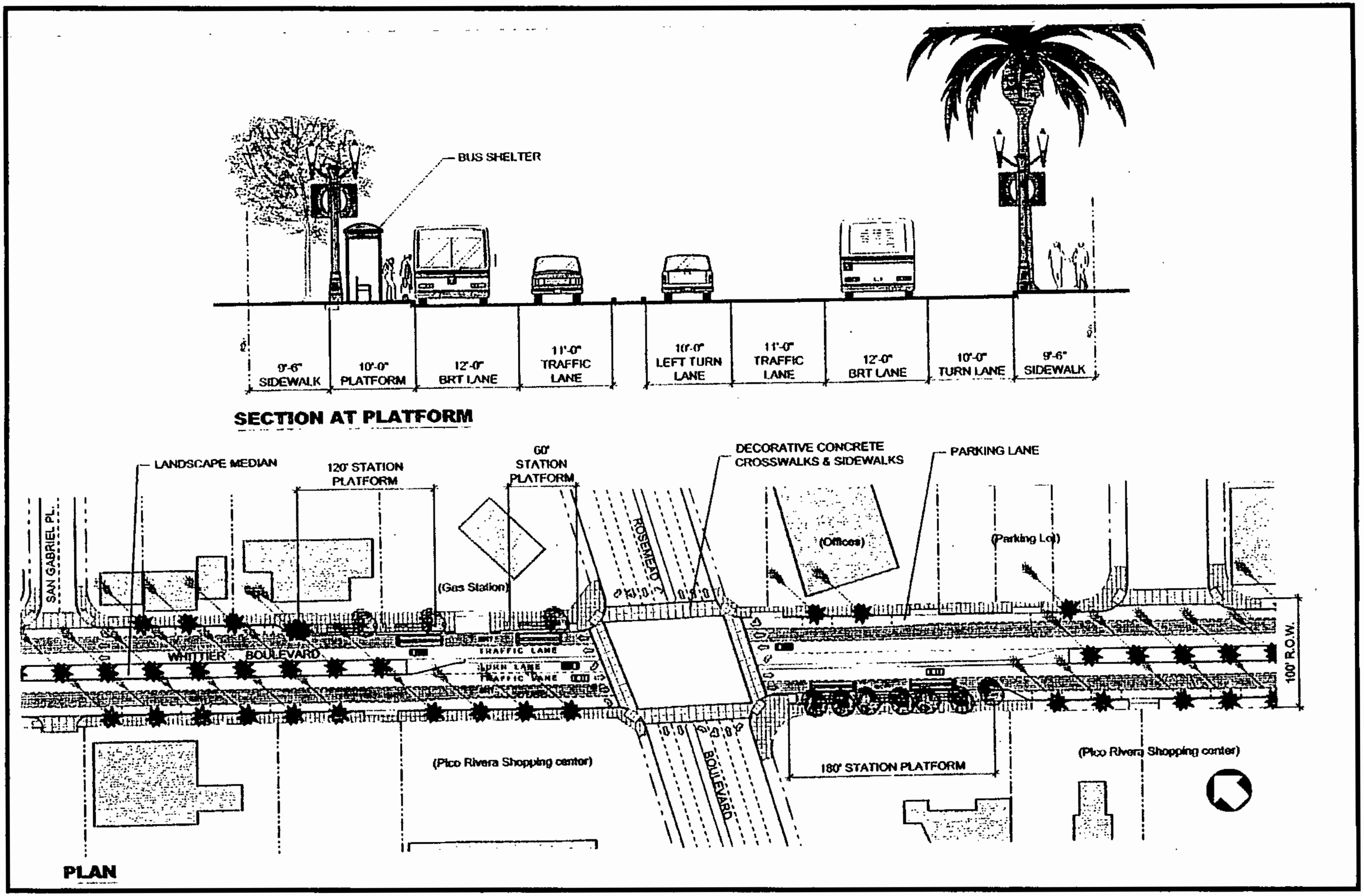


Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Urban Design Concepts
Bus Rapid Transit Alternative
Fourth/Evergreen

Figure 2-14



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Urban Design Concepts
Bus Rapid Transit Alternative
Whittier/Rosemead

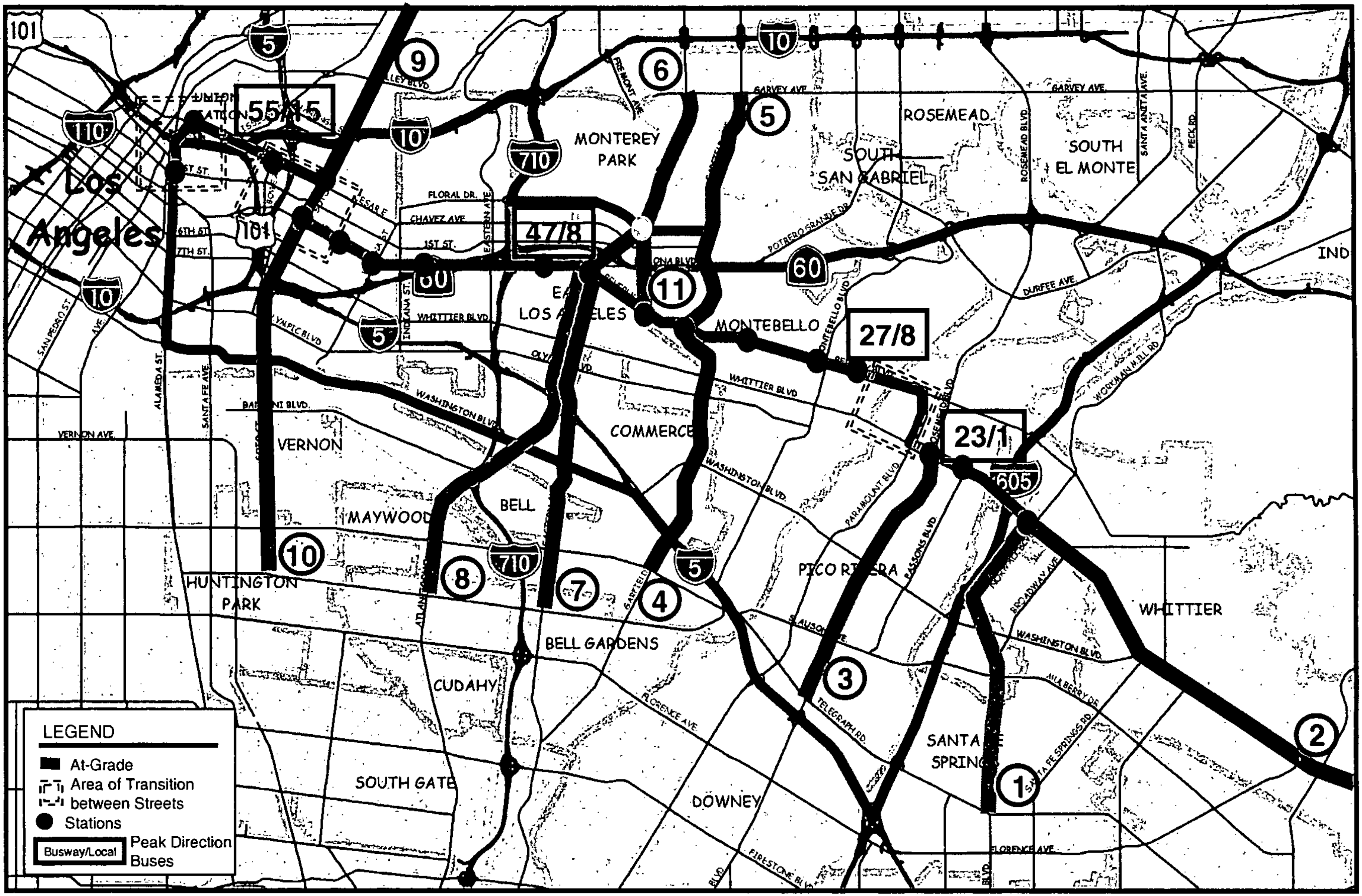
Figure 2-15

Table 2-3
Alternative 1
Station Locations and Characteristics

Station Location	Mode	Park/Ride	Bus Routes which Interface (operator and route)
Alameda / 1st	BRT	No	DASH A,D; Montebello 40; MTA 30,31,40,42,434,436,442,445,466
Union Station	BRT	Yes	Red Line,Pasadena Blue Line,Metrolink, Amtrak AVTA,Santa Clarita,OCTA,Foothill,LADOT, MTA Expresses MTA 33,40,42,55,60,68,70,71,78,79,333,378,379,DASH B,D
Chavez / Boyle	BRT	No	MTA 68, 250, 620
Chavez / Soto	BRT	No	MTA 68, 251, 252, 605
4th / Soto	BRT	No	Montebello 40; MTA 251, 252, 605
4th / Evergreen	BRT	No	Montebello 40; MTA 253
4th / Lorena	BRT	No	Montebello 40; MTA 254
3rd / Rowan	BRT	No	Montebello 40; MTA 65, 255
3rd / Mednik	BRT	Yes	Montebello 40; MTA 258, 259
Beverly / Atlantic	BRT	No	Montebello 10, 40, 341, 342, 343; MTA 260; Monterey Park?
Beverly / Gerhart	BRT	No	Montebello 40, 341, 342, 343; Monterey Park?
Beverly / Garfield	BRT	Yes	Montebello 40, 341, 342, 343; MTA 262
Beverly / Wilcox	BRT	No	Montebello 40, 70, 341, 342, 343
Beverly / Montebello	BRT	Yes	Montebello 20, 40, 70, 341, 342, 343
Beverly / 4th	BRT	No	Montebello 40, 70, 342
Whittier / Rosemead	BRT	Yes	Montebello 10, 60; MTA 265, 266, 318
Whittier / Passons	BRT	No	Montebello 10, 60; MTA 265, 318
Whittier / Norwalk	BRT	Yes	Norwalk 1; Whittier 1,2; MTA 318

Alternative 1 : Alameda*, Cesar Chavez, Soto*, 4th Street, 3rd Street, Beverly Blvd, Paramount*, Whittier Blvd

*North-south transition areas subject to further study



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Alternative 1

Bus Rapid Transit
Dedicated Busway

Figure 2-16

2.3.4 Alternative 2 – Bus Rapid Transit on Alameda, 1st, 4th, 3rd, Arizona, and Whittier

Alternative 2 is the second of three exclusive BRT alternatives identified for study. The alignment of Alternative 2 is shown in Figure 2-2 and in the referenced Conceptual Engineering Report. Alternative 2 is approximately 13.1 miles long with 19 stations from Union Station and to Whittier and Norwalk Boulevards via Alameda, 1st, Soto, 4th, 3rd, Mednik, Arizona, and Whittier. Table 2-4 further describes the station locations, whether the station has an assumed park-and-ride lot (six stations plus existing Union Station), and the local bus routes that interface with each station.

The BRT operating plan is designed to maximize the use of the dedicated bus lane and to optimize the operating characteristics and flexibility of a bus system operation. The operating plan was also designed to provide an equivalent capacity to the LRT at-grade alternatives that are being studied. The BRT operating plan for this Alternative and the other BRT alternatives is comprised of three components. These are (1) a major BRT Trunk line operating between Whittier/Norwalk Boulevards and Union Station with 4 minute peak service and 10 minute off-peak service; (2) Ten BRT (Routes 1 to 10) connecting routes as shown on Figure 2-17 operating with 15 minute peak service and 30 minute off-peak service – these routes provide a one-seat ride for example from Washington/Rosemead (BRT Connector Route 3) to all points west of Whittier/Rosemead; and (3) local bus connecting routes to all stations along the BRT line. The BRT running time using the dedicated bus lane with stops at each station is estimated to be 35 minutes from Whittier/Norwalk to Union Station. The Wilshire/Whittier Rapid Bus line is included in this and all the Build alternatives, but the peak period service frequency was reduced to 7 minutes and the off-peak frequency to 12 minutes. Table 2-2 shows the assumed service frequencies for each bus and rail route for this alternative.

Based on the assumed operating plans described above the number of buses per hour in the peak direction on the dedicated bus lane would vary from 24 (23 BRT, 1 local) at Passons and Whittier to approximately 77 (55 BRT, 22 local) at 1st and Chicago as shown on Figure 2-17.

2.3.5 Alternative 3 – Light Rail Transit on Alameda, 1st, 4th, 3rd, Arizona, and Whittier

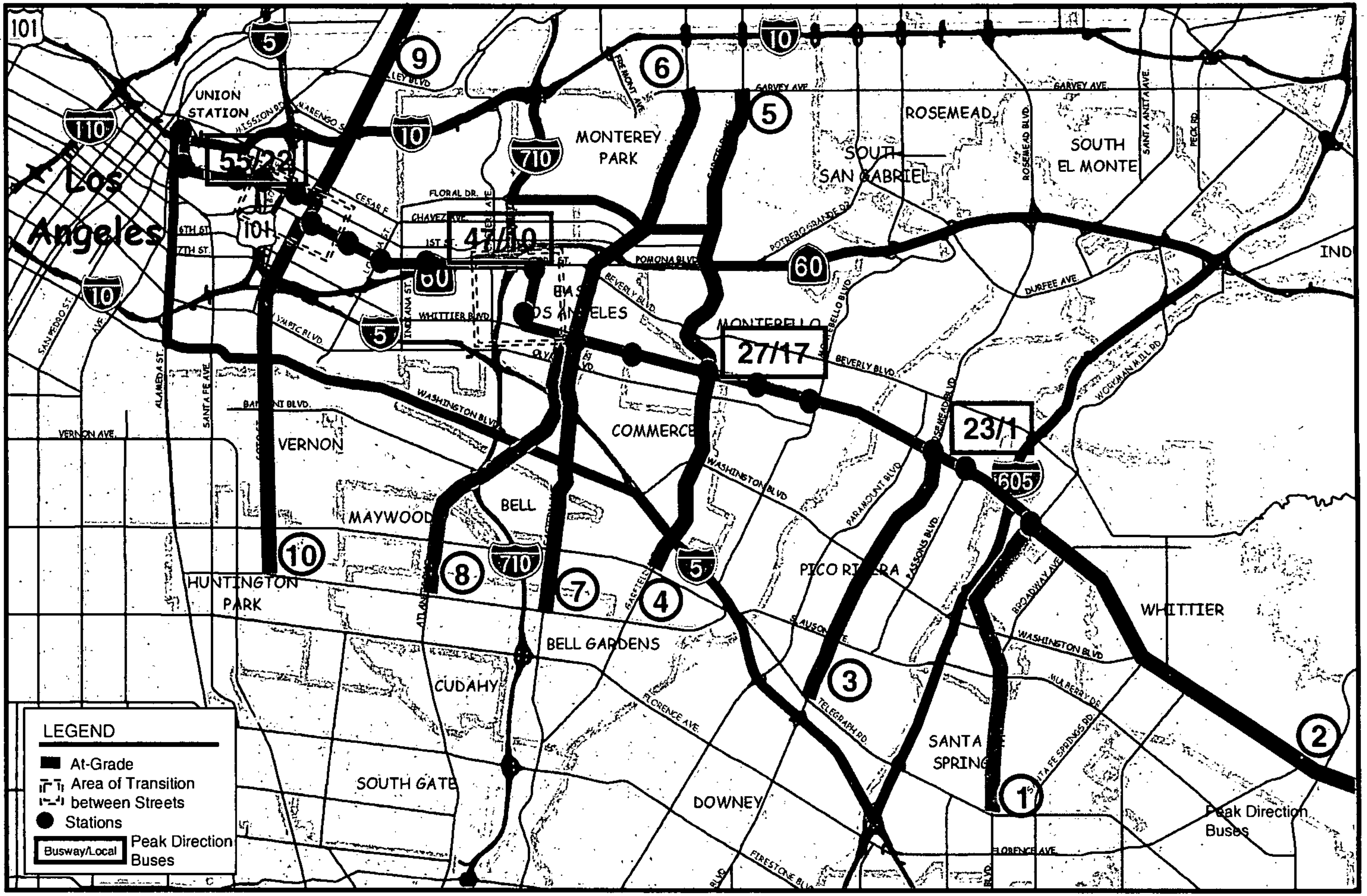
This alternative introduces the Light Rail Transit (LRT) mode to the Eastside Corridor. The following discussion is applicable to all the LRT oriented alternatives and not just Alternative 3. The LRT fixed guideway concept would operate in a dual track configuration in the center of the selected streets and provide for what are called low platform center station arrangements. LRT is electrically powered (similar to the Long Beach Blue Line and the Green Line) and receives its electric power from overhead power lines within the street right of way. All the LRT concepts would operate at-grade (street level) on existing arterial streets (or in a subway for a portion of Alternative 6) and would require the removal of one general purpose travel lane in each direction. This design configuration would allow for the retaining of a majority of the on street parking

Table 2-4
Alternative 2
Station Locations and Characteristics

Station Location	Mode	Park/Ride	Bus Routes which Interface (operator and route)
Union Station	BRT	Yes	Red Line,Pasadena Blue Line,Metrolink, Amtrak AVTA,Santa Clarita,OCTA,Foothill,LADOT, MTA Expresses MTA 33,40,42,55,60,68,70,71,78,79,333,378,379,DASH B,D
1st Street / Alameda	BRT	No	DASH A,D; Montebello 40; MTA 30,31,40,42,434,436,442,445,466
1st / Utah	BRT	No	MTA 30, 31
1st / Boyle	BRT	No	MTA 30, 31, 250, 620
1st / Chicago	BRT	No	MTA 30, 31, 250, 620
4th / Soto	BRT	No	Montebello 40; MTA 251, 252, 605
4th / Evergreen	BRT	No	Montebello 40; MTA 253
4th / Lorena	BRT	No	Montebello 40; MTA 254
3rd / Rowan	BRT	No	Montebello 40; MTA 65, 255
3rd / Mednik	BRT	Yes	Montebello 40; MTA 258, 259
Whittier / Arizona	BRT	No	MTA 18, 258, 259, 318
Whittier / Atlantic	BRT	Yes	Montebello 10; MTA 18, 260, 318; Commerce all lines
Whittier / Gerhart	BRT	No	Montebello 10; MTA 18, 318; Commerce all lines
Whittier / Garfield	BRT	Yes	Montebello 10, 70; MTA 18, 262, 318
Whittier / Wilcox	BRT	No	Montebello 10, 70; MTA 318
Whittier / Montebello	BRT	Yes	Montebello 10, 20, 70, 343; MTA 318
Whittier / Rosemead	BRT	Yes	Montebello 10, 60; MTA 265, 266, 318
Whittier / Passons	BRT	No	Montebello 10, 60; MTA 265, 318
Whittier / Norwalk	BRT	Yes	Norwalk 1; Whittier 1,2; MTA 318

Alternative 2 : Alameda*, 1st Street, Soto*, 4th Street, 3rd Street, Mednik/Arizona*, Whittier Blvd

*North-south transition areas subject to further study



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Alternative 2

Bus Rapid Transit
Dedicated Busway

Figure 2-17

on the arterial streets that are used. The center sections of all the designated arterial streets would require major reconstruction in order to implement the LRT alternatives. Figure 2-18 (80' to 82' right of way) and Figure 2-19 (100' right of way) illustrate the concept used on the typical streets of the Eastside Corridor.

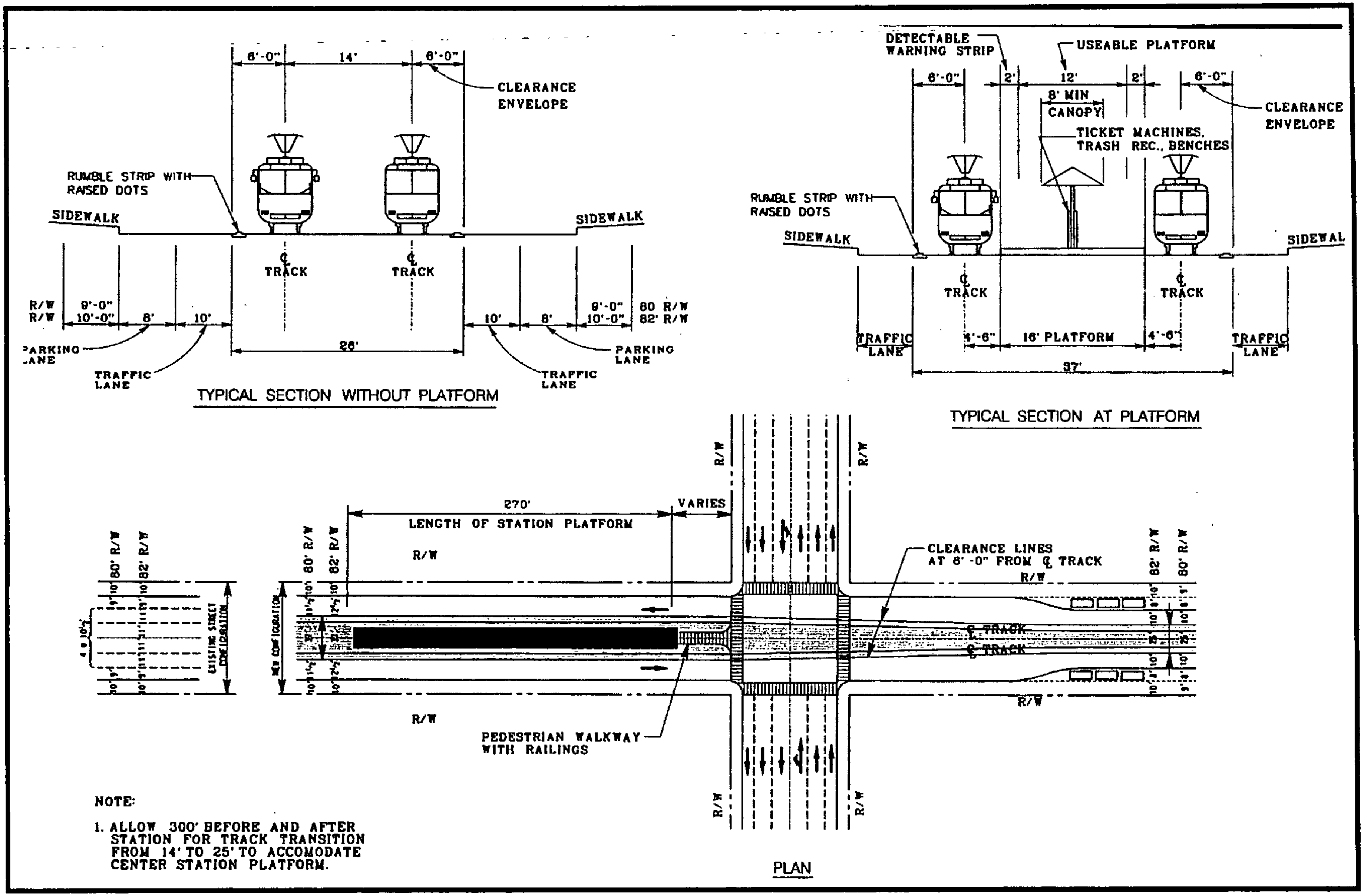
The operation of the LRT will be a new operating and traffic arrangement scheme for the Eastside Corridor alignments but is not new to transit users in Los Angeles County and is similar to existing operations throughout the United States and the world. The LRT Station stop would entail constructing a 270 foot long platform (allows for a maximum of 3-car trains) along with pedestrian walkways to allow for safe passage to crosswalks for arriving and departing passengers.

The LRT operating speeds for the Eastside Corridor would be much different than is currently in operation in Los Angeles. Because of the placement of the LRT track and stations at-grade in arterial streets the maximum speed of operation would be limited by the streets' speed limit (varies from 25 mph to 35 mph) with a 35 mph maximum speed allowed under all circumstances by State PUC regulations. Based on experience with the Long Beach Blue Line operations, the lower speed at-grade operation has less fatalities than high-speed (55 mph) operations even though the number of minor accidents are greater with the in-street operation proposed for the Eastside Corridor alternatives.

The LRT is assumed to operate at 5-minute frequencies in the peak periods and at 12-minute frequencies in the off-peak periods and stop at all stations. Because the individual cars can be "trained" together, the train lengths can then vary from 1 to 3 cars depending on the demand and time of day. The LRT vehicle proposed would be a completely new style (low floor LRT vehicles) rail vehicle for Los Angeles as shown in Figure 2-10. In addition, local buses with local stops would continue to operate along the same arterial streets as the LRT but would be at lower service frequencies. This will also allow transit patrons to access areas that are not directly served by the LRT station stops.

Automobiles and delivery vehicles will operate in a much different fashion than they do now. In order to maximize the safety of the LRT operation and to minimize private vehicles conflict with the LRT trains, it is recommended that left turns and crossings of the LRT train track be limited and possibly restricted to only major intersecting streets where advanced traffic and train control systems can be implemented. Between major intersections, a 6-inch curb next to the travel lane would protect the LRT track section and therefore driveways and minor or secondary streets would be limited to right-turns in and out. Private vehicles would not be able to make left-turns across the LRT tracks or cross from one side to the other (no straight through movements). Private vehicles left turns at designated intersections would be controlled and all safety measures (including the possibility of left-turn gates) would be taken.

As discussed with the BRT mode concept, it is also expected that the streets with the LRT mode concept will become more "transit" oriented and through traffic will be reduced and directed to other streets within the corridor. On the narrower streets left-turns may have to be restricted at certain intersections during certain portions of the day



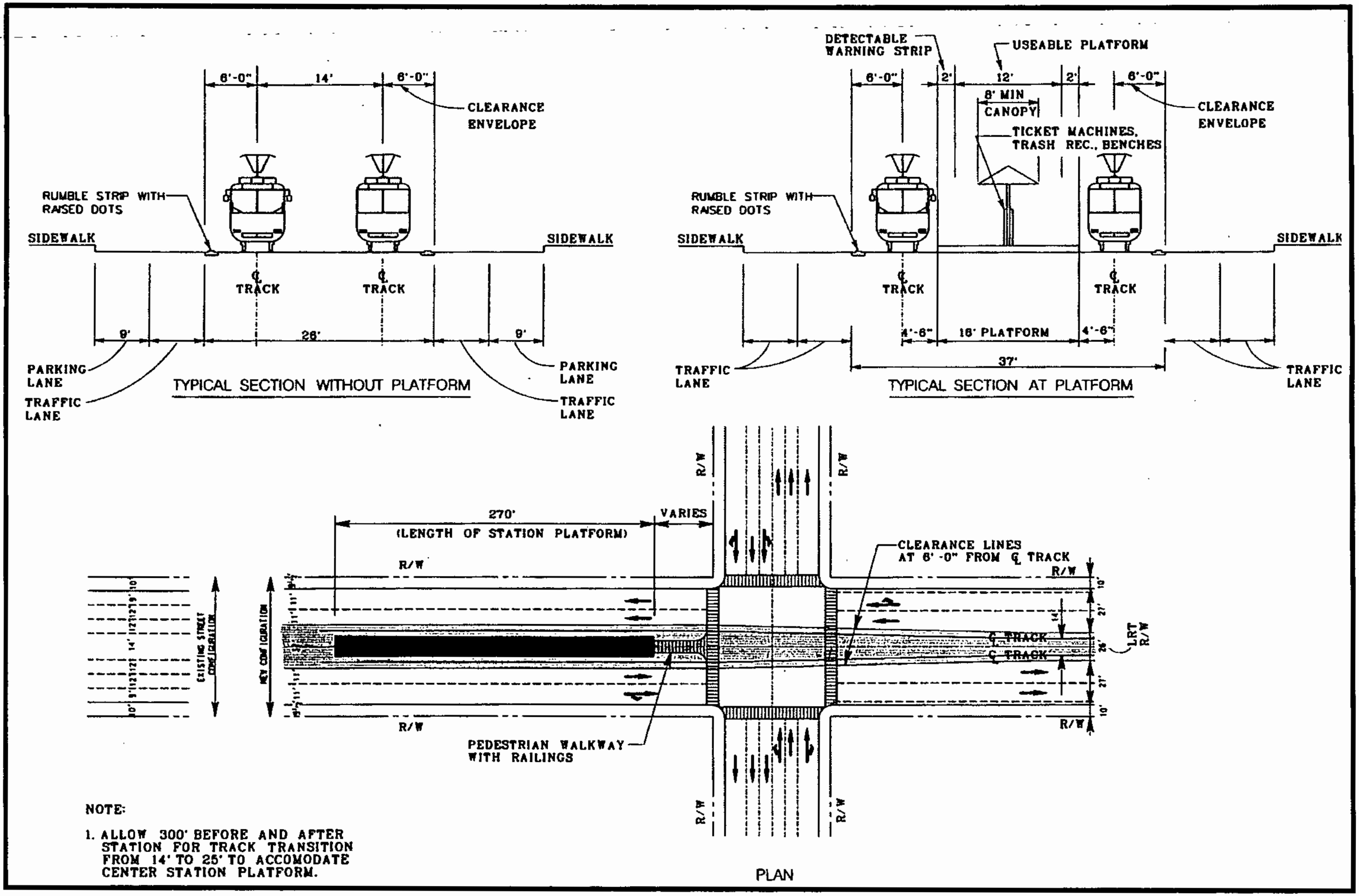
Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Light Rail Transit

Typical Center Platform
80' and 82' Street R/W

Figure 2-18



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Light Rail Transit

Typical Center Platform
100' Street R/W

Figure 2-19

(probably peak periods) because of the lack of space for a dedicated left turn pocket. The reduction of one traffic lane in each direction will impact the level of service and possible ease of access to commercial businesses and other public activities. It is expected over time that traffic would re-orient itself because most of the streets in the western portion of the Eastside Corridor have some available capacity and might accept more traffic and still be acceptable.

Figures 2-20 and 2-21 taken from the Urban Design Concept Report show how the LRT concept would fit into the urban fabric of the neighborhoods and streets it would serve. Through the use of attractive paving, landscaping, signing, and other decorative features it could be made to "fit".

Alternative 3 is the first of three exclusive LRT alternatives identified for study. The alignment is shown in Figure 2-3 and in the referenced Conceptual Engineering Report. Alternative 3 is approximately 12.8 miles long with 19 stations from a connection (the present concept would require a transfer) with the Pasadena Blue Line at Union Station to Whittier and Norwalk Boulevards via Alameda, 1st, Soto, 4th, 3rd, Mednik, Arizona, and Whittier. Table 2-5 further describes the station locations, whether the station has an assumed park-and-ride lot (six stations plus existing Union Station), and the local bus routes that feed and connect with each LRT station.

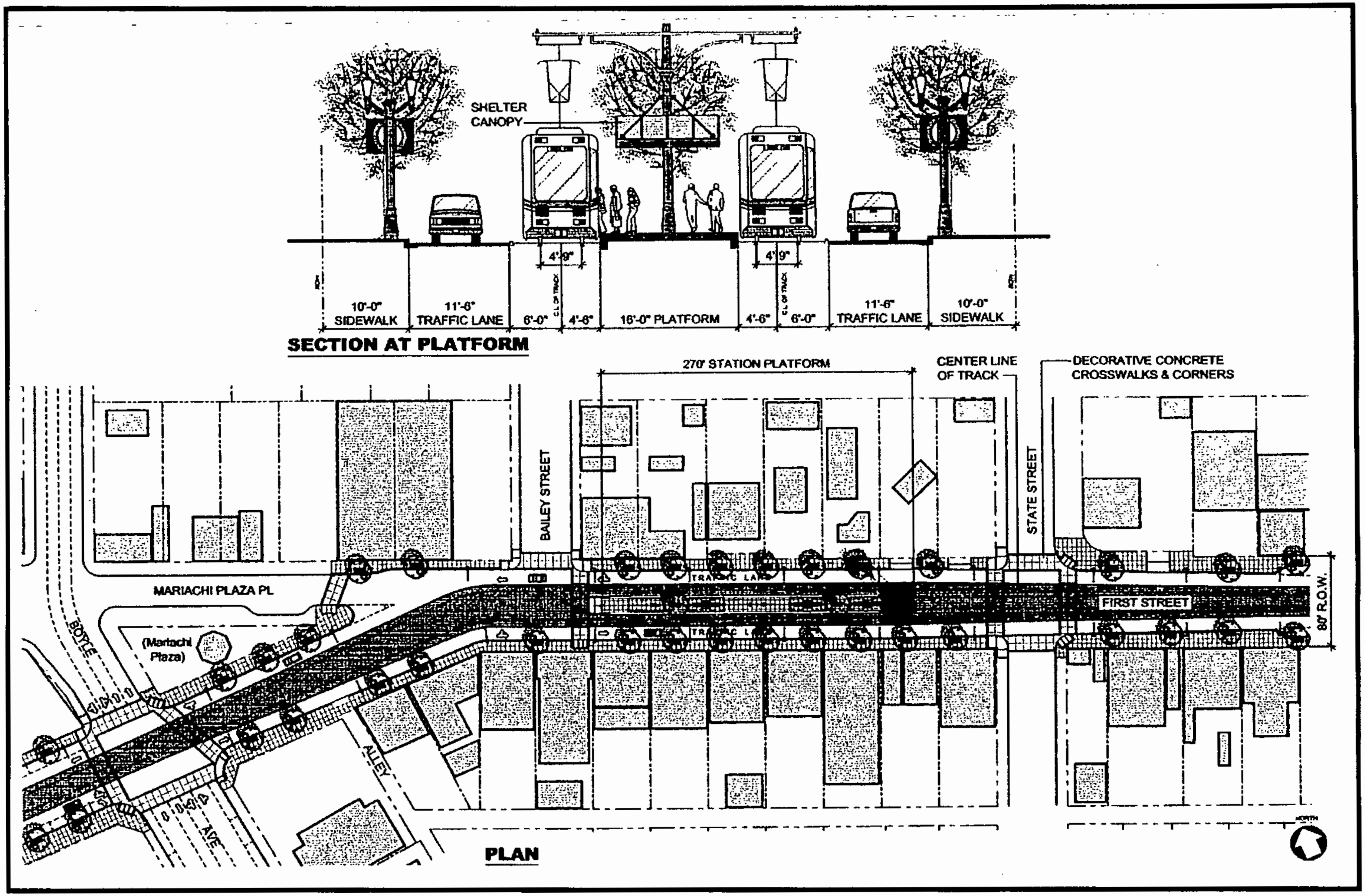
The LRT operating plan for this Alternative and the other LRT alternatives is comprised of two components. These are (1) the LRT operating line between Whittier/Norwalk Boulevards with 5 minute peak service and 12 minute off-peak service; and (2) local bus connecting routes to all stations along the LRT line. The LRT running time while making stops are each station is estimated to be 32 minutes from Whittier/Norwalk to Union Station. Table 2-2 shows the assumed service frequencies for each bus and rail route for this alternative. Figure 2-22 shows the feeder bus concept to each LRT station for Alternative 3. This same concept would apply to all the LRT alternatives.

Based on the assumed LRT operating plan described above the number of trains per hour in the peak direction on the LRT track would be 12 and in the off-peak would be 5.

2.3.6 Alternative 4 – Bus Rapid Transit on Alameda, 1st, 4th, 3rd, Beverly, and Whittier

Alternative 4 is the third of three exclusive BRT alternatives identified for study. The alignment of Alternative 4 is shown in Figure 2-4 and in the referenced Conceptual Engineering Report. Alternative 4 is approximately 13.0 miles long with 19 stations from Union Station and to Whittier and Norwalk Boulevards via Alameda, 1st, Soto, 4th, 3rd, Beverly, Paramount, and Whittier. Table 2-6 further describes the station locations, whether the station has an assumed park-and-ride lot (five stations plus existing Union Station), and the local bus routes that interface with each station.

The BRT operating plan is designed to maximize the use of the dedicated bus lane and to optimize the operating characteristics and flexibility of a bus system operation. The operating plan was also designed to provide an equivalent capacity to the LRT at-grade



Eastside Transit Corridor Study

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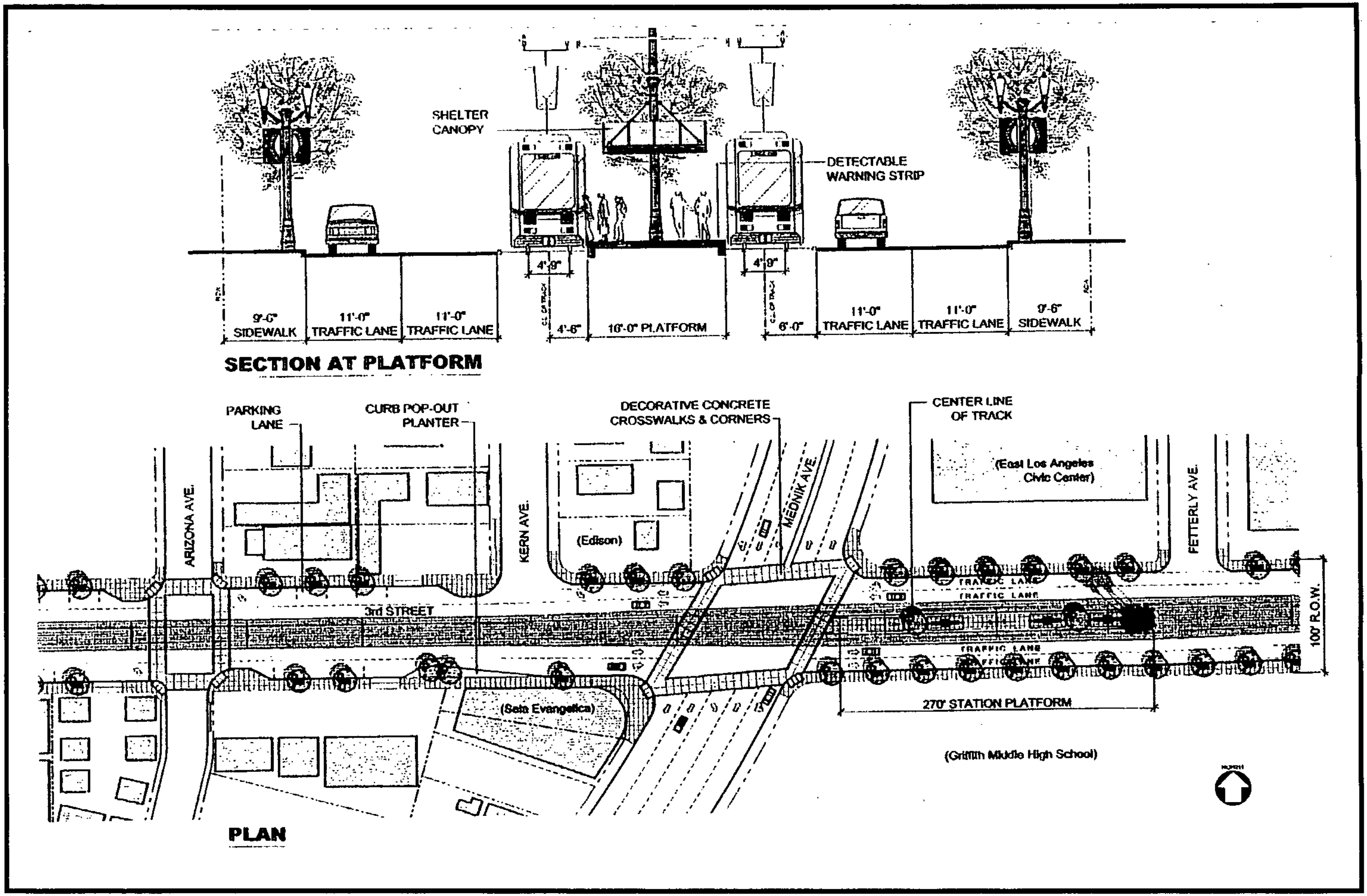
Urban Design Concepts

Light Rail Transit Alternative

First/Boyle

Figure 2-20



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Urban Design Concepts

Light Rail Transit Alternative

Third/Mednik

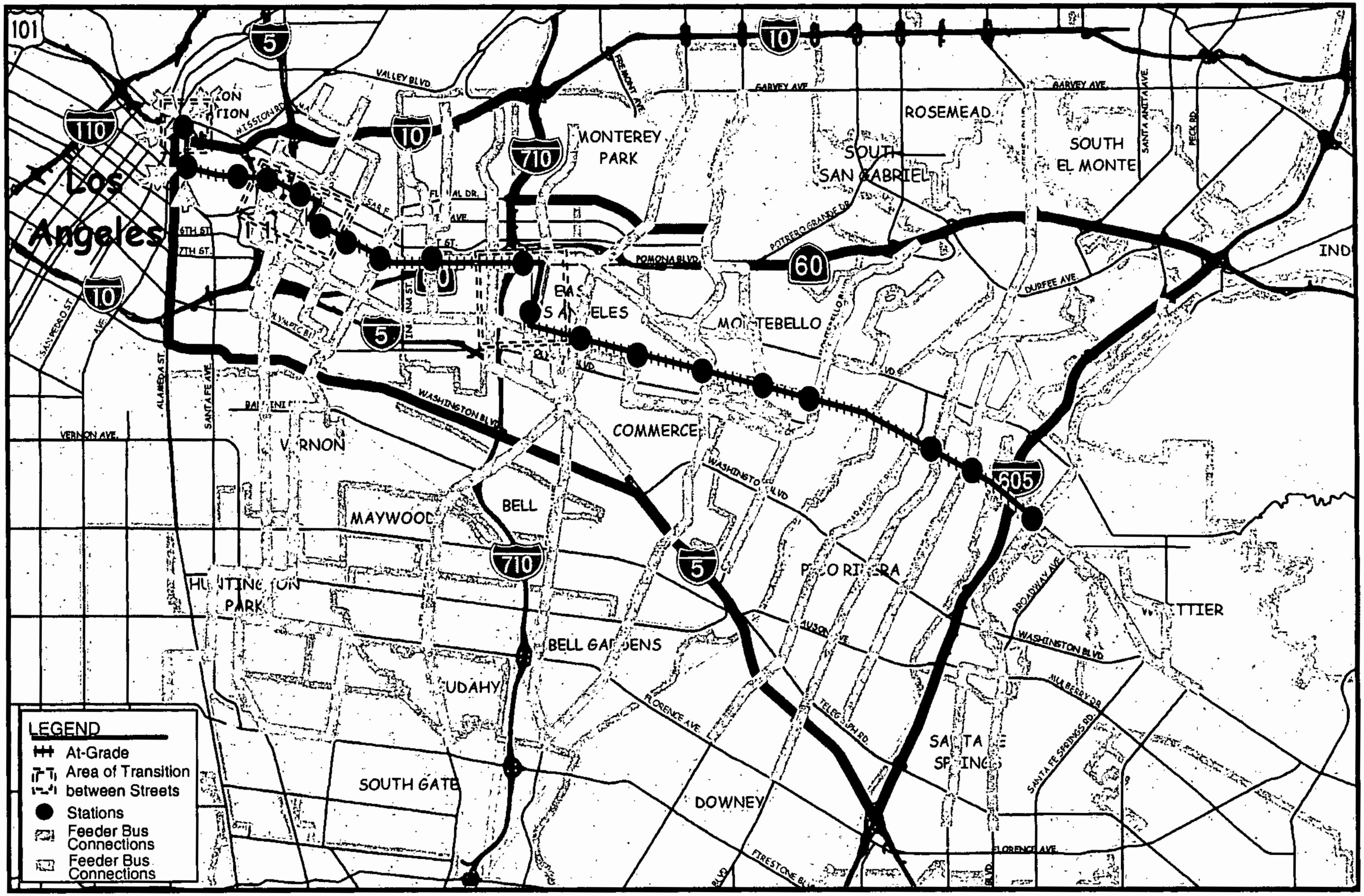
Figure 2-21

Table 2-5
Alternative 3
Station Locations and Characteristics

Station Location	Mode	Park/Ride	Bus Routes which Interface (operator and route)
Union Station	LRT	Yes	Red Line,Pasadena Blue Line,Metrolink, Amtrak AVTA,Santa Clarita,OCTA,Foothill,LADOT, MTA Expresses MTA 33,40,42,55,60,68,70,71,78,79,333,378,379,DASH B,D
1st Street / Alameda	LRT	No	DASH A,D; Montebello 40; MTA 30,31,40,42,434,436,442,445,466
1st / Utah	LRT	No	MTA 30, 31
1st / Boyle	LRT	No	MTA 30, 31, 250, 620
1st / Chicago	LRT	No	MTA 30, 31, 250, 620
4th / Soto	LRT	No	Montebello 40; MTA 251, 252, 605
4th / Evergreen	LRT	No	Montebello 40; MTA 253
4th / Lorena	LRT	No	Montebello 40; MTA 254
3rd / Rowan	LRT	No	Montebello 40; MTA 65, 255
3rd / Mednik	LRT	Yes	Montebello 40; MTA 258, 259
Whittier / Arizona	LRT	No	MTA 18, 258, 259, 318
Whittier / Atlantic	LRT	Yes	Montebello 10; MTA 18, 260, 318; Commerce all lines
Whittier / Gerhart	LRT	No	Montebello 10; MTA 18, 318; Commerce all lines
Whittier / Garfield	LRT	Yes	Montebello 10, 70; MTA 18, 262, 318
Whittier / Wilcox	LRT	No	Montebello 10, 70; MTA 318
Whittier / Montebello	LRT	Yes	Montebello 10, 20, 70, 343; MTA 318
Whittier / Rosemead	LRT	Yes	Montebello 10, 60; MTA 265, 266, 318
Whittier / Passons	LRT	No	Montebello 10, 60; MTA 265, 318
Whittier / Norwalk	LRT	Yes	Norwalk 1; Whittier 1,2; MTA 318

Alternative 3 : Alameda*, 1st Street, Soto*, 4th Street, 3rd Street, Mednik/Arizona*, Whittier Blvd

*North-south transition areas subject to further study



Eastside Transit Corridor Study

Alternative 3
Light Rail Transit

Eastside Corridor Transit Consultants

Figure 2-22

Table 2-6
Alternative 4
Station Locations and Characteristics

Station Location	Mode	Park/Ride	Bus Routes which Interface (operator and route)
Union Station	BRT	Yes	Red Line,Pasadena Blue Line,Metrolink, Amtrak AVTA,Santa Clarita,OCTA,Foothill,LADOT, MTA Expresses MTA 33,40,42,55,60,68,70,71,78,79,333,378,379,DASH B,D
1st Street / Alameda	BRT	No	DASH A,D; Montebello 40; MTA 30,31,40,42,434,436,442,445,466
1st / Utah	BRT	No	MTA 30, 31
1st / Boyle	BRT	No	MTA 30, 31, 250, 620
1st / Chicago	BRT	No	MTA 30, 31, 250, 620
4th / Soto	BRT	No	Montebello 40; MTA 251, 252, 605
4th / Evergreen	BRT	No	Montebello 40; MTA 253
4th / Lorena	BRT	No	Montebello 40; MTA 254
3rd / Rowan	BRT	No	Montebello 40; MTA 65, 255
3rd / Mednik	BRT	Yes	Montebello 40; MTA 258, 259
Beverly / Atlantic	BRT	No	Montebello 10, 40, 341, 342, 343; MTA 260; Monterey Park?
Beverly / Gerhart	BRT	No	Montebello 40, 341, 342, 343; Monterey Park?
Beverly / Garfield	BRT	Yes	Montebello 40, 341, 342, 343; MTA 262
Beverly / Wilcox	BRT	No	Montebello 40, 70, 341, 342, 343
Beverly / Montebello	BRT	Yes	Montebello 20, 40, 70, 341, 342, 343
Beverly / 4th	BRT	No	Montebello 40, 70, 342
Whittier / Rosemead	BRT	Yes	Montebello 10, 60; MTA 265, 266, 318
Whittier / Passons	BRT	No	Montebello 10, 60; MTA 265, 318
Whittier / Norwalk	BRT	Yes	Norwalk 1; Whittier 1, 2; MTA 318

Alternative 4 : Alameda*, 1st Street, Soto*, 4th Street, 3rd Street, Beverly Blvd, Paramount*, Whittier Blvd

*North-south transition areas subject to further study

alternatives that are being studied. The BRT operating plan for this Alternative and the other BRT alternatives is comprised of three components. These are (1) a major BRT Trunk line operating between Whittier/Norwalk Boulevards and Union Station with 4 minute peak service and 10 minute off-peak service; (2) Ten BRT (Routes 1 to 10) connecting routes as shown on Figure 2-23 operating with 15 minute peak service and 30 minute off-peak service – these routes provide a one-seat ride for example from Washington/Rosemead (BRT Connector Route 3) to all points west of Whittier/Rosemead; and (3) local bus connecting routes to all stations along the BRT line. The BRT running time using the dedicated bus lane with stops at each station is estimated to be 34 minutes from Whittier/Norwalk to Union Station. The Wilshire/Whittier Rapid Bus line is included in this and all the Build alternatives, but the peak period service frequency was reduced to 7 minutes and the off-peak frequency to 12 minutes. Table 2-2 shows the assumed service frequencies for each bus and rail route for this alternative.

Based on the assumed operating plans described above the number of buses per hour in the peak direction on the dedicated bus lane would vary from 24 (23 BRT, 1 local) at Passons and Whittier to approximately 77 (55 BRT, 22 local) at 1st and Chicago as shown on Figure 2-23.

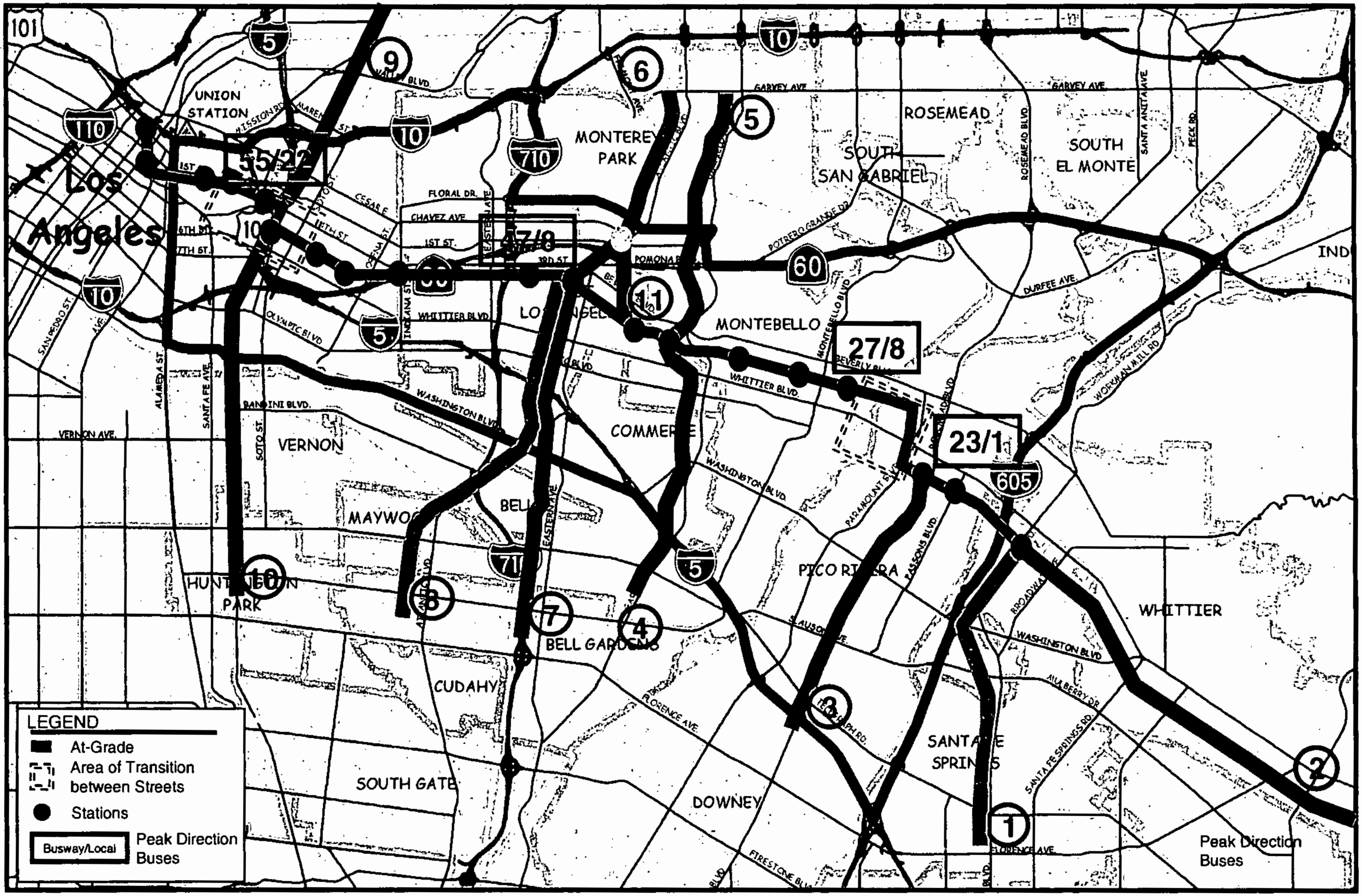
2.3.7 <u>Alternative 5 – Light Rail Transit on Alameda, 1st, 4th, 3rd, Beverly, and Whittier</u>

Alternative 5 is the second of three exclusive LRT alternatives identified for study. The alignment is shown in Figure 2-5 and in the referenced <u>Conceptual Engineering Report</u>. Alternative 5 is approximately 12.6 miles long with 19 stations from a connection (the present concept would require a transfer) of the Pasadena Blue Line at Union Station to Whittier and Norwalk Boulevards via Alameda, 1st, Soto, 4th, 3rd, Beverly, Paramount, and Whittier. Table 2-7 further describes the station locations, whether the station has an assumed park-and-ride lot (five stations plus existing Union Station), and the local bus routes that feed and connect with each LRT station.

The LRT operating plan for this Alternative and the other LRT alternatives is comprised of two components. These are (1) the LRT operating line between Whittier/Norwalk Boulevards with 5 minute peak service and 12 minute off-peak service; and (2) local bus connecting routes to all stations along the LRT line. The LRT running time with making stops are each station is estimated to be 32 minutes from Whittier/Norwalk to Union Station. Table 2-2 shows the assumed service frequencies for each bus and rail route for this alternative. Figure 2-22 shows the feeder bus concept that is conceptually the same for each LRT station in Alternative 5.

Based on the assumed LRT operating plan described above the number of trains per hour in the peak direction on the LRT track would be 12 and in the off-peak would be 5.

2.3.8 <u>Alternative 6 – Light Rail Transit on Alameda, 1st, Indiana, 4th, 3rd, Arizona, and Whittier</u>



Eastside Transit Corridor Study

Alternative 4
Bus Rapid Transit
Dedicated Busway

Eastside Corridor Transit Consultants

Figure 2-23

Table 2-7
Alternative 5
Station Locations and Characteristics

Station Location	Mode	Park/Ride	Bus Routes which Interface (operator and route)
Union Station	LRT	Yes	Red Line,Pasadena Blue Line,Metrolink, Amtrak AVTA,Santa Clarita,OCTA,Foothill,LADOT, MTA Expresses MTA 33,40,42,55,60,68,70,71,78,79,333,378,379,DASH B,D
1st Street / Alameda	LRT	No	DASH A,D; Montebello 40; MTA 30,31,40,42,434,436,442,445,466
1st / Utah	LRT	No	MTA 30, 31
1st / Boyle	LRT	No	MTA 30, 31, 250, 620
1st / Chicago	LRT	No	MTA 30, 31, 250, 620
4th / Soto	LRT	No	Montebello 40; MTA 251, 252, 605
4th / Evergreen	LRT	No	Montebello 40; MTA 253
4th / Lorena	LRT	No	Montebello 40; MTA 254
3rd / Rowan	LRT	No	Montebello 40; MTA 65, 255
3rd / Mednik	LRT	Yes	Montebello 40; MTA 258, 259
Beverly / Atlantic	LRT	No	Montebello 10, 40, 341, 342, 343; MTA 260; Monterey Park?
Beverly / Gerhart	LRT	No	Montebello 40, 341, 342, 343; Monterey Park?
Beverly / Garfield	LRT	Yes	Montebello 40, 341, 342, 343; MTA 262
Beverly / Wilcox	LRT	No	Montebello 40, 70, 341, 342, 343
Beverly / Montebello	LRT	Yes	Montebello 20, 40, 70, 341, 342, 343
Beverly / 4th	LRT	No	Montebello 40, 70, 342
Whittier / Rosemead	LRT	Yes	Montebello 10, 60; MTA 265, 266, 318
Whittier / Passons	LRT	No	Montebello 10, 60; MTA 265, 318
Whittier / Norwalk	LRT	Yes	Norwalk 1; Whittier 1, 2; MTA 318

Alternative 5 : Alameda*, 1st Street, Soto*, 4th Street, 3rd Street, Beverly Blvd, Paramount*, Whittier Blvd

*North-south transition areas subject to further study

Alternative 6 is the third of three exclusive LRT alternatives identified for study. The alignment is shown in Figure 2-6 and in the referenced Conceptual Engineering Report. Alternative 6 is approximately 12.6 miles long with 16 stations from a connection (the present concept would require a transfer) of the Pasadena Blue Line at Union Station to Whittier and Norwalk Boulevards via Alameda, 1st, Indiana, 4th, 3rd, Mednik, Arizona, and Whittier. Table 2-8 further describes the station locations, whether the station has an assumed park-and-ride lot (six stations plus existing Union Station), and the local bus routes that feed and connect with each LRT station.

Alternative 6 is significantly different from the other at-grade LRT and BRT exclusive alternatives in that a subway or underground section is assumed on 1st Street from just west of the I-5 Freeway to Lorena. An underground station is assumed at 1st/Boyle and a partially underground station is assumed at 1st/Lorena. The LRT underground stations are approximately 2/3rds the size of the Metro Red Line underground stations (270 foot platforms versus 450 foot platforms) that had been proposed as part of the previous Locally Preferred Alternative and the Suspended Project for the Eastside communities.

This alternative was chosen for comparison and analysis to the other LRT alternatives because of the potential impacts of an at-grade LRT operation through the most dense and narrow street areas of Boyle Heights. This alternative does, though, reduce the number of stations in Boyle Heights significantly from Alternatives 3 and 5.

The LRT operating plan for this Alternative and the other LRT alternatives is comprised of two components. These are (1) the LRT operating line between Whittier/Norwalk Boulevards with 5 minute peak service and 12 minute off-peak service; and (2) local bus connecting routes to all stations along the LRT line. The LRT running time with making stops are each station is estimated to be 29 minutes from Whittier/Norwalk to Union Station. Table 2-2 shows the assumed service frequencies for each bus and rail route for this alternative. Figure 2-24 shows the feeder bus concept for Alternative 6.

Based on the assumed LRT operating plan described above the number of trains per hour in the peak direction on the LRT track would be 12 and in the off-peak would be 5.

2.3.9 Alternative 7 – Heavy Rail Transit – Union Station to 1st/Lorena and Light Rail Transit on 1st, Indiana, 4th, 3rd, Beverly, and Whittier

Alternative 7 is the first of two hybrid modal fixed guideway alternatives for the Eastside Corridor. This alternative combines two modes: (1) Heavy Rail Transit that is an extension of the current Metro Red Line mode and technology from Union Station to the Eastside Corridor, and (2) At-grade Light Rail Transit that is the same as described in Alternatives 3, 5, and 6.

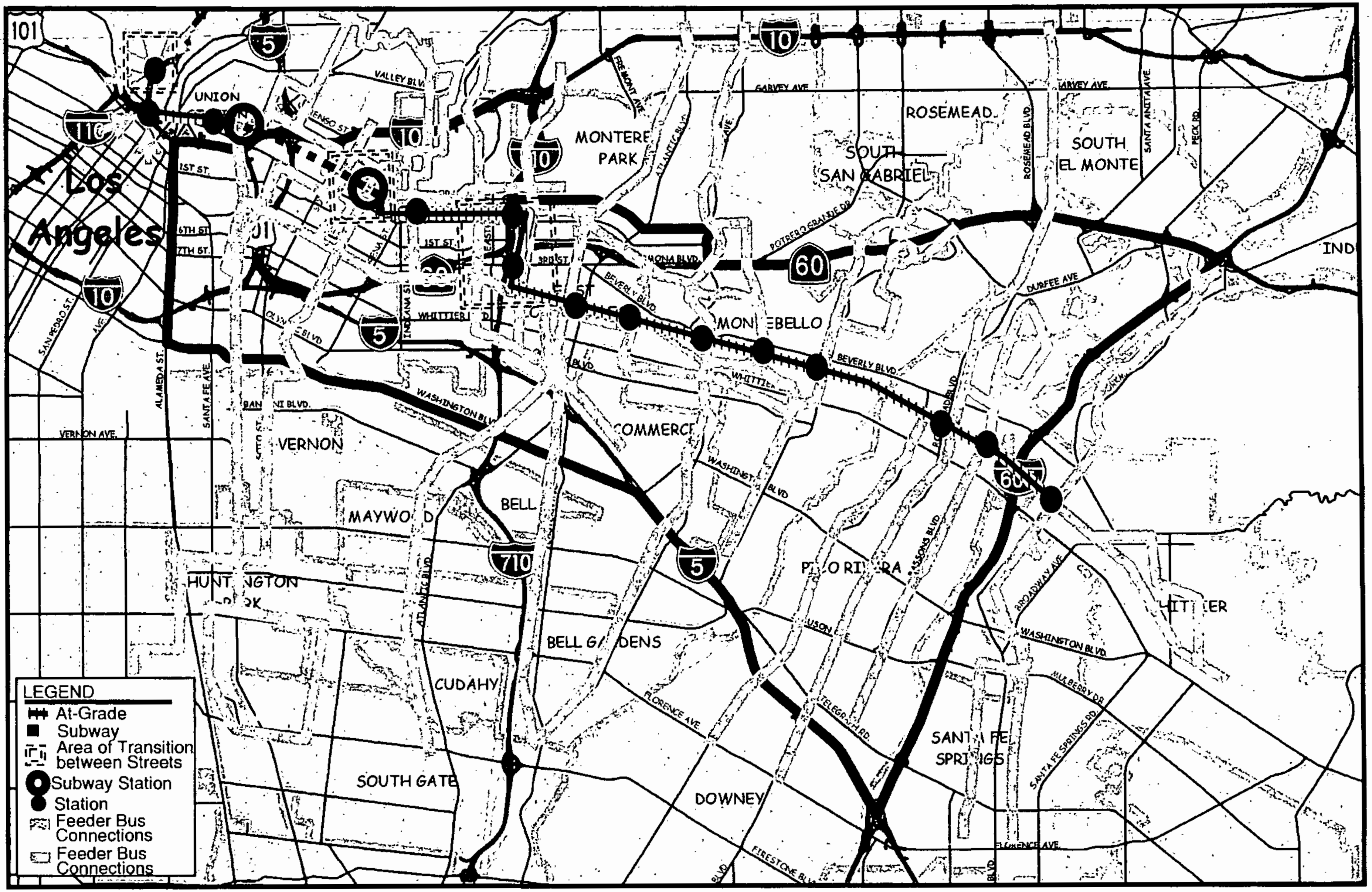
The first component of Alternative 7 is the extension of the Metro Red Line in subway from Union Station to 1st/Lorena with subway stations at 1st/Boyle and 1st/Lorena. These are two of the stations that were part of the suspended project and substantial right of way has been purchased at those sites for access to the stations and other related construction

Table 2-8
Alternative 6
Station Locations and Characteristics

Station Location	Mode	Park/Ride	Bus Routes which Interface (operator and route)
Union Station	LRT	Yes	Pasadena Blue Line, Metrolink, Amtrak AVTA, Santa Clarita, OCTA, Foothill, LADOT, MTA Expresses MTA 33,40,42,55,60,68,70,71,78,79,333,378,379, DASH B,D
1st / Alameda	LRT	No	DASH A,D; Montebello 40; MTA 30,31,40,42,434,436,442,445,466
1st / Utah	LRT	No	MTA 30, 31
1st / Boyle	LRT	No	MTA 30, 31, 250, 620
1st / Lorena	LRT	No	MTA 30, 31, 65, 254
3rd / Rowan	LRT	No	Montebello 40; MTA 65, 255
3rd / Mednik	LRT	Yes	Montebello 40; MTA 258, 259
Whittier / Arizona	LRT	No	MTA 18, 258, 259, 318
Whittier / Atlantic	LRT	Yes	Montebello 10; MTA 18, 260, 318; Commerce all lines
Whittier / Gerhart	LRT	No	Montebello 10; MTA 18, 318; Commerce all lines
Whittier / Garfield	LRT	Yes	Montebello 10, 70; MTA 18, 262, 318
Whittier / Wilcox	LRT	No	Montebello 10, 70; MTA 318
Whittier / Montebello	LRT	Yes	Montebello 10, 20, 70, 343; MTA 318
Whittier / Rosemead	LRT	Yes	Montebello 10, 60; MTA 265, 266, 318
Whittier / Passons	LRT	No	Montebello 10, 60; MTA 265, 318
Whittier / Norwalk	LRT	Yes	Norwalk 1; Whittier 1,2; MTA 318

Alternative 6 : Alameda*, 1st Street (portion between Boyle and Lorena in subway), Indiana*, 3rd Street, Mednik/Arizona*, Whittier Blvd

*North-south transition areas subject to further study



Eastside Transit Corridor Study

Alternative 6
Light Rail Transit

Eastside Corridor Transit Consultants

Figure 2-24

activities. At 1st/Lorena, the transit patron would proceed to grade level and access a Light Rail Transit vehicle to continue the trip to Whittier/Norwalk Boulevards. This Alternative is being evaluated similar to Alternative 6 to assist in judging the impacts of at-grade fixed guideway operations through Boyle Heights. This Alternative as well as Alternative 8 does not provide any access to the Little Tokyo/Arts District community as the other six alternatives do.

The alignment is shown in Figure 2-7 and in the referenced Conceptual Engineering Report. Alternative 7 is approximately11.9 miles long with 15 stations. The Heavy Rail Transit subway component beginning at Union Station is approximately 2.6 miles long with two subway stations as an extension of the two operating Red Line subway lines. The Light Rail Transit component is approximately 9.3 miles long with 12 stations. The LRT alignment from 1st/Lorena would use Indiana, 4th, 3rd, Beverly, Paramount, and Whittier. Table 2-9 further describes the station locations, whether the station has an assumed park-and-ride lot (five stations plus existing Union Station), and the local bus routes that feed and connect with each LRT and Heavy Rail station.

The Heavy Rail Transit operating plan assumes the extension the Red Line operation to the Eastside. The operating plan would provide direct service on two lines from 1st/Lorena to the North Hollywood station and to the Wilshire/Western station. Each Line would operate with 4 minute peak service and 8 minute off-peak service. This operation would provide for a Red Line train to leave the Eastside community at 1st/Lorena every 2 minutes in the peak and every 4 minutes in the off-peak.

The Light Rail Transit operating plan would provide 5 minute peak service and 12 minute off-peak service between 1st/Lorena and Whittier/Norwalk Boulevards. Local bus connecting routes to all stations along the Heavy Rail Transit and Light Rail Transit segments would be provided similar to those shown in Alternatives 3, 5, and 6. Based on the assumed LRT operating plan described above the number of trains per hour in the peak direction on the LRT track would be 12 and in the off-peak would be 5.

Table 2-2 shows the assumed service frequencies for each bus and rail route for this alternative. The total combined (using the two rail systems) travel time (including the required transfer) from Whittier/Norwalk to Union Station would be approximately 28 minutes.

2.3.10 Alternative 8 – Heavy Rail Transit – Union Station to Chavez/Soto and Bus Rapid Transit on Soto, 4th, 3rd, Beverly, and Whittier

Alternative 8 is the second of two hybrid modal fixed guideway alternatives for the Eastside Corridor. This alternative combines two modes: (1) Heavy Rail Transit that is an extension of the current Metro Red Line mode and technology from Union Station to the Eastside Corridor, and (2) At-grade Bus Rapid Transit that is the same as described in Alternatives 1, 2, and 4.

Table 2-9
Alternative 7
Station Locations and Characteristics

Station Location	Mode	Park/Ride	Bus Routes which Interface (operator and route)
Union Station	HRT	Yes	Pasadena Blue Line,Metrolink, Amtrak AVTA,Santa Clarita,OCTA,Foothill,LADOT, MTA Expresses MTA 33,40,42,55,60,68,70,71,78,79,333,378,379,DASH B,D
1st / Boyle	HRT	No	MTA 30, 31, 250, 620
1st / Lorena	HRT	No	MTA 30, 31, 65, 254
1st / Lorena	LRT	No	MTA 30, 31, 65, 254
3rd / Rowan	LRT	No	Montebello 40; MTA 65, 255
3rd / Mednik	LRT	Yes	Montebello 40; MTA 258, 259
Beverly / Atlantic	LRT	No	Montebello 10, 40, 341, 342, 343; MTA 260; Monterey Park?
Beverly / Gerhart	LRT	No	Montebello 40, 341, 342, 343; Monterey Park?
Beverly / Garfield	LRT	Yes	Montebello 40, 341, 342, 343; MTA 262
Beverly / Wilcox	LRT	No	Montebello 40, 70, 341, 342, 343
Beverly / Montebello	LRT	Yes	Montebello 20, 40, 70, 341, 342, 343
Beverly / 4th	LRT	No	Montebello 40, 70, 342
Whittier / Rosemead	LRT	Yes	Montebello 10, 60; MTA 265, 266, 318
Whittier / Passons	LRT	No	Montebello 10, 60; MTA 265, 318
Whittier / Norwalk	LRT	Yes	Norwalk 1; Whittier 1, 2; MTA 318

Alternative 7 : Heavy rail subway from Union Station to 1st/Lorena with 1st/Boyle station; then LRT on 1st Street, Indiana*, 3rd Street, Beverly Blvd, Paramount*, Whittier Blvd

*North-south transition areas subject to further study

The first component of Alternative 8 is the extension of the Metro Red Line in subway from Union Station to Chavez/Soto with subway stations at 1st/Boyle and Chavez/Soto. These are two of the stations that were part of the suspended project and substantial right of way has been purchased at those sites for access to the stations and other related construction activities. Figure 2-25 shows the current plan for the Chavez/Soto station area. This Alternative is being evaluated similar to Alternative 6 to assist in judging the impacts of at-grade fixed guideway operations through Boyle Heights. This Alternative as well as Alternative 7 does not provide any access to the Little Tokyo/Arts District community as the other six alternatives do.

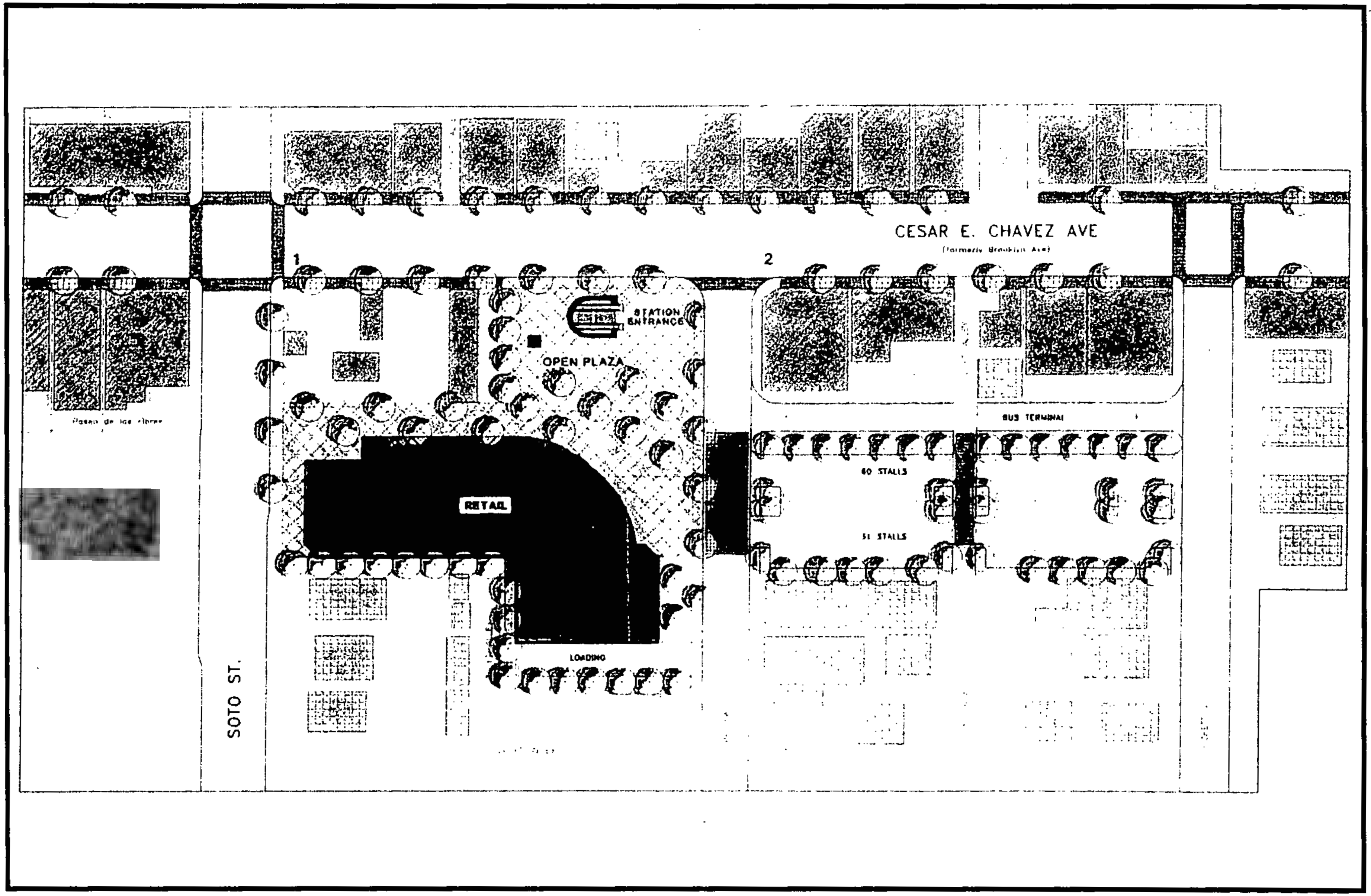
The alignment is shown in Figure 2-8 and in the referenced Conceptual Engineering Report. Alternative 8 is approximately12.3 miles long with 18 stations. The Heavy Rail Transit subway component beginning at Union Station is approximately 1.1 miles long with two subway stations as an extension of the two operating Red Line subway lines. The Bus Rapid Transit component is approximately 11.2 miles long with 15 stations. The BRT alignment from Chavez/Soto would use Soto, 4th, 3rd, Beverly, Paramount, and Whittier. Table 2-10 further describes the station locations, whether the station has an assumed park-and-ride lot (five stations plus existing Union Station), and the local bus routes that feed and connect with each BRT and Heavy Rail station.

The Heavy Rail Transit operating plan assumes the extension the Red Line operation to the Eastside. The operating plan would provide direct service on two lines from Chavez/Soto to the North Hollywood station and to the Wilshire/Western station. Each Line would operate with 4 minute peak service and 8 minute off-peak service. This operation would provide for a Red Line train to leave the Eastside community at Chavez/Soto every 2 minutes in the peak and every 4 minutes in the off-peak.

Table 2-2 shows the assumed service frequencies for each bus and rail route for this alternative. The total combined (using the two rail systems) travel time (including the required transfer) from Whittier/Norwalk to Union Station would be approximately 28 minutes.

The BRT operating plan for this Alternative is comprised of three components. These are (1) a major BRT Trunk line operating between Whittier/Norwalk Boulevards and Chavez/Soto with 4 minute peak service and 10 minute off-peak service; (2) Eight BRT (Routes 1 to 8) connecting routes as shown on Figure 2-26 operating with 15 minute peak service and 30 minute off-peak service; and (3) local bus connecting routes to all stations along the BRT line. Based on the assumed operating plans described above the number of buses per hour in the peak direction on the dedicated bus lane would vary from 24 (23 BRT, 1 local) at Passons and Whittier to approximately 62 (47 BRT, 15 local) at Chavez and Soto as shown on Figure 2-26.

Table 2-2 shows the assumed service frequencies for each bus and rail route for this alternative. The total combined (using the two systems) travel time (including the required transfer) from Whittier/Norwalk to Union Station would be approximately 33 minutes.

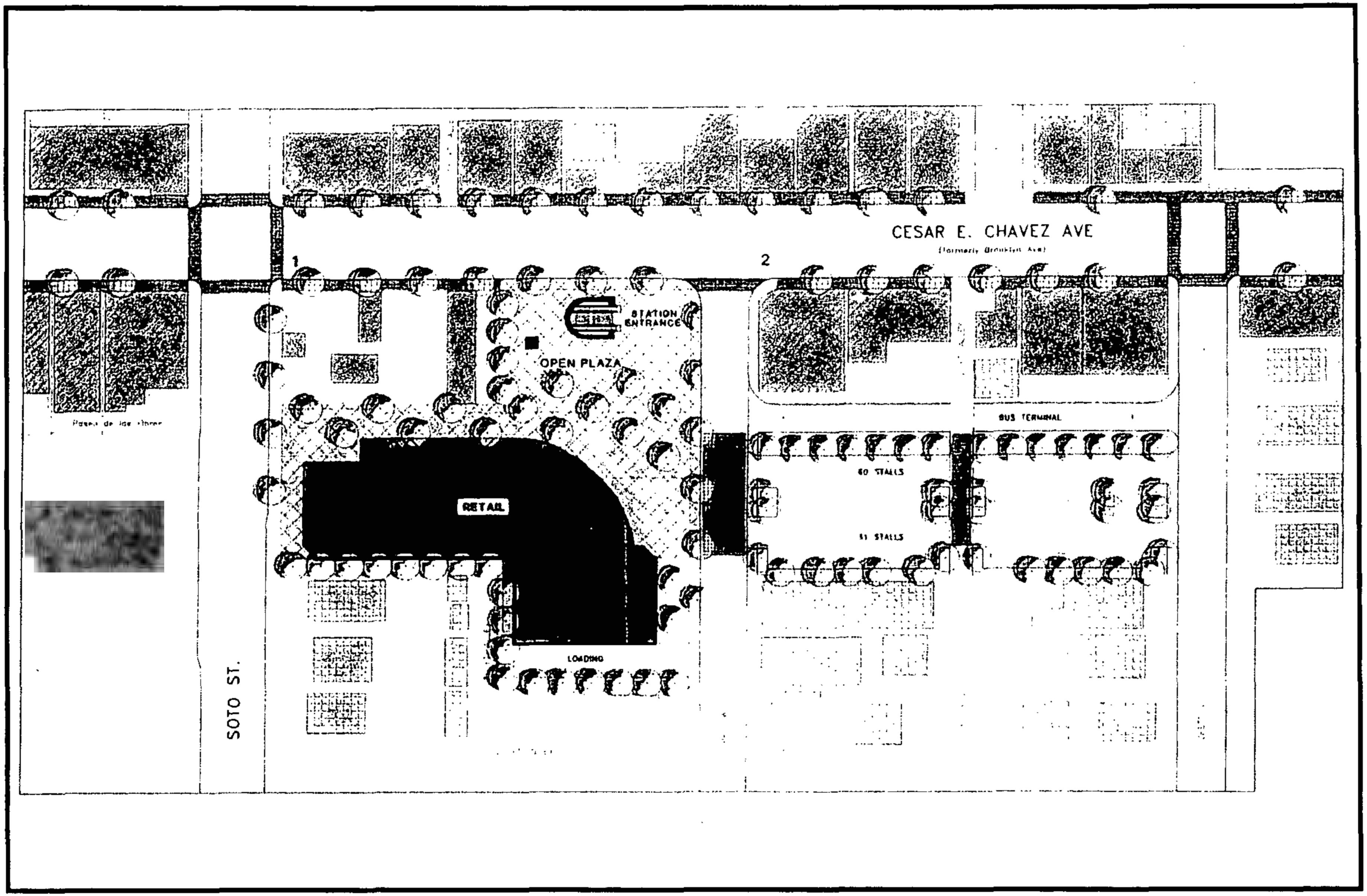


Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Urban Design Concepts
Heavy Rail Transit Alternative
Cesar E. Chavez/Soto

Figure 2-25



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Urban Design Concepts
Heavy Rail Transit Alternative
Cesar E. Chavez/Soto

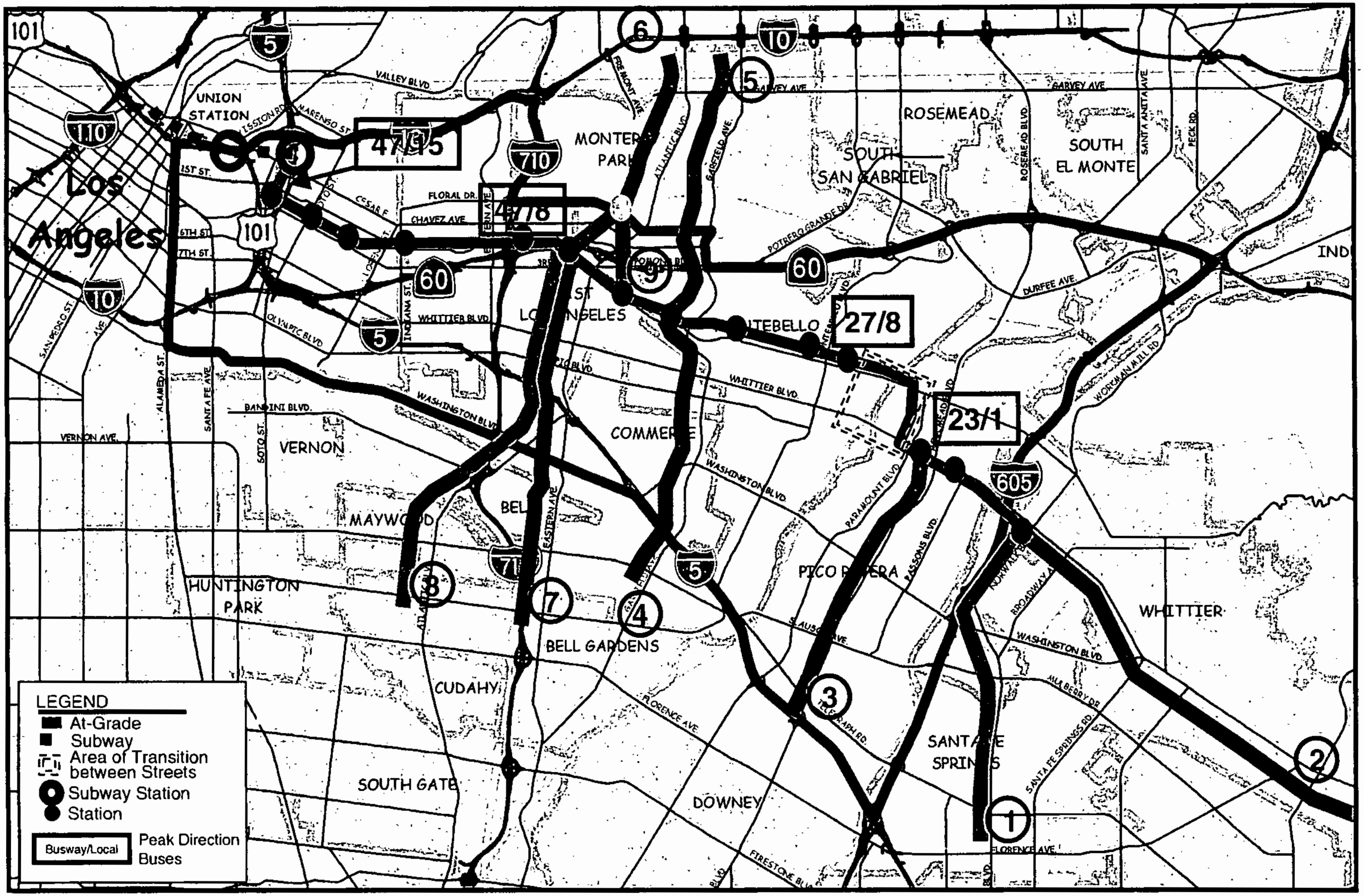
Figure 2-25

Table 2-10
Alternative 8
Station Locations and Characteristics

Station Location	Mode	Park/Ride	Bus Routes which Interface (operator and route)
Union Station	HRT	Yes	Pasadena Blue Line,Metrolink, Amtrak AVTA,Santa Clarita,OCTA,Foothill,LADOT, MTA Expresses MTA 33,40,42,55,60,68,70,71,78,79,333,378,379,DASH B,D
1st / Boyle	HRT	No	MTA 30, 31, 250, 620
Chavez / Soto	HRT	No	MTA 68, 251, 252, 605
Chavez / Soto	BRT	No	MTA 68, 251, 252, 605
4th / Soto	BRT	No	Montebello 40; MTA 251, 252, 605
4th / Evergreen	BRT	No	Montebello 40; MTA 253
4th / Lorena	BRT	No	Montebello 40; MTA 254
3rd / Rowan	BRT	No	Montebello 40; MTA 65, 255
3rd / Mednik	BRT	Yes	Montebello 40; MTA 258, 259
Beverly / Atlantic	BRT	No	Montebello 10, 40, 341, 342, 343; MTA 260; Monterey Park?
Beverly / Gerhart	BRT	No	Montebello 40, 341, 342, 343; Monterey Park?
Beverly / Garfield	BRT	Yes	Montebello 40, 341, 342, 343; MTA 262
Beverly / Wilcox	BRT	No	Montebello 40, 70, 341, 342, 343
Beverly / Montebello	BRT	Yes	Montebello 20, 40, 70, 341, 342, 343
Beverly / 4th	BRT	No	Montebello 40, 70, 342
Whittier / Rosemead	BRT	Yes	Montebello 10, 60; MTA 265, 266, 318
Whittier / Passons	BRT	No	Montebello 10, 60; MTA 265, 318
Whittier / Norwalk	BRT	Yes	Norwalk 1; Whittier 1, 2; MTA 318

Alternative 8 : Heavy rail subway from Union Station to Chavez/Soto with 1st/Boyle station; then BRT on Soto, 4th Street, 3rd Street, Paramount*, Whittier Blvd

*North-south transition areas subject to further study



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

Alternative 8

Heavy Rail and Bus Rapid Transit
Dedicated Busway

Figure 2-26

3 TRANSPORTATION ISSUES AND ANALYSIS

3.1 TRANSIT ANALYSIS

3.1.1 Service Levels

Existing Transit Service Levels

The eastside area is one of the most transit-dependent and transit-oriented communities in Los Angeles County. Six operators currently provide service within the study area. This section provides a summary of the existing transit services in the area.

The Eastside Transit Corridor has one of the most extensive networks of bus routes in the County. The corridor's transit routes generally follow a grid pattern and include many express and local routes and one limited service route. As mentioned, six public agencies operate bus service in the Eastside Transit Corridor: Los Angeles County Metropolitan Transportation Authority, Montebello Transit, Whittier Transit, Norwalk Transit, the City of Monterey Park, and the City of Commerce. Table 3-1 lists all the current bus transit routes operated in the corridor with the limits of their service.

Most of the heavily used routes are those that run in an east-west direction. These include bus routes that operate on Cesar Chavez Avenue, 1st Street, Whittier Boulevard, and Olympic Boulevard. Soto Street and Atlantic Boulevard are two north-south streets on which heavily used bus routes operate. North-south travel is limited to these two main through bus lines on Soto Street and Atlantic Boulevard. The predominant flow of transit passengers in the corridor is in an east-west orientation. Severe overcrowding occurs regularly on many of these routes during peak periods. A service allocation mismatch is evident in the fact that some bus lines are overcrowded, and others are underutilized during various periods of the day. Table 3- 2 shows the service frequency (headways) for all the bus lines in the corridor. This is illustrative of the very high demand for service on many of the lines, particularly on MTA lines 30/31 and 66 where headways during the morning peak period average three to four minutes. This is indicative of transit service with very high demand in those particular corridors along 1st Street, Whittier Boulevard, and Olympic Boulevard.

3.1.2 Ridership

Regional and Corridor Patronage Comparisons

The numbers of projected daily transit trips within the region and the Eastside Transit Corridor are presented in Tables 3-3 and 3-4. The BRT alternatives result in the lowest ridership of the build alternatives, and Heavy Rail/LRT Alternative 7 results in the highest ridership. Of the alternatives involving BRT, Alternative 8, which also includes a heavy rail subway segment, would have the highest ridership, but the number of trips are still lower than any of the rail alternatives. An additional 7,087 regional trips would occur daily under Alternative 7 when compared to the BRT Alternative 2 (the lowest ridership of the build alternatives). Within the corridor, Alternative 7 would result in an additional 6,250 daily transit trips as compared to BRT Alternatives 1 and 2 (the lowest ridership of the build alternatives).

TABLE 3-1
EASTSIDE TRANSIT CORRIDOR
EXISTING BUS ROUTES

Operator	Line	Destinations
Commerce	Red	Community Circulator (Commerce)
	Blue	Community Circulator (Commerce)
	Green	Community Circulator (Commerce)
	Orange	Community Circulator (Commerce)
	Yellow	Community Circulator (Commerce)
Montebello	10	East LA College - Pico Rivera
	20	Rosemead - South Montebello
	40	Downtown LA – Whittier
	60	Pico Rivera North to South
	70	Montebello - Montebello Towne Center
	341	Downtown LA - Montebello EXPRESS
	342	Downtown LA - Montebello EXPRESS
	343	Downtown LA - Montebello EXPRESS
Monterey Park	1	Community Circulator (Monterey Park)
	2	Community Circulator (Monterey Park)
	5	Community Circulator (Monterey Park)
MTA	18	Wilshire Center – Montebello
	30/31	Mid City - East LA College
	65	Downtown LA – CSULA
	66	Wilshire Center – Montebello
	68	West LA Transit Center - Montebello Towne Center
	250	LAC+USC - Boyle Heights
	251	Cypress Park – Watts
	252	El Sereno – Lynwood
	253	LAC+USC - Boyle Heights
	254	LAC+USC – Willowbrook
	255	Montecito Heights - East LA
	256	Altadena - East LA
	258	Alhambra - South Gate
	259	El Sereno - South Gate
	260	Altadena – Compton
	262	Alhambra - South Gate
	265	Pico Rivera – Lakewood
	266	East Pasadena – Lakewood
	275	Pico Rivera – Cerritos
	318	Wilshire Center – Whittier
	362	Downtown LA - Hawaiian Gardens
	605	LAC+USC - Boyle Heights
	620	LAC+USC - Boyle Heights
Norwalk	1	Bassett (Industry) – Bellflower
Whittier	1	Community Circulator (Whittier)
	2	Community Circulator (Whittier)

Source: Parsons Brinckerhoff Quade and Douglas. 1999.

TABLE 3-2
EASTSIDE TRANSIT CORRIDOR
EXISTING FREQUENCY OF TRANSIT SERVICE

Operator	Line	Days	Frequency (minutes)					Hours of Operation
			AM Peak	Midday	PM Peak	Evening	Owl	
Commerce	Red	Weekday	60	60	60			6:00 AM - 6:00 PM
		Saturday	60	60	60			6:00 AM - 6:00 PM
	Blue	Weekday		60	60			9:00 AM - 6:00 PM
		Saturday		60	60			9:00 AM - 6:00 PM
	Green	Weekday	60	60	60			6:00 AM - 9:30 PM
		Saturday	60	60	60			6:00 AM - 9:30 PM
	Orange	Weekday	60	60	60			5:30 AM - 6:00 PM
	Yellow	Weekday	60	60	60			6:00 AM - 9:00 PM
Montebello	10	Weekday	8	10	10	15		5:00 AM - 11:00 PM
		Saturday	20	10	10	20		5:00 AM - 11:00 PM
		Sunday	20	10	10	20		5:00 AM - 11:00 PM
	20	Weekday	15	15	15	15		5:30 AM - 10:30 PM
		Saturday	15	15	15	15		5:30 AM - 10:30 PM
		Sunday	15	15	15	15		5:30 AM - 10:30 PM
	40	Weekday	10	12	10	30		5:00 AM - 11:00 PM
		Saturday	15	15	15	30		5:00 AM - 12:00 AM
		Sunday	20	20	20	20		5:00 AM - 11:00 PM
	60	Weekday	35	35	35	70		6:00 AM - 9:30 PM
		Saturday	70	70	70	70		6:00 AM - 9:30 PM
	70	Weekday	30	30	30	30		5:30 AM - 8:30 PM
	341	Weekday	30		30			7:00-9:30 AM & 3:00-6:00 PM
	342	Weekday	180		180			6:00-7:00 AM & 5:00-6:00 PM
	343	Weekday	30		30			6:00-8:00 AM & 5:00-7:00 PM
Monterey Park	1	Weekday	40	40	40			6:30 AM - 6:00 PM
		Saturday	40	40	40			6:30 AM - 6:00 PM
	2	Weekday	40	40	40			6:30 AM - 6:00 PM
		Saturday	40	40	40			6:30 AM - 6:00 PM
	5	Weekday	50	30	30			6:30 AM - 6:00 PM
Norwalk	1	Weekday	15	30	30			6:00 AM - 7:00 PM
		Saturday		60	60			9:00 AM - 5:00 PM
		Sunday		60	60			9:00 AM - 5:00 PM
Whittier	1	Weekday	60	60	60			6:00 AM - 6:30 PM
		Saturday		60	60			6:00 AM - 6:30 PM
	2	Weekday	60	60	60			6:30 AM - 7:00 PM
		Saturday		60	60			6:30 AM - 7:00 PM
MTA	18	Weekday	10	15	10	15	60	24 hours
		Saturday	15	12	15	20	60	24 hours
		Sunday	20	30	15	30	60	24 hours
	30/31	Weekday	4	7.5	5	15	60	24 hours
		Saturday	7	7	12	30	60	24 hours
		Sunday	12	7	8	30	60	24 hours
	65	Weekday	15	30	25	50		5:30 AM - 10:00 PM
		Saturday	60	60	60	60		6:00 AM - 8:00 PM
		Sunday		60	60	60		8:00 AM - 8:00 PM

TABLE 3-2 (Continued)
EASTSIDE TRANSIT CORRIDOR
EXISTING FREQUENCY OF TRANSIT SERVICE

Operator	Line	Days	Frequency (minutes)					Hours of Operation
			AM Peak	Midday	PM Peak	Evening	Owl	
	66	Weekday	3	8	7	30		4:30 AM - 1:30 AM
		Saturday	4	10	15	30		5:00 AM - 1:30 AM
		Sunday	15	12	12	30		5:00 AM - 1:00 AM
	68	Weekday	8	12	12	40		4:00 AM - 12:30 AM
		Saturday	15	10	15	40		4:00 AM - 12:30 AM
		Sunday	40	15	20	40		4:30 AM - 12:30 AM
	250	Weekday	40	40	40	40		6:00 AM - 7:00 PM
	251/252	Weekday	6	12	10	30	60	24 hours
		Saturday	5	15	12	30	60	24 hours
		Sunday	30	20	20	30	60	24 hours
	253	Weekday	40	40	40			6:00 AM - 8:00 PM
		Saturday	40	40	40			6:00 AM - 7:30 PM
		Sunday		40	40			8:00 AM - 6:30 PM
	254	Weekday	35	55	30	60		4:30 AM - 8:30 PM
		Saturday	60	60	60			6:30 AM - 7:30 PM
		Sunday	60	60	60			7:30 AM - 7:30 PM
	255	Weekday	45	50	45			5:00 AM - 8:30 PM
		Saturday	45	45	45			5:30 AM - 8:30 PM
		Sunday		45	45			5:30 AM - 8:30 PM
	256	Weekday	35	50	35	50		6:00 AM - 10:30 PM
		Saturday	60	60	60	60		5:30 AM - 9:00 PM
		Sunday	60	60	60	60		5:30 AM - 9:00 PM
	258/259	Weekday	20	30	30			5:00 AM - 8:00 PM
	260	Weekday	12	15	15	60		4:00 AM - 11:30 PM
		Saturday	30	25	20	60		5:00 AM - 12:00 AM
		Sunday	50	25	25	60		6:00 AM - 12:00 AM
	262	Weekday	40	45	45	60		5:00 AM - 11:30 PM
		Saturday	60	40	60	60		5:30 AM - 11:30 PM
		Sunday	50	25	25	60		5:30 AM - 11:30 PM
	265	Weekday	65	50	60			5:30 AM - 7:30 PM
	266	Weekday	30	40	30	60		4:30 AM - 11:30 PM
		Saturday	60	40	45	60		5:00 AM - 11:30 PM
		Sunday	60	40	45	60		5:30 AM - 10:30 PM
	275	Weekday	65	50	50			5:30 AM - 7:30 PM
	318	Weekday	8	15	10			5:30 AM - 8:00 PM
		Saturday	15	12.5	17			6:00 AM - 8:00 PM
		Sunday	30	15	30			6:30 AM - 7:30 PM
	362	Weekday	20	30	25	60		5:00 AM - 11:30 PM
		Saturday	50	60	60	60		5:00 AM - 11:30 PM
		Sunday	50	60	60	60		5:00 AM - 11:30 PM
	605	Weekday	15	30	15	30		6:00 AM - 7:30 PM
		Saturday	30	30	30			6:00 AM - 7:30 PM
		Sunday	30	30	30			6:00 AM - 7:30 PM
	620	Weekday		12	12			9:00 AM - 6:30 PM

Source: Parsons Brinckerhoff Quade and Douglas. 1999.

As expected, all of the build alternatives (including those employing BRT) result in an increase in transit trips as compared to the No-Build and TSM Alternatives. For regional transit trips, the increases over the No-Build Alternative range from 27,245 daily trips for Alternative 2 to 34,332 daily trips for Alternative 7. The added daily trips over the TSM Alternative range from 7,383 for Alternative 2 to 14,470 for Alternative 7. Within the corridor, the increases over the No-Build Alternative range from 25,400 trips for Alternatives 1 and 2 to 31,650 trips for Alternative 7. A comparison to the TSM Alternative shows the numbers of daily corridor trips increase by 9,200 under Alternatives 1 and 2 and by 15,450 under Alternative 7.

TABLE 3-3
YEAR 2020 REGIONAL DAILY TRANSIT TRIPS

Alternative	2020 Daily Transit Trips – All Purposes	Transit Modal Share (%)
No-Build	1,985,936	3.04%
TSM	2,005,798	3.07%
BRT 1	2,014,520	3.08%
BRT 2	2,013,181	3.08%
LRT 3	2,017,685	3.09%
BRT 4	2,014,992	3.08%
LRT 5	2,019,707	3.09%
LRT 6	2,018,185	3.09%
HRT/LRT 7	2,020,268	3.09%
HRT/BRT 8	2,015,967	3.09%

TABLE 3-4
YEAR 2020 CORRIDOR DAILY TRANSIT TRIPS

Alternative	2020 Daily Transit Trips – All Purposes	Transit Modal Share (%)
No-Build	149,100	4.22%
TSM	165,300	4.68%
BRT 1	174,500	4.94%
BRT 2	174,500	4.94%
LRT 3	178,700	5.06%
BRT 4	174,900	4.95%
LRT 5	180,350	5.11%
LRT 6	179,550	5.08%
HRT/LRT 7	180,750	5.12%
HRT/BRT 8	177,150	5.01%

Fixed Guideway Daily Transit Boardings

Table 3-5 displays the forecasted numbers of corridor daily boardings on the fixed guideway for each of the build alternatives. Like total daily transit trips, the BRT alternatives would result in the fewest boardings, while the rail alternatives would have the highest boardings. Of the BRT alternatives, Alternative 8, which also includes a heavy rail subway segment, would have the highest number of boardings. However, 3,000 to 4,700 fewer daily boardings are expected under this alternative as compared with any of the rail alternatives. The heavy rail/LRT Alternative 7 would result in the highest number of boardings of any of the alternatives, and a comparison with the alternative having the lowest boardings (BRT Alternative 4) shows that Alternative 7 would produce 7,400 more boardings each day.

TABLE 3-5
YEAR 2020 CORRIDOR DAILY FIXED GUIDEWAY BOARDINGS

Alternative	Daily Fixed Guideway Transit Boardings
No-Build	N.A.
TSM	N.A.
BRT 1	11,500
BRT 2	12,400
LRT 3	17,000
BRT 4	11,300
LRT 5	18,000
LRT 6	17,800
HRT/LRT 7	18,700
HRT/BRT 8	14,000

Comparison of Transit Patronage Forecasts

One measure of the overall benefits provided by a major transit investment is the change in the overall transit ridership that the investment produces. This ridership change is measured for all transit services, not just the new facilities, because there is a high degree of interdependence among new fixed guideway services, the surrounding bus services, and the assumed background transportation system.

It is useful to compare the regional ridership generated by each of the alternatives with that produced by the No-Build and TSM Alternatives. The ranges in increased transit trips of the highest and lowest ridership-producing alternatives over the No-Build and TSM Alternatives were previously presented in the regional and corridor patronage comparisons section. Table 3-6 shows the relationship of the year 2020 total daily transit trips for all eight fixed guideway alternatives compared to the No-Build and TSM Alternatives. As noted earlier, all of the build alternatives (including those employing BRT) result in an increase in transit trips as compared to the No-Build and TSM Alternatives. However, the extent of the increase is not as dramatic with any of the BRT alternatives as with the rail alternatives.

TABLE 3-6 DAILY 2020 LINKED TRANSIT TRIPS AND DAILY NEW 2020 TRANSIT TRIPS COMPARED TO THE NO-BUILD AND TSM ALTERNATIVES			
Alternative	**Total Daily Linked Transit Trips**	**Daily New 2020 Linked Transit Trips Compared to the No-Build Alternative**	**Daily New 2020 Linked Transit Trips Compared to the TSM Alternative**
No-Build	1,985,936	N.A.	N.A.
TSM	2,005,798	19,862	N.A.
BRT 1	2,014,520	28,584	8,722
BRT 2	2,013,181	27,245	7,383
LRT 3	2,017,685	31,749	11,887
BRT 4	2,014,992	29,056	9,194
LRT 5	2,019,707	33,771	13,909
LRT 6	2,018,185	32,249	12,387
HRT/LRT 7	2,020,268	34,332	14,470
HRT/BRT 8	2,015,967	30,031	10,169

3.2 ROADWAY ANALYSIS

3.2.1 Traffic Congestion and Circulation

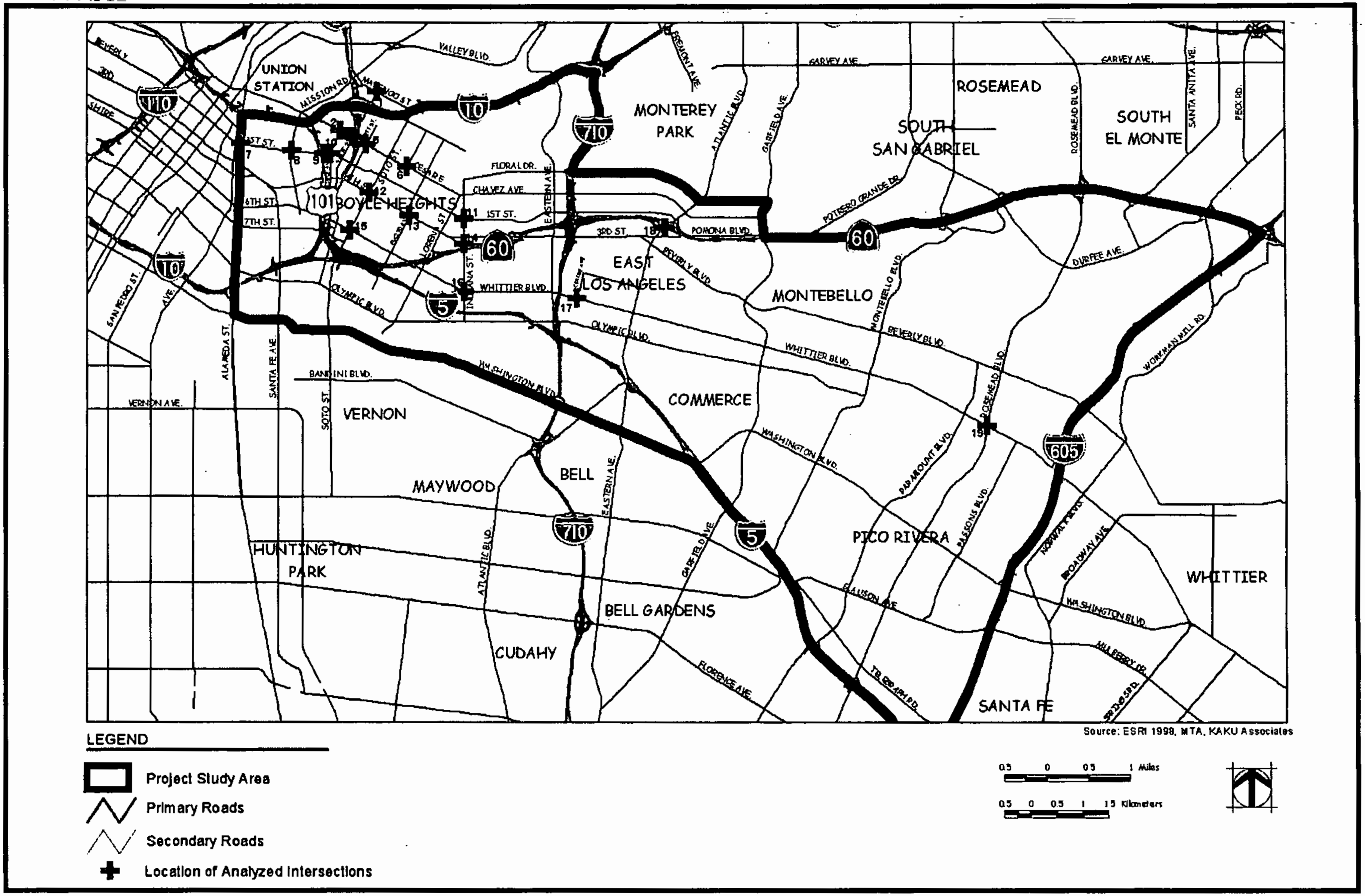
Existing Traffic Conditions

Intersections

The following describes the existing traffic operating conditions at 19 key intersections within the study area for the standard peak hours. The locations of the intersections were determined based on the alternative alignments and the potential effect each may have on the surrounding transportation network.

With the implementation of any one of the alternatives, existing traffic will be affected. Two lanes of surface mixed flow traffic will be removed throughout each surface portion of every alignment. The proposed BRT or LRT would remove trips from nearby streets and freeways, particularly parallel facilities, as people change their mode of travel to transit. However, vehicular traffic in the vicinity of the proposed stations is likely to increase. Therefore, several locations could potentially be affected (positively or negatively) by the implementation of the transit corridor. The 19 intersections shown in Table 3-7 and presented in Figure 3-1 are analyzed for existing conditions. The analysis of projected conditions for each of the alternatives being considered is presented in the impacts section . Limited traffic count data within the study area restricted the number of intersection locations analyzed.

The existing peak hour traffic volumes were obtained for the 19 analyzed intersections from a variety of sources including the City of Los Angeles Department of Transportation (LADOT) and previous studies. As shown, only the evening peak hour volumes were available.



Eastside Transit Corridor Study

Location of Analyzed Intersections

Eastside Corridor Transit Consultants

Figure 3-1

TABLE 3-7 INTERSECTION ANALYSIS			
No.	Intersection	PM Peak Hour	
		V/C Ratio	LOS
1	State St./Marengo St.	0.916	E
2	Chavez Ave./Boyle Ave.	0.430	A
3	Chavez Ave./State St.	0.656	B
4	Chavez Ave./I-5 SB Ramp	0.355	A
5	Chavez Ave./St. Louis St.	0.614	B
6	Chavez Ave./Mott St.	0.826	D
7	1st St./Alameda St.	0.801	D
8	1st St./Mission St.	0.810	D
9	1st St./US 101 NB Ramps	0.402	A
10	1st St./Boyle Ave.	0.822	D
11	1st St./Indiana St.	0.664	B
12	4th St./Soto St.	0.760	C
13	4th St./Euclid St.	0.645	B
14	4th St./Indiana St./SR 60 WB Ramp	0.717	C
15	Whittier Blvd./Soto St.	1.070	F
16	Whittier Blvd./Indiana St.	1.133	F
17	Whittier Blvd./McBride Ave.	0.808	D
18	Atlantic Blvd./SR 60 EB Ramps	1.089	F
19	Whittier Blvd./Rosemead Blvd.	1.048	F

The peak hour volumes at each intersection were analyzed using the Critical Movement Analysis (CMA) methodology, which determines a volume-to-capacity (V/C) ratio and corresponding level of service (LOS). Level of service is a qualitative measure used to describe the condition of traffic flow, ranging from excellent conditions (LOS A) to overloaded conditions (LOS F). LOS C is the level of operation typically used as a design standard, while LOS D is often considered to be acceptable for urban street systems. Intersection level of service definitions are included in Table 3-8.

Table 3-7 summarizes the existing peak hour level of service analysis conducted for the 19 analyzed intersections. As shown, the following five locations are currently operating at LOS E or F during the PM peak hour:

- State Street and Marengo Street;
- Whittier Boulevard and Soto Street;
- Whittier Boulevard and Indiana Street;
- Atlantic Boulevard and State Route 60 EB Ramps; and
- Whittier Boulevard and Rosemead Boulevard.

The other 14 analyzed locations are operating at LOS D or better.

TABLE 3-8 LEVEL OF SERVICE DEFINITIONS FOR SIGNALIZED INTERSECTIONS		
Level of Service	**Volume/Capacity Ratio**	**Definition**
A	0.000 - 0.600	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	0.601 - 0.700	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.701 - 0.800	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.801 - 0.900	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.901 - 1.000	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	>1.000	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.
Source: Transportation Research Board, *Transportation Research Circular No. 212, Interim Materials on Highway Capacity*, 1980.		

Roadways

Average daily traffic (ADT) conditions were obtained from LADOT and the cities of Montebello, Pico Rivera, and Whittier. Table 3-9 summarizes estimated daily roadway capacity, estimated daily traffic, and the daily volume-to-capacity ratio for multiple locations along key roadways in the study area. Although many arterial streets in the corridor operate below their design capacity during the peak period, several key street segments exceed their level of service (LOS) C capacity during the evening peak period. In addition, the following important arterial streets are shown to experience daily LOS E or F conditions based on the mid-block V/C ratio analysis:

- Atlantic Boulevard south of 1st Street;
- Chavez Avenue west of Lorena Street;
- 3rd Street west of I-710;
- Whittier Boulevard west of I-710;

TABLE 3-9
SUMMARY OF AVERAGE DAILY TRAFFIC (ADT) FOR THE STUDY AREA

Screenline	Cross Street	Facility Type	Number of Lanes	Capacity	ADT[1]	Ratio[2]	LOS[3]
North of Cesar Chavez Ave							
	Boyle Ave	Collector	4	24,000	1,680	0.07	A
	State St	Collector	4	24,000	13,440	0.56	A
	Soto St	Arterial	4	36,000	16,970	0.47	A
	Mott St	Local	2	6,000	5,160	0.86	D
	Lorena St	Collector	2	24,000	2,830	0.12	A
	Indiana St	Collector	2	6,000	1,850	0.31	A
	Eastern Ave	Arterial	4	24,000	13,740	0.57	A
	Atlantic Blvd	Arterial	4	36,000	27,810	0.77	C
			Total	180,000	83,480	0.46	A
South of 1st Street							
	Mission Rd	Collector	2	6,000	2,190	0.37	A
	Boyle Ave	Collector	4	24,000	12,100	0.50	A
	State St	Collector	4	24,000	2,690	0.11	A
	Soto St	Arterial	4	36,000	17,680	0.49	A
	Mott St	Local	2	6,000	4,520	0.75	C
	Lorena St	Collector	2	24,000	9,830	0.41	A
	Indiana St	Collector	2	24,000	8,890	0.37	A
	Eastern Ave	Arterial	4	24,000	11,110	0.46	A
	Atlantic Blvd	Arterial	4	36,000	33,880	0.94	E
			Total	204,000	102,890	0.50	A
North of Whittier Boulevard							
	Boyle Ave	Collector	4	24,000	10,750	0.45	A
	Soto St	Arterial	4	36,000	17,590	0.49	A
	Mott St	Local	2	6,000	6,630	1.11	F
	Indiana St	Collector	2	24,000	11,880	0.50	A
	Rowan Ave	Collector	2	6,000	2,030	0.34	A
	Eastern Ave	Arterial	4	24,000	9,070	0.38	A
	Arizona Ave	Collector	4	24,000	16,400	0.68	B
	Atlantic Blvd	Arterial	4	36,000	20,180	0.56	A
			Total	180,000	94,530	0.53	A
North of Washington Blvd							
	Paramount Blvd	Arterial	4	24,000	11,248	0.47	A
	Rosemead Blvd	Arterial	4	24,000	12,642	0.53	A
	Passons Blvd	Arterial	4	24,000	8,000	0.33	A
			Total	72,000	31,890	0.44	A
West of I-5 Freeway							
	Cesar Chavez Ave	Arterial	4	24,000	12,790	0.53	A
	1st St	Arterial	4	24,000	15,930	0.66	B
	4th St	Arterial	4	24,000	18,640	0.78	C
	Whittier Blvd	Arterial	4	24,000	14,200	0.59	A
	7th St	Collector	4	24,000	10,410	0.43	A
			Total	120,000	71,970	0.60	A

TABLE 3-9 (Continued)
SUMMARY OF AVERAGE DAILY TRAFFIC (ADT) FOR THE STUDY AREA

Screenline	Cross Street	Facility Type	Number of Lanes	Capacity	ADT[1]	Ratio[2]	LOS[3]
West of Lorena Street							
	Cesar Chavez Ave	Arterial	4	24,000	52,220	2.18	F
	1st St	Arterial	4	24,000	14,550	0.61	A
	4th St	Arterial	4	24,000	3,490	0.15	A
	Whittier Blvd	Arterial	4	24,000	20,150	0.84	D
			Total	96,000	90,410	0.94	E
West of I-710 Freeway							
	Cesar Chavez Ave	Arterial	4	24,000	21,500	0.90	D
	1st St	Arterial	4	24,000	11,330	0.47	A
	3rd St	Arterial	4	24,000	23,300	0.97	E
	Whittier Blvd	Arterial	4	24,000	25,200	1.05	F
	Olympic Blvd	Arterial	4	24,000	23,600	0.66	B
			Total	120,000	104,930	0.87	D
East of Atlantic Boulevard							
	Cesar Chavez Ave	Arterial	4	24,000	16,490	0.69	B
	1st St	Arterial	4	24,000	9,280	0.39	A
	Pomona Blvd	Arterial	4	24,000	12,861	0.54	A
	Beverly Blvd	Arterial	4	24,000	21,823	0.91	E
	Whittier Blvd	Arterial	4	24,000	21,120	0.88	D
	Olympic Blvd	Arterial	4	24,000	28,056	1.17	F
			Total	144,000	109,630	0.76	C
West of Garfield Avenue							
	Olympic Blvd	Arterial	4	24,000	16,881	0.70	B
	Washington Blvd	Arterial	4	24,000	25,288	1.05	F
			Total	48,000	42,169	0.88	D
West of Rosemead Blvd							
	Beverly Blvd	Arterial	4	24,000	12,289	0.51	A
	Whittier Blvd	Arterial	4	24,000	14,918	0.62	B
			Total	48,000	27,207	0.57	A
East of Norwalk Boulevard							
	Whittier Blvd	Arterial	4	24,000	22,000	0.92	E
			Total	24,000	22,000	0.92	E

[1]Average Daily Traffic, Caltrans (1991), LADOT (1991), County of Los Angeles (1996), Cities of Commerce (1998), Pico Rivera (1987), and Whittier (1990)
City of Montebello ADT data currently unavailable
[2]Volume/Capacity Ratio
[3]Level of Service

- Beverly Boulevard east of Atlantic Boulevard;
- Olympic Boulevard east of Atlantic Boulevard;
- Washington Boulevard west of Garfield Avenue; and
- Whittier Boulevard east of Norwalk Boulevard.

Also, a local street, Mott Street north of Whittier Boulevard, experiences daily LOS E conditions.

Traffic Circulation Analysis Methodology

The following presents the three-step methodology used to estimate the impacts of the alternatives.

Future Traffic Volumes With and Without the Project

Future traffic volumes for the analyzed intersections and selected street segments were obtained from the modeling data, including peak hour traffic volumes for conditions with and without the project for each alternative under consideration. It has been assumed that future traffic volumes along parallel facilities to the various alignments are expected to decrease while the volumes near the stations with park-and-ride facilities are expected to increase. Selected street segments were analyzed at specific screenline locations.

Future Level of Service With and Without the Project

Based on the future peak hour traffic volumes, the future level of service (LOS) at each of the analyzed intersections and along each of the street segments was determined for conditions with and without the project. The intersections that are projected to operate at LOS E or F were identified and considered unacceptable. This analysis was conducted for each of the alternatives. It is expected that several of the alternatives will have similar results.

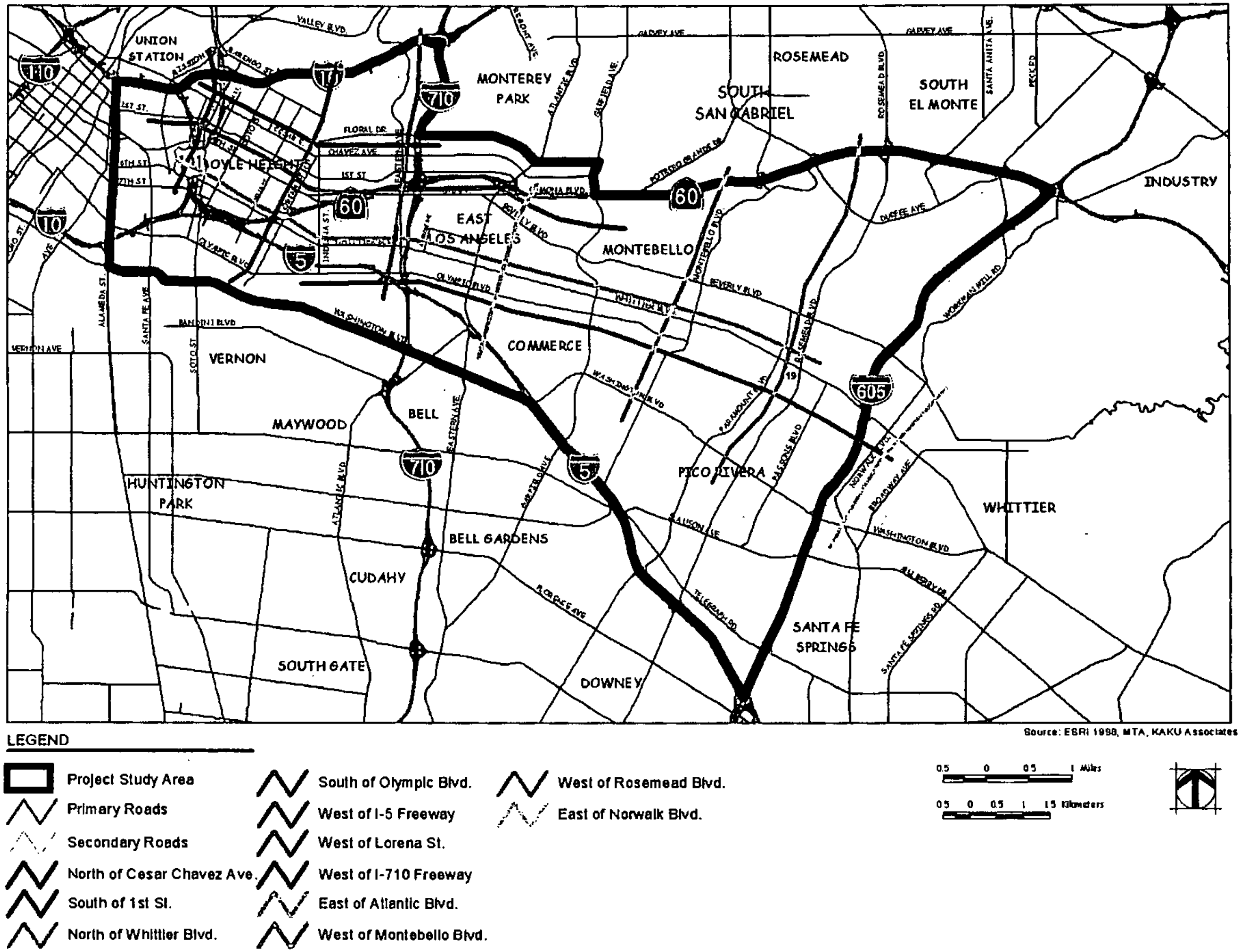
Comparison of Alternatives

Based on the LOS analysis, the number of analyzed intersections and street segments operating at unacceptable levels were calculated and compared for each of the alternatives being considered. The comparison presents the alternatives with both the least and highest numbers of impacted locations.

Traffic Circulation Impacts Assessment

Roadway Impacts

Each build alternative's traffic impacts were compared with those in the No-Build and TSM Alternatives. Average Daily Traffic (ADT) data for the year 2020 was obtained from the transportation demand model and then used as the basis for the evaluation of traffic impacts in the Eastside Corridor. Table 3-10 presents the results of the analysis. The eleven representative screenline locations used in the analysis are displayed in Figure 3-2.



Eastside Transit Corridor Study

Screenline Locations

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Figure 3-2

TABLE 3-10
AVERAGE DAILY TRAFFIC (ADT) AND LEVEL OF SERVICE (LOS) AT SELECTED SCREENLINES
YEAR 2020

FACILITY	Alternative																			
	No-Build		TSM		1		2		3		4		5		6		7		8	
	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS
NORTH OF CHAVEZ AVE.	(Screenline 1 on Figure 3-2)																			
State St.	11,700	A	11,600	A	13,500	A	11,900	A	11,800	A	11,700	A	11,300	A	12,200	A	11,900	A	12,300	A
Soto St.	17,900	A	16,600	A	16,400	A	16,300	A	16,700	A	16,700	A	16,400	A	1,800	A	17,800	A	15,800	A
Indiana St.	7,900	A	7,800	A	8,800	A	8,100	A	8,100	A	8,100	A	8,000	A	7,300	A	7,000	A	7,700	A
Eastern Ave.	15,900	A	15,600	A	15,800	A	15,400	A	15,400	A	15,900	A	15,900	A	15,700	A	15,600	A	15,600	A
Atlantic Blvd.	32,200	B	31,500	B	31,300	B	13,700	A	13,600	A	16,100	A	31,300	B	32,400	B	31,000	B	31,100	B
Surface Street Total	**85,600**	**A**	**83,100**	**A**	**85,800**	**A**	**65,400**	**A**	**65,600**	**A**	**68,500**	**A**	**82,900**	**A**	**69,400**	**A**	**83,300**	**A**	**82,500**	**A**
Golden State Fwy I-5	374,600	F	377,000	F	376,300	F	379,400	F	361,800	F	380,500	F	376,800	F	365,000	F	381,200	F	382,100	F
Long Beach Fwy I-710	224,900	F	223,700	F	227,300	F	224,400	F	238,500	F	225,600	F	224,700	F	236,000	F	224,500	F	224,200	F
Freeway Total	**599,500**	**F**	**600,700**	**F**	**603,600**	**F**	**603,800**	**F**	**600,300**	**F**	**606,100**	**F**	**601,500**	**F**	**601,000**	**F**	**605,700**	**F**	**606,300**	**F**
SOUTH OF 1ST ST.	(Screenline 2 on Figure 3-2)																			
Mission Rd.	10,300	B	10,100	B	9,900	B	11,300	C	11,100	B	12,100	C	11,300	C	11,000	B	10,200	B	10,700	B
Boyle Ave.	8,900	A	8,400	A	10,300	A	10,100	A	9,300	A	10,200	A	9,000	A	10,200	A	8,900	A	9,300	A
Soto St.	26,900	D	27,100	D	19,200	F*	19,400	F*	19,100	F*	19,400	F*	19,100	F*	27,600	D	27,400	D	18,700	F*
Indiana St.	18,500	F	18,100	F	19,300	F	18,500	F	18,600	F	18,700	F	18,900	F	13,800	D	13,700	D	18,800	F
Eastern Ave.	10,400	A	10,500	A	9,500	A	9,400	A	9,400	A	9,700	A	9,900	A	9,700	A	9,600	A	9,500	A
Atlantic Blvd.	33,200	B	32,500	B	34,500	C	33,800	C	33,200	B	34,700	C	34,700	C	34,800	C	34,300	C	34,500	C
Garfield Ave.	33,300	B	32,100	B	33,300	B	33,800	C	33,100	B	32,400	B	33,100	B	33,700	C	33,600	C	33,500	C
Surface Street Total	**141,500**	**B**	**138,800**	**B**	**136,000**	**B**	**136,300**	**B**	**133,800**	**B**	**137,200**	**B**	**136,000**	**B**	**140,800**	**B**	**137,700**	**B**	**135,000**	**B**
Santa Ana Fwy US 101	258,600	F	253,800	F	248,100	F	252,700	F	249,800	F	249,300	F	254,000	F	246,100	F	247,000	F	251,100	F
Golden State Fwy I-5	359,000	F	361,200	F	364,200	F	350,400	F	346,900	F	366,200	F	362,400	F	349,100	F	365,800	F	368,400	F
Long Beach Fwy I-710	240,000	F	241,500	F	242,600	F	237,200	F	251,900	F	241,100	F	241,700	F	249,400	F	240,000	F	239,500	F
Freeway Total	**857,600**	**F**	**856,500**	**F**	**854,900**	**F**	**840,300**	**F**	**848,600**	**F**	**856,600**	**F**	**858,100**	**F**	**844,600**	**F**	**852,800**	**F**	**859,000**	**F**
NORTH OF WHITTIER BLVD.	(Screenline 3 on Figure 3-2)																			
Boyle Ave.	6,500	A	6,100	A	6,600	A	6,800	A	7,100	A	6,800	A	6,400	A	6,600	A	6,500	A	6,200	A
Soto St.	24,800	C	24,600	C	23,900	C	24,200	C	23,500	C	24,100	C	23,900	C	24,000	C	24,900	C	24,300	C
Indiana St.	14,700	E	14,700	E	15,400	E	15,200	E	15,600	E	15,200	E	15,100	E	14,600	E	15,200	E	15,300	E
Rowan Ave.	17,500	F	19,600	F	16,500	F	16,500	F	16,300	F	16,500	F	16,300	F	16,800	F	16,600	F	16,600	F
Ford Blvd.	9,000	A	9,200	A	9,500	A	9,300	A	9,500	A	9,600	A	9,200	A	9,900	A	9,400	A	9,400	A
Arizona Ave.	13,000	A	13,000	A	14,100	A	8,300	A*	8,200	A*	13,400	A	14,400	A	8,000	A*	13,300	A	13,200	A
Atlantic Blvd.	37,500	C	37,000	C	36,000	C	27,500	A	27,200	C	36,400	C	36,400	C	37,800	C	35,900	C	25,100	A
Garfield Ave.	43,500	E	43,000	E	41,500	D	41,600	D	41,600	A	41,500	A	41,400	D	42,000	D	41,400	D	41,400	D
Montebello Blvd.	24,100	C	24,100	C	23,100	C	23,600	C	23,600	C	23,900	C	24,100	C	23,600	C	24,000	C	24,100	C
Paramount Blvd.	17,700	A	16,200	A	18,400	F*	18,600	F*	18,600	A	19,200	A	19,100	F*	18,700	A	19,200	F*	19,100	F*
Rosemead Blvd.	26,100	D	25,900	D	22,700	C	25,300	C	25,400	C	23,500	C	22,900	C	25,000	C	22,800	C	23,000	C
Surface Street Total	**234,400**	**B**	**233,400**	**B**	**227,700**	**B**	**216,900**	**B**	**216,600**	**B**	**229,800**	**B**	**229,200**	**B**	**227,000**	**B**	**229,200**	**B**	**217,700**	**B**
Santa Ana Fwy. US-101	263,600	F	259,300	F	254,000	F	258,000	F	255,000	F	255,100	F	258,400	F	251,600	F	253,200	F	257,000	F
Golden State Fwy. I-5	344,800	F	345,900	F	349,500	F	350,400	F	332,700	F	351,400	F	347,700	F	336,600	F	351,500	F	352,300	F
Long Beach Fwy. I-710	224,700	F	225,800	F	227,600	F	226,700	F	239,700	F	227,800	F	226,500	F	237,300	F	226,500	F	225,300	F
San Gabriel R. Fwy. I-605	298,400	F	298,400	F	295,200	F	296,200	F	295,700	F	295,000	F	295,100	F	295,800	F	295,000	F	295,000	F
Freeway Total	**1,129,400**	**F**	**1,126,300**	**F**	**1,131,300**	**F**	**1,123,100**	**F**	**1,131,300**	**F**	**1,129,300**	**F**	**1,127,700**	**F**	**1,121,300**	**F**	**1,130,300**	**F**	**1,130,300**	**F**

*Indicates that number of traffic lanes will be reduced by the fixed guideway under this alternative.

TABLE 3-10 (CONTINUED)
AVERAGE DAILY TRAFFIC (ADT) AND LEVEL OF SERVICE (LOS) AT SELECTED SCREENLINES
YEAR 2020

FACILITY	Alternative																			
	No-Build		TSM		1		2		3		4		5		6		7		8	
	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS
SOUTH OF OLYMPIC BLVD	(Screenline 4 on Figure 3-2)																			
Indiana St.	15,200	A	16,200	A	15,700	A	14,500	A	14,900	A	14,800	A	14,900	A	15,000	A	14,900	A	14,900	A
Atlantic Blvd.	32,400	B	31,600	B	32,700	B	31,700	B	30,600	B	31,700	B	32,500	B	31,400	B	31,500	B	13,500	B
Garfield Ave.	35,400	C	34,600	C	35,200	C	34,700	C	35,000	C	35,300	C	35,400	C	35,500	C	35,400	C	35,300	C
Montebello Blvd.	18,700	A	18,900	A	19,400	B	19,000	A	19,200	B	19,000	A	19,100	B	19,400	B	18,800	A	18,900	A
Paramount Blvd.	17,100	A	17,000	A	18,200	A	16,900	A	16,400	A	18,400	A	18,500	A	16,700	A	18,300	A	18,400	A
Rosemead Blvd.	24,300	C	17,500	A	19,800	B	19,300	B	19,100	B	20,600	B	19,800	B	18,900	A	19,800	B	20,100	B
Norwalk Blvd.	13,100	A	13,500	A	13,100	A	13,100	A	13,300	A	13,100	A	13,200	A	13,400	A	13,300	A	13,300	A
Surface Street Total	**156,200**		**149,300**	**A**	**154,100**	**B**	**149,200**	**A**	**148,500**	**A**	**152,900**	**B**	**153,400**	**B**	**150,300**	**A**	**152,000**	**A**	**152,400**	**B**
Long Beach Fwy. I-710	265,200	F	237,100	F	264,300	F	238,300	F	252,200	F	238,400	F	237,000	F	249,100	F	236,000	F	235,300	F
San Gabriel R. Fwy. I-605	295,900	F	296,500	F	294,600	F	294,700	F	295,300	F	294,600	F	294,900	F	295,200	F	294,200	F	295,000	F
Freeway Total	**561,900**	**F**	**533,600**	**F**	**558,900**	**F**	**533,000**	**F**	**547,500**	**F**	**533,000**	**F**	**531,900**	**F**	**544,300**	**F**	**530,200**	**F**	**530,300**	**F**
WEST OF I-5 FREEWAY	(Screenline 5 on Figure 3-2)																			
Cesar Chavez Ave.	13,800	A	13,900	A	10,000	B	13,800	A	14,200	A	14,500	A	14,000	A	14,200	A	13,900	A	13,700	A
1st Street	11,400	A	11,900	A	12,800	A	9,000	A*	8,900	A*	8,900	A*	8,500	A*	9,000	A*	12,200	A	11,700	A
4th Street	10,400	A	10,000	A	10,900	A	10,700	A	11,100	A	10,700	A	10,100	A	10,200	A	9,800	A	10,000	A
Whittier Blvd.	11,100	A	11,200	A	11,400	A	9,900	A	10,100	A	11,100	A	11,000	A	10,200	A	10,900	A	11,500	A
7th Street	5,600	A	5,300	A	5,300	A	4,700	A	5,500	A	5,700	A	5,700	A	5,800	A	5,500	A	5,500	A
Surface StreetTotal	**52,300**	**A**	**52,300**	**A**	**50,400**	**A**	**48,100**	**A**	**49,800**	**A**	**50,900**	**A**	**49,300**	**A**	**49,400**	**A**	**52,300**	**A**	**52,400**	**A**
San Bernardino Fwy.	187,300	F	186,400	F	187,100	F	190,300	F	189,300	F	188,000	F	188,800	F	193,400	F	189,700	F	192,500	F
Santa Monica Fwy. I-10	441,600	F	439,900	F	438,600	F	439,100	F	436,400	F	440,100	F	440,400	F	436,900	F	439,300	F	438,100	F
Freeway Total	**628,900**	**F**	**626,300**	**F**	**625,700**	**F**	**629,400**	**F**	**625,700**	**F**	**628,100**	**F**	**629,200**	**F**	**630,300**	**F**	**629,000**	**F**	**630,600**	**F**
WEST OF LORENA STREET	(Screenline 6 on Figure 3-2)																			
Cesar Chavez Ave.	10,700	A	10,900	A	8,700	A	10,600	A	10,600	A	11,300	A	11,400	A	10,400	A	10,200	A	11,300	A
1st Street	6,700	A	6,100	A	8,700	A	7,500	A	8,000	A	7,700	A	7,600	A	5,100	A*	5,300	A	8,100	A
4th Street	14,100	A	14,200	A	9,900	B*	9,800	B*	9,600	B*	9,700	B*	9,600	B*	14,400	A	14,500	A	9,600	B*
Whittier Blvd.	5,100	A	4,600	A	5,600	A	5,800	A	5,200	A	5,600	A	5,600	A	5,600	A	5,800	A	5,600	A
Olympic Blvd.	15,100	A	15,500	A	15,400	A	15,200	A	15,600	A	15,200	A	15,300	A	15,900	A	15,300	A	15,800	A
Surface Street Total	**51,700**	**A**	**51,300**	**A**	**48,300**	**A**	**48,900**	**A**	**49,000**	**A**	**49,500**	**A**	**49,500**	**A**	**51,400**	**A**	**15,100**	**A**	**49,800**	**A**
San Bernardino Fwy. I-10	313,300	F	311,700	F	312,500	F	309,700	F	321,400	F	312,900	F	311,300	F	319,600	F	310,100	F	310,200	F
Pomona Fwy. SR-60	295,900	F	294,000	F	296,500	F	296,100	F	294,400	F	296,700	F	295,200	F	294,000	F	294,300	F	293,900	F
Santa Ana Fwy. I-5	453,000	F	451,300	F	448,200	F	452,800	F	437,000	F	449,700	F	451,900	F	437,200	F	449,800	F	454,000	F
Freeway Total	**1,062,200**	**F**	**1,057,000**	**F**	**1,057,200**	**F**	**1,058,600**	**F**	**1,052,800**	**F**	**1,059,300**	**F**	**1,058,400**	**F**	**1,050,800**	**F**	**1,054,200**	**F**	**1,058,100**	**F**
WEST OF I-710 FREEWAY	(Screenline 7 on Figure 3-2)																			
Cesar Chavez Ave.	16,300	A	18,400	A	16,500	A	29,800	E	30,000	E	30,200	E	30,700	E	30,000	E	30,000	E	30,100	E
1st Street	3,300	A	3,100	A	3,500	A	4,200	A	4,100	A	3,900	A	3,800	A	4,300	A	3,800	A	3,900	A
3rd Street	12,100	A	12,400	A	8,600	A*	8,600	A*	8,500	A*	8,800	A*	8,900	A*	8,700	A*	8,600	A*	8,600	A*
Whittier Blvd.	15,400	A	13,200	A	15,900	A	15,500	A	15,400	A	15,600	A	15,600	A	15,500	A	15,800	A	16,000	A
Olympic Blvd.	9,300	A	9,400	A	12,500	A	9,700	A	9,400	A	9,900	A	9,400	A	9,400	A	9,700	A	9,600	A
Surface Street Total	**56,400**	**A**	**56,500**	**A**	**57,000**	**A**	**67,800**	**A**	**67,400**	**A**	**68,400**	**A**	**68,400**	**A**	**67,900**	**A**	**67,900**	**A**	**68,200**	**A**

*Indicates that number of traffic lanes will be reduced by the fixed guideway under this alternative.

TABLE 3-10 (CONTINUED)
AVERAGE DAILY TRAFFIC (ADT) AND LEVEL OF SERVICE (LOS) AT SELECTED SCREENLINES
YEAR 2020

FACILITY	Alternative																			
	No-Build		TSM		1		2		3		4		5		6		7		8	
	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS
WEST OF I-710 FREEWAY	(Screenline 7 on Figure 3-2)																			
San Bernardino Fwy. I-10	318,000	F	316,000	F	316,700	F	313,800	F	326,300	F	315,700	F	314,900	F	324,400	F	314,000	F	314,000	F
Pomona Fwy. SR-60	320,200	F	318,200	F	320,300	F	319,900	F	319,100	F	320,400	F	318,100	F	319,600	F	319,400	F	318,500	F
Santa Ana Fwy. I-5	447,000	F	444,500	F	442,100	F	447,300	F	431,800	F	444,500	F	446,300	F	431,100	F	444,600	F	448,500	F
Freeway Total	**1,085,200**	**F**	**1,079,300**	**F**	**1,079,100**	**F**	**1,081,000**	**F**	**1,077,200**	**F**	**1,059,300**	**F**	**1,079,300**	**F**	**1,075,100**	**F**	**1,078,000**	**F**	**1,081,000**	**F**
EAST OF ATLANTIC BLVD.	(Screenline 8 on Figure 3-2)																			
Cesar Chavez Ave.	20,900	B	20,400	B	20,800	B	20,200	B	20,200	A	20,700	B	21,000	A	20,100	B	21,000	B	20,800	B
Pomona Blvd.	10,800	A	10,300	A	11,400	A	10,900	A	10,300	A	11,400	A	11,100	A	10,600	A	11,400	A	11,400	A
Beverly Blvd.	34,600	F	33,700	F	25,400	F*	32,600	F	32,500	F	25,100	F*	24,900	F*	32,600	F	25,300	F*	25,400	F*
Whittier Blvd.	20,200	B	19,800	B	20,200	B	19,800	F*	19,600	F*	20,100	B	20,500	A	19,500	F*	20,400	B	20,200	B
Olympic Blvd.	39,000	F	38,900	F	39,400	F	38,600	F	38,200	F	39,500	F	39,100	F	38,200	F	29,500	E	39,600	F
Surface Street Total	**125,500**	**C**	**123,100**	**C**	**117,200**	**D**	**122,100**	**D**	**120,800**	**D**	**116,800**	**D**	**97,700**	**B**	**121,000**	**D**	**107,600**	**C**	**117,400**	**D**
Pomona Fwy. SR-60	295,400	F	295,500	F	295,200	F	294,500	F	294,400	F	295,700	F	295,900	F	294,200	F	295,500	F	295,300	F
Santa Ana Fwy. I-5	344,000	F	341,600	F	341,900	F	343,800	F	340,600	F	342,800	F	341,800	F	339,700	F	341,900	F	344,000	F
Freeway Total	**639,400**	**F**	**637,100**	**F**	**637,100**	**F**	**638,300**	**F**	**635,300**	**F**	**638,500**	**F**	**637,700**	**F**	**633,900**	**F**	**637,400**	**F**	**639,300**	**F**
WEST OF MONTEBELLO BLVD.	(Screenline 9 on Figure 3-2)																			
Beverly Blvd.	43,500	F	43,400	F	36,900	F*	44,800	F	44,600	F	36,900	F*	36,900	F*	45,000	F	36,800	F*	37,000	F*
Whittier Blvd.	28,000	D	28,100	D	27,600	D	21,000	F*	21,300	F*	27,500	D	27,400	D	21,400	F*	27,100	D	27,100	D
Olympic Blvd.	11,400	A	11,100	A	11,000	A	11,600	A	11,500	A	11,000	A	11,100	A	11,700	A	11,000	A	10,000	A
Washington Blvd.	31,700	B	30,700	B	31,200	B	31,100	B	30,900	B	21,400	A	31,700	B	31,400	B	31,300	B	31,400	B
Surface Street Total	**114,600**	**D**	**113,300**	**C**	**106,700**	**D**	**108,500**	**D**	**108,300**	**D**	**96,800**	**C**	**107,100**	**D**	**109,500**	**D**	**106,200**	**D**	**105,500**	**D**
Pomona Fwy. SR-60	284,100	F	284,300	F	283,900	F	284,500	F	284,200	F	284,400	F	283,200	F	284,100	F	283,600	F	283,900	F
Freeway Total	**284,100**	**F**	**284,300**	**F**	**283,900**	**F**	**284,500**	**F**	**284,200**	**F**	**284,400**	**F**	**283,200**	**F**	**284,100**	**F**	**283,600**	**F**	**283,900**	**F**
WEST OF ROSEMEAD BLVD.	(Screenline 10 on Figure 3-2)																			
Beverly Blvd.	39,000	F	39,000	F	38,000	F*	42,100	F	41,900	F	38,700	F*	38,400	F*	41,600	F	38,400	F*	38,200	F*
Whittier Blvd.	43,000	F	42,900	F	27,000	F	26,100	F*	26,000	F*	26,800	F	26,800	F	26,000	F*	26,800	F	27,000	F
Washington Blvd.	47,400	E	47,500	E	51,300	F	50,600	F	49,900	F	51,300	F	51,200	F	50,100	F	51,100	F	51,500	F
Surface Street Total	**129,400**	**F**	**129,400**	**F**	**116,300**	**F**	**118,800**	**F**	**117,800**	**F**	**116,800**	**F**	**116,400**	**F**	**117,700**	**F**	**116,300**	**F**	**116,700**	**F**
Pomona Fwy. SR-60	277,100	F	278,100	F	279,500	F	279,100	F	279,600	F	278,100	F	279,200	F	279,600	F	279,000	F	278,900	F
Freeway Total	**277,100**	**F**	**278,100**	**F**	**279,500**	**F**	**279,100**	**F**	**279,600**	**F**	**278,100**	**F**	**279,200**	**F**	**279,600**	**F**	**279,000**	**F**	**278,900**	**F**
EAST OF NORWALK BLVD.	(Screenline 11 on Figure 3-2)																			
Beverly Blvd.	48,700	F	48,500	F	53,600	F	54,000	F	53,800	F	53,500	F	53,600	F	53,900	F	53,500	F	35,700	F
Whittier Blvd.	41,200	F	41,700	F	34,200	F	33,900	F	34,200	F	34,400	F	34,700	F	34,300	F	34,400	F	34,200	F
Washington Blvd.	37,100	C	37,700	C	39,400	C	39,500	D	39,300	D	39,300	D	39,100	D	39,200	D	39,500	D	39,600	D
Surface Street Total	**127,000**	**F**	**127,900**	**F**	**127,200**	**F**	**127,400**	**F**	**127,300**	**F**	**127,200**	**F**	**127,400**	**F**	**127,400**	**F**	**127,400**	**F**	**109,500**	**F**

*Indicates that number of traffic lanes will be reduced by the fixed guideway under this alternative.

Surface Arterial Streets

As a rule, traffic impacts where lanes were reduced on arterial streets were greater than the impacts that occurred on other streets where lanes were not removed for the proposed transit systems in Alternatives 1 through 8. A good example of this is Soto Street between 1st and 4th streets where the level of service (LOS) degrades from D in the No-Build and TSM Alternatives to LOS F in Alternatives 1 through 5 and 8. In Alternatives 6 and 7, where a subway segment replaces the need to remove lanes of traffic on Soto, Soto Street remained at LOS D. Due to the lack of through north-south arterials in Boyle Heights and the existence of many east-west alternate routes, there is a far greater traffic impact on Soto Street (the principal north-south arterial in Boyle Heights) than on the east-west streets when lanes of traffic are removed on these arterials. East-west arterials, such as Cesar Chavez Avenue in Alternative 1, and 1st and 4th streets in Alternatives 2 through 8, are impacted more when combined with pedestrian safety and parking impacts in the narrow streets of the community. Levels of service degraded from LOS A in the No-Build and TSM Alternatives to LOS B in the alternatives where lanes were removed for these streets. A degradation from LOS A to LOS B is not an impact that is significant for traffic. As traffic lanes are removed on one east-west arterial in Boyle Heights, other parallel streets absorb the traffic that was displaced. Some of the traffic also disappears either because it is diverted to other corridors or because trips are diverted from the automobile mode to the new, more attractive transit mode. At the screenline located west of Lorena Street, the sum of the traffic volumes is 51,700 and 51,300 in the No-Build and TSM Alternatives, respectively, and in the build alternatives, the sum ranges from 48,000 to 51,000. The higher traffic volumes in this east-west corridor location applies to those alternatives where a subway profile does not remove traffic lanes. The higher volumes exist in Alternatives 6 and 7 where the light rail system is in a subway west of Lorena Street. At this screenline, those alternatives that remove lanes from 4th Street see a degradation of service from LOS A to LOS B on 4th Street. Most other streets will be operating at LOS A in the year 2020 with each alternative in Boyle Heights.

Although the traffic level of service calculations reveal a minor degradation in traffic conditions (or none at all) with the introduction of a transit system within street rights-of-way, it is important to recognize the conditions of the streets in Boyle Heights. Street widths in Boyle Heights are very narrow (most have a curb-to-curb width of 60 feet) and only allow for one lane of traffic in each direction when light rail or a busway occupy the remaining two traffic lanes. Such a condition makes for a degradation in service levels at intersections (to be described in a subsequent section) where right and left-turning movements are permitted. The level of service analysis in this section does not take into consideration traffic impacts at intersections. Levels of service will also be degraded due to the maneuvering of motorists wishing to park in the on-street parking spaces along the streets where a BRT or LRT system will be running. Significant delays could be realized when there is conflict between through traffic and traffic wishing to utilize on-street parking spaces. These two operational problems are exacerbated by the narrow conditions of the streets in Boyle Heights.

In addition to intersection-induced delays and parking delays, there is a concern over pedestrian safety that requires redress. If the remaining traffic lane at an intersection is up against the curb while a light rail station occupies the majority of roadway space in the median, there is very little buffer space between pedestrians on the sidewalk and flowing traffic in the traffic lane. The proximity of pedestrians to potentially fast-moving traffic poses a safety threat, especially at station locations. There are six such situations in LRT Alternatives 3 and 5. There are only two of these situations at station locations in Alternative 6, and only one such situation in Alternative 7. The enhanced pedestrian safety of Alternatives 6 and 7 is a direct result of their containing subway segments through Boyle Heights. Boyle Heights has the greatest pedestrian activity of any of the communities along the Eastside Corridor. The confluence of high pedestrian activity and narrow streets in the Boyle Heights community makes the issue of pedestrian safety very important when considering the introduction of a new transit system that will realign traffic rights-of-way closer to the pedestrian realm. A simple level of service calculation does not take into account the issues of parking and pedestrian safety in Boyle Heights.

From a level of service analytical perspective, the East Los Angeles community incurs greater traffic impacts than those in Boyle Heights because of the elimination of alternative east-west streets east of Atlantic. West of Atlantic Boulevard, traffic impacts are minimal along 3rd Street and Arizona Avenue. At the screenline west of the Long Beach Freeway (I-710), there is little impact on traffic as lanes are removed from 3rd Street in all eight build alternatives. Although capacity was reduced by 50 percent on 3rd Street, the LOS did not worsen and remained at LOS A even though the volume-to-capacity (V/C) ratio increased significantly from approximately 0.38 to 0.54. As was true for Boyle Heights, the issue of pedestrian safety must be recognized in the Whittier Boulevard business corridor west of Atlantic where the street is narrow. East of Atlantic Boulevard, several alternative east-west streets become discontinuous to the east, such as Floral Drive and 1st Street. In addition, Cesar Chavez Avenue/Riggin Street and Pomona Boulevard do not continue in the same corridor as Beverly, Whittier, and Olympic as they travel east of Atlantic. As a result, traffic impacts on the east-west streets increase east of Atlantic Boulevard. At the screenline east of Atlantic, levels of service deteriorate significantly on streets where lanes were removed in the build alternatives. Whittier Boulevard goes from LOS B in the No-Build Alternative to LOS F in Alternatives 2, 3, and 6 where lanes were removed. Beverly Boulevard in the No-Build Alternative already operates at LOS F. When traffic lanes are removed in Alternatives 1, 4, 5, 7, and 8, the V/C ratio increases from approximately 1.02 to 1.57, which constitutes a serious worsening of LOS F on Beverly. The other build alternatives have Beverly Boulevard operating at an LOS F that is comparable to that found in the No-Build Alternative. North-south arterials in the East Los Angeles area do not have their service levels degraded by any significant amount in any of the build alternatives. Because the streets are wider in the areas of the corridor east of Indiana Street, pedestrian safety issues are of lesser concern. The greater width of the streets, such as on 3rd Street and Beverly Boulevard, allows for a sufficient buffer zone between flowing traffic and pedestrians on the sidewalk. Traffic will not be utilizing the far curb lanes where street space is occupied for a light rail station in Alternatives 3, 5, 6, and 7.

Because there are a lesser number of alternative surface arterials there, the eastern portion of the Eastside Corridor experiences greater traffic impacts on Beverly and Whittier Boulevards. Traffic impacts increase as one moves west to east through the cities of Montebello, Pico Rivera, and Whittier. At the screenline west of Montebello Boulevard, Beverly operates at LOS F and Whittier operates at LOS D in the No-Build and TSM Alternatives. When traffic lanes are removed from Whittier Boulevard in Alternatives 2, 3, and 6, the street operates at LOS F with a V/C ratio of approximately 1.32. When lanes are removed from Beverly Boulevard in Alternatives 1, 4, 5, 7, and 8, the LOS F significantly worsens from a V/C ratio of approximately 1.36 to 2.31. At the screenline west of Rosemead Boulevard in the City of Pico Rivera, both Beverly and Whittier Boulevards operate at LOS F in the No-Build and TSM Alternatives. Each build alternative worsens the LOS F on Whittier Boulevard from a V/C ratio of approximately 1.34 to 1.69. In each of the build alternatives, Washington Boulevard appears to pick up some of the traffic from Whittier. Washington is a southern alternative arterial street to Whittier. Washington Boulevard operates at LOS E in the No-Build and TSM Alternatives and operates at LOS F in all eight build alternatives. Most north-south arterial streets in the Montebello/Pico Rivera area of the Corridor are not impacted in any of the build alternatives. In Alternatives 1, 4, 5, 7, and 8 where lanes are removed from Paramount Boulevard in Pico Rivera, there is a significant degradation of service (LOS A to F). Paramount Boulevard declines from LOS A in the No-Build and TSM Alternatives to F in those alternatives.

Whereas the removal of lanes in each of the alternatives in the Boyle Heights and East Los Angeles areas generally results in a minor shift in traffic volumes and a minor degradation of service that is not of great significance except for Soto Street, the removal of lanes on major arterial streets in the eastern portion of the Eastside Corridor (east of Atlantic) results in a significant degradation of service. Soto Street remains the only arterial in the Boyle Heights area that suffers a major degradation in level of service in Alternatives 1 through 5 and 8. Alternatives 6 and 7 have the least impact on traffic in Boyle Heights because they are in a subway through this area and do not remove lanes from Soto Street as do the other alternatives. These two alternatives also remove lanes on Whittier Boulevard instead of Beverly east of Arizona Avenue, which creates less of a traffic impact than those alternatives that remove lanes on Beverly Boulevard. Although it is not the subject of this analysis, there may be trade-offs made between on-street parking lanes and traffic lanes. In areas where the demand for on-street parking is low, the parking lanes may be removed instead of the traffic lanes. This is one possible mitigation that could be introduced to minimize the impact of the proposed transit system on streets where traffic impacts are high, such as along Beverly or Whittier Boulevards in Montebello and Pico Rivera. This strategy will be explored during preparation of the SEIS/SEIR. However, for the purposes of this Re-Evaluation MIS, it is assumed that all on-street parking lanes will be maintained. The introduction of a new transit system only removes traffic lanes in the street roadbed. Alternatives 6 and 7 also minimize pedestrian safety problems in the Boyle Heights community by their providing a subway profile through most of the community. The narrowness of the streets in Boyle Heights combined with curbside traffic lanes, intersection delays, and parking conflicts makes the traffic and pedestrian impacts greater than those we can measure through a simple level of service analysis.

Freeways

Since none of the build alternatives directly impacts any portion of the many freeways that cross the Eastside Corridor, there is little difference in traffic volumes and levels of service on any portion of the freeway system in the area in any of the build alternatives. However, predicted traffic volumes far exceed capacity on the freeways. At each screenline, freeway levels of service are at LOS F. Most freeways operate with a V/C ratio of between 1.70 and 2.15, which is a severe level of service F on the freeways of the Eastside Corridor.

Congested Roadway Segments

A comparison of the numbers of roadway segments that would be congested in 2020 is provided in Table 3-11 for each alternative. Congestion is defined as any segment operating at a LOS E or F. The segments shown assume an approximate one-mile segment located at the screenline locations displayed in Table 3-10 and in Figure 3-2. Comparison of the build alternatives shows that the highest number of congested roadway segments (16) would occur under Alternative 2, while the fewest (12) would occur under Alternative 7. The No-Build and TSM Alternatives both would have 12 congested street segments, and Alternative 7 is the only alternative that does not increase that number. Alternatives 6 and 7 contain a subway section through Boyle Heights, which reduces congestion on such streets as Soto Street and Indiana Street. Alternative 8 also has a subway section that stops at Soto Street and continues on Soto as BRT. The Soto Street alignment increases the number of congested segments for this alternative. The difference in congested segments between Alternatives 6 and 7 is explained by Alternative 6 following Whittier Boulevard versus Alternative 7 following Beverly Boulevard. Whittier Boulevard is at LOS D in the No-Build and TSM Alternatives, and it operates at LOS F in those alternatives where a transit alignment follows the street.

If we consider pedestrian safety issues as was discussed in the previous section, the number of impacted segments would necessarily increase. As stated earlier, the physical conditions of the narrow streets in Boyle Heights presents unique pedestrian safety concerns when traffic is flowing immediately adjacent to the curb and sidewalk in the community. For this reason, those alternatives (6 and 7) containing a subway section throughout Boyle Heights would have less of an impact if pedestrian safety were taken into consideration. However, for the purposes of strictly measuring traffic congestion on street segments, the LOS analysis is adequate to compare the alternatives.

TABLE 3-11
COMPARISON OF CONGESTED ROADWAY SEGMENTS[1]
YEAR 2020

	Alternative									
	No-Build	TSM	1	2	3	4	5	6	7	8
No. segments	12	12	13	16	15	13	14	13	12	14

[1]Assumes an approximate one-mile segment based on the screenline analysis.

Intersection Impacts

Based on the model data provided, intersection LOS analyses were conducted for 14 intersections for each of the alternatives being considered. The results are presented in Table 3-12. Because the model network did not include five of the 19 intersections presented in Table 3-7 and Figure 3-1, those intersections are not included in the future LOS analysis. As noted earlier, the lack of available traffic count data limited the numbers of intersections that were analyzed. Most of the intersections evaluated are in the western portion of the study area (west of Atlantic Boulevard) within the Little Tokyo Arts District, Boyle Heights, and East Los Angeles. Only one of the intersections is located within the City of Pico Rivera. Therefore, the analysis focuses mostly on anticipated impacts in the western portion of the study area.

TABLE 3-12
INTERSECTION PM PEAK HOUR LEVEL OF SERVICE
YEAR 2020

Intersection[1]		Alternative																			
		No-Build		TSM		1		2		3		4		5		6		7		8	
		V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
1	State St./ Marengo St.	1.580	F	1.439	F	1.419	F	1.444	F	1.434	F	1.444	F	1.435	F	1.222	F	1.428	F	1.409	F
2	Chavez Ave./ Boyle Ave.	0.561	A	0.577	A	0.425	A	0.542	A	0.546	A	0.541	A	0.537	A	0.552	A	0.520	A	0.561	A
3	Chavez Ave./ State St.	0.557	A	0.546	A	0.507	A	0.544	A	0.492	A	0.523	A	0.527	A	0.532	A	0.543	A	0.542	A
4	Chavez Ave./ I-5 SB Ramp	0.844	D	0.887	D	0.811	D	0.963	E	0.793	C	0.951	E	0.933	E	0.910	E	0.933	E	0.930	E
5	Chavez Ave./ St. Louis St.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	Chavez Ave./ Mott St.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	1st St./ Alameda St.	0.874	D	0.950	E	0.892	D	1.193	F	1.173	F	1.144	F	1.183	F	1.404	F	0.888	D	0.895	D
8	1st St./ Mission St.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	1st St./US 101 NB Ramps	0.280	A	0.291	A	0.457	A	0.212	A	0.215	A	0.239	A	0.235	A	0.238	A	0.303	A	0.291	A
10	1st St./ Boyle Ave.	0.787	C	0.772	C	0.938	E	0.828	D	0.823	D	0.812	D	0.789	C	0.701	C	0.756	C	0.766	C
11	1st St./ Indiana St.	0.752	C	0.743	C	0.954	E	0.742	C	0.777	C	0.777	C	0.785	C	1.002	F	0.999	E	0.773	C
12	4th St./Soto St.	0.586	A	0.636	B	0.680	B	0.669	B	0.637	B	0.665	B	0.674	B	0.624	B	0.619	B	0.690	B
13	4th St./Euclid St.	0.641	B	0.708	C	0.626	B	0.626	B	0.652	B	0.636	B	0.619	B	0.665	B	0.649	B	0.629	B
14	4th St./ Indiana St./SR 60 WB Ramp	1.591	F	1.559	F	1.594	F	1.592	F	1.582	F	1.555	F	1.551	F	1.582	F	1.567	F	1.545	F
15	Whittier Blvd./ Soto St.	1.116	F	1.148	F	1.082	F	1.081	F	1.059	F	1.076	F	1.088	F	1.097	F	1.126	F	1.079	F
16	Whittier Blvd./ Indiana St.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
17	Whittier Blvd./ McBride Ave.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18	Atlantic Blvd./ SR 60 EB Ramps	0.962	E	0.978	E	1.011	F	1.001	F	1.041	F	1.014	F	1.028	F	1.107	F	0.999	E	1.006	F
19	Whittier Blvd./ Rosemead Blvd.	1.170	F	1.167	F	1.039	F	1.121	F	1.128	F	1.045	F	1.046	F	1.117	F	1.049	F	1.044	F
Unacceptable LOS (E or F)			5		6		7		7		6		7		7		8		7		6

N/A = Not available.
[1]Intersection locations are displayed in Figure 3-1.

As shown in Table 3-12, the No-Build Alternative would result in five intersections operating at an unacceptable LOS (i.e., LOS E or F). The TSM Alternative would result in six intersections operating at an unacceptable LOS. Of the eight build alternatives, Alternatives 3 and 8 would have the least number of intersections (6) operating at an unacceptable LOS, and Alternative 6 would have the greatest number of intersections (8) operating at an unacceptable LOS.

The following five intersections will operate at LOS E or F regardless of alternative selected (including No-Build and TSM Alternatives):

- State Street and Marengo Street;
- 4th Street/Indiana Street/SR 60 Westbound Ramp;
- Whittier Boulevard and Soto Street;
- Atlantic Boulevard and SR 60 Eastbound Ramps; and
- Whittier Boulevard and Rosemead Boulevard.

With implementation of Alternatives 3 or 8, one additional intersection would be adversely affected. The intersection of 1st Street and Alameda Street would also be affected under Alternative 3. The intersection of Chavez Avenue and the I-5 southbound ramp would be the additional one affected under Alternative 8. Under Alternative 6, the seven intersections just noted would all operate at LOS E or F. Also, the intersection of 1st Street and Indiana Street would operate at unacceptable service levels.

3.2.2 Parking Access

Existing Street and Parking Conditions

A comprehensive data collection effort was undertaken to develop a detailed description of the street characteristics along the different alignments, including the availability of on-street parking. The collected data provides, by direction, the number of travel lanes, type of median, and the presence of on-street parking and the associated parking restrictions, if any. This information was collected along the streets in which the alternatives would be aligned. Table 3-13 summarizes the information.

With each of the alternatives there may be the potential need to eliminate on-street parking in order to accommodate the proposed alignments. As shown on Table 3-13, on-street parking is permitted on the majority of the streets along the proposed alignments. However, there are sections where on-street parking is prohibited on at least one side of the street during the peak hours or all day. This is evident along Cesar Chavez Avenue between Alameda Street and Pennsylvania Avenue and also along the eastern portions of Beverly and Whittier Boulevards.

TABLE 3-13
EXISTING SURFACE STREET CHARACTERISTICS

Segment	From	To	Lane		Median Type	Parking Restrictions		Speed Limit
			NB/EB	SB/WB		NB/EB	SB/WB	
Indiana St	1st St	Whittier Bl	1	1	SDY	PA	PA	30
Mednik Av/Arizona Av*	3rd St	Hubbard St	2	2	RM	PA	PA	35
	Hubbard St	Whittier Bl	2	2	RM	2HR PA 7a-6p	PA	35
Alameda St	Cesar Chavez Av	Commercial St	3	3	2LT	NSAT	NSAT	35
Cesar Chavez Av	Alameda St	Mission Rd	2	2	DY	NSAT	NSAT	35
	Mission Rd	Pennsylvania Av	2	2	2LT	NSAT	NSAT	35
	Pennsylvania Av	Warren St	2	2	DY	NSAT	PA (NS 7-9a)	30
	Warren St	Boyle Av	2	2	DY	PA	PA (NS 7-9a)	30
	Boyle Av	State St	2	2	DY	PA	1HR PA 9a-6p (NS 7-9a)	30
	State St	Brittania St	2	2	DY	NSAT	NSAT	30
	Brittania St	Soto St	2	2(3)	DY	1HR (m)PA 8a-6p	1HR (m)PA 9a-6p (NS 7-9a)	30
Soto St	Cesar Chavez Av	3rd St	2	2	DY	1HR PA 9a-6p (NS 7-9a)	1HR PA 8a-4p (NS 4-6p)	35
	3rd St	4th St	2	2	DY	NSAT	NSAT	35
4th St/3rd St	Soto St	Concord St	2	2	DY	PA	PA (NS 7-9a)	35
	Concord St	Lorena St	2	2	DY	NSAT	PA (NS 7-9a)	35
	Lorena St	Indiana St	2	2	DY	PA	PA (NS 7-9a)	35
	Indiana St	Gage St	2(3)	2(3)	2LT	PA (NS 4-6p)	PA (NS 6:30-9a)	35
	Gage St	Herbert Av	2	2(3)	RM	PA	PA (NS 6:30-9a)	35
	Herbert Av	Downey Rd	2	3	RM	NSAT	NSAT	35
	Downey Rd	Sunol Dr	3	3	RM	NSAT	NSAT	35
	Sunol Dr	Eastern Av	2(3)	2(3)	2LT	PA (NS 4-6p)	PA (NS 6:30-9a)	35
	Eastern Av	Humphreys Av	2(3)	2(3)	2LT	PA (NS 4-6p)	PA (NS 6:30-9a)	35
	Humphreys Av	Ford Bl	2(3)	2(3)	DY	PA (NS 4-6p)	PA (NS 6:30-9a)	35
	Ford Bl	Mednik Av	2(3)	2(3)	2LT	PA (NS 4-6p)	PA (NS 6:30-9a)	35
	Mednik Av	Fetterly Av	2(3)	2(3)	2LT	PA (NS 4-6p)	2HR PA 9a-6p (NS 6:30-9a)	35
	Fetterly Av	Beverly Bl	2(3)	2(3)	2LT	PA (NS 4-6p)	PA (NS 6:30-9a)	35
Beverly Bl	3rd St	Atlantic Bl	2	2	RM	PA	2HR PA 8a-5p	35
	Atlantic Bl	Bradshawe St	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	35
	Bradshawe St	Hendricks Av	2	2	2LT	2HR PA 7a-6p	2HR PA 7a-6p	35
	Hendricks Av	Findlay Av	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	35
	Findlay Av	Via Acosta	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	35
	Via Acosta	Garfield Av	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	35
	Garfield Av	Via Altamira	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	35
	Via Altamira	Hay St	2	2	RM/2LT/ RM	2HR PA 7a-6p	2HR PA 7a-6p	35
	Hay St	Via Val Verde	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	35
	Via Val Verde	Vail Av	2(3)	2(3)	RM	2HR PA 7a-3p (NS 3-6p)	2HR PA 9a-6p (NS 6:30-9a))	35

Notes:
Lanes:
#(#)= Number of lanes(Number of lanes during Peak Hour)
Parking:
PA = Parking Allowed
NSAT = No Stopping Anytime (m) = Metered Parking
*=Tapers to one through lane at 4th St. due to construction on both NB & SB approaches.

Median Type:
DY = Double Yellow Centerline
NPAT = No Parking Anytime
RM = Raised Median
2LT = Dual Left Turn Centerline
SDY = Single Dashed Yellow Centerline

TABLE 3-13 (Continued)
EXISTING SURFACE STREET CHARACTERISTICS

Segment	From	To	Lane		Median	Parking Restrictions		Speed
			NB/EB	SB/WB	Type	NB/EB	SB/WB	Limit
	Via Val Verde	Vail Av	2(3)	2(3)	RM	2HR PA 7a-3p (NS 3-6p)	2HR PA 9a-6p (NS 6:30-9a))	35
	Via Altamira	Hay St	2	2	RM/2LT/ RM	2HR PA 7a-6p	2HR PA 7a-6p	35
	Hay St	Via Val Verde	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	35
	Via Val Verde	Vail Av	2(3)	2(3)	RM	2HR PA 7a-3p (NS 3-6p)	2HR PA 9a-6p (NS 6:30-9a))	35
	Vial Av	Maple Av	2(3)	2(3)	RM	NSAT	2HR PA 9a-6p (NS 6:30-9a))	35
	Maple Av	Taylor Av	2(3)	2(3)	RM/2LT/ RM	2HR PA 7a-3p (NS 3-6p)	2HR PA 9a-6p (NS 6:30-9a))	35
	Taylor Av	Howard Av	2(3)	2(3)	2LT/RM	2HR PA 7a-3p (NS 3-6p)	2HR PA 9a-6p (NS 6:30-9a))	35
	Howard Av	Spruce St	2(3)	2(3)	2LT	2HR PA 7a-3p (NS 3-6p)	2HR PA 9a-6p (NS 6:30-9a))	35
	Spruce St	Montebello Bl	2(3)	2(3)	2LT/RM	2HR PA 7a-3p (NS 3-6p)	2HR PA 9a-6p (NS 6:30-9a))	35
	Montebello Bl	Wilber Pl	2	2	2LT	NSAT	NSAT	35
	Wilber Pl	Bradley Av	2	2	2LT	NSAT	PA	35
	Bradley Av	Rea Dr	2	2	2LT	NSAT	NSAT	35
	Rea Dr	Pine St	2	2	DY/RM/ DY	NSAT	NSAT	35
	Pine St	Paramount Bl	2	2(3)	RM	NS 3-6p	NS 6-9a	35
Paramount Bl	Beverly Bl	Olympc Bl	2	2	RM	PA	PA	35
	Olympc Bl	Whittier Bl	2	2	RM	NSAT	NSAT	35
Whittier Bl	Arizona Av	Atlantic Bl	2	2	DY	1HR PA 7a-6p	1HR PA 7a-6p	30
	Atlantic Bl	Amalia Av	2	2	DY	NSAT	PA	30
	Amalia Av	Hillview Av	2	2	DY	PA	PA	30
	Hillview Av	Goodrich Bl	2	2	2LT	PA	PA	30
	Goodrich Bl	Belden Av	2	2	2LT	NSAT	PA	30
	Belden Av	Gerhart Av	2	2	2LT	PA	PA	30
	Gerhart Av	Simmons Av	2	2	2LT	NSAT	1HR PA 7a-6p	30
	Simmons Av	Westside Dr	2	2	2LT	1HR PA 7a-6p	1HR PA 7a-6p	30
	Westside Dr	Saybrook Av	2	2	2LT	NSAT	1HR PA 7a-6p	30
	Saybrook Av	Via Clemente	2	2	2LT	1HR PA 7a-6p	1HR PA 7a-6p	30
	Via Clemente	Garfield Av	2	2	2LT/RM	1HR PA 7a-6p	2HR PA 7a-6p	30
	Garfield Av	Concourse Av	2	2	RM/2LT/ RM	2HR PA 7a-6p	2HR PA 7a-6p	30

Notes:
Lanes:
#(#)= Number of lanes(Number of lanes during Peak Hour)
Parking:
PA = Parking Allowed
NSAT = No Stopping Anytime
(m) = Metered Parking
* = Tapers to one through lane at 4th St due to construction on both Northbound and Southbound approaches.

Median Type:
DY = Double Yellow Centerline
NPAT = No Parking Anytime
RM = Raised Median
2LT = Dual Left Turn Centerline
SDY = Single Dashed Yellow Centerline

TABLE 3-13 (Continued)
EXISTING SURFACE STREET CHARACTERISTICS

Segment	From	To	Lane NB/EB	Lane SB/WB	Median Type	Parking Restrictions NB/EB	Parking Restrictions SB/WB	Speed Limit
	Concourse Av	Wilcox Av	2	2	RM/2LT/ RM	2HR PA 7a-6p	2HR PA 7a-6p	30
	Wilcox Av	22nd St	2	2	DY	2HR PA 7a-6p	2HR PA 7a-6p	30
	22nd St	2oth St	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	30
	2oth St	19th St	2	2	2LT/RM	2HR PA 7a-6p	2HR PA 7a-6p	30
	19th St	Vail Av	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	30
	Vail Av	Maple Av	2	2	RM	2HR PA 7a-6p	NSAT	30
	Maple Av	Taylor Av	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	30
	Taylor Av	12th St	2	2	RM/2LT	2HR PA 7a-6p	2HR PA 7a-6p	30
	12th St	Greenwood Av	2	2	RM	2HR PA 7a-6p	2HR PA 7a-6p	30
	Greenwood Av	10th St	2	2	2LT	2HR PA 7a-6p	NSAT	30
	10th St	Montebello Bl	2	2	2LT	NSAT	2HR PA 7a-6p	30
	Montebello Bl	2nd St	2	2	DY	2HR PA 7a-6p	2HR PA 7a-6p	30
	2nd St	1st St	2	2	DY	NSAT	NSAT	35
	1st St	Van Norman Rd	2	2	DY/RM/ DY	NSAT	NSAT	35
	Van Norman Rd	Orange St	2	2	2LT	NSAT	NSAT	35
	Orange St	Paramount Bl	2	2	RM	PA	PA	35
	Paramount Bl	Gregg Rd	2	2	RM	PA	PA	35
	Gregg Rd	Esperanza Av	2	2	RM/DY	NSAT	NSAT	35
	Esperanza Av	I-605 NB On Ramps	2	2	RM	NSAT	NSAT	35
	I-605 NB On Ramps	Redman Av	2	2	DY	NSAT	NSAT	35
	Redman Av	Norwalk Bl	2	2	DY	PA	PA	35
1st St	Alameda St	Rose St	2	2	DY	NSAT	NSAT	30
	Rose St	Vignes St	2	2	DY	2HR (m)PA 8a-4p (NS 4-6p)	2HR (m)PA 9a-6p (NS 7a-9p)	30
	Vignes St	Mission Rd	2	2	DY	NSAT	NSAT	30
	Mission Rd	Anderson St	2	2	DY	NSAT	NSAT	30
	Anderson St	Clarence St	2	2	DY	1HR PA 8a-4p (NS 4-7p)	1HR PA 9a-6p (NS 7a-9p)	30
	Clarence St	Gless St	2	2	DY	1HR PA 8a-4p (NS 4-7p)	PA (NS 7-9a)	30
	Gless St	Boyle Av	2	2	DY	NSAT	NSAT	30
	Boyle Av	Mathews St	2	2	DY	1HR (m)PA 8a-6p	1HR (m)PA 8a-6p	30
	Mathews St	Fickett St	2	2	DY	1HR (m)PA 8a-6p	1HR (m)PA 8a-6p	30
	Fickett St	Mott St	2	2	DY	PA	1HR (m)PA 8a-6p	30
	Mott St	Saratoga St	2	2	2LT	NPA 8a-6p	PA	30
	Saratoga St	Savannah St	2	2	DY	NPA 7a-5p	PA	30
	Savannah St	Lorena St	2	2	DY	PA	PA	30
	Lorena St	Cheesbroughs Ln	2	2	DY	1HR PA 8a-6p	PA	30
	Cheesbroughs Ln	Indiana St	2	2	DY	1HR PA 8a-6p	NSAT	30

Lanes:
#(#)= Number of lanes(Number of lanes during Peak Hour)
Parking:
PA = Parking Allowed
NSAT = No Stopping Anytime (m) = Metered Parking
*=Tapers to one through lane at 4th St. due to construction on both NB & SB approaches.

Median Type:
DY = Double Yellow Centerline
NPAT = No Parking Anytime
RM = Raised Median
2LT = Dual Left Turn Centerline
SDY = Single Dashed Yellow Centerline

Parking Impacts Methodology

Two tasks were undertaken to provide an estimate of parking losses. The first task was to perform a field survey to inventory the number of parking spaces. Every street segment was surveyed where a transit alignment of any of the eight alternatives was proposed. The survey also yielded parking restriction information on each of the streets. This is helpful in determining whether spaces would indeed be removed. For example, the presence of a 24-hour parking prohibition on a block where a station is located would mean a zero loss of parking on that block because there was no parking available in the first place.

The second task was to estimate the number of parking spaces lost based on the characteristics of each type of station (BRT or LRT). Each mode has different implications for parking impacts. Details of the differences are discussed in the next section.

Parking Impacts Assessment

A preliminary parking analysis was performed in order to assess the extent to which the number of on-street parking spaces would be removed if one of the eight build alternatives were chosen as the Locally Preferred Alternative. Each of the eight build alternatives was compared with each other and with the No-Build and TSM Alternatives. The issue of on-street parking is especially important in areas where small businesses are located. There will be few on-street parking spaces removed on any alignment except where a station location is proposed. Parking losses between stations will generally be due to longer parking spaces used to facilitate easier parallel parking. The focus of this parking analysis, therefore, is on the station locations. Parking impacts are distributed differently based on the number of stations and the type of stations (BRT or LRT) in each alternative.

Parking Losses due to Bus Rapid Transit

The typical cross-sections of the streets that include a BRT system reveal a loss of parking only where the parking lane serves as a station platform. Between stations, the BRT line would utilize one traffic lane in each direction, and curb parking would be retained. Bus station platforms would typically be located on the far side of a street intersection and would be 180 feet long. Parking would be permitted immediately beyond the platforms. The average length of a parking space is 25 feet. Therefore, the average number of spaces lost per bus platform is seven. This number may be conservatively estimated because it does not take into account such parking interruptions as driveways and alleyways. Nevertheless, a single BRT station could displace up to approximately 14 parking spaces (counting both sides of the street) unless pre-existing parking prohibitions make the number lower.

Because only one through traffic lane will be available approaching each BRT station, there is a need to provide a separate right turn lane at the major street intersections to accommodate right-turn movements. This will ensure that the single through travel lane is not blocked by vehicles waiting for pedestrians to cross the street in the crosswalk. This will require approximately 150 feet of curb lane for each approach, which translates into the removal of an additional six spaces on each side of the street at each station location.

The retention of curb parking between station areas on the BRT system presents the possibility of conflict between transit vehicles and cars parking in the curb lane. Cars would need to enter the dedicated BRT lane in order to back into a parking space along the curb. This could impact the operation of the BRT system, cause significant delays, and create conflicts between BRT transit vehicles and curb parking vehicles. The high turnover of parking spaces in business districts increases the likelihood of conflict between BRT vehicles and cars accessing parking spaces across the dedicated BRT lane.

It is assumed that local buses along the BRT alignments will utilize all BRT station platforms and all existing intermediate local curbside bus stops. In order to maintain superior BRT operations and improve local bus service in the BRT corridor, local buses will operate in the exclusive BRT lane on all streets. This operating pattern will not require the removal of additional parking spaces along the BRT alignments.

Parking Losses due to Light Rail Transit

Because the typical cross-sections of the streets that include a LRT system are different from a BRT system, different parking impacts would occur. The amount of space needed for a station is different for BRT and LRT systems. LRT stations require almost three times as much space in the street as BRT stations. This is due to the nature of the LRT tracks and the need to transition the width of the tracks at and near the stations. The loss of parking for LRT would still only occur at station locations, but only on streets with less than 100 feet of right-of-way. Generally, narrower streets on the alignments are located west of Indiana Street in Boyle Heights. Because of this, the LRT alternatives would have parking impacts primarily in Boyle Heights. LRT stations would be located in the center of the street, and in streets where the right-of-way is narrow, parking would be eliminated. Where streets have a 100-foot width, parking would be retained in the station areas and one traffic lane in each direction would be eliminated.

LRT station platforms are typically 270 feet long, and a 300-foot distance is needed on each side of the platform to allow the tracks to transition from being 14 feet to 25 feet apart to accommodate the platform. Therefore, the length of parking that would be displaced for a LRT station on a narrow street would be approximately 870 feet on each side. However, not all of this length is parking. Because stations are located adjacent to major cross-streets, those streets would be included in the 870-foot distance. The width of major cross streets in Boyle Heights was assumed to be 80 feet. There is often one minor cross street on the opposite side of the station platform, and this width was assumed to be 60 feet. Using these assumptions, the length of parking that would be displaced is not 870 feet, but 730 feet. This translates into a loss of up to approximately 29 spaces per side of the street per station. This is a very conservative number and does not take into consideration driveways or parking prohibition zones on the curb. Parking prohibitions are taken into consideration in the station by station analysis, which follows in the next section.

Because only one lane of traffic will be available at each LRT station location, there will be impacts on right-turning movements. Due to the presence of the LRT system in the center of the street, it is assumed that left-turn movements would be accommodated through changes in signal phasing at signalized intersections. On streets with narrow widths (80 to 82 feet), parking would be removed at station areas, and there would be no room to provide any turn lanes. This could cause significant delay for through traffic when a vehicle making a right turn waits for pedestrians to cross the street in the crosswalk. On wider streets, approximately 150 feet of curb lane would be needed for a right turn lane so that the single through travel lane is not blocked by turning vehicles waiting for pedestrians to cross the street in the crosswalk. This is the same issue that was discussed previously with the BRT station areas. At station areas where the street is 100 feet wide, six parking spaces would be displaced on each side of the street.

Local buses along the LRT alignments will utilize the travel lane and all existing curbside bus stops, including those located near the station areas. No additional parking spaces will be displaced to accommodate the operation of local bus lines on streets where a light rail line also operates.

Parking Impacts by Station

For all stations, a parking impact analysis was performed. The analysis was based on three criteria: 1) the length of parking removed (based on whether the station is for BRT or LRT), the need to provide for right-turning lanes, and 3) the parking prohibitions located in the station area. Table 3-14 shows the number of parking spaces that may be removed at each station location by mode.

LRT station parking impacts would have significant concentrations in the Boyle Heights station areas whereas parking impacts of the BRT system would be spread out over most of the 28 BRT stations. Three BRT stations (1st/Alameda, 1st/Boyle, and Beverly/4th) would have no parking impacts because of the existence of 24-hour curb parking prohibitions at those locations. One BRT station (4th/Soto) would have half the parking impact of other similar stations because one side of the street at 4th/Soto currently has a 24-hour curb parking prohibition.

The greatest impacts of the LRT stations would occur in Boyle Heights. The wider streets of East Los Angeles, Montebello, Pico Rivera, and Whittier allow for parking to be maintained in these communities if one traffic lane is removed in each direction. Three stations (1st/Boyle, 4th/Soto, and 4th/Lorena) have approximately 36 spaces eliminated due to the presence of 24-hour parking prohibitions on one side of the street at those locations. The other four Boyle Heights stations would each have up to 58 spaces eliminated. The actual number of parking spaces displaced may be somewhat less due to reductions in parking for driveways, alleyways, loading zones, or other special curb zones.

Parking Impacts by Alternative

The number of curb parking spaces that may be removed for each build alternative is summarized in Table 3-15. Table 3-16 provides a breakdown of the parking losses by corridor segment.

TABLE 3-14 ESTIMATED NUMBER OF ON-STREET PARKING SPACES DISPLACED AT STATIONS			
Station Location	**Alternative**	**BRT**	**LRT**
Union Station	All	0	0
Chavez/Boyle	1	19	0
Chavez/Soto	1, 8	20	0
1st/Alameda	1-6	0	0
1st/Utah	2-6	26	58
1st/Boyle	2-5	0	36
1st/Chicago	2-5	26	58
1st/Lorena	6,7	0	58
4th/Soto	1-5,8	13	36
4th/Evergreen	1-5,8	26	58
4th/Lorena	1-5,8	14	36
3rd/Rowan	All	26	12
3rd/Mednik	All	26	12
Beverly/Atlantic	1,4,5,7,8	26	12
Beverly/Gerhart	1,4,5,7,8	26	12
Beverly/Garfield	1,4,5,7,8	26	12
Beverly/Wilcox	1,4,5,7,8	26	12
Beverly/Montebello	1,4,5,7,8	13	6
Beverly/4th Street	1,4,5,7,8	0	0
Whittier/Arizona	2,3,6	26	12
Whittier/Atlantic	2,3,6	26	12
Whittier/Gerhart	2,3,6	13	6
Whittier/Garfield	2,3,6	26	12
Whittier/Wilcox	2,3,6	26	12
Whittier/Montebello	2,3,6	13	6
Whittier/Rosemead	All	26	12
Whittier/Passons	All	26	12
Whittier/Norwalk	All	26	12

The No-Build Alternative would displace no parking spaces, and it is unlikely that the bus improvements identified in the TSM Alternative will displace any parking spaces. Of the eight Build alternatives, two have relatively low impacts. LRT Alternative 6 and HRT/LRT Alternative 7 remove 236 and 172 parking spaces, respectively, and remove the most spaces at one station location (1st/Utah for Alternative 6 and 1st/Lorena for Alternative 7). This represents a low overall impact, but a concentrated impact in the one station area on each alignment. The other LRT alternatives (3 and 5) displace the greatest number of parking spaces of all the alternatives. These two alternatives displace 402 and 396 spaces, respectively, and have a concentrated impact at station locations in Boyle Heights. LRT station areas located east of Indiana Street have parking removed only for the provision of right turn lanes.

TABLE 3-15 ESTIMATED ON-STREET PARKING PLACES DISPLACED	
Alternative	**Number of Parking Spaces**
No-Build	0
TSM	0
1	339
2	365
3	402
4	352
5	396
6	236
7	172
8	320

TABLE 3-16 ESTIMATED ON-STREET PARKING PLACES DISPLACED BY CORRIDOR SEGMENT		
Corridor Segment	**Alternative**	**Number of Parking Spaces**
Boyle Heights (Alameda to Indiana)	1	92
	2	105
	3	282
	4	105
	5	282
	6	116
	7	58
	8	73
East Los Angeles (Indiana to Garfield)	1	130
	2	143
	3	66
	4	130
	5	60
	6	66
	7	60
	8	130
Montebello/Pico Rivera (Garfield to Norwalk)	1	117
	2	117
	3	54
	4	117
	5	54
	6	54
	7	54
	8	117

The BRT alternatives displace less parking per station area, but displace parking at many more station locations. The BRT alternative with the least impact on parking is HRT/BRT Alternative 8 (320 spaces displaced). The BRT alternative with the greatest impact is Alternative 2 (365 spaces displaced).

Overall, the LRT alternatives that have no subway portions have the greatest number of parking spaces displaced while the BRT alternatives have impacts in the range of 320 to 365 spaces displaced. The subway portions of the alternatives reduce the number of parking spaces displaced because significant impacts are concentrated around station locations in Boyle Heights, especially with alternatives that include light rail. The distribution of impacts per station between LRT and BRT alternatives reflects the different physical dimensions of the two different modes and the need to accommodate turning movements to keep through traffic moving through the corridor.

Mitigation

After a preferred alternative is selected, MTA will begin working with the affected communities to develop plans for mitigation to minimize the impacts of parking losses. This section discusses possible options that could be considered. A possible mitigation is to build convenient parking structures as replacement for the loss of parking, especially in small business districts. Another option is to purchase small properties in affected areas in order to provide several smaller parking lots that would not be as centralized as a structure. A third option is to take advantage of underutilized parking lots near stations, where available, as a way of making more efficient use of existing parking infrastructure. These are just three options and are not to be taken as policies endorsed by the MTA. As discussed, these and other options will be explored in more detail later. MTA is committed to replacing the lost parking as a project cost.

3.3 SUMMARY TRANSPORTATION ANALYSIS

3.3.1 Introduction

This section begins by summarizing the major transportation issues associated with each alternative according to the evaluation criteria that was considered. The major observations of the comparative evaluation of the alternatives are next presented. In the event that it is decided to construct the project in phases, a comparison of the potential traffic and parking impacts of two smaller segments of each alignment is also presented. The two segments are: Union Station to Lorena Street and Union Station to Atlantic Boulevard. No ridership forecasts were prepared for the two smaller segments; therefore, the criteria focus only on the traffic and parking impacts. Table 3-17, found at the conclusion of this section, consists of a matrix that compares the criteria considered for each alternative throughout the total length of each alignment (Union Station to Norwalk Boulevard). Table 3-18 compares the criteria for each alternative for the portion of the study area between Union Station and Lorena Street, and Table 3-19 presents this information for the section of the study area between Union Station and Atlantic Boulevard.

3.3.2 Comparison by Alternative

No-Build Alternative

Implementation of the No-Build Alternative would result in the lowest ridership (1,985,936 daily regional transit trips and 149,100 daily such trips within the Eastside Transit Corridor) of all of the alternatives. With regard to numbers of congested roadway segments, this alternative ties with the TSM Alternative and LRT Alternative 7 for the fewest congested (12). As stated earlier, congestion is defined as any segment operating at a LOS E or F. It also results in the fewest congested intersections (5). The No-Build Alternative would not require displacement of any existing on-street parking spaces or reduction in the number of traffic lanes available.

TSM Alternative

The second lowest daily patronage would be achieved with implementation of the modest transit improvements associated with the TSM Alternative (2,005,798 regional trips and 165,300 corridor trips). Although this alternative would produce 19,862 new regional transit trips each day as compared to the No-Build Alternative, it would still produce 7,383 fewer new trips than the build alternative with the lowest ridership (BRT Alternative 2) and 14,470 fewer new trips than the alternative with the highest patronage (Heavy rail/LRT Alternative 7). With regard to congested roadway segments, this alternative ties with the No-Build and LRT Alternative 7 for the fewest congested (12). It ties with Alternatives 3 and 8 for the second fewest congested intersections (6). Like the No-Build Alternative, the TSM Alternative would not require displacement of any existing on-street parking spaces or reduction in the number of traffic lanes available.

Alternative 1

BRT Alternative 1 ranks second to last of the build alternatives with regard to regional ridership (2,014,520 daily trips) and ties with Alternative 2 for lowest corridor ridership (174,500 daily trips). However, it still creates 28,584 additional regional trips over the No-Build Alternative and 8,722 additional regional trips over the TSM Alternative. Of the build alternatives, Alternative 1 results in the second fewest fixed guideway boardings within the corridor (11,500 daily).

Alternative 1 ties with Alternatives 4 and 6 regarding numbers of congested roadway segments (13). All three alternatives have one more congested segment than the No-Build and TSM Alternatives and Alternative 7. Alternative 1 also ties with Alternatives 2, 4, 5, and 7 in the numbers of congested intersections (7) ranking third behind the No-Build and TSM Alternatives, respectively.

This alternative may result in the loss of 339 on-street parking spaces to accommodate the stations. The stations are the only areas where on-street parking would be removed for any of the build alternatives. This alternative ranks in the middle range of all build alternatives in terms of numbers of spaces lost. As with all of the BRT alternatives, the losses are more or less spread throughout the study area in the vicinity of all of the stations and are not concentrated in any particular location.

Alternative 2

BRT Alternative 2 produces the lowest daily ridership of the build alternatives (2,013,181 regional trips and 174,500 corridor trips). However, it still creates 27,245 additional trips over the No-Build Alternative and 7,383 new trips over the TSM Alternative. It ranks sixth with regard to fixed guideway boardings within the corridor (12,400 each day), but it results in the most boardings of the alternatives employing only BRT.

This alternative ranks worst with regard to congested street segments (16). Alternative 1 ties with Alternatives 1, 4, 5, and 7 in the numbers of congested intersections (7) ranking third best behind the No-Build and TSM Alternatives, respectively.

A total of 365 on-street parking spaces may be lost in the vicinity of the stations throughout the study area. This alternative ranks third highest in number of spaces lost.

Alternative 3

LRT Alternative 3 ranks mid-range with regard to patronage compared to all of the build alternatives. Of the alternatives employing LRT, it produces the lowest daily ridership (2,017,685 regional trips and 178,700 corridor trips). A comparison to the No-Build and TSM Alternatives reveals that Alternative 3 produces 31,749 and 11,887 more daily transit trips, respectively. It creates 17,000 fixed guideway boardings which also ranks it mid-range of all the build alternatives, but lowest of the alternatives employing LRT.

This alternative ranks next to worst with regard to congested street segments (15). However, Alternative 3 ties with the TSM Alternative and Alternative 8 for second least numbers of congested intersections (6).

On-street parking losses are ranked highest of all the alternatives (402 spaces). For all of the LRT alternatives, station parking impacts would be concentrated at station locations in Boyle Heights, and fewer parking losses would be required at the other stations as compared to the BRT alternatives.

Alternative 4

BRT Alternative 4 ranks sixth with regard to daily patronage compared to all of the build alternatives. However, it produces the highest ridership of the alternatives that employ only BRT (2,014,992 regional trips and 174,900 corridor trips). It results in an additional 29,056 regional transit trips each day compared to the No-Build Alternative and 9,194 more such trips than the TSM Alternative. Alternative 4 ranks lowest with regard to daily fixed guideway boardings (11,300).

This alternative ties with Alternatives 1 and 6 regarding numbers of congested roadway segments (13). All three alternatives have one more congested segment than the No-Build and TSM Alternatives and Alternative 7. It also ties with Alternatives 1, 2, 5, and 7 in the numbers of congested intersections (7) ranking third behind the No-Build and TSM Alternatives, respectively.

A total of 352 on-street parking spaces may be lost, ranking Alternative 4 about middle range in terms of losses. Like the other BRT alternatives, the losses are more or less spread throughout the study area in the vicinity of all of the stations and are not concentrated in any particular location.

Alternative 5

LRT Alternative 5 ranks second highest in terms of daily ridership producing 2,019,707 regional trips and 180,350 corridor trips. It results in an additional 33,771 regional trips each day compared to the No-Build Alternative and 13,909 more such trips than the TSM Alternative. This alternative also ranks second highest in daily fixed guideway boardings (18,000).

This alternative ties with Alternative 8 ranking them both third fewest in numbers of congested roadway segments (14). It also ties with Alternatives 1, 2, 4, and 7 in the numbers of congested intersections (7) ranking them third behind the No-Build and TSM Alternatives, respectively.

On-street parking losses are ranked second highest of all the alternatives (396 spaces). For all of the LRT alternatives, station parking impacts would be concentrated at station locations in Boyle Heights, and fewer parking losses would be required at the other stations as compared to the BRT alternatives.

Alternative 6

LRT Alternative 6 consists of a mostly at-grade alignment with a subway segment through a portion of Boyle Heights. It ranks third highest in terms of daily ridership producing 2,018,185 regional trips and 179,550 corridor trips. Compared to the No-Build and TSM Alternatives, Alternative 6 creates an additional 32,249 and 12,387 daily transit trips, respectively. It also results in the third largest number of daily fixed guideway boardings (17,800).

This alternative ties with Alternatives 1 and 4 regarding numbers of congested roadway segments (13). All three alternatives have one more congested segment than the No-Build and TSM Alternatives and Alternative 7. However, Alternative 6 has the highest numbers of congested intersections (8) of any of the alternatives mainly because of the eastern portion on Whittier Boulevard. It results in three more congested intersections than the No-Build Alternative, which has the fewest such intersections. Note that the level of service analysis (LOS) that was used to evaluate congestion for the roadways and intersections does not take into account pedestrian safety issues and potential parking conflicts (discussed in Section 3.2.1) associated with a surface LRT or BRT system running through the narrow streets in Boyle Heights. The subway segment of Alternative 6 eliminates the need to remove lanes along Soto Street (the street segment most severely impacted by a surface transit system in Boyle Heights) and provides a subway profile through most of that community also minimizing potential pedestrian safety problems. Boyle Heights contains the highest pedestrian activity within the study area.

A total of 236 on-street parking spaces may be lost in the vicinity of the stations ranking it second in terms of lowest such losses of the build alternatives. Like the other LRT alternatives, the parking impacts would be concentrated at station locations in Boyle Heights, and fewer impacts would occur at the other stations as compared to the BRT alternatives.

Alternative 7

This hybrid alternative consists of a heavy rail subway segment and an at-grade LRT segment. Alternative 7 achieves the highest daily patronage of all of the alternatives (2,020,268 regional trips and 180,750 corridor trips). Compared to the No-Build and TSM Alternatives, this alternative produces 34,332 and 14,470 additional trips each day, respectively. It also creates the highest daily fixed guideway boardings (18,700).

With regard to congested roadway segments, this alternative ties with the No-Build and TSM Alternatives for the fewest congested (12). It also ties with Alternatives 1, 2, 4, and 5 in the numbers of congested intersections (7) ranking them third behind the No-Build and TSM Alternatives, respectively. As noted in the discussion of Alternative 6, the LOS analysis that was used to evaluate congestion for the roadways and intersections does not take into account pedestrian safety issues and potential parking conflicts associated with a surface LRT or BRT system running through the narrow streets in Boyle Heights. Like Alternative 6, the subway segment of Alternative 7 eliminates the need to remove lanes along Soto Street (the street segment most severely impacted by a surface transit system in Boyle Heights) and provides a subway profile through most of that community also minimizing potential pedestrian safety problems.

Alternative 7 requires the least loss of on-street parking (172 spaces). Like the other LRT surface alternatives, the parking impacts would be concentrated at station locations in Boyle Heights, and fewer impacts would occur at the other stations as compared to the BRT alternatives. Of the LRT alternatives, Alternative 7 has the lowest losses in Boyle Heights because of the tunneled segment that traverses a portion of that community.

Alternative 8

This hybrid alternative consists of a heavy rail subway segment and an at-grade BRT segment. Alternative 8 ranks fifth highest in terms of daily ridership (2,015,967 regional trips and 177,150 corridor trips). Compared to the No-Build and TSM Altenatives, this alternative produces 30,031 and 10,169 additional daily trips, respectively. Alternative 8 also creates the fifth highest daily fixed guideway boardings (14,000). Note that this alternative results in the highest ridership and fixed guideway boardings of any of the alternatives employing BRT.

Alternative 8 ties with Alternative 5 ranking them both third fewest in numbers of congested roadway segments (14). However, Alternative 8 ties with the TSM Alternative and Alternative 3 for second least numbers of congested intersections (6).

Alternative 8 ranks third in fewest number of parking spaces lost (320). The spaces would be lost in the vicinity of the BRT stations throughout the study area and are not concentrated in any particular location.

3.3.3 Conclusions

The major observations of the alternatives being considered with regard to ridership, traffic impacts, and parking losses are discussed in this section.

Ridership

In terms of ridership, the BRT alternatives (Alternative 1, 2, 4, as well as Alternative 8 which also includes a heavy rail subway segment) result in the lowest ridership of the build alternatives. However, Alternative 8 achieves the highest ridership of those alternatives employing BRT. Although BRT Alternative 2 has the lowest ridership of any of the build alternatives, it still produces more daily regional transit trips than the No-Build and TSM Alternatives (an additional 27,245 and 7,383 such trips, respectively). The heavy rail/LRT hybrid Alternative 7 has the highest ridership of any of the alternatives producing 34,332 more regional trips than the No-Build Alternative and 14,470 more trips than the TSM Alternative. Alternative 7 also produces 7,087 more regional trips than the build alternative with the least ridership (Alternative 2). Within the corridor, the build alternatives also result in increased daily transit trips as compared to the No-Build and TSM Alternatives. The increases over the No-Build Alternative range from 25,400 trips for Alternatives 1 and 2 to 31,650 trips for Alternative 7. A comparison to the TSM Alternative shows the numbers of daily corridor trips increase by 9,200 under Alternatives 1 and 2 and by 15,450 under Alternative 7.

Like total daily transit trips, the BRT alternatives result in the fewest fixed guideway boardings, while the rail alternatives have the highest boardings. Of the BRT alternatives, Alternative 8 produces the highest number of daily boardings (14,000); however, as previously noted, this alternative also includes heavy rail subway along a portion of its alignment. Even with the heavy rail segment, 3,000 to 4,700 fewer daily boardings are expected with Alternative 8 as compared with any of the other rail alternatives. The heavy rail/LRT Alternative 7 results in the highest number of boardings (18,700), and a comparison with the alternative having the lowest boardings (BRT Alternative 4) shows that Alternative 7 would produce 7,400 more boardings each day.

Traffic

The major findings regarding potential impacts on roadways and intersections are presented below.

Roadways

As a rule, traffic impacts where lanes are reduced on arterial streets would be greater than the impacts that occur on other streets where lanes are not removed for the proposed transit systems in Alternatives 1 through 8. A good example of this is Soto Street between 1st and 4th Streets where the level of service (LOS) degrades from D in the No-Build and TSM Alternatives to LOS F in Alternatives 1 through 5 and 8. In Alternatives 6 and 7, where a subway segment replaces the need to remove lanes of traffic on Soto, Soto Street remained at LOS D. Due to the lack of through north-south arterials in Boyle Heights and the existence of many east-west alternate routes, there is a far greater traffic impact on Soto Street (the principal north-south arterial in Boyle Heights) than on the east-west streets when lanes of traffic are removed on these arterials. East-west arterials, such as Cesar Chavez Avenue in Alternative 1, and 1st and 4th streets in Alternatives 2 through 8, are impacted more when combined with pedestrian safety and parking impacts in the narrow streets of the community. LOS degraded from LOS A in the No-Build and TSM Alternatives to LOS B in the alternatives where lanes were removed for these streets. A degradation from LOS A to LOS B is not an impact that is significant for traffic.

Although the traffic LOS calculations reveal a minor degradation in traffic conditions (or none at all) with the introduction of a transit system within street rights-of-way, it is important to recognize the conditions of the streets in Boyle Heights. Street widths in Boyle Heights are very narrow (most have a curb-to-curb width of 60 feet) and only allow for one lane of traffic in each direction when light rail or a busway occupy the remaining two traffic lanes. Besides adversely affecting intersections where turning movements are permitted, LOS will be degraded due to the maneuvering of motorists wishing to park in the on-street parking spaces along the streets where a BRT or LRT system will be running. Significant delays could be realized when there is conflict between through traffic and traffic wishing to use on-street parking spaces. These two operational problems are exacerbated by the narrow conditions of the streets in Boyle Heights.

Pedestrian safety is another concern, especially in areas with narrow street rights-of-way. The introduction of a new transit system will realign traffic rights-of-way closer to the pedestrian realm. Boyle Heights has the greatest pedestrian activity of any of the communities along the Eastside Corridor. The proximity of pedestrians to potentially fast-moving traffic poses a safety threat, especially at station locations. There are six such situations in LRT Alternatives 3 and 5. There are only two of these situations at station locations in Alternative 6, and only one such situation in Alternative 7. The enhanced pedestrian safety of Alternatives 6 and 7 is a direct result of their containing subway segments through Boyle Heights. A simple LOS calculation does not take into account the issues of parking and pedestrian safety in Boyle Heights.

From a LOS analytical perspective, the East Los Angeles community incurs greater traffic impacts than those in Boyle Heights because of the elimination of alternative east-west streets east of Atlantic Boulevard. As was true for Boyle Heights, the issue of pedestrian safety must be recognized in the Whittier Boulevard business corridor west of Atlantic Boulevard where the street is narrow. At the screenline east of Atlantic Boulevard, LOS deteriorates significantly on streets where lanes were removed in the build alternatives. Whittier Boulevard goes from LOS B in the No-Build Alternative to LOS F in Alternatives 2, 3, and 6 where lanes were removed. Beverly Boulevard in the No-Build Alternative already operates at LOS F. When traffic lanes are removed in Alternatives 1, 4, 5, 7, and 8, the volume to capacity (V/C) ratio increases from approximately 1.02 to 1.57, which constitutes a serious worsening of LOS F on Beverly. The other build alternatives have Beverly Boulevard operating at an LOS F that is comparable to that found in the No-Build Alternative. North-south arterials in the East Los Angeles area do not have their service levels degraded by any significant amount in any of the build alternatives. Because the streets are wider in the areas of the corridor east of Indiana Street, pedestrian safety issues are of lesser concern. Traffic will not be using the far curb lanes where street space is occupied for a light rail station in Alternatives 3, 5, 6, and 7.

Because there are a lesser number of alternative surface arterials there, the eastern portion of the Eastside Corridor experiences greater traffic impacts on Beverly and Whittier Boulevards. Traffic impacts increase as one moves west to east through the cities of Montebello, Pico Rivera, and Whittier Boulevard. At the screenline west of Montebello Boulevard, Beverly Boulevard operates at LOS F and Whittier Boulevard operates at LOS D in the No-Build and TSM Alternatives. When traffic lanes are removed from Whittier Boulevard in Alternatives 2, 3, and 6, the street operates at LOS F with a V/C ratio of approximately 1.32. When lanes are removed from Beverly Boulevard in Alternatives 1, 4, 5, 7, and 8, the LOS F significantly worsens from a V/C ratio of approximately 1.36 to 2.31. At the screenline west of Rosemead Boulevard in the City of Pico Rivera, both Beverly and Whittier Boulevards operate at LOS F in the No-Build and TSM Alternatives. Each build alternative worsens the LOS F on Whittier Boulevard from a V/C ratio of approximately 1.34 to 1.69. In each of the build alternatives, Washington Boulevard appears to pick up some of the traffic from Whittier Boulevard. Washington Boulevard is a southern alternative arterial street to Whittier Boulevard. Washington Boulevard operates at LOS E in the No-Build and TSM Alternatives and operates at LOS F in all eight build alternatives. Most north-south arterial streets in the Montebello/Pico Rivera area of the Corridor are not impacted in any of the build alternatives. In Alternatives 1, 4, 5, 7, and 8 where lanes are removed from Paramount Boulevard in Pico Rivera, there is a significant degradation of service (LOS A to F). Paramount Boulevard declines from LOS A in the No-Build and TSM Alternatives to F in those alternatives.

Whereas the removal of lanes in each of the alternatives in the Boyle Heights and East Los Angeles areas generally results in a minor shift in traffic volumes and a minor degradation of service that is not of great significance except for Soto Street, the removal of lanes on major arterial streets in the eastern portion of the Eastside Corridor (east of Atlantic Boulevard) results in a significant degradation of service. Alternatives 6 and 7 have the least impact on traffic in Boyle Heights because they are in a subway through this area and do not remove lanes from Soto Street as do the other alternatives. These two alternatives also remove lanes on Whittier Boulevard instead of Beverly Boulevard east of Arizona Avenue, which creates less of a traffic impact than those alternatives that remove lanes on Beverly Boulevard. Alternatives 6 and 7 also minimize pedestrian safety problems in the Boyle Heights community by their providing a subway profile through most of the community. The narrowness of the streets in Boyle Heights combined with curbside traffic lanes, intersection delays, and parking conflicts makes the traffic and pedestrian impacts greater than those we can measure through a simple level of service analysis.

Table 3-17 summarizes the numbers of congested street segments by alternative. Comparison of the build alternatives shows that the highest number of congested roadway segments (16) would occur under Alternative 2, while the fewest (12) would occur under Alternative 7. The No-Build and TSM Alternatives both would have 12 congested street segments, and Alternative 7 is the only build alternative that does not increase that number.

Intersections

Most of the intersection analysis focuses on the western portion of the study area (west of Atlantic Boulevard) due to the limited traffic count data available in the eastern portion of the study area. Of the 14 intersections evaluated, the No-Build Alternative would result in five intersections operating at an unacceptable LOS (i.e., LOS E or F). The TSM Alternative would result in six intersections operating at an unacceptable LOS. Of the eight build alternatives, Alternatives 3 and 8 would have the least number of intersections (6) operating at an unacceptable LOS, and Alternative 6 would have the greatest number of intersections (8) operating at an unacceptable LOS.

Parking

With regard to on-street parking losses, the highest losses would be associated with LRT Alternatives 3 and 5 (approximately 400 spaces in both cases). As with all of the LRT alternatives, most of the impact would be concentrated in Boyle Heights (282 spaces lost under either alternative). Alternative 7 would have the least impact on parking in Boyle Heights (58 spaces lost) because the subway segment extends through a large portion of Boyle Heights; it also has the least overall impact on parking throughout the study area (172 spaces lost). Alternative 8 has the second lowest impact in Boyle Heights (73 spaces lost) because of the subway segment and the BRT at-grade configuration from Chavez/Soto to 4th/Indiana. Of the subway alternatives, LRT Alternative 6 has the highest impact in Boyle Heights (116 spaces lost). This is because of the requirements for the LRT at-grade configuration in the narrow street rights-of-way in Boyle Heights. Alternative 6 would result in somewhat higher losses than the two at-grade BRT Alternatives 2 and 4 in Boyle Heights (105 spaces lost under each alternative).

3.3.4 Comparison of Alternatives by Shorter Segments

Union Station to Lorena Street

Table 3-18 summarizes the traffic and parking impacts for this segment of the alternatives. Of the roadway segments evaluated for congestion, the alternatives range from two segments (No-Build Alternative) to four segments (Alternatives 2, 4, 5, and 6) that would be congested. With regard to congested intersections, the No-Build Alternative would have the fewest (2) while Alternatives 2, 4, 5, and 6 would have the most (4).

As previously noted, the LOS analysis used to evaluate congestion does not take into account pedestrian safety issues and potential parking conflicts (discussed in Section 3.2.1) associated with a surface LRT or BRT system running through the narrow streets in Boyle Heights. The subway segments of Alternatives 6 and 7 eliminate the need to remove lanes along Soto Street (the street segment most severely impacted by a surface transit system in Boyle Heights) and provides a subway profile through most of that community also minimizing potential pedestrian safety problems. Boyle Heights contains the highest pedestrian activity within the entire study area.

In terms of impacts on existing on-street parking, no spaces would be lost under the No-Build or TSM Alternatives. Of the build alternatives, Alternative 7 would result in removal of the fewest spaces (58), while Alternatives 3 and 5 would require displacement of the highest number of spaces (282 each). All of the other alternatives range from 73 to 116 spaces removed, depending on the alternative selected for comparison.

Union Station to Atlantic Boulevard

The traffic and parking impacts for this segment of the alternatives are presented in Table 3-19. The numbers of congested roadway segments range from three segments (No-Build and TSM Alternatives and Alternatives 6 and 7) to five segments (Alternatives 2 through 5 and 8). Alternative 1 had four congested segments. With regard to congested intersections, the No-Build Alternative had the fewest (4), while Alternative 6 had the most (7).

As previously noted, the LOS analysis used to evaluate congestion does not take into account pedestrian safety issues and potential parking conflicts associated with a surface LRT or BRT system running through the narrow streets in Boyle Heights and a portion of Whittier Boulevard in East Los Angeles. As just noted, the subway segments of Alternatives 6 and 7 eliminate the need to remove lanes along Soto Street and provide a subway profile through most of that community also minimizing potential pedestrian safety problems. The at-grade alignments of Alternatives 1, 4, 5, 7, and 8 all avoid the narrow roadway section of Whittier Boulevard, while Alternatives 2, 3, and 6 do not.

In terms of impacts on existing on-street parking, no spaces would be lost under the No-Build or TSM Alternatives. Of the build alternatives, Alternative 7 would again result in removal of the fewest spaces (94), while Alternative 3 would require displacement of the highest number of spaces (330). Alternative 5 has slightly fewer space removal requirements (318) than Alternative 3. All of the other alternatives range from 151 to 209 spaces removed, depending on the alternative selected for comparison.

TABLE 3-17
COMPARISON OF ALTERNATIVES
(Union Station to Whittier/Norwalk)

Criteria	Alternative									
			1	2	3	4	5	6	7	8
	No-Build	TSM	BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Ridership										
Regional Daily Transit Trips	1,985,936	2,005,798	2,014,520	2,013,181	2,017,685	2,014,992	2,019,707	2,018,185	2,020,268	2,015,967
Corridor Daily Transit Trips	149,100	165,300	174,500	174,500	178,700	174,900	180,350	179,550	180,750	177,150
Corridor Daily Fixed Guideway Boardings	N.A.	N.A.	11,500	12,400	17,000	11,300	18,000	17,800	18,700	14,000
Daily New Transit Trips compared to the No Build	N.A.	19,862	28,584	27,245	31,749	29,056	33,771	32,249	34,332	30,031
Daily New Transit Trips compared to the TSM	N.A.	N.A.	8,722	7,383	11,887	9,194	13,909	12,387	14,470	10,169
Traffic										
Number of congested intersections	5	6	7	7	6	7	7	8	7	6
Number of congested street segments[1]	12	12	13	16	15	13	14	13	12	14
Parking										
On-street parking spaces displaced	0	0	339	365	402	352	396	236	172	320

1Assumes an approximate one-mile segment based on the screenline analysis.

TABLE 3-18
COMPARISON OF TRAFFIC AND PARKING IMPACTS OF THE ALTERNATIVES
(Union Station to Lorena Street)

Criteria	Alternative									
	No-Build	TSM	1	2	3	4	5	6	7	8
			BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Number of congested intersections	2	3	3	4	3	4	4	4	3	3
Number of congested street segments[1]	0	0	1	1	1	1	1	0	0	1
On-street parking spaces displaced	0	0	92	105	282	105	282	116	58	73

1Assumes an approximate one-mile segment based on the screenline analysis.

TABLE 3-19
COMPARISON OF TRAFFIC AND PARKING IMPACTS OF THE ALTERNATIVES
(Union Station to Atlantic Boulevard)

Criteria	Alternative									
	No-Build	TSM	1	2	3	4	5	6	7	8
			BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Number of congested intersections	4	5	6	6	5	6	6	7	6	5
Number of congested street segments[1]	3	3	4	5	5	5	5	3	3	5
On-street parking spaces displaced	0	0	170	209	330	183	318	164	94	151

1Assumes an approximate one-mile segment based on the screenline analysis.

4 AFFECTED ENVIRONMENT AND ENVIRONMENTAL ISSUES

The Los Angeles Metropolitan Transportation Authority (MTA) is currently in the process of preparing a Re-Evaluation/Major Investment Study (MIS) and a Supplemental Environmental Impact Statement/Supplemental Environmental Impact Report (SEIS/SEIR) on a proposal to provide mass transit service to the Eastside communities within the Los Angeles metropolitan area. The Eastside Transit Corridor Study area is a major travel corridor in the Los Angeles region. It is one of the most transit-dependent and transit-oriented communities in Los Angeles County. Many of the highest MTA and Montebello Transit ridership bus routes are in the area. The commercial and shopping areas on Cesar Chavez Avenue, 1st Street, Beverly Boulevard, and Whittier Boulevard are not only important to the community but serve the needs of a much larger area. The three colleges (California State University at Los Angeles, the East Los Angeles Community College, and the Rio Hondo Community College) in the study area are important to the cultural and educational needs of the Eastside and require quality public transit accessibility.

The MTA has considered an extension of the Los Angeles Rail Rapid Transit Project (Metro Red Line) to the Eastside communities for many years. The most recent study, *Final Environmental Impact Statement, Los Angeles East Side Extension* (September 1994) led to the adoption of a Locally Preferred Alternative to extend the Metro Red Line as a subway for 6.8 miles with seven subway stations into the Eastside communities. The initial phase (3.7 miles and four subway stations) of the Eastside heavy rail subway project continued into Final Design and right-of-way acquisition activities, and MTA entered into a Full Funding Grant Agreement for the initial phase with FTA in December 1994. Right-of-way was purchased for three of the stations at 1st Street/Boyle Avenue, Chavez Avenue/Soto Street, and 1st Street/Lorena Street. A total of 24 properties containing 21 buildings on 7.3 acres was purchased for $17,885,784. The costs included land acquisition and relocation costs for 123 residences and 24 businesses.

Subsequently, an evaluation of the current local funding available for the Eastside project and other rail projects in Los Angeles County led to a suspension of work in February 1998. Voters also approved a new County law in November 1998 that restricts the use of local Proposition A and C sales tax revenues for "new subways". In June 1997, the MTA Board authorized study of cost-effective alternatives to the suspended projects including bus rapid transit, light rail, and heavy rail with an emphasis on the corridors in which rail lines project development efforts had been suspended. As a result, MTA has decided to undertake the current study for the Eastside Corridor that involves an in-depth review of fixed guideway alternatives (rail and bus) that could lead to a project that is affordable, cost-effective, meets corridor mobility and related needs and goals, and is acceptable to the community.

This chapter of the Re-Evaluation/MIS Report addresses the environmental concerns and issues within the Eastside Corridor that are directly related to the alternatives described in Chapter 2. Each area of environmental concern is addressed with the "affected environment" or "environmental setting" (detailed information on the setting is included in the Environmental Setting Final Chapter Report dated January 2000. The environmental setting that is presented for each issue is used as the baseline data for the environmental evaluation of the alternatives under consideration. The environmental setting focuses on those portions of the environmental setting on which data is needed to provide background information necessary to help decision makers choose between proposed alternatives. A section is also included which lays out the evaluation methodology before the discussion of the environmental issues. The purpose of the environmental issues portion of each environmental concern is to focus on the possible impact/consequences of the most critical issues leading to a decision on the best solutions for the Eastside Corridor. Also, the information provided in this chapter will be useful to help determine if the options being considered would have any "fatal flaws" that would preclude their implementation. This chapter provides a discussion and comparison of the major environmental limitations and opportunities within the study area of the eight build alternatives, the No-Build Alternative, and the TSM Alternative. The detailed information on the environmental issues is included in the Environmental Issues Final Chapter Report dated February 2000.

4.1 LAND USE AND DEVELOPMENT

4.1.1 Affected Environment

Regional Setting

The Eastside Transit Corridor Study Area is located in the eastern part of the greater Los Angeles Basin. The Study Area extends eastward from downtown Los Angeles at Alameda Street to Norwalk Boulevard in the City of Whittier and encompasses approximately 40 square miles.

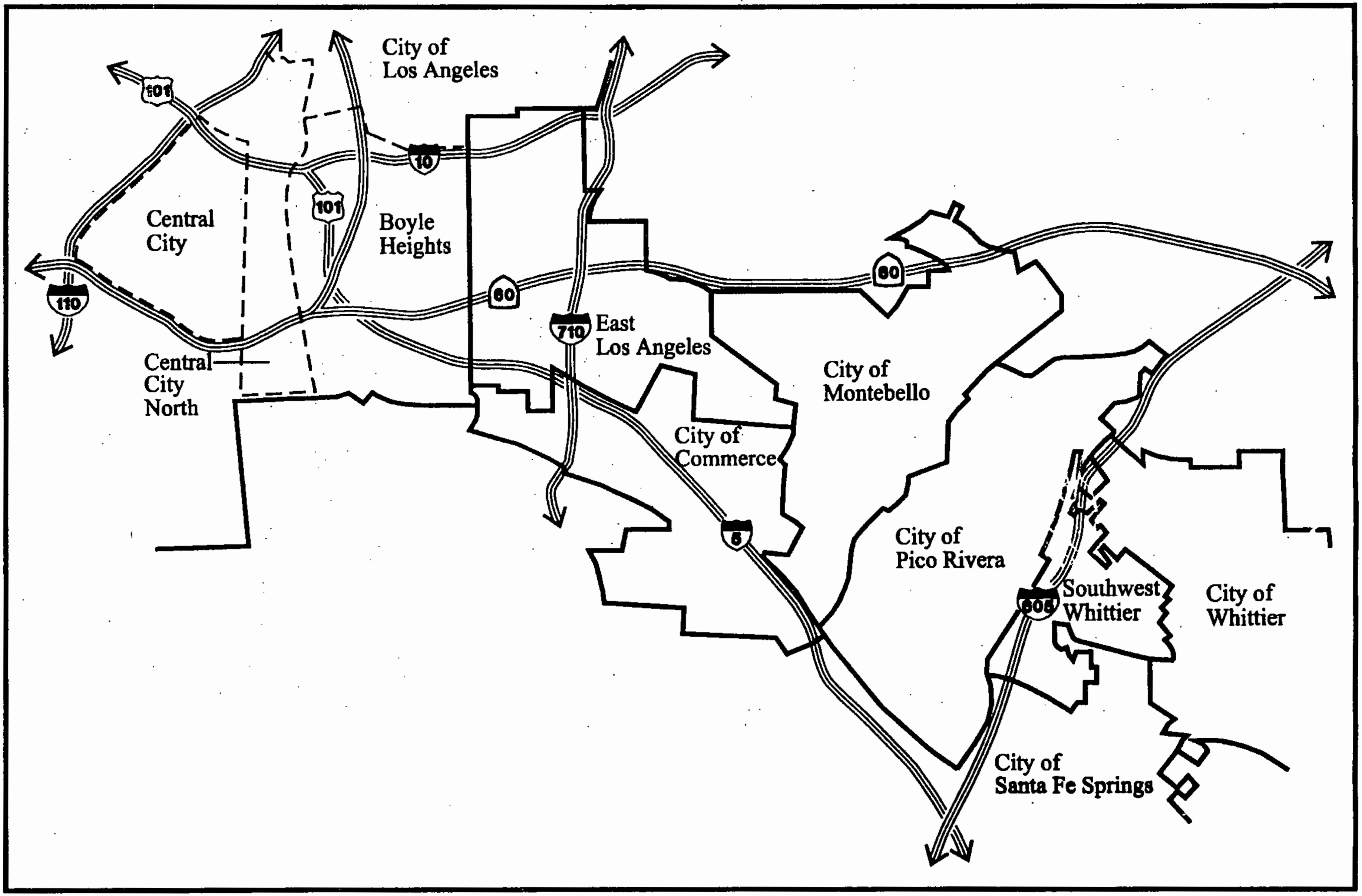
The boundaries of the Eastside Transit Corridor Study Area are Alameda Street on the west, the Interstate 10 to the Long Beach Freeway (I-710) to the Pomona Freeway (SR 60) on the north, to Norwalk Boulevard just east of the San Gabriel Freeway (I-605) on the east, and Washington Boulevard and Interstate 5 on the south.

The Study Area traverses the Central City, Central City North and Boyle Heights communities within the City of Los Angeles, the unincorporated East Los Angeles community of the County of Los Angeles, a small northerly portion of the City of Commerce, the cities of Montebello and Pico Rivera, the western portion of the City of Whittier, and the unincorporated community of Southwest Whittier in the County of Los Angeles (Figure 4-1).

The natural features of the Study Area include the Los Angeles River on the west and the Rio Hondo and San Gabriel Rivers on the east which traverse the Study Area in a north-south direction. Modest hillside topography extends east to west along the northern boundary of the Study Area and steeper hillside topography just east of the I-605 Freeway which is the origin of the Puente Hills formation.

The Study Area also includes a continuous industrial sector that lies just east of downtown Los Angeles and continues eastward within and along the southern boundary of the Study Area. The Study Area is also traversed by the network of freeways that generally run in a north-south (US 101, I-5, I-710, and I-605) or east-west (I-10 and SR 60) direction.

The demographics of the Study Area are very unique from a historical and cultural perspective. The Boyle Heights and East Los Angeles communities have historically functioned as port of entry communities for Latinos of Mexican descent since the early 1930's. The original



Eastside Transit Corridor Study

Jurisdictional Boundaries
General Plan Areas

Eastside Corridor Transit Consultants

Figure 4-1

settlements were in "Sonoratown" in the El Pueblo District, the birthplace of the City of Los Angeles. With the increase of the Latino population, their migration pattern into Boyle Heights and East Los Angeles was well-established by the 1930's.

Demographic studies over the past 60 years indicate that the Latino population continued to move into communities northeast of the Downtown area and eastward into the cities of Montebello, Commerce, Pico Rivera, Norwalk, and the City of Whittier as their educational attainment and income levels increased. Latinos within the Study Area represent various generations from recent immigrants to fourth and fifth generations. Consequently, the Study Area communities are uniquely bonded by historical, social, and cultural characteristics, which influence the transportation needs and travel patterns of the residents within these communities.

Study Area

Information relating to existing land uses, community general plans, redevelopment areas, and specialized zones associated with the jurisdictions in the study area are presented in this section. Also, a summary of the *Land Use/Transportation Policy* plan, developed jointly by the City of Los Angeles and LACMTA, is provided at the conclusion of this section.

Existing Land Uses

The following provides a brief summary of existing land uses by community or city within the Eastside Transit Corridor Study Area.

Central City and Central City North

West of Alameda Street, the Central City area includes the El Pueblo de Los Angeles State Historic Park, portions of the Los Angeles Civic Center, and regional serving commercial uses including the Little Tokyo community north and south of First Street. East of Alameda Street the predominant land uses are light and heavy industrial uses along with a portion of the artist-loft community.

Boyle Heights Community

Boyle Heights is one of the oldest communities in the City of Los Angeles. The residential densities are quite varied throughout the community. Lower density residential uses are generally located south of Whittier Boulevard. A mixture of low-medium and medium-density residential uses exist from Whittier Boulevard north to beyond Cesar E. Chavez Avenue. In 1995, Brooklyn Avenue was officially changed to Cesar E. Chavez Avenue from Figueroa Street on the west to Atlantic Boulevard on the east. Boyle Heights also contains several large housing projects located west of the US 101 Freeway, north of Olympic Boulevard, and north of the I-10 Freeway.

Neighborhood and community serving commercial uses are located primarily along east-west highways. They tend to be concentrated along Cesar E. Chavez Avenue at Soto Street, along First Street at State Street, and along Whittier Boulevard at Lorena Street. Other neighborhood serving commercial uses are stretched out along portions of Cesar E. Chavez Avenue, First Street, Fourth Street, Whittier Boulevard, Olympic Boulevard and are often intermixed with residential uses or public facilities. Industrial uses are predominant just east of the Los Angeles River and just south of Olympic Boulevard. In Boyle Heights, there are four significant north-south streets that connect to the east-west thoroughfares: Boyle Avenue, Soto Street, Lorena Street, and Indiana Street.

Residential neighborhoods in Boyle Heights were originally subdivided by the 1880's. The housing stock reflects the residential construction booms of the 1900's and the 1920's. Most of the commercial corridors in Boyle Heights were established by the 1920's. Significant medical facilities were originally established in Boyle Heights, including the White Memorial Hospital and the County General Hospital that evolved into the LA County/USC Medical Center. By the 1940's, the community had developed a large industrial sector located adjacent to the Los Angeles River and along major railroad lines. Major developments in the community since the 1940's included the construction of four major public housing projects and portions of five major freeways that traverse the community.

According to the Eastside Redevelopment Feasibility Study, conducted by the Community Redevelopment Agency of the City of Los Angeles in April 1995, the commercial corridors of Boyle Heights have several characteristics associated with the age of the community. Some of these characteristics include the need for rehabilitation of aging commercial structures, small parcel sizes, and excessive lot coverage, which increase the need for street parking and the loading and unloading of goods from the street rather than on-site. The study also found that the first zoning code for the City of Los Angeles was established in the mid-1920's. By that time, 43 percent of all the structures in Boyle Heights had already been constructed, and zoning codes had minimal or no impact on existing structures. Consequently, it is not unusual to find a mixture of residential, commercial, and public type uses along the commercial corridors of Boyle Heights such as on Cesar Chavez Avenue and First and Fourth Streets.

East Los Angeles Community and City of Commerce

Existing residential densities in the East Los Angeles community are similar to those of the Boyle Heights community. The predominant residential uses are low-medium density with concentrations of medium density scattered throughout the community. East Los Angeles contains one major public housing project that is located near Cesar E. Chavez Avenue and Mednik Avenue.

Community serving commercial uses are concentrated along a two-mile stretch of Whittier Boulevard between the I-710 Freeway on the west and Simmons Street on the east. This strip includes the City of Commerce Shopping Center on the south side of Whittier Boulevard, east of Goodrich Boulevard. Smaller neighborhood-serving commercial hubs are located along Cesar E. Chavez Avenue and First Street just east of Indiana Street, and along Ford Boulevard near Cesar E. Chavez Avenue.

The entire length of Atlantic Boulevard contains a variety of strip type commercial uses and several underutilized parcels. Portions of Cesar E. Chavez Avenue, Third Street, and Whittier

Boulevard contain smaller scale commercial uses interspersed with residential uses and public or community facilities. Beverly Boulevard, east of Atlantic Boulevard, contains a concentration of office type commercial uses with some retail uses.

Industrial uses in East Los Angeles are concentrated along Union Pacific Avenue and Telegraph Road on the southside of the community. In the City of Commerce, industrial uses are concentrated north and south of Olympic Boulevard between Goodrich Boulevard and Gerhart Avenue.

The unincorporated East Los Angeles community shares many characteristics with the Boyle Heights community. East Los Angeles is part of the eastward expansion of the City and County of Los Angeles that occurred in the 1920's. A majority of the existing housing stock and older commercial corridors were developed in the 1920's and expanded in the 1940's with the growing industrial sector that lies just south of East Los Angeles.

The Whittier Boulevard commercial corridor, which follows the same alignment as El Camino Real, was originally paved in 1923. It subsequently was developed with a variety of retail, service and commercial uses and became the major commercial center in the greater eastside communities. In 1984, the County of Los Angeles undertook a major revitalization project of Whittier Boulevard along a 14-block area from the Long Beach Freeway on the west to Atlantic Boulevard on the east. Over $4.5 million were spent to reconstruct the street, provide crosswalk enhancements, bus shelters, street furniture, street trees, and the now popular Whittier Archway and Latino Walk of Fame.

<u>City of Montebello</u>

Beverly and Whittier Boulevards are the two significant east-west thoroughfares within the City of Montebello. Olympic Boulevard, which is located south of Whittier Boulevard, is a secondary highway that terminates at 4th Street on the east. Generally, residential uses are located north of Olympic Boulevard, and industrial uses are located to the south. Significant north-south connectors in the City of Montebello include Garfield, Avenue, Wilcox Avenue, Garfield Avenue, and Montebello Boulevard.

One and two family dwellings are the predominant residential uses in the City of Montebello. Concentrations of low-medium density residential, however, do exist along Garfield Avenue, north of Beverly Boulevard between Wilcox Avenue and Montebello Boulevard, and north of Mines Avenue, east of Montebello Boulevard.

Several community commercial hubs exist on Beverly Boulevard at Wilcox Avenue and Montebello Boulevard and on Whittier Boulevard at Montebello Boulevard and Wilcox Avenue. Strip-type office, medical clinics and retail uses extend along the entire stretch of Beverly Boulevard, and strip-type retail uses are located along the balance of Whittier Boulevard. The City of Montebello contains a concentrated industrial sector that is located generally west of Greenwood Boulevard extending from south of Olympic Boulevard to the I-5 Freeway.

City of Pico Rivera

The City of Pico Rivera is predominantly a single-family residential community. Medium density residential uses generally exist north and south of the City's commercial hub at Whittier and Rosemead Boulevards, along portions of Rosemead Boulevard, and south of the commercial hub of Slauson Avenue between Rosemead Boulevard and Passons Boulevard.

Significant north-south streets in the City of Pico Rivera include Paramount Boulevard, Rosemead Boulevard, and Passons Boulevard. The City contains a large extended commercial shopping area that stretches for three-quarters of a mile along Whittier Boulevard, between Paramount Boulevard and Passons Boulevard. Neighborhood and community serving commercial uses are concentrated at key intersections such as Beverly and Rosemead Boulevards, Washington and Rosemead Boulevards or along Slauson Avenue, between Rosemead and Passons Boulevards, and along Telegraph Road.

The City of Pico Rivera contains three industrial clusters that are located east and west of the San Gabriel River and north of Whittier Boulevard; between Paramount Boulevard and the Rio Hondo River; and south of Washington Boulevard, between the Rio Hondo River and Rosemead Boulevard.

Southwest Whittier Community and City of Whittier

The unincorporated Southwest Whittier Community is generally located south of Whittier Boulevard and east of the San Gabriel River. Westerly of Norwalk Boulevard, the community consists predominantly of one and two family dwellings. The City of Whittier located north of Whittier Boulevard is predominantly single-family residential uses with some medium density uses along portions of Norwalk Boulevard and Pioneer Boulevard. Both of these jurisdictions share some strip type commercial uses along Whittier Boulevard.

General Plan Summaries

This section discusses the general plans of the jurisdictions that comprise the Eastside Transit Corridor Study Area. A summary is provided of the land use policies within an approximate one-half mile distance of each of the proposed transit alternative alignments as well as any applicable transit oriented policies.

The Eastside Transit Corridor Study Area traverses seven jurisdictional boundaries including the Cities of Los Angeles, Commerce, Montebello, Pico Rivera and a portion of the City of Whittier, and portions of two unincorporated areas of the County of Los Angeles. The City of Los Angeles includes the communities of Boyle Heights, Central City north and Central City which are designated as distinct community planning areas by the City of Los Angeles. The Study Area also includes the unincorporated East Los Angeles community, which the County of Los Angeles designated as a distinct community plan area. The unincorporated community of Southwest Whittier has not yet developed a community plan. The general plan land use designation maps for each of the jurisdictions are displayed in Figures 4-2 through 4-7.

Central City / City of Los Angeles (Figure 4-2)

The Central City Community Plan was adopted by the Los Angeles City Council in 1974 and has been amended through 1998. The Central City planning area abuts the Eastside Transit Corridor Study Area on the west, west of Alameda Street.

The community plan designates the area north of First Street to Cesar E. Chavez Avenue as the civic center for Federal, State, County and local government uses including the El Pueblo de Los Angeles State Historic Park and portions of the Little Tokyo community. South of First Street to Third Street the area is designated as a regional commercial center including the balance of the Little Tokyo community.

Major land use and transportation policies of the plan are:

- Support additions to the housing stock in Little Tokyo.
- Retain the existing retail base in Central City.
- Make Downtown a tourist destination by combining its cultural and commercial offerings with those of the ethnic communities surrounding it.
- Encourage traditional and non-traditional sources of open space by capitalizing on linkages with transit, parking, historic resources, cultural facilities, and social services programs.
- Encourage rail connections and high occupancy vehicle lanes that will serve the Downtown traveler.
- Reinforce the integration and accessibility of the neighborhoods surrounding Downtown with the Downtown core through enhanced levels of service.

Central City North / City of Los Angeles (Figure 4-2)

The Central City North Community Plan was adopted in 1979 and has been amended through 1988. The Central City North planning area is located east of Alameda Street to the Los Angeles River, from North Broadway Street on the north to 25th Street on the south.

The majority of the area north of Fourth Street is designated for heavy industrial uses. Portions of the frontage along First Street and from Temple Street to the Hollywood Freeway are designated for commercial manufacturing. More specifically, this area is designated as the Little Tokyo East Area neighborhood. This area is viewed as an expansion area of the Little Tokyo community to the west. The land uses proposed include industrial activities and government facilities of an industrial or service character.

North of the Hollywood Freeway, the area is designated as the Government Support Area neighborhood. The community plan proposes to continue development of government facilities in the area and redevelop Union Station to accommodate tourist-oriented commercial and cultural facilities and a transportation center, combining a wide variety of rail and bus services.

TABLE 3-10
AVERAGE DAILY TRAFFIC (ADT) AND LEVEL OF SERVICE (LOS) AT SELECTED SCREENLINES
YEAR 2020

FACILITY	Alternative																			
	No-Build		TSM		1		2		3		4		5		6		7		8	
	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS
NORTH OF CHAVEZ AVE.	(Screenline 1 on Figure 3-2)																			
State St.	11,700	A	11,600	A	13,500	A	11,900	A	11,800	A	11,700	A	11,300	A	12,200	A	11,900	A	12,300	A
Soto St.	17,900	A	16,600	A	16,400	A	16,300	A	16,700	A	16,700	A	16,400	A	1,800	A	17,800	A	15,800	A
Indiana St.	7,900	A	7,800	A	8,800	A	8,100	A	8,100	A	8,100	A	8,000	A	7,300	A	7,000	A	7,700	A
Eastern Ave.	15,900	A	15,600	A	15,800	A	15,400	A	15,400	A	15,900	A	15,900	A	15,700	A	15,600	A	15,600	A
Atlantic Blvd.	32,200	B	31,500	B	31,300	B	13,700	A	13,600	A	16,100	A	31,300	B	32,400	B	31,000	B	31,100	B
Surface Street Total	**85,600**	**A**	**83,100**	**A**	**85,800**	**A**	**65,400**	**A**	**65,600**	**A**	**68,500**	**A**	**82,900**	**A**	**69,400**	**A**	**83,300**	**A**	**82,500**	**A**
Golden State Fwy I-5	374,600	F	377,000	F	376,300	F	379,400	F	361,800	F	380,500	F	376,800	F	365,000	F	381,200	F	382,100	F
Long Beach Fwy I-710	224,900	F	223,700	F	227,300	F	224,400	F	238,500	F	225,600	F	224,700	F	236,000	F	224,500	F	224,200	F
Freeway Total	**599,500**	**F**	**600,700**	**F**	**603,600**	**F**	**603,800**	**F**	**600,300**	**F**	**606,100**	**F**	**601,500**	**F**	**601,000**	**F**	**605,700**	**F**	**606,300**	**F**
SOUTH OF 1ST ST.	(Screenline 2 on Figure 3-2)																			
Mission Rd.	10,300	B	10,100	B	9,900	B	11,300	C	11,100	B	12,100	C	11,300	C	11,000	B	10,200	B	10,700	B
Boyle Ave.	8,900	A	8,400	A	10,300	A	10,100	A	9,300	A	10,200	A	9,000	A	10,200	A	8,900	A	9,300	A
Soto St.	26,900	D	27,100	D	19,200	F*	19,400	F*	19,100	F*	19,400	F*	19,100	F*	27,600	D	27,400	D	18,700	F*
Indiana St.	18,500	F	18,100	F	19,300	F	18,500	F	18,600	F	18,700	F	18,900	F	13,800	D	13,700	D	18,800	F
Eastern Ave.	10,400	A	10,500	A	9,500	A	9,400	A	9,400	A	9,700	A	9,900	A	9,700	A	9,600	A	9,500	A
Atlantic Blvd.	33,200	B	32,500	B	34,500	C	33,800	C	33,200	B	34,700	C	34,700	C	34,800	C	34,300	C	34,500	C
Garfield Ave.	33,300	B	32,100	B	33,300	B	33,800	C	33,100	B	32,400	B	33,100	B	33,700	C	33,600	C	33,500	C
Surface Street Total	**141,500**	**B**	**138,800**	**B**	**136,000**	**B**	**136,300**	**B**	**133,800**	**B**	**137,200**	**B**	**136,000**	**B**	**140,800**	**B**	**137,700**	**B**	**135,000**	**B**
Santa Ana Fwy US 101	258,600	F	253,800	F	248,100	F	252,700	F	249,800	F	249,300	F	254,000	F	246,100	F	247,000	F	251,100	F
Golden State Fwy I-5	359,000	F	361,200	F	364,200	F	350,400	F	346,900	F	366,200	F	362,400	F	349,100	F	365,800	F	368,400	F
Long Beach Fwy I-710	240,000	F	241,500	F	242,600	F	237,200	F	251,900	F	241,100	F	241,700	F	249,400	F	240,000	F	239,500	F
Freeway Total	**857,600**	**F**	**856,500**	**F**	**854,900**	**F**	**840,300**	**F**	**848,600**	**F**	**856,600**	**F**	**858,100**	**F**	**844,600**	**F**	**852,800**	**F**	**859,000**	**F**
NORTH OF WHITTIER BLVD.	(Screenline 3 on Figure 3-2)																			
Boyle Ave.	6,500	A	6,100	A	6,600	A	6,800	A	7,100	A	6,800	A	6,400	A	6,600	A	6,500	A	6,200	A
Soto St.	24,800	C	24,600	C	23,900	C	24,200	C	23,500	C	24,100	C	23,900	C	24,000	C	24,900	C	24,300	C
Indiana St.	14,700	E	14,700	E	15,400	E	15,200	E	15,600	E	15,200	E	15,100	E	14,600	E	15,200	E	15,300	E
Rowan Ave.	17,500	F	19,600	F	16,500	F	16,500	F	16,300	F	16,500	F	16,300	F	16,800	F	16,600	F	16,600	F
Ford Blvd.	9,000	A	9,200	A	9,500	A	9,300	A	9,500	A	9,600	A	9,200	A	9,900	A	9,400	A	9,400	A
Arizona Ave.	13,000	A	13,000	A	14,100	A	8,300	A*	8,200	A*	13,400	A	14,400	A	8,000	A*	13,300	A	13,200	A
Atlantic Blvd.	37,500	C	37,000	C	36,000	C	27,500	A	27,200	C	36,400	C	36,400	C	37,800	C	35,900	C	25,100	A
Garfield Ave.	43,500	E	43,000	E	41,500	D	41,600	D	41,600	A	41,500	A	41,400	D	42,000	D	41,400	D	41,400	D
Montebello Blvd.	24,100	C	24,100	C	23,100	C	23,600	C	23,600	C	23,900	C	24,100	C	23,600	C	24,000	C	24,100	C
Paramount Blvd.	17,700	A	16,200	A	18,400	F*	18,600	F*	18,600	A	19,200	A	19,100	F*	18,700	A	19,200	F*	19,100	F*
Rosemead Blvd.	26,100	D	25,900	D	22,700	C	25,300	C	25,400	C	23,500	C	22,900	C	25,000	C	22,800	C	23,000	C
Surface Street Total	**234,400**	**B**	**233,400**	**B**	**227,700**	**B**	**216,900**	**B**	**216,600**	**B**	**229,800**	**B**	**229,200**	**B**	**227,000**	**B**	**229,200**	**B**	**217,700**	**B**
Santa Ana Fwy. US-101	263,600	F	259,300	F	254,000	F	258,000	F	255,000	F	255,100	F	258,400	F	251,600	F	253,200	F	257,000	F
Golden State Fwy. I-5	344,800	F	345,900	F	349,500	F	350,400	F	332,700	F	351,400	F	347,700	F	336,600	F	351,500	F	352,300	F
Long Beach Fwy. I-710	224,700	F	225,800	F	227,600	F	226,700	F	239,700	F	227,800	F	226,500	F	237,300	F	226,500	F	225,300	F
San Gabriel R. Fwy. I-605	298,400	F	298,400	F	295,200	F	296,200	F	295,700	F	295,000	F	295,100	F	295,800	F	295,000	F	295,000	F
Freeway Total	**1,129,400**	**F**	**1,126,300**	**F**	**1,131,300**	**F**	**1,123,100**	**F**	**1,131,300**	**F**	**1,129,300**	**F**	**1,127,700**	**F**	**1,121,300**	**F**	**1,130,300**	**F**	**1,130,300**	**F**

*Indicates that number of traffic lanes will be reduced by the fixed guideway under this alternative.

Central City North Community
& Central City (City of Los Angeles)

General Plan
Land Use Designations
Central City North Community & Central City
Figure 4-2

Boyle Heights / City of Los Angeles (Figure 4-3)

The Boyle Heights Community Plan was adopted in 1979 and has been amended through 1991. The community plan area is located east of the Los Angeles River and extends to the City boundary at Indiana Street. The northerly boundary is the San Bernardino Freeway and Marengo Street and the southern boundary is 25th Street.

Community plan designations for that portion of Boyle Heights between Whittier Boulevard to north of Cesar E. Chavez Avenue is a mix of low-medium 1 (9-12 units per acre) residential uses, generally east of Soto Street, and low-medium 2 (12-24 units per acre) to medium density, west of Soto Street. Neighborhood and community commercial uses are designated for the corridors near Cesar E. Chavez Avenue and Soto Street, First and Lorena Street, and First and State Streets. Portions of remaining corridors along Cesar E. Chavez Avenue, First Street, Fourth Street and Whittier Boulevard are designated as highway oriented commercial. Limited-industrial to heavy-industrial designations are located immediately adjacent to and east of the Los Angeles River.

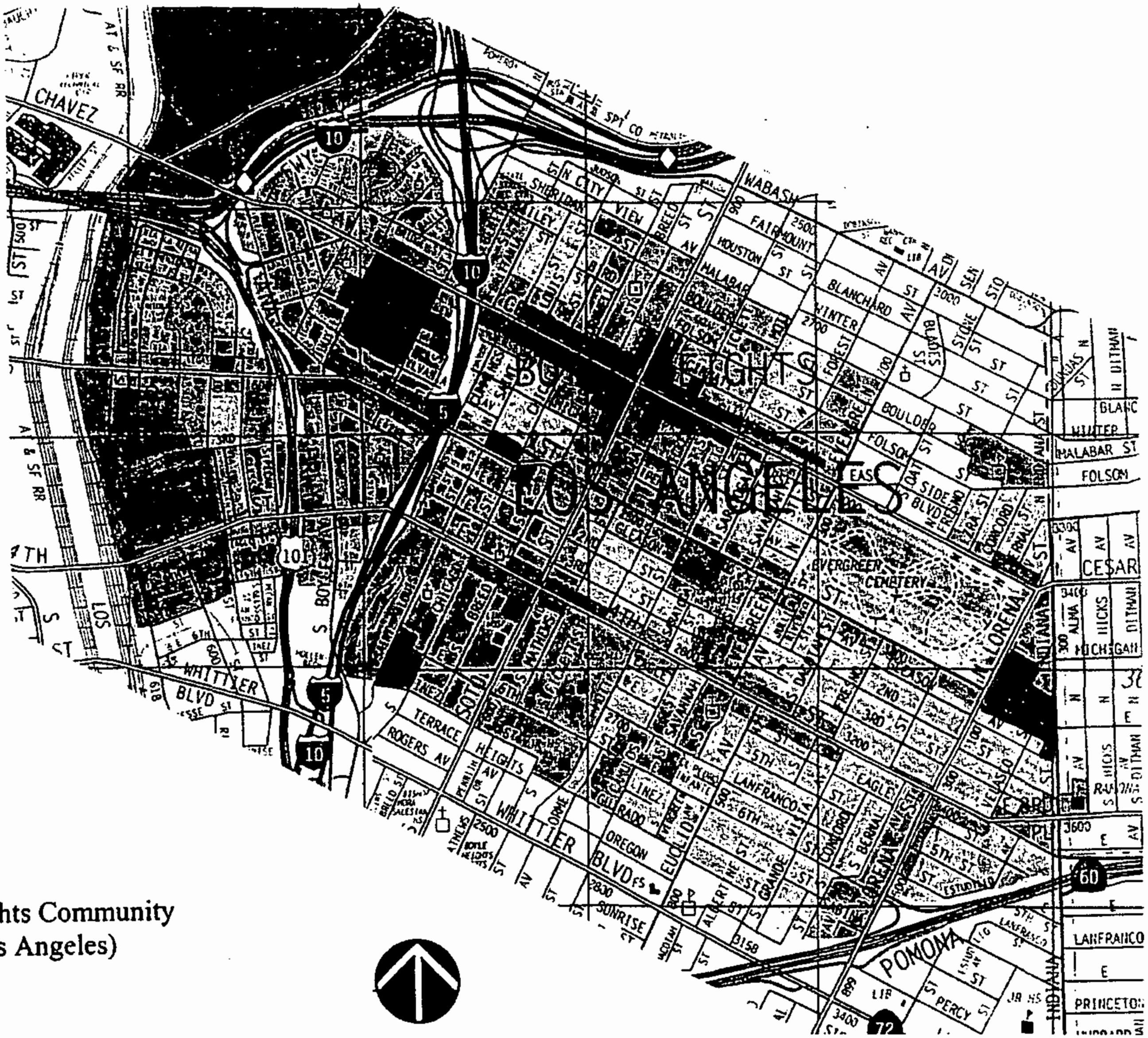
Major land use and transportation policies of the plan are:

- Conserve and improve existing sound housing especially for low and moderate-income families.
- Provide housing alternatives to accommodate a range of needs and opportunities for individual choice.
- That medium density housing be located in areas already developed to that density, on selected frontages along major and secondary highways and adjacent to commercial centers.
- Conserve and strengthen viable commercial development.
- Preserve designated industrial lands for industrial uses.
- That the unique character of community streets be enhanced by improved design characteristics such as street trees, landscaped median strips, traffic islands and special paving.
- Maximize the effectiveness of public transportation to meet the travel needs of transit dependent residents.
- Encourage alternative modes of travel and provide an integrated transportation system that is coordinated with land uses and which can accommodate the total travel needs of the community.

East Los Angeles / County of Los Angeles (Figure 4-4)

The East Los Angeles Community Plan was adopted in 1988. The planning area is located in the County of Los Angeles and bounded by Indiana Street on the west, generally the San Bernardino Freeway, Floral Drive, Pomona Freeway and Repetto Street on the north, Concourse Avenue on the east, and Telegraph Road and Union Pacific Avenue on the south.

The community plan designates most of the area north of Sixth Street for low-medium density residential and for medium density residential south of Sixth Street and east of Atlantic Boulevard. Major commercial designations are indicated for Beverly Boulevard east of Atlantic

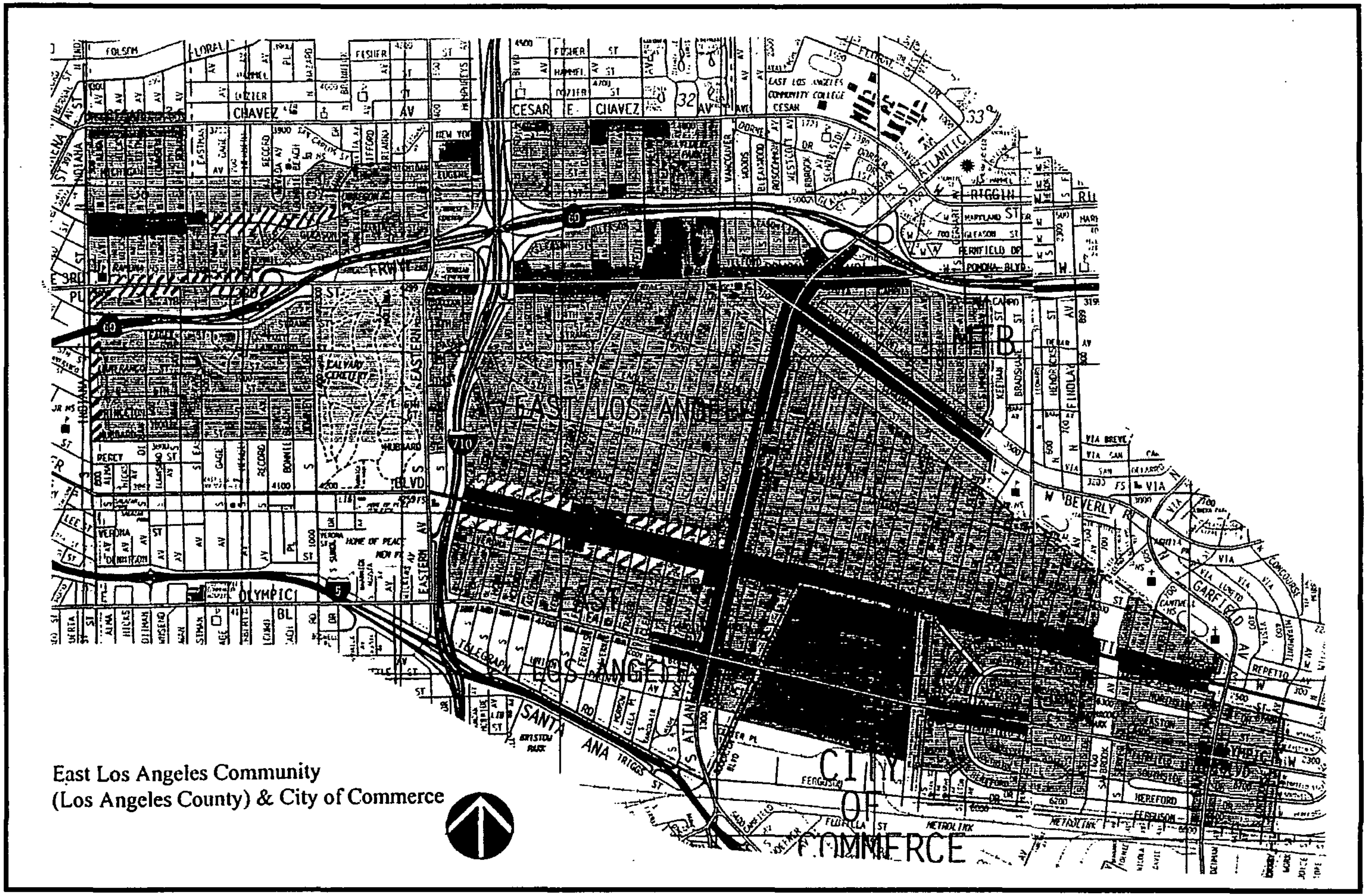


Boyle Heights Community
(City of Los Angeles)

Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

General Plan
Land Use Designations
Boyle Heights Community
Figure 4-3



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

General Plan

Land Use Designations

East Los Angeles Community

Figure 4-4

Boulevard, most of Atlantic Boulevard and along Whittier Boulevard, from the Long Beach Freeway to Gerhart Street. East of Gerhart Street, Whittier Boulevard is designated as community commercial. First Street is designated as major commercial and commercial-residential, just east of Indiana Street. Third Street is designated commercial-residential, just east of Indiana Street, and community commercial further east.

Major land use and transportation policies of the plan are:

- Maintain and enhance the quality of healthy and stable residential neighborhoods.
- Allow the intensification of land uses only if it does not adversely impact existing uses, neighborhoods, and the existing character and density of the East Los Angeles community.
- Encourage rehabilitation of existing commercial uses and development of new commercial in-fill along the major corridors (Whittier, Olympic and Atlantic Boulevards) and where transportation and other municipal services can support development.
- Improve the local public transit to more closely serve the needs of the people.
- Improve the image of the major corridors by use of landscaping, lighting, graphics, and/or other streetscape treatments.

City of Commerce (Figure 4-4)

The Eastside Transit Corridor Study Area includes a one-half mile portion of the City of Commerce just south of Whittier Boulevard, between Goodrich Boulevard and Gerhart Street. The City of Commerce General Plan was adopted in 1961 and amended through 1998.

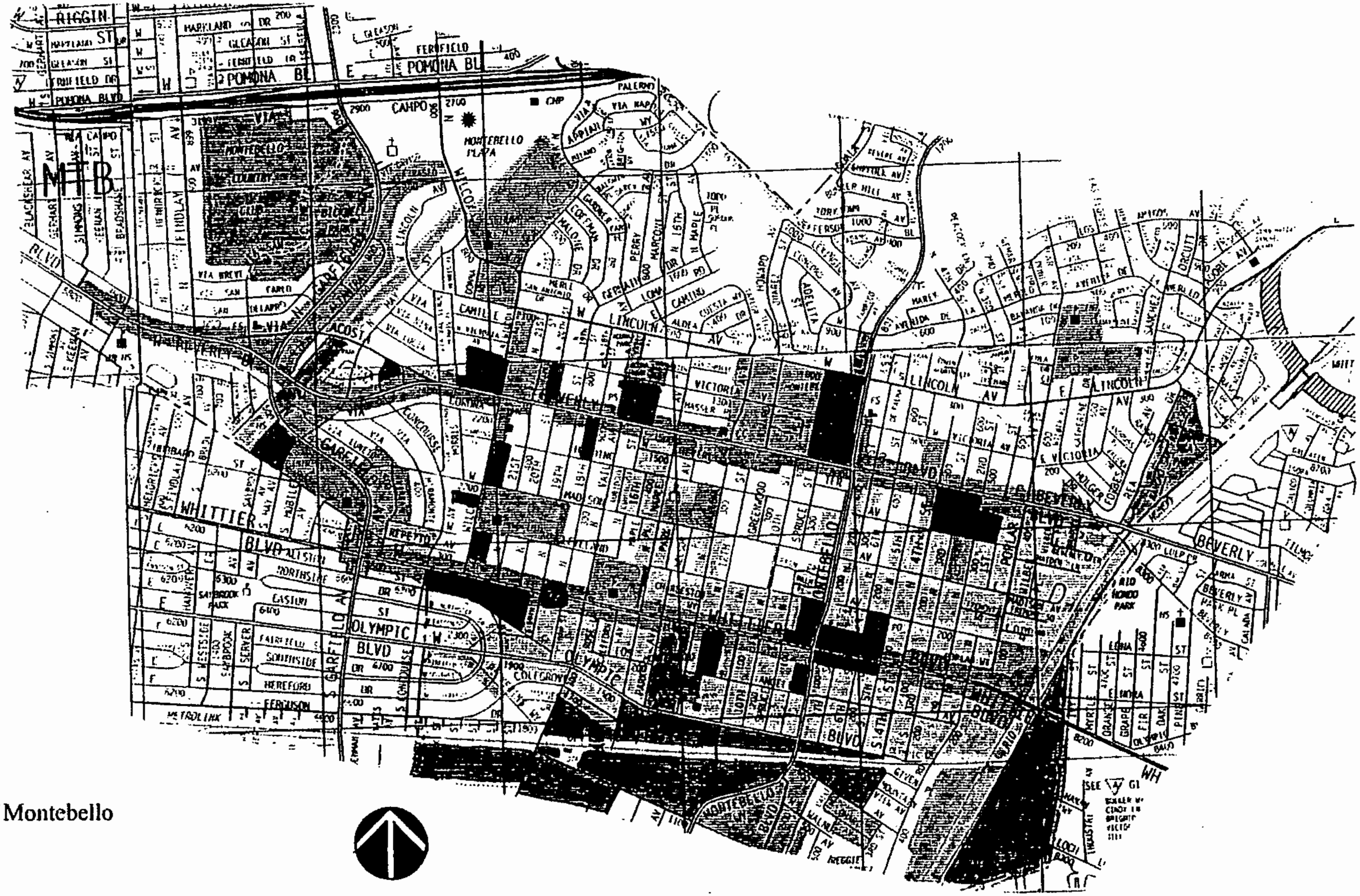
The general plan designates the frontage of Whittier Boulevard for unlimited commercial. Immediately south of the unlimited commercial area, the balance is designated as heavy industrial. The frontages along Goodrich Boulevard and Gerhart Street are designated as commercial manufacturing.

City of Montebello (Figure 4-5)

The City of Montebello General Plan was adopted in 1973. The City of Montebello is bounded by the Pomona Freeway on the north, the Rio Hondo River on the east, Santa Ana Freeway on the south, and generally Simmons Avenue, Concourse Avenue and Yates Avenue on the west.

The general plan designates low density residential for most of the neighborhoods north and south of Beverly Boulevard. However, the frontage along Garfield Avenue, portions of Wilcox Avenue, and the area north of Beverly Boulevard and east of Taylor Avenue are designated high density residential. The neighborhoods north and south of Whittier Boulevard are generally designated medium density residential.

General commercial designations are located along Beverly Boulevard at Wilcox Avenue and Montebello Boulevard, and along Whittier Boulevard at Montebello Boulevard and Wilcox Avenue. The balance of Whittier and Beverly Boulevard are designated as boulevard commercial. Properties located north and south of the Metrolink right-of-way, south of Olympic



City of Montebello

Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

General Plan

Land Use Designations

City of Montebello

Figure 4-5

Boulevard, and a portion of the City just east of the Rio Hondo River are designated as industrial.

The major land use and transportation policies of the plan are:

- The existing medium density residential area characterized by mixed housing types in the central portion of Montebello should be retained.
- Large concentrations of high and very high-density residential development should be avoided.
- Residential neighborhoods should be quiet, safe, and pleasant areas in which to live. They should be free from through traffic movements, and incompatible land uses should not be encouraged.
- The City's major commercial streets, Beverly Boulevard and Whittier Boulevard, are in need of a major beautification and improvement program including street landscaping, provision of ample off-street parking, and some lot unification.
- A circulation system that provides for continuous movement to and from adjacent communities should be developed.

City of Pico Rivera (Figure 4-6)

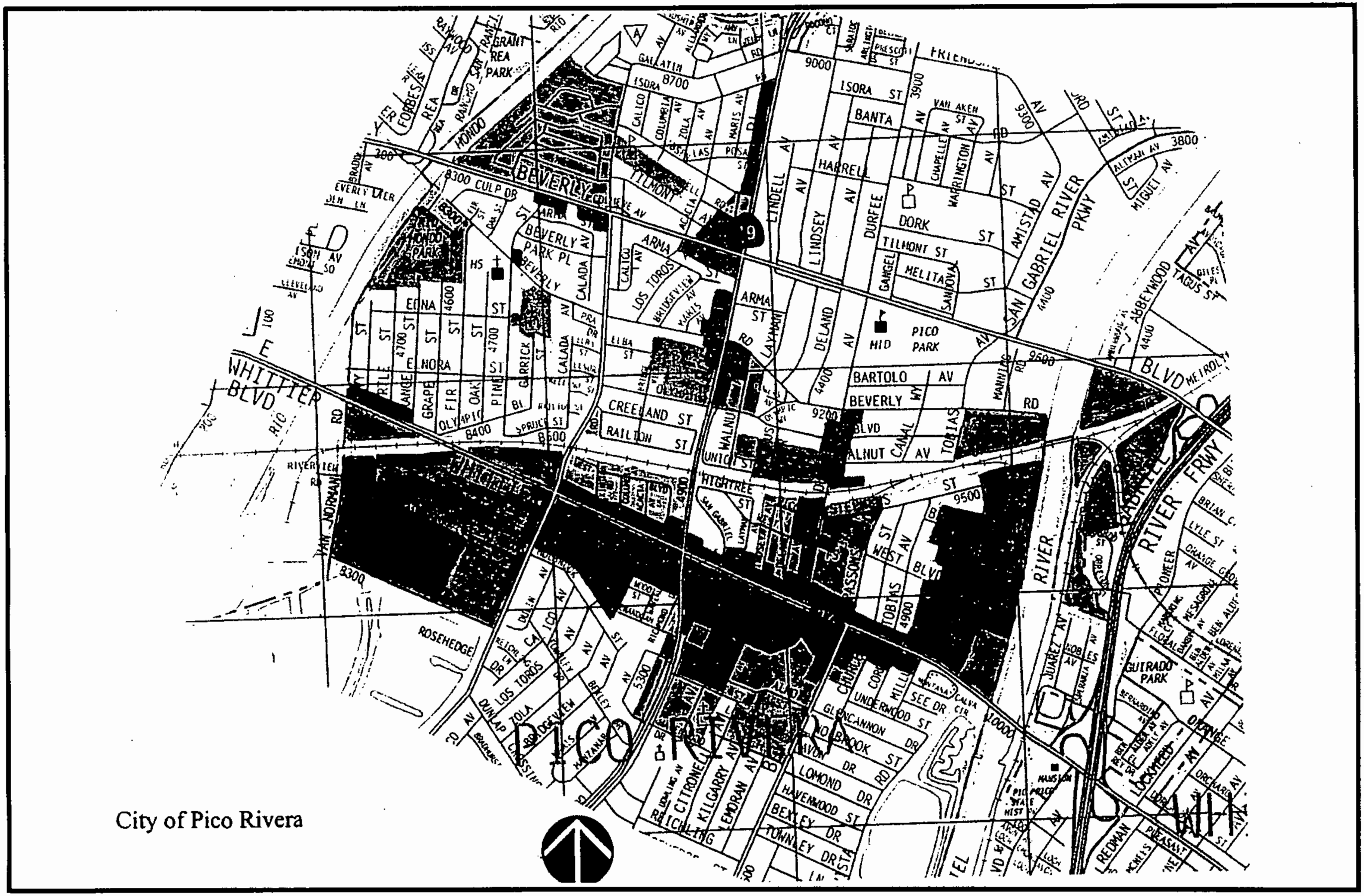
The City of Pico Rivera General Plan was adopted in 1993. The City is generally bounded by the Rio Hondo River on the west, the Whittier Narrows Dam on the north, San Gabriel River on the east and Telegraph Road on the south.

Low density residential is the predominant general plan designation. However, medium density and highest density residential are designated north and south of the Pico Rivera commercial center along Whittier Boulevard and east of the Rio Hondo River.

Commercial uses are located along Whittier Boulevard, east of Paramount Boulevard, along portions of Durfee Avenue and Rosemead Boulevard. Restricted and general industrial designations are located generally south of Whittier Boulevard, west of Paramount Boulevard, and in the area west of the San Gabriel River and north of Whittier Boulevard.

The major land use and transportation policies of the plan are:

- Protect existing residential neighborhoods and provide adequate housing opportunities to meet the needs of Pico Rivera residents.
- Provide adequate land for retail and service commercial, professional services, and office-based employment generating uses to meet the needs of Pico Rivera residents.
- Promote a mix of attractive, employment-generating industrial areas which provide a sound and diversified economic base, and which are compatible with the community's overall residential character.
- Coordinate land use planning programs between local, regional, State and Federal agencies.
- Provide a transportation system that provides the capacity necessary to accommodate the levels and types of traffic, which will be generated by the City's land use plan.



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

General Plan
Land Use Designations
City of Pico Rivera
Figure 4-6

- Encourage and support accessible, safe and efficient public transit opportunities as a viable alternative to the automobile.
- Work closely with local and regional transit agencies to participate in the implementation of regional transportation plans and programs, which support the use of alternative modes of transportation.

City of Whittier (Figure 4-7)

The Eastside Transit Corridor Study Area extends approximately three-quarters of a mile into the City of Whittier on the City's western edge. The City of Whittier General Plan was adopted in 1993. The City of Whittier generally lies east of the I-605 Freeway and north of Whittier Boulevard.

The predominant land use designation is low density residential with portions of Norwalk Boulevard and Pioneer Boulevard designated as medium/high density and high density. The north side of Whittier Boulevard is designated as general commercial, west of Carley Avenue, and designated as park, east of Carley Avenue.

Major land use and transportation policies of the plan are:

- Provide a comprehensive transportation system for the movement of persons and goods with maximum efficiency and convenience, and with a minimum of danger, delay and cost.
- Provide a public road system, which will move private automobiles within the City safely, efficiently, and with minimum impact on residential neighborhoods.
- Encourage the development of a comprehensive public transportation system and alternative modes of transit.

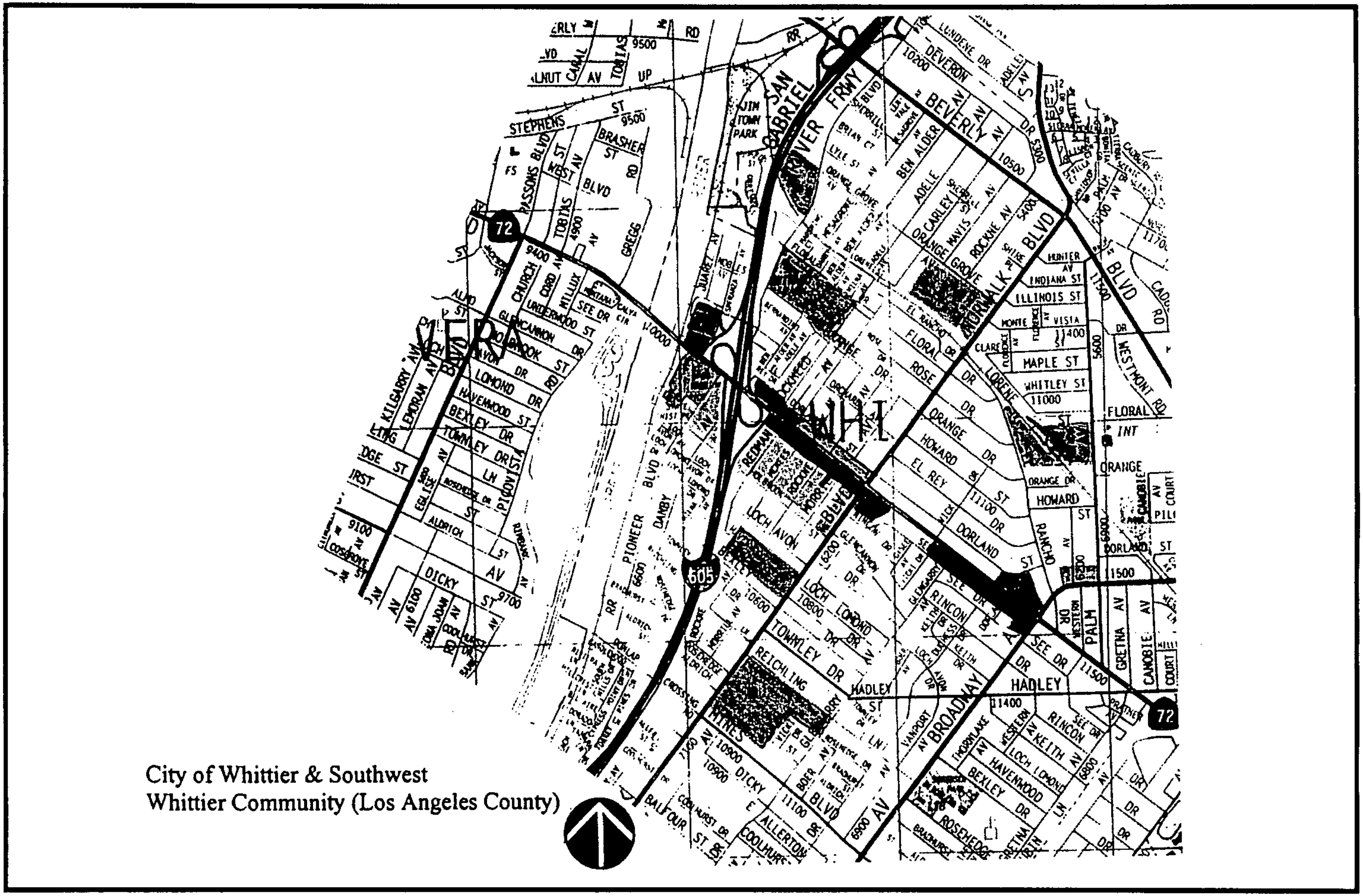
Southwest Whittier Community / County of Los Angeles (Figure 4-7)

Southerly of the City of Whittier, the Eastside Transit Corridor Study Area extends about three-quarters of a mile into the unincorporated Southwest Whittier community, in the County of Los Angeles. This community is generally located south of Whittier Boulevard and east of the San Gabriel River. A community plan has not been prepared for this community by the County.

However, a review of existing zoning indicates that the area is generally zoned for low density residential with some low-medium density just south of Whittier Boulevard. The frontage on the south side of Whittier Boulevard is zoned for major commercial.

Redevelopment Areas

The proposed alternative alignments of the Eastside Transit Corridor Study either traverse or are immediately adjacent to several adopted redevelopment project areas in various jurisdictions (Figures 4-8 through 4-12). The following provides a brief summary of the location and boundaries of existing redevelopment project areas.



Eastside Transit Corridor Study

Eastside Corridor Transit Consultants

General Plan
Land Use Designations
City of Whittier and Southwest

Figure 4-7

Central City and Central City North / City of Los Angeles (Figure 4-8)

The Central City planning area contains two redevelopment project areas which abut each other and are located just west of Alameda Street. The Little Tokyo Redevelopment Project is generally bounded by First Street on the north, Los Angeles Street on the west, 3rd Street on the south, and Alameda Street on the east. The Central City Redevelopment Project borders the Little Tokyo Redevelopment Project and extends north to the Hollywood Freeway, east to Alameda Street, and west to the Harbor Freeway with the exception of the Bunker Hill area.

The Central City north planning area contains the Chinatown Redevelopment Project which lies northwest of the Union Station. It is bounded by Main Street on the east, Cesar E. Chavez Avenue on the south, and the Pasadena Freeway on the west.

Boyle Heights Community / City of Los Angeles (Figure 4-9)

The Boyle Heights Community includes a primarily commercial and industrial redevelopment project known as the Adelante Eastside Redevelopment Project. The redevelopment project area includes the street frontages along Cesar E. Chavez Avenue, First Street, Fourth Street, as well as the industrial sector that lies immediately east of the Los Angeles River.

East Los Angeles Community / County of Los Angeles (Figure 4-10)

The East Los Angeles Community includes the Maravilla Redevelopment Project. The project area is bounded by 3rd Street on the south, Mednik Avenue on the east, Floral Drive on the north and Ford Boulevard on the west.

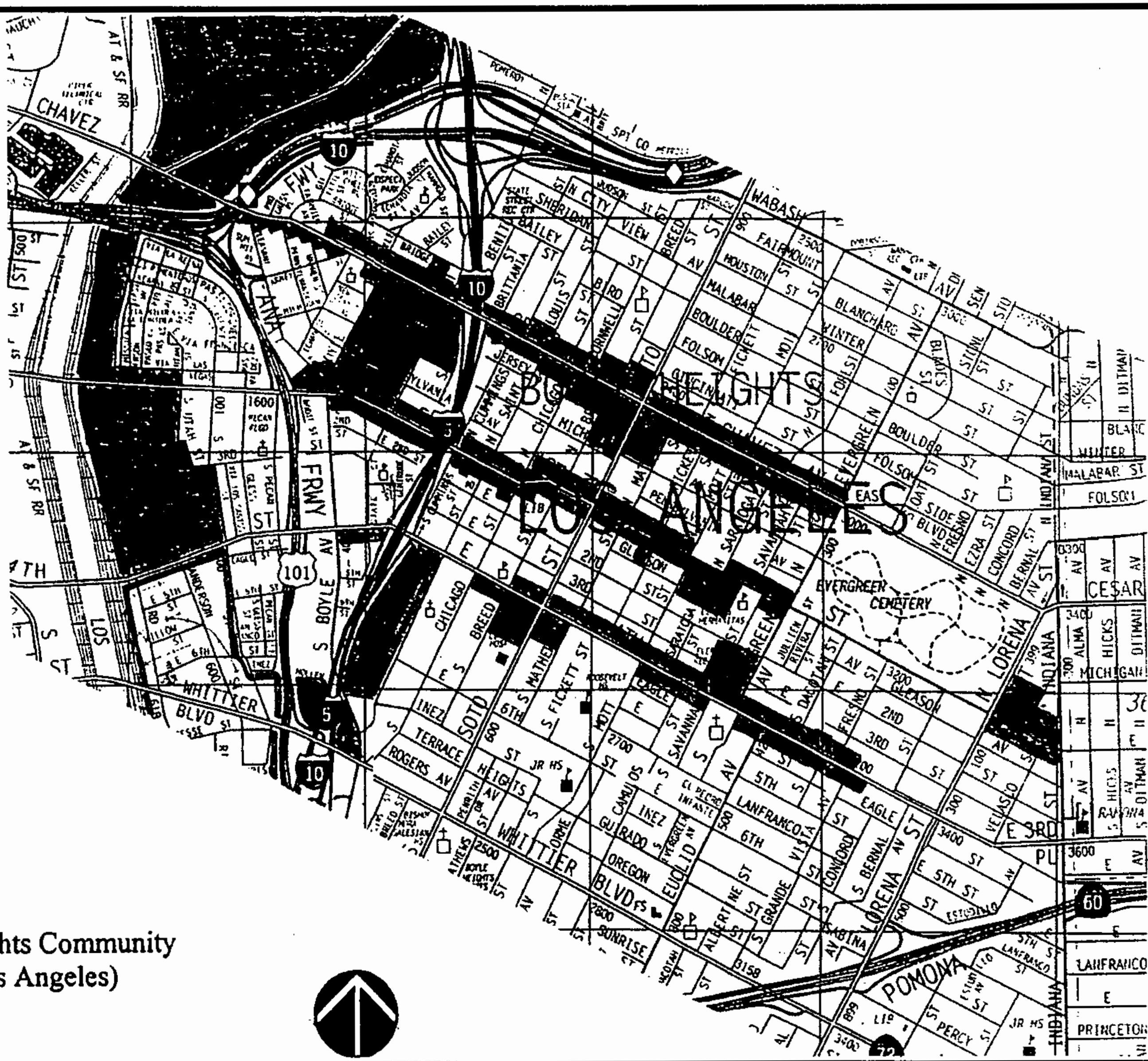
City of Montebello (Figure 4-11)

The City of Montebello contains two redevelopment project areas in close proximity to the proposed alternative alignments. The Montebello Economic Revitalization Project extends along the entire frontage of Whittier Boulevard and includes portions of the frontage along Montebello Boulevard. The Montebello Hills Redevelopment Project originates on the north side of Beverly Boulevard between Montebello Boulevard and Howard Avenue; and between 18th Street and 16th Street and extends northerly beyond Lincoln Avenue.

City of Pico Rivera (Figure 4-12)

The City of Pico Rivera also contains two redevelopment project areas. The Whittier Boulevard Redevelopment Project Area includes the north and south frontages along Whittier Boulevard, and west of Paramount Boulevard the project area extends southerly to Lomond Drive. The Beverly Boulevard Redevelopment Project Area extends from Beverly Boulevard north to the Whittier Narrows Dam between the Rio Hondo River and Paramount Boulevard. This redevelopment project area also includes selected frontages along Rosemead Boulevard, north and south of Beverly Boulevard.

Central City North & Central City (City of Los Angeles)



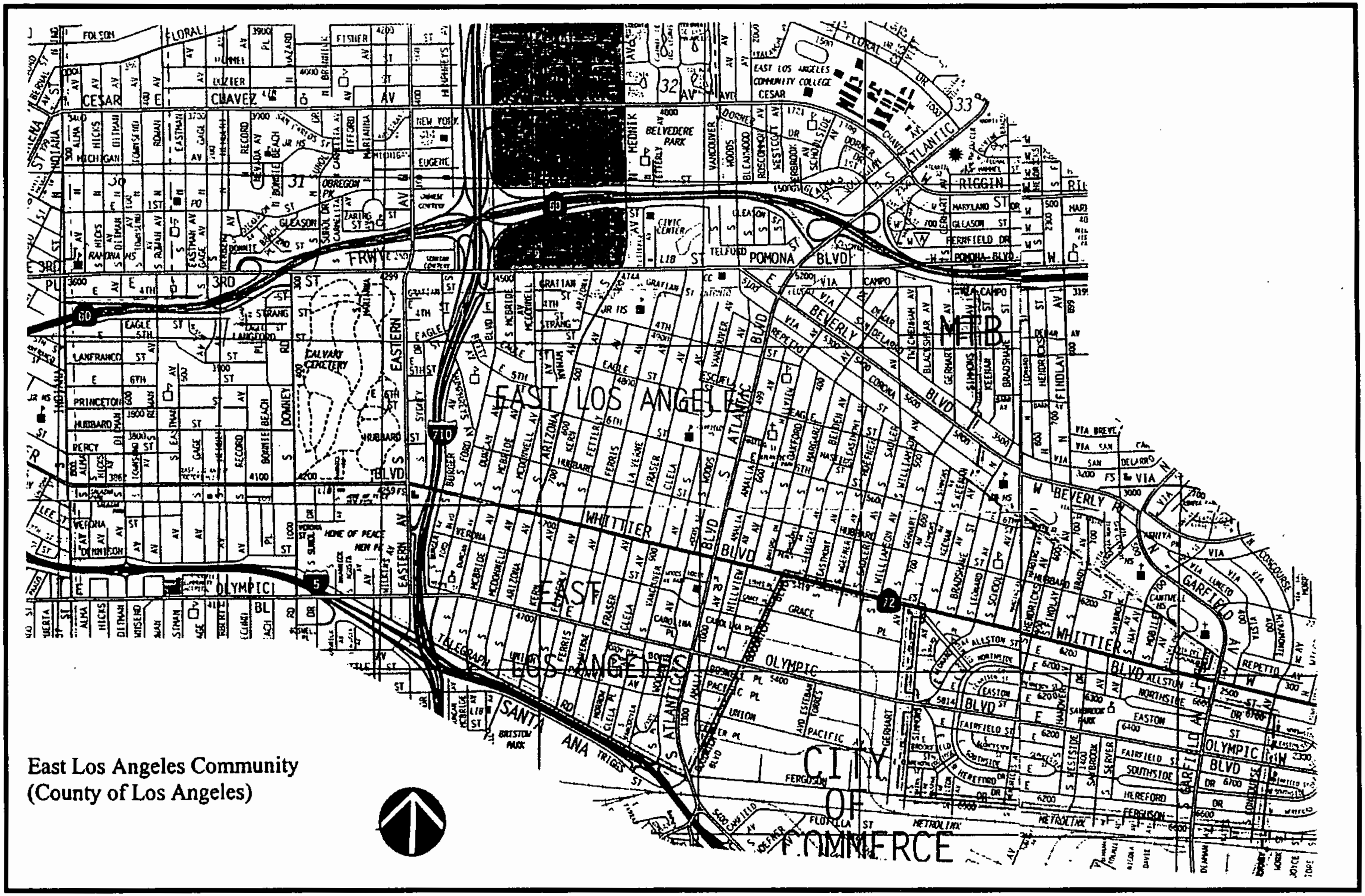
Boyle Heights Community
(City of Los Angeles)

Eastside Transit Corridor Study

Redevelopment Project Areas
Boyle Heights Community

Eastside Corridor Transit Consultants

Figure 4-9



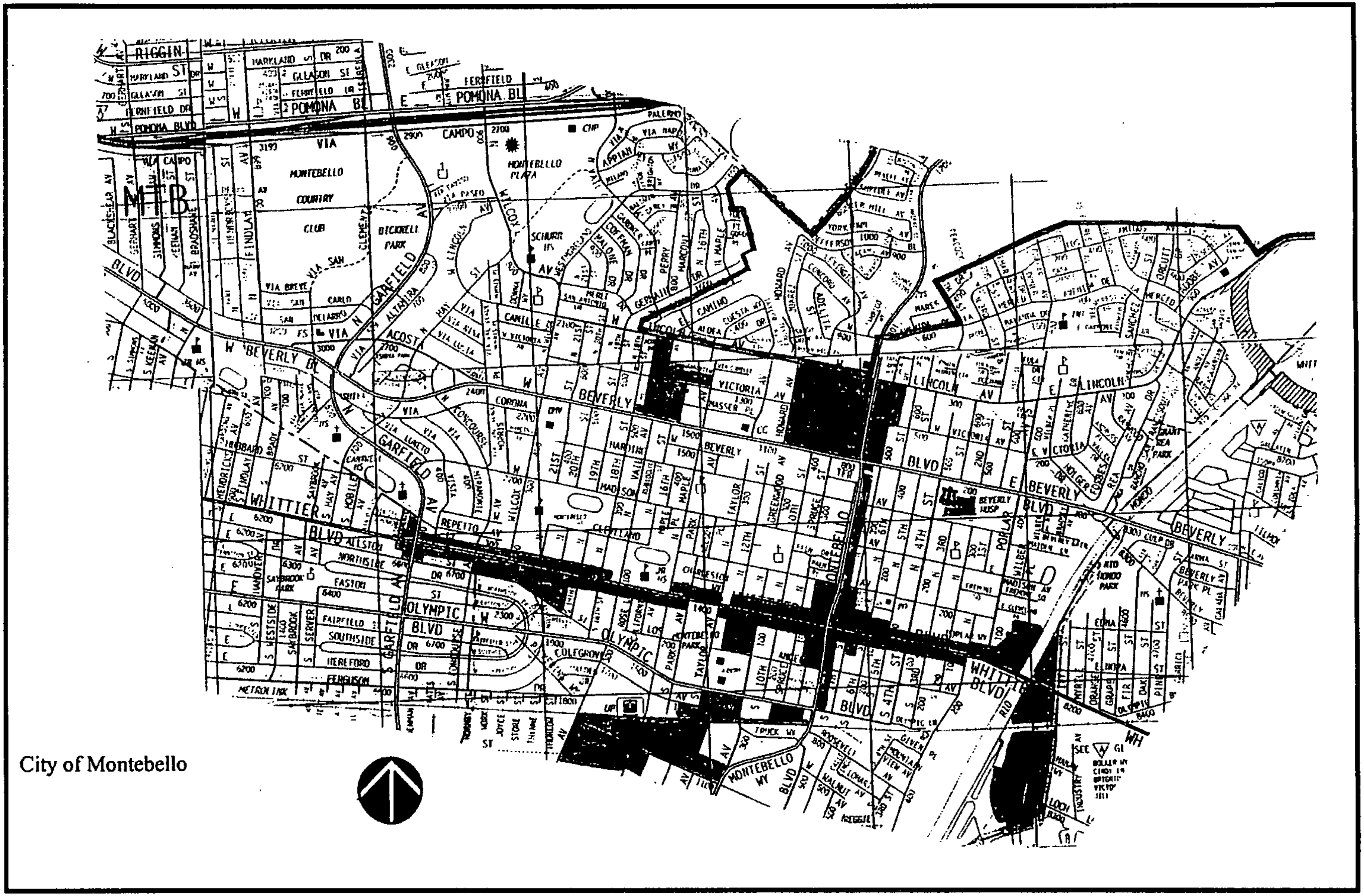
Eastside Transit Corridor Study

Redevelopment Project Areas

East Los Angeles Community

Eastside Corridor Transit Consultants

Figure 4-10



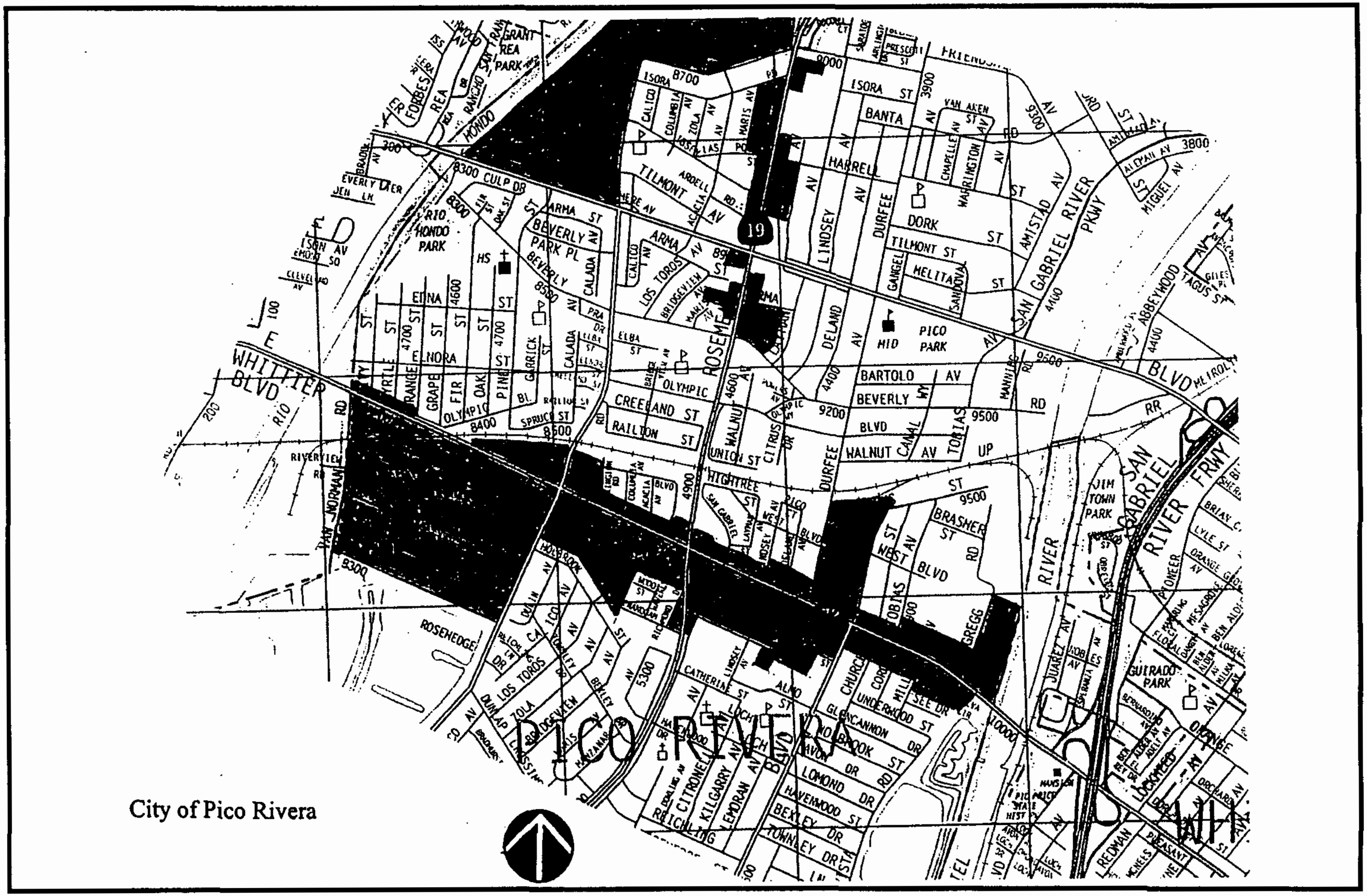
Eastside Transit Corridor Study

Redevelopment Project Areas

City of Montebello

Eastside Corridor Transit Consultants

Figure 4-11



Eastside Transit Corridor Study

Redevelopment Project Areas

City of Pico Rivera

Eastside Corridor Transit Consultants

Figure 4-12

Specialized Zones / City of Los Angeles

The City of Los Angeles portion of the Eastside Transit Corridor Study Area contains three specialized zones (Figure 4-13) which are described as follows:

<u>Eastside Enterprise Zone</u>

The Eastside Enterprise Zone was designated by the State of California in 1988. This zone area has been targeted for economic revitalization and investment. The zone area includes all of the Boyle Heights Community and almost all of the Central City North community plan area. The enterprise designation allows for State incentives such as: (1) Hiring Tax Credit, (2) Sales and Tax Credits, (3) Business Expense Deduction, (4) Net Interest Deduction for Lenders, and (5) Net Operating Loss Carryover.

<u>Los Angeles Revitalization Zone</u>

The Los Angeles Revitalization Zone was created by the City of Los Angeles in 1993 for areas affected by the 1992 civil unrest. In relation to the Eastside Transit Corridor Study Area, the Revitalization Zone covers all of the Boyle Heights Community, Central City North and Central City of the City of Los Angeles. The Revitalization Zone entitles the area to the following tax incentives: (1) Employee Hiring Credit, (2) Construction Hiring Credit, (3) Sales and Use Tax Credits, (4) Business Expense Deduction, (5) Net Interest Deduction for Lenders, and (6) Net Operating Loss Carryover.

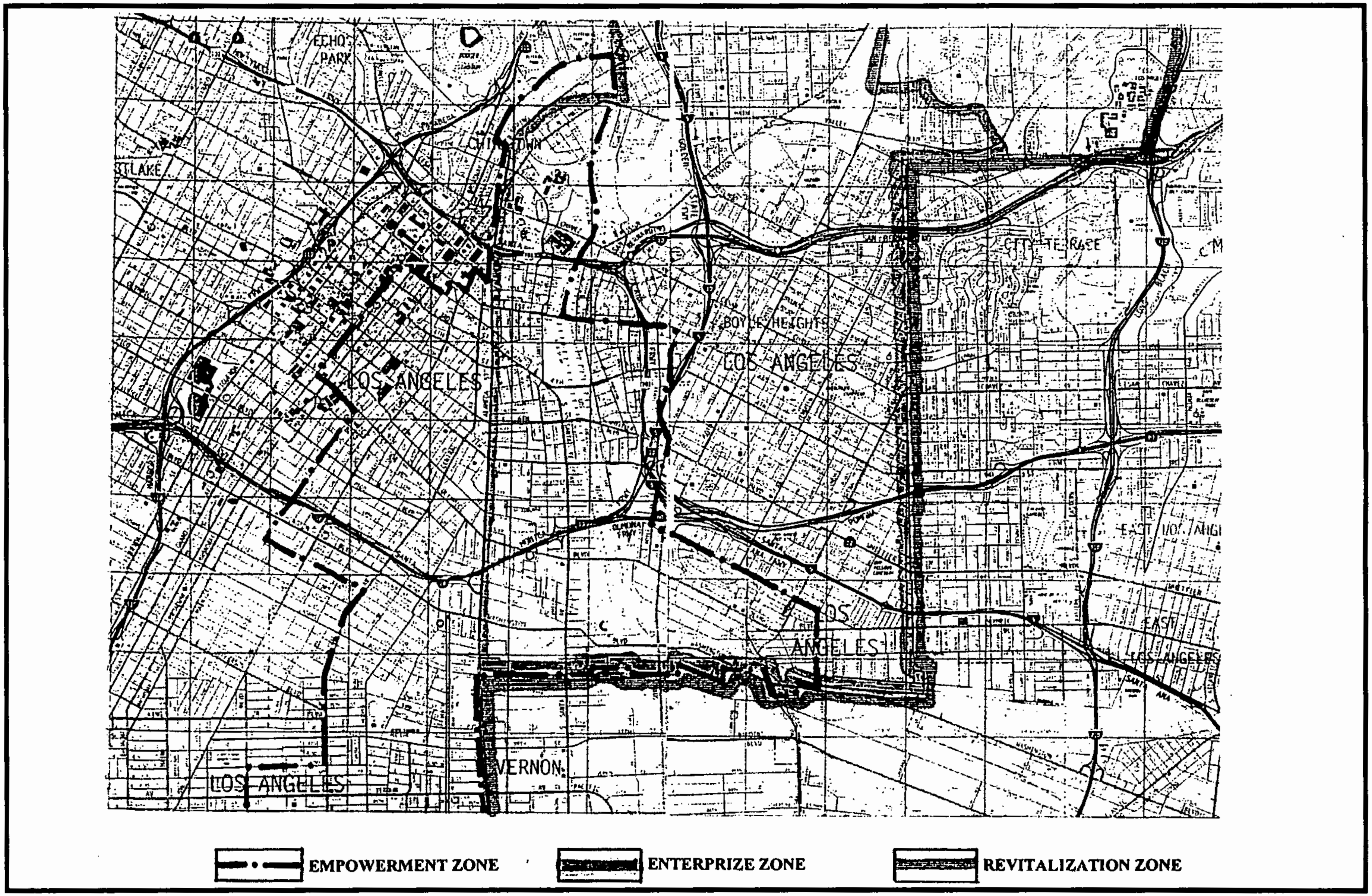
<u>Empowerment Zone</u>

The Empowerment Zone is a federal program that seeks to create reinvestment and job creation within the nation's poorest urban communities. In relation to the Eastside Transit Corridor Study Area, the Empowerment Zone includes most of the Central City North area, the western and southern portion of the Boyle Heights Community and the eastern portion of the Central City area of the City of Los Angeles. Some of the opportunities provided in the Empowerment Zone include micro-loans, business loans, commercial real estate and venture capital financing, special tax-exempt bonds, "brownfields" deduction, and city business tax reduction.

Land Use – Transportation Policy / City of Los Angeles

In 1993 and 1994, the Los Angeles City Council and the Los Angeles County Metropolitan Transportation Authority respectively adopted the Land Use/Transportation Policy to address land use, transportation, and air quality issues related to the regional transportation system. The Policy provides general objectives and principles to guide future development around transit station areas. The major objectives of the Land Use – Transportation Policy are:

- Focus future growth of the City of Los Angeles around transit stations.
- Increase land use intensity in transit station areas, where appropriate.
- Create a pedestrian oriented environment in context of an enhanced urban environment.



Eastside Transit Corridor Study

Specialized Zones

Empowerment, Enterprise, & Revitalization Zones

Eastside Corridor Transit Consultants

Figure 4-13

- Accommodate mixed commercial/residential use development.
- Provide for places of employment.
- Provide a wide variety of housing for a substantial portion of the projected citywide population.
- Reduce reliance on the automobile.
- Protect and preserve existing single family neighborhoods.

This policy provides for continuing transit/land use policy coordination within the City of Los Angeles to promote transit-supportive land uses adjacent to the station areas.

4.1.2 Evaluation Methodology

The evaluation of each of the alternatives' compatibility with local plans and policies as well as the types of redevelopment/revitalization areas that are serviced involved a pragmatic methodology. The Community Plans or General Plans of each affected jurisdiction were retrieved and reviewed to determine adopted land use designations and to identify appropriate land use and transportation /transit related policies.

General Plan land use designations were mapped within an approximate one-half mile distance of each of the proposed build alternative alignments. Information about existing redevelopment project areas and existing revitalization or special zones were also gathered from each affected jurisdiction. Each of these areas was also documented graphically to determine if they were adjacent to or bordered the proposed transit alternatives.

4.1.3 Environmental Issues

The criteria evaluated in this section include: 1) compatibility with local plans and policies, 2) number of redevelopment/revitalization areas served, and 3) economic development potential.

Compatibility with Local Plans and Policies

This section presents a preliminary assessment of the eight build alternatives and the No-Build and TSM Alternatives in terms of their compatibility with the local plans and policies of the various planning areas that comprise the Eastside Transit Corridor Study area. Specifically, the assessment compares the compatibility of the alternatives against the land use designations, land use policies, and transit-supportive policies as contained in the general plans of the local jurisdictions. A comparison of the compatibility of each alternative being considered in presented in Table 4-1.

The Eastside Transit Corridor Study area is an urbanized developed area with minimal vacant land available for new development. With a few exceptions, most new developments are the result of private in-fill developments or through the redevelopment activities of local jurisdictions. Most all-new developments are dependent on positive economic and demographic factors and the strength of local market conditions. Without the strength of strong market conditions or public sector participation, the land use effects of a transit system are somewhat reduced or limited, especially in lower-income communities.

Central City & Central City North

Alternative 1 contains a station at Chavez/Alameda. Alternatives 2, 3, 4 and 5 contain a station at 1st/Alameda. Alternatives 3, 5, 6 contain a station at either 1st/Alameda or 1st/Hewitt, depending on which alignment option is selected to connect to Union Station.

All of the build alternatives are compatible with the policies of the Central City Plan to make downtown a tourist destination; encourage rail connections that serve the downtown traveler; and that reinforce the accessibility of surrounding neighborhoods. All of the alternatives are compatible with the Central City North Plan to: redevelop Union Station as a transportation center; accommodate the expansion of the Little Tokyo Community east of Alameda Street; and continue development of government facilities. The No-Build and TSM Alternatives would maintain the status quo and have minimal, if any, impact on local plans and policies.

Boyle Heights Community

Within the Boyle Heights community, Alternative 1 contains stations at Chavez/Boyle and Chavez/Soto. Alternatives 2, 3, 4 and 5 contain stations at 1st/Utah Street, 1st/Boyle, 1st/Chicago, 4th/Soto, 4th/Evergreen, and 4th/Lorena Street. Alternatives 6 and 7 contain stations on 1st/Boyle and 1st/Lorena. Alternative 8 contains stations at 1st/Boyle and Chavez/Soto.

The build alternatives are compatible with the Boyle Heights Community Plan to encourage alternative modes of travel and provide for an integrated transportation system; maximize the effectiveness of public transportation to meet the travel needs of transit dependent residents; and to conserve and strengthen viable commercial corridors. The No-Build and TSM Alternatives would maintain the status quo and have minimal impact on the Boyle Heights Community Plan and its policies.

All the build alternatives within the Central City, Central City North, and the Boyle Heights communities also traverse, or are adjacent to, adopted redevelopment project areas that seek to accommodate new development where appropriate and to revitalize existing commercial corridors and public streets.

In addition, these three communities are located within the City of Los Angeles. The build alternatives are in keeping with the Land Use-Transportation Policy of the City of Los Angeles (1993) whose objectives are to: focus development near transit stations; create pedestrian oriented environments; reduce reliance on the automobile; increase land use intensity in transit station areas, where appropriate; and protect and preserve single-family neighborhoods.

East Los Angeles Community and City of Commerce

Within the East Los Angeles Community, Alternatives 1, 4, 5, 7 and 8 are located along 3rd Street which transitions to Beverly Boulevard, and stations are located at 3rd/Rowan, 3rd/Mednik, Beverly/Atlantic and Beverly/Gerhart Avenue.

The build alternatives are compatible with the policies of the East Los Angeles Community Plan such as to improve public transit to more closely serve the needs of its residents; improve the image of major corridors by use of landscaping, lighting, and other streetscape treatments, especially through the application of appropriate urban design measures; and encourage rehabilitation of existing commercial uses and new in-fill commercial along major corridors. The No-Build and TSM Alternatives would maintain the status quo and have minimal impact on the East Los Angeles Community Plan and its policies.

City of Montebello

Alternatives 1, 4, 5, 7 and 8 are all aligned along Beverly Boulevard within the City of Montebello. Stations are located at Garfield Avenue, Wilcox Avenue, Montebello Boulevard and 4th Street. Alternatives 2, 3 and 6 are all aligned along Whittier Boulevard with stations at Garfield Avenue, Wilcox Avenue, and Montebello Boulevard.

The build alternatives are compatible with the City's existing commercial streets of Beverly Boulevard and Whittier Boulevard and the City General Plan designation of medium density residential along portions near both corridors. The alternatives are also in keeping with the City's policy to create a circulation system that provides for continuous movement to and from adjacent communities. The general plan for the City of Montebello was adopted in 1973, and future revisions could refine the land use and transit policies as appropriate. All the build alternatives are also located within, or adjacent to, existing redevelopment project areas within the City of Montebello. The No-Build and TSM Alternatives would maintain the status quo and have minimal impact on the City's General Plan and its policies.

City of Pico Rivera

All the build alternatives converge onto Whittier Boulevard, east of Paramount Boulevard, within the City of Pico Rivera. Two stations are proposed at Whittier/Rosemead and Whittier/Passons.

The alternatives are compatible with the general plan policies to: coordinate land use planning programs between local, regional, State, and Federal agencies; encourage and support accessible, safe and efficient public transit opportunities as a viable alternative to the automobile; and participate in regional transportation plans and programs, which support the use of alternative modes of transportation. The transit alternatives also traverse one of the City's major redevelopment project areas along Whittier Boulevard. The No-Build and TSM Alternatives would maintain the status quo and have minimal impact on the City's General Plan and its policies.

City of Whittier and Southwest Whittier Community

East of the City of Pico Rivera, all eight build alternatives are located on Whittier Boulevard and terminate with one station at Whittier/Norwalk. The City of Whittier is generally located north of Whittier Boulevard, and the unincorporated Southwest Whittier Community is located south of Whittier Boulevard.

The City of Whittier General Plan policies encourage the development of a comprehensive public transportation system and alternative modes of transit. The transit alternatives support this policy. The predominant land use designation, near the proposed transit station, however, is for single family residential, greenspace, and general commercial along Whittier Boulevard. Any intensification of land use, near the station area would be in conflict with the City's general plan. Future amendments or revisions to the City's general plan could consider modifications to the land use designations.

The unincorporated Southwest Whittier Community has no adopted community plan at the present time. The zoning of this area, however, is for low-density residential uses. To promote compatibility with the proposed transit station, the County of Los Angeles could modify the zoning patterns, as appropriate, when a community plan is prepared. The No-Build and TSM Alternatives would maintain the status quo and have minimal impact on Whittier's General Plan and its policies or the existing zoning of the Southwest Whittier community.

Redevelopment/Revitalization Areas Served

As discussed in the affected environment section above, there are eleven existing redevelopment or special revitalization zones within the Eastside Transit Corridor Study area. An improved transit system could assist in the revitalization of these projects by providing improved access and mobility.

Table 4-2 provides a comparison of the numbers of these projects that would be served by each alternative. The No-Build and TSM Alternatives would not present any significant issues related to existing redevelopment or revitalization areas. With the No-Build Alternative, there would be no opportunities for additional transit access and mobility to serve these projects beyond that already provided. The TSM Alternative may provide some additional opportunities, but not to the extent of any of the build alternatives. Of the build alternatives, Alternatives 1, 4 and 5 would directly serve the highest number (ten) of these zones, while Alternative 7 would serve the fewest zones (seven).

Potential Land Use Impacts

The potential impacts of the planned park-and-ride facilities and subway stations are discussed in this section.

Park-and-Ride Facilities

One of the elements of the transit alternatives that could have a significant impact on existing land use and potential displacement is the introduction of park-and-ride facilities at several station areas along the various alternatives.

<table>
<tr><th colspan="9">TABLE 4-1
COMPATIBILITY WITH LOCAL PLANS AND POLICIES</th></tr>
<tr><th rowspan="2">Alt.</th><th colspan="8">Local Plan</th></tr>
<tr><th>Central City Plan</th><th>Central City North Plan</th><th>Boyle Heights Community Plan</th><th>East Los Angeles Plan</th><th>Montebello General Plan</th><th>Pico Rivera General Plan</th><th>Whittier General Plan</th><th>Southwest Whittier Zoning[1]</th></tr>
<tr><td>No-Build</td><td>Maintains status quo</td><td>Maintains status quo</td><td>Maintains Status quo</td><td>Maintains status quo</td><td>Maintains status quo</td><td>Maintains status quo</td><td>Maintains status quo</td><td>Maintains status quo</td></tr>
<tr><td>TSM</td><td>Maintains status quo</td><td>Maintains status quo</td><td>Maintains Status quo</td><td>Maintains status quo</td><td>Maintains status quo</td><td>Maintains status quo</td><td>Maintains status quo</td><td>Maintains status quo</td></tr>
<tr><td>1</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td rowspan="8">Generally compatible except in vicinity of Whittier/Norwalk station. An amendment to the plan may be needed.</td><td rowspan="8">Generally compatible except in vicinity of Whittier/Norwalk station. Changes to current zoning may be needed.</td></tr>
<tr><td>2</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td></tr>
<tr><td>3</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td></tr>
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<tr><td>8</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td><td>Compatible</td></tr>
<tr><td colspan="9">[1]Southwest Whittier has no general plan.</td></tr>
</table>

TABLE 4-2 REDEVELOPMENT/REVITALIZATION AREAS SERVED		
Alternative	**No. Served**	**Specific Areas Served**
No-Build	0	Current trends and market conditions would prevail.
TSM	0	Current trends and market conditions would prevail.
1	10	Central City, Little Tokyo, Adelante Eastside, Maravilla, Montebello Hills, Beverly Boulevard, Whittier Boulevard, Eastside Enterprise Zone, Los Angeles Revitalization Zone, Empowerment Zone.
2	9	Central City, Little Tokyo, Adelante Eastside, Maravilla, Montebello Revitalization, Whittier Boulevard, Eastside Enterprise Zone, Los Angeles Revitalization Zone, and Empowerment Zone.
3	9	Central City, Little Tokyo, Adelante Eastside, Maravilla, Montebello Revitalization, Whittier Boulevard, Eastside Enterprise Zone, Los Angeles Revitalization Zone, and Empowerment Zone.
4	10	Central City, Little Tokyo, Adelante Eastside, Maravilla, Montebello Hills, Beverly Boulevard, Whittier Boulevard, Eastside Enterprise Zone, Los Angeles Revitalization Zone, and Empowerment Zone
5	10	Central City, Little Tokyo, Adelante Eastside, Maravilla, Montebello Hills, Beverly Boulevard, Whittier Boulevard, Eastside Enterprise Zone, Los Angeles Revitalization Zone, and Empowerment Zone
6	9	Central City, Little Tokyo, Adelante Eastside, Maravilla, Montebello Revitalization, Whittier Boulevard, Eastside Enterprise Zone, Los Angeles Revitalization Zone, and Empowerment Zone.
7	7	Adelante Eastside, Maravilla, Montebello Hills, Whittier Boulevard, Eastside Enterprise Zone, Los Angeles Revitalization Zone, and Empowerment Zone.
8	8	Adelante Eastside, Maravilla, Montebello Hills, Beverly Boulevard, Whittier Boulevard, Eastside Enterprise Zone, Los Angeles Revitalization Zone, Empowerment Zone.

All of the alternatives would have new park-and-ride facilities near 3rd /Mednik, Whittier/Rosemead, and Whittier/Norwalk station areas. Alternatives 1, 4, 5, 7 and 8 would also have park-and-ride facilities near the Beverly/Garfield and Beverly/Montebello station areas. Alternatives 2, 3 and 6 would also have park-and-ride facilities near the Whittier/Atlantic, Whittier/Garfield, and Whittier/Montebello station areas. Note that no new facilities are planned in the vicinity of Union Station. The existing facilities appear to be adequate to accommodate the build alternatives.

Although the specific number of parking spaces per park-and-ride facility have not yet been determined, nor the specific location for the park-and-ride lots, it appears that they will have a significant impact given the urbanized nature of the alignment corridors. Preliminary estimates for the number of required park-and-ride parking spaces range from 300 to 500 parking spaces along the alignments and up to 700 parking spaces at the eastern terminus near Norwalk Boulevard. Each 80 parking spaces could require about one acre of land area if accommodated through surface parking lots. An alternative would be to develop parking structures that would be governed by the allowable height districts as contained in the zoning codes of local jurisdictions.

In order to minimize the potential impacts the following strategies should be considered:

- Utilize existing vacant or underutilized parcels;

- Encourage joint development of public parking structures with larger commercial centers or business corridors;
- Develop a combination of below-grade and above-grade parking structures; and
- Develop parking structures with ground-level retail businesses.

More specific analysis of the impact of the park-and-ride facilities and their locations will be developed in Phase II as part of the SEIS/SEIR.

Heavy Rail Stations Areas

Alternative 6 is a subway LRT alternative between the 101 Freeway on the west and 1st/Lorena on the east. Stations are included near 1st/Boyle and 1st/Lorena within the 1st Street right-of-way. No land acquisitions are anticipated at these two station locations.

Alternative 7 is a combined heavy rail and light rail alternative. The subway heavy rail portion through the Boyle Heights Community includes stations at 1st/Boyle and 1st/Lorena. Although the MTA already owns property near these station areas, additional property may need to be acquired to accommodate the cut-and-cover process of constructing the station box area. While the amount of property acquisitions and corresponding displacements are unknown at this time, their potential impacts could be significant.

Alternative 8 is also a below-grade heavy rail system through the Boyle Heights Community. The station location at 1st/Boyle could have similar land acquisition and displacement impacts as discussed under Alternative 7. The subway station at Chavez/Soto is not expected to require land acquisition due to the amount of property previously acquired by MTA in this area.

Potential for Economic Development in the Vicinity of Station Locations

Studies of transportation and land use often cite examples of the intensification of land use associated with the provision of rapid transit (primarily heavy rail) at city center and sub-center station locations (Newman and Kenworthy, *Cities and Automobile Dependence*, Aldershot, England, 1989). The experience of American cities that have used transit investment to stimulate economic development at station locations indicates that a combination of factors will determine the feasibility, and ultimately the success, of station area development. In cities with light rail systems, such as Portland, San Diego, San Jose, and heavy rail systems, such as San Francisco and Washington, DC, station areas in downtown locations or in vibrant commercial corridors are the most appealing for developers and can induce multiple developments outward from the station.

In neighborhoods that have real or perceived impediments to development, such as the less affluent communities in the Eastside corridor, the transit investment is often preceded by and coordinated with redevelopment and revitalization efforts organized by the local jurisdiction with input from the community. The transit investment becomes part of a concerted program to improve the physical environment of the community and to promote enhanced pedestrian circulation around stations. In this situation, the investment is typically one element of a multi-phase redevelopment or revitalization process. This multi-phase process has already been initiated in several communities in the Eastside corridor by establishing redevelopment, enterprise, revitalization, and empowerment zones that target areas, particularly along potential transit alignments, for economic revitalization and future development. Redevelopment project areas are located along the corridor in Central City, Boyle Heights, East Los Angeles, Montebello, and Pico Rivera. The Eastside Enterprise Zone, which includes Boyle Heights and Central City North, was targeted by the State of California for economic revitalization and investment. The City of Los Angeles has established Revitalization Zones that also include Boyle Heights and Central City to support businesses by providing tax incentives. Portions of these communities are part of the federal Empowerment Zone that seeks to create investment and job creation within the nation's poorest communities.

The Federal Transit Administration promotes transit investment to support community revitalization, as exemplified by the Third Street light rail project in San Francisco. In this case, transit funds will be used to redesign the streetscape and improve vehicle and pedestrian circulation in the commercial district of a low-income neighborhood to be served by a new light rail line. Although the transit investment offers no guarantee that developers will be attracted to a given station location (market factors/project feasibility, land availability and zoning often exert greater influence in making development decisions), it underlines the local jurisdiction's commitment to creating the right environment for development. In locations that are perceived as less desirable for private investment, local jurisdictions and transit agencies have used public investment in new construction, subsidies for low income housing, tax increment financing, tax credits, use of non-profit agencies as the primary developer, and corporate sponsorship to attract developers.

For the modes being considered in the Eastside corridor, a subway (light rail or heavy rail) offers the opportunity to assemble parcels, which can be leased to developers, following station area construction. As a part of the previous Red Line extension project, land clearance occurred at three potential subway station locations in Boyle Heights. For at-grade portions of a light rail alignment, transit capital funds can be used to enhance the physical environment and pedestrian circulation in an entire commercial corridor, thereby supporting redevelopment activities, such as those already occurring in commercial areas along Whittier Boulevard. Bus Rapid Transit (BRT), with far fewer American examples, has not been used to attract developers or to stimulate revitalization efforts as has rail projects. In Pittsburgh and Ottawa, BRT, which operates in exclusive guideways (called busways) between downtown and outlying areas, has not, typically, been linked with joint development opportunities at station locations. There have been limited efforts to link busway stations with new development or with existing land uses, such as at a subsidized housing project in Pittsburgh and at regional shopping centers in Ottawa.

In summary, as indicated in Table 4-3, research of other transit systems indicates that rail transit investment offers greater possibility to support community development and revitalization efforts than implementing BRT or TSM measures, such as bus lanes with signal preemption. However, it appears that the location, type, and success of development is often contingent on a series of market-driven factors, public policy initiatives, and financing scenarios, particularly in less affluent communities.

TABLE 4-3 POTENTIAL FOR ECONOMIC DEVELOPMENT	
Alternative	**Potential for Economic Development in Vicinity of Stations[1]**
No-Build	Baseline
TSM	Low potential.
1	BRT - Low potential.
2	BRT - Low potential.
3	LRT - Good potential.
4	BRT - Low potential.
5	LRT - Good potential.
6	LRT (subway) - Good potential. LRT (at grade) - Good potential.
7	Heavy rail (subway) - Good potential. LRT (at grade) – Good potential.
8	Heavy rail (subway) - Good potential. BRT - Low potential.
[1]The success of any economic development depends also on other factors in addition to the provision of a transit system. Examples of other factors include: implementation of appropriate public policies to encourage development; local market forces; subsidies; innovative financing scenarios; and land use and zoning changes to encourage transit-oriented development.	

4.2 POPULATION AND EMPLOYMENT, RESIDENCES AND BUSINESSES DISPLACED

4.2.1 Affected Environment

Population

According to the 1990 U.S. Census, Los Angeles County had a 1990 population of 8.8 million persons, making it the most populous county in the state. It has almost two thirds of the population of the Southern California region, which includes Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties, and one-third of the state's population. Population and employment in the region, county, and Eastside Transit Corridor Study area are anticipated to grow through 2020.

Based on SCAG 1998 adopted forecasts, the 2020 population for the entire region is projected to increase approximately 43 percent from 1994 to over 22 million persons (Table 4-4). This growth rate is slightly higher for the region as compared to Los Angeles County, which is projected to grow about 33 percent. Population projections developed by LACMTA indicate that population in the Eastside Transit Corridor Study area is anticipated to grow at a slightly lower rate than Los Angeles County and the region through 2020. The 1995 population within the Eastside Transit Corridor Study area was 496,465 and is projected to grow to 621,983 in 2020, about a 25 percent increase. This would be a result of higher density residential development and overcrowding. Given the absence of large parcels of undeveloped land within the area, overcrowding within existing residential areas may occur. This includes having more than one household or family residing within a single residence.

TABLE 4-4 POPULATION CHANGE				
Jurisdiction	**1994**	**2020**	**Change**	**% Change**
SCAG Region	15,610,700	22,352,000	6,741,300	43.2%
Los Angeles County	9,231,600	12,249,100	3,017,500	32.7%
Eastside Transit Corridor Study Area	496,465[1]	621,983	125,518	25.3%

[1]Eastside Transit Corridor Study Area is 1995 data.

Source: SCAG Region and Los Angeles County – SCAG, 1998 RTP Adopted Forecast, April 1998.
Eastside Corridor Study Area – Los Angeles County Metropolitan Transportation Authority, 1999.

The number of people per square mile within Los Angeles County was approximately 2,274 in 1994 and is projected to increase to 3,017 people per square mile in 2020 (Table 4-5). The Eastside Transit Corridor Study Area has a much higher density compared to the county. This is attributed to the dense urban development throughout the area. The population density for the overall study area was 12,228 people per square mile in 1995 and is anticipated to grow to approximately 15,526 people per square mile in 2020. Figures 4-14 and 4-15 portray density by MTA Zone. In general, the highest densities under both current and projected conditions are in the western portion of the study area between approximately Boyle and Garfield Avenues. As expected, the population densities are projected to increase in many areas by 2020.

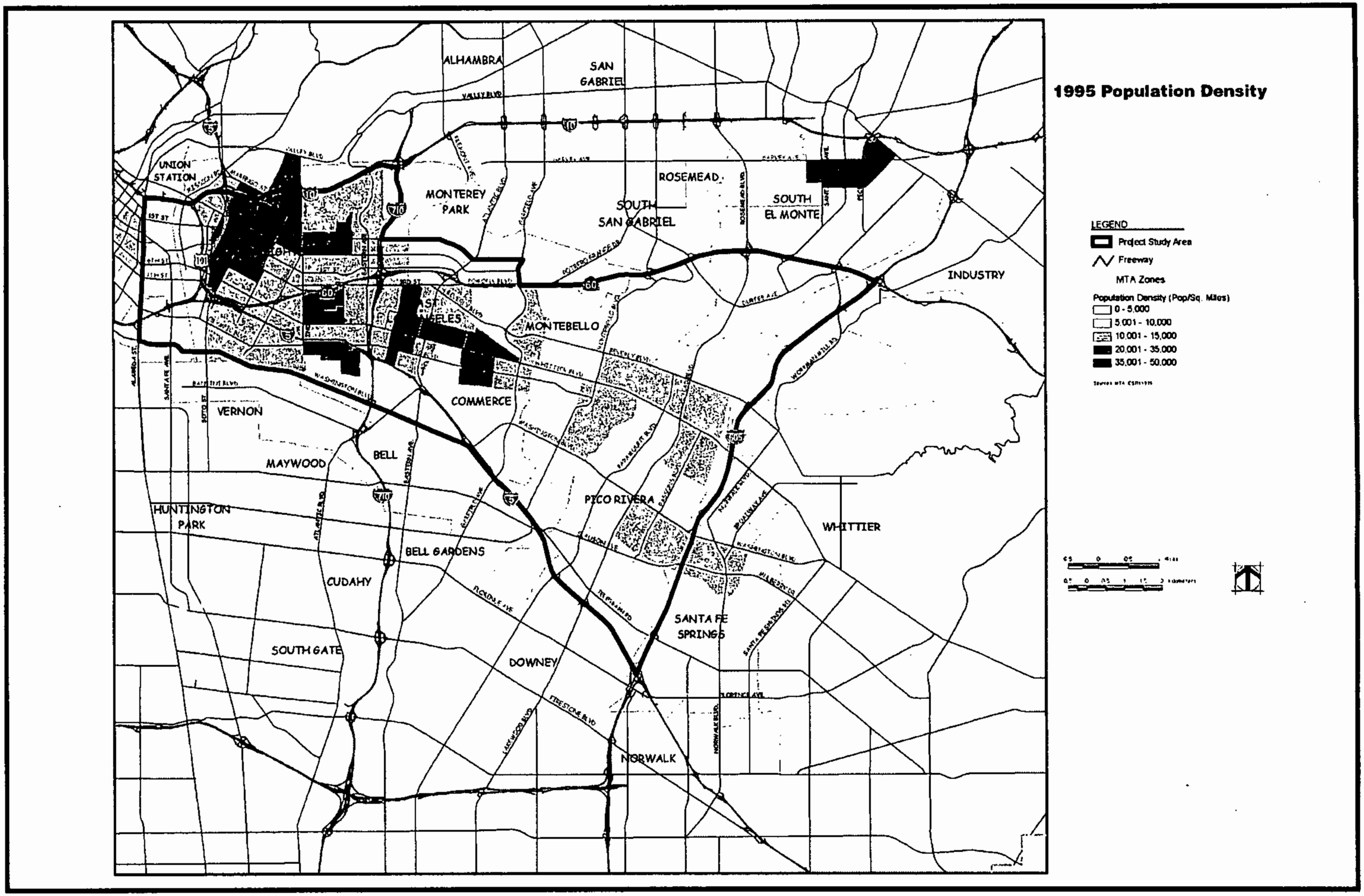
TABLE 4 - 5 POPULATION DENSITY				
Jurisdiction	**1994 Population**	**1994 Pop/Sq. Mile**	**2020 Population**	**2020 Pop/Sq. Mile**
Los Angeles County - 4,060 square miles	9,231,600	2,274	12,249,100	3,017
Eastside Transit Corridor Study Area - 40.06 square miles	496,465[1]	12,228	621,983	15,526

[1]Eastside Transit Corridor Study Area is 1995 data.

Source: SCAG Region and Los Angeles County – SCAG, 1998 RTP Adopted Forecast, April 1998.
Eastside Corridor Study Area – Los Angeles County Metropolitan Transportation Authority, 1999.

Employment

As shown in Table 4-6, the number of jobs in Los Angeles County fell about five percent between 1990 and 1998. During this period, Los Angeles County and the state, in general, experienced one of the largest economic recessions in recent history. The largest gain in employment between this period was in the service sector with approximately

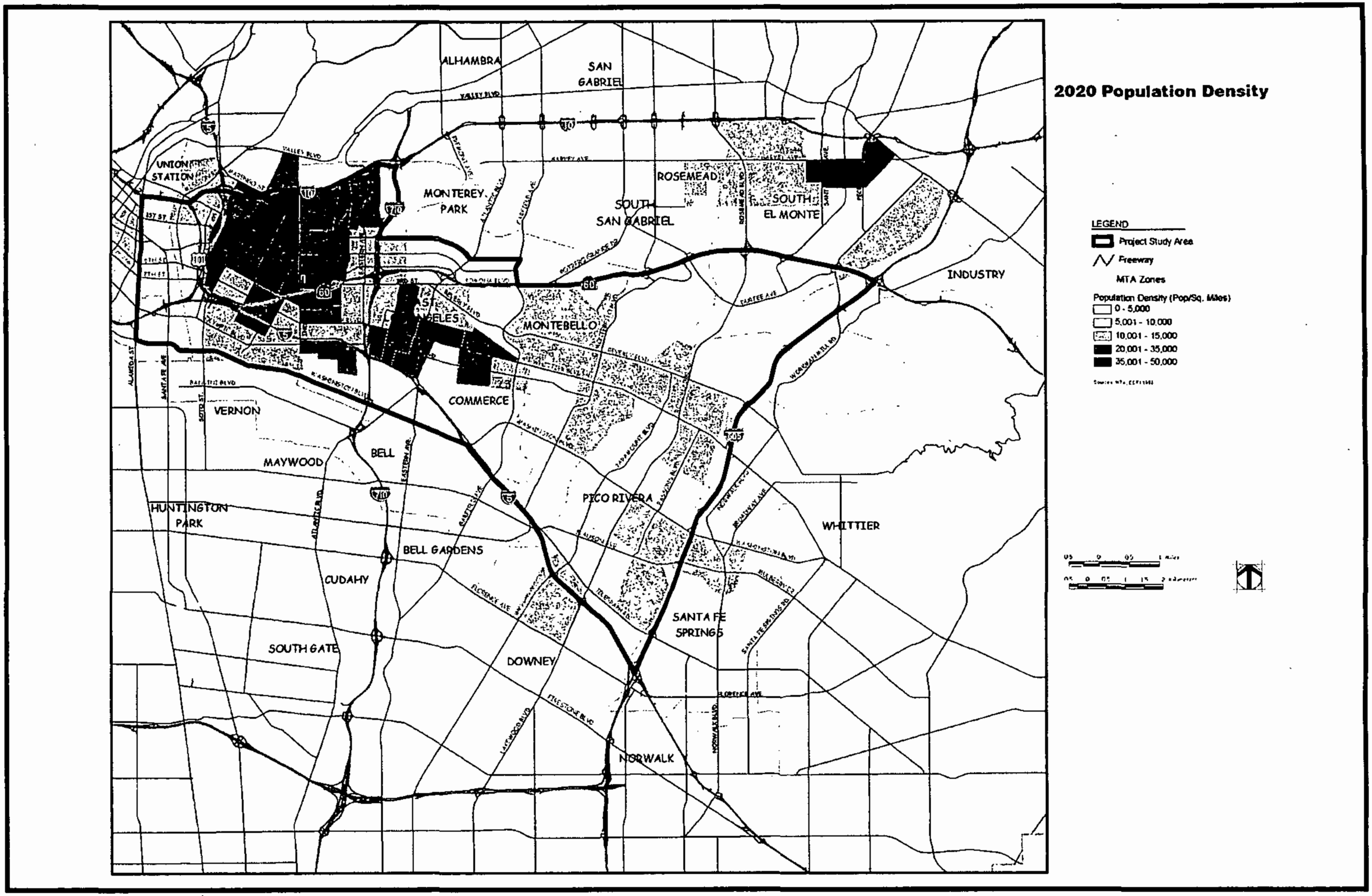


Eastside Transit Corridor Study

1995 Population Density

Eastside Corridor Transit Consultants

Figure 4-14



Eastside Transit Corridor Study

2020 Population Density

Eastside Corridor Transit Consultants

Figure 4-15

115,200 new jobs. The largest decline in employment was in the manufacturing sector with approximately 166,800 jobs. The only other employment sector to experience an increase within this period was the transportation and public utilities sector.

With regard to projected employment, the Eastside Transit Corridor Study area's employment is anticipated to grow at a slightly higher rate than Los Angeles County but at a lower rate than the entire SCAG region through 2020 (Table 4-7). The 1995 employment within the Eastside Transit Corridor Study area was 310,392 and is projected to grow to 455,715 in 2020, about a 47 percent increase. The SCAG region is projected to grow approximately 60 percent from 1994 to 2020.

TABLE 4-6
LOS ANGELES COUNTY 1990 AND 1998
ANNUAL AVERAGE LABOR FORCE AND INDUSTRY EMPLOYMENT

Sector	1990	1998	Change	% Change
Agriculture	13,700	7,600	(6,100)	-45%
Mining	7,900	4,900	(3,000)	-38%
Construction	133,100	116,200	(16,900)	-13%
Manufacturing	834,600	667,800	(166,800)	-20%
Transportation & Public Utilities	211,600	223,700	12,100	6%
Wholesale/Retail Trade	949,600	873,900	(75,700)	-8%
Finance, Insurance & Real Estate	277,600	226,500	(51,100)	-18%
Services	1,179,200	1,294,400	115,200	10%
Government	539,800	539,300	(500)	0%
TOTAL, All Industries	**4,147,100**	**3,954,200**	**(192,900)**	-5%

Source: California Employment Development Department, 1998.

TABLE 4-7
EMPLOYMENT CHANGE

Jurisdiction	1994	2020	Change	% Change
SCAG Region	6,604,000	10,574,000	3,970,000	60.1%
Los Angeles County	4,134,000	5,817,600	1,683,600	40.7%
Eastside Transit Corridor Study Area	310,392*	455,715	145,323	46.8%

Source: SCAG Region and Los Angeles County – SCAG, 1998 RTP Adopted Forecast, April 1998.
Eastside Corridor Study Area – Los Angeles County Metropolitan Transportation Authority, 1999.
Note: * - Eastside Transit Corridor Study Area is 1995 data.

As shown in Table 4-8 , the Los Angeles County labor force was approximately 4.7 million in September 1999. The countywide unemployment rate was 5.8 percent. In contrast the city of Los Angeles had an unemployment rate of 6.6 percent. The unemployment rate in the Boyle Heights area is included with the city of Los Angeles.

Commerce, East Los Angeles, and Pico Rivera exceeded both the Los Angeles City and county unemployment rates. Only Montebello, South Whittier, and Whittier had unemployment rates below the county and city.

TABLE 4 - 8
EMPLOYMENT/UNEMPLOYMENT – SEPTEMBER 1999

Area	Labor Force	Employment	Unemployment	Rate
Commerce	5,420	4,290	500	9.2%
East Los Angeles	52,840	47,960	4,880	9.2%
Los Angeles	1,897,590	1,771,650	125,940	6.6%
Montebello	29,490	27,920	1,570	5.3%
Pico Rivera	28,480	26,570	1,910	6.7%
South Whittier	26,160	24,860	1,300	5.0%
Whittier	40,920	39,360	1,560	3.8%
Los Angeles County	***4,734,900***	***4,458,400***	***276,500***	***5.8%***

Source: California Employment Development Department, 1999.

4.2.2 Evaluation Methodology

Employment Issues

The employment analysis conducted for the Eastside Transit Corridor Study area considers capital investments and support for transit operations. The analysis was conducted to identify the number of short-term (temporary) and long-term (permanent) jobs generated by the project.

Short-term Employment

Construction of the alternatives within the Eastside Transit Corridor Study area would generate employment opportunities at the local and regional level. Two types of jobs are created from transit investments: direct and indirect. Direct impacts account for construction workers, professional services, motor vehicle manufacturing, steel works, and others. Indirect impacts account for added employment in other sectors that is generated by the project (the trickle down effect).

Based on the Regional Industrial Modeling System (RIMS) developed by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA), transit capital investments have been shown to result in a direct regional employment benefit. Using the RIMS II model, the American Public Transit Association has determined that for each $100 million[1] invested in new rail projects, it is estimated to directly increase employment by 3,380 full time-equivalent (FTE) jobs. The same amount invested in bus and bus facilities would directly create 3,149 jobs. Of the total jobs generated by new rail starts, over half are typically construction-related or business and professional services.

[1] Does not include right-of-way.

For bus and bus facility investments, the jobs created are more equally divided among various employment sectors with a fairly large percentage in motor vehicle manufacturing. The higher employment impacts of new start projects are attributable to the higher labor-intensity of new transit construction work and related professional services. Bus projects generate somewhat fewer jobs per unit of investment since a larger proportion of these costs are expended on manufacture and assembly of motor vehicles, which is a more capital-intensive activity (APTA, 1983).

Indirect impacts are estimated through an employment multiplier of 1.365 drawn from a 1981 U.S. Department of Transportation study (USDOT, 1981). This estimate is based on Bureau of Labor Statistics studies, which have been used in a number of FTA projects. A new rail transit investment of $100 million is estimated to indirectly increase employment by 4,610 FTE jobs. For bus and bus facility projects of the same investment, 4,300 FTE jobs would indirectly be created.

For every $100 million invested, the total direct and indirect jobs created is estimated to be 7,990 FTE jobs for new rail projects and 7,450 FTE jobs for bus and bus facility projects.

The 1999 conceptual construction cost estimates developed for the Eastside Transit Corridor Study build alternatives and the direct and indirect factors identified above were used to estimate the total number of temporary jobs created.

Long-term Employment

Operation of the alternatives would also generate jobs and could increase customer patronage for local businesses especially those located near stations or bus stops. Jobs created from operation are considered permanent. The completion of a project can be expected to improve business conditions and employment opportunities. Employment is generated by new business activity that occurs as a result of project completion and transit operating expenditures.

Transit operating expenses create substantially more employment per $100 million than do capital projects. Most of the direct impacts from operation are created in the transit industry, usually on-site. Based on the RIMS model and the indirect multiplier of 1.365, $100 million spent on transit operations would support a total of 9,610 FTE jobs (4,060 FTE jobs - direct and 5,550 FTE jobs - indirect).

Residences and Businesses Displaced

The conceptual plans were reviewed to determine if additional right-of-way is needed to accommodate the various build alternative alignments and associated facilities. For those alternatives requiring additional right-of-way, the estimated numbers of residences and businesses to be displaced were estimated in those cases where the conceptual design is sufficiently developed to determine that information. Since the No-Build and TSM Alternatives do not include construction of any physical improvements, it was assumed that these alternatives would not require additional land. For the proposed park-and-ride facilities associated with the build alternatives, it was estimated that an acre of land would be needed for every 80 parking spaces. At this conceptual level of analysis, only general locations for park-and-ride facilities are known; the specific sites and necessary displacements will be determined during preparation of the SEIS/SEIR. For this evaluation, the land requirements for park-and-ride facilities are reported in acres.

4.2.3 Environmental Issues

Short-term Employment Impacts

As discussed in the methodology presented in Section 4.2.2, new rail starts are estimated to generate 3,380 direct and 4,610 indirect jobs for each $100 million investment. Bus and bus facility projects are estimated to generate 3,149 direct and 4,300 indirect jobs for each $100 million investment. Examples of direct jobs include those for construction, professional services, motor vehicle manufacturing, steel works, etc. Indirect jobs are those generated in other sectors as a result of the project (the trickle down effect).

Table 4-9 presents the conceptual construction cost estimates and short-term jobs created for the alternatives. Given that short-term employment is directly related to the construction cost of the alternatives, the higher the construction cost, the higher the potential employment opportunities would be. Employment opportunities could come from within the Eastside Study Corridor, the Los Angeles Basin, Southern California, nationally, or internationally. Some equipment and parts could be constructed in other countries or within the study area. It is likely that the majority of construction labor would come from Southern California and within Los Angeles County. It is unknown exactly how much would be generated locally. Construction of the LRT or HRT alternatives would generate more local (within Southern California) short-term employment opportunities. This is due to the fact that more construction occurs on site rather than with the BRT alternatives where the largest expenditure is on vehicles constructed outside of the region.

Construction of the alternatives may be phased, therefore "short-term" may encompass a number of years rather than one or two years. In addition, with a phased project, the number of construction jobs may not be additive from phase to phase. For example, there may be the potential for 1,000 new short-term jobs for a full project (being constructed at one time). With a phased project, the first phase of construction may result in 600 jobs, and the second phase may only result in 400 jobs. The jobs in the second phase may be taken by employees finished with the first phase. Thus, overall short-term job opportunities could be 400 less in a phased project. The number of short-term employment opportunities throughout construction would be dependent on phasing. The data in Table 4-9 is for a project constructed at one time.

The No-Build Alternative would not result in any additional employment for the local or regional economy beyond that already projected. The TSM Alternative would result in less employment opportunities than any of the build alternatives due to its low cost nature.

TABLE 4-9 ESTIMATED SHORT-TERM EMPLOYMENT				
Alternative	Conceptual Construction Costs (1999 Million $)[1]	Estimated Direct Employment Generated[2]	Estimated Indirect Employment Generated[2]	Estimated Total Employment Generated[2]
No-Build	$0	0	0	0
TSM[3]	$73.2	2,305	3,148	5,453
1	$338.6	10,663	14,560	25,222
2	$333.7	10,508	14,349	24,857
3	$542.9	18,350	25,028	43,378
4	$342.6	10,788	14,732	25,520
5	$542.7	18,343	25,018	43,362
6	$693.1	23,427	31,952	55,379
7	$990.5	33,479	45,662	79,141
8	$701.7	24,786	33,825	58,611

Sources:
[1] Conceptual construction costs do not include right-of-way costs (PBQD, 1999).
[2] For each $100 million investment - 3,380 direct and 4,610 indirect jobs would be generated for new rail starts and 3,149 direct and 4,300 indirect jobs would be generated for bus and bus facility projects (APTA, 1983).
[3] The TSM Alternative includes construction of minimal facilities.

All of the BRT alternatives (Alternatives 1, 2, and 4) would generate approximately the same amount of employment (about 25,000 jobs). Of the LRT alternatives, Alternative 6 would generate approximately 55,000 new jobs or about 12,000 more than either Alternatives 3 or 5. The HRT/LRT alternative, Alternative 7, would generate the highest potential short-term employment related to construction and services as compared to the other build alternatives. This alternative could generate up to approximately 79,000 jobs. Alternative 8, the other HRT alternative would generate approximately the same amount of short-term employment as Alternative 6.

Long-term Employment Impacts

Operation of the transit alternatives would generate permanent jobs and could increase customer patronage for local businesses, especially those located near stations or bus stops. The completion of a project can be expected to improve business conditions and employment opportunities. Employment is generated by new business activity that occurs as a result of project completion and transit operating expenditures. As discussed in the methodology presented above, transit projects are estimated to generate 4,060 direct and 5,550 indirect jobs for each $100 million spent on operating expenses.

Table 4-10 presents the conceptual operations costs and potential long-term or permanent jobs created for the alternatives. As with the short-term employment discussed above, the long-term employment is estimated based on the cost of operations and maintenance of the alternatives. It should be noted however, that not all new jobs would be created this way. As discussed in the Section 4.1, there are eleven existing redevelopment or special revitalization zones within the Eastside Transit Corridor Study area. An improved transit system could assist in the revitalization of these areas by providing improved access and mobility. This in turn could also enhance long-term employment opportunities within the study area, especially around station locations. Types of development that could occur include neighborhood shops or pedestrian-oriented shopping/entertainment streets such as is occurring in Long Beach near the Blue Line. A December 14, 1999 article in the Los Angeles Times stated that pedestrian-oriented shopping streets are more appealing to people rather than malls. This trend offers MTA with the opportunity to provide the residents of the Eastside Transit Corridor Study area with an impetus for development and job growth. Perceptions of investors could also lead to new employment opportunities. Those willing to invest in redevelopment and joint development projects are more apt to invest in an area where long-term transit opportunities exist such as with the HRT and LRT alternatives. The BRT alternatives offer flexibility, but may also be perceived to be temporary and not offer the long-term view to investors. Joint development (public/private partnerships) around station locations of the HRT and LRT alternatives offers a high potential for job creation.

TABLE 4- 10
ESTIMATED LONG-TERM EMPLOYMENT

Alternative	Conceptual Operating Costs(1999 $)[1]	Estimated Direct Employment Generated[2]	Estimated Indirect Employment Generated[2]	Estimated Total Employment Generated[2]
No-Build	$0	0	0	0
TSM	$15.2	619	846	1,464
1	$39.0	1,584	2,165	3,748
2	$39.2	1,593	2,177	3,770
3	$43.7	1,775	2,427	4,202
4	$41.6	1,691	2,312	4,003
5	$47.5	1,930	2,638	4,568
6	$42.5	1,725	2,359	4,084
7	$53.1	2,158	2,950	5,108
8	$49.1	1,993	2,725	4,718

Sources:
[1] Conceptual operations costs (PBQD, 1999).
[2] For each $100 million operating expenses - 4,060 direct and 5,550 indirect jobs would be generated (APTA, 1983).

Based on the data presented in Table 4-10, the No-Build Alternative would not generate any additional permanent employment for the local or regional economy beyond that already projected. The TSM Alternative would result in some additional employment, mainly due to the additional bus service associated with this alternative, but given the low cost nature of this alternative, the total increase in employment is far lower than that generated by Alternatives 1 through 8.

As with the short-term employment discussed above, the long-term employment opportunities would be highest for the HRT/LRT alternative, Alternative 7. The heavy rail and light rail nature of this alternative would require more jobs to operate and maintain the system. This alternative also offers a high potential for redevelopment around station locations since it is perceived to be more permanent. All of the BRT alternatives, Alternatives 1, 2, and 4, offer approximately the same level of permanent employment opportunities. Given that there are few BRT systems in operation, it is unknown to what extent other employment opportunities might be linked to future development along the routes or near stations. LRT Alternatives 3, 5, and 6 would also result in approximately the same number of new long-term jobs. These alternatives offer a high potential for redevelopment near station areas. Alternatives 3 and 5 have 19 stations and Alternative 6 has 16.

Long-term employment opportunities are likely to be only partially driven by operations and maintenance of the system. Measurable gains in employment are likely to come from potential business development and redevelopment along the alignments and near stations.

Residences and Businesses Displaced

Table 4-11 presents the potential land acquisition needs for each alternative. None of the alternatives will require purchase of additional land to accommodate the right-of-way for the alignments or at-grade stations. All can be accommodated within the existing street rights-of-way. However, park-and-ride facilities will be constructed necessitating acquisition of additional land in the vicinity of some of the stations east of I-710. As mentioned previously in section 4.2.1 (*Evaluation Methodology)*, only general locations for park-and-ride facilities are known at this conceptual level of analysis. Therefore, the potential numbers of residences and businesses displaced for these facilities cannot be determined at this time, and the additional land needs are, therefore, reported in acres. In addition, although the MTA already owns property for the subway station areas, it is possible that additional land may be needed for the heavy rail alternatives to accommodate the cut-and-cover process of constructing the station box area at 1st/Boyle (Alternatives 7 and 8) and at 1st/Lorena (Alternative 7). This possibility will be further investigated once a preferred alternative is selected, and the design is further refined. A detailed evaluation of displacements will be conducted during preparation of the SEIS/SEIR.

Table 4-12 compares the park-and-ride land requirements for each alternative by station location based on a preliminary estimate of parking space requirements for this initial evaluation. A more detailed analysis will be conducted during the SEIS/SEIR phase to more precisely define the parking needs. As shown, BRT Alternative 2 and LRT Alternatives 3 and 6 have the highest acquisition requirements (35 acres) based on this initial analysis. All would provide six park-and-ride facilities with a total of 2,800 parking spaces. The other build alternatives would provide five park-and-ride facilities with a total of 2,300 spaces. These alternatives would each require 28 acres of land to accommodate park-and-ride.. The No-Build and TSM Alternatives would not require any additional land.

TABLE 4-11 POTENTIAL LAND ACQUISITION NEEDS BY ALTERNATIVE		
Alternative	**Alignment and Stations**	**Park-and-Ride**
	No. Residences/Businesses Displaced	**Acres[1,2]**
No-Build	0	0
TSM	0	0
1 – BRT	0	28
2 – BRT	0	35
3 – LRT	0	35
4 – BRT	0	28
5 – LRT	0	28
6 – LRT	0	35
7 – HRT/LRT	0	28
8 – HRT/BRT	0	28

[1] Numbers of residences and businesses to be displaced cannot be determined at this conceptual level of analysis.
[2] Based on initial parking requirement estimates.

TABLE 4-12
ESTIMATED LAND ACQUISITION AND PARKING SPACE REQUIREMENTS FOR THE PARK-AND-RIDE FACILITIES (ACRES/SPACES[1,2])

Alt.	Station/Location								
	3rd/ Mednik	Whittier/ Atlantic	Beverly/ Garfield	Whittier/ Garfield	Beverly/ Montebello	Whittier/ Montebello	Whittier/ Rosemead	Whittier/ Norwalk	Total
No-Build	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TSM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1 – BRT	3.75 300		3.75 300		6.25 500		6.25 500	8.75 700	28 2,300
2 – BRT	3.75 300	6.25 500		3.75 300		6.25 500	6.25 500	8.75 700	35 2,800
3 – LRT	3.75 300	6.25 500		3.75 300		6.25 500	6.25 500	8.75 700	35 2,800
4 – BRT	3.75 300		3.75 300		6.25 500		6.25 500	8.75 700	28 2,300
5 – LRT	3.75 300		3.75 300		6.25 500		6.25 500	8.75 700	28 2,300
6 – LRT	3.75 300	6.25 500		3.75 300		6.25 500	6.25 500	8.75 700	35 2,800
7 – HRT/ LRT	3.75 300		3.75 300		6.25 500		6.25 500	8.75 700	28 2,300
8 – HRT/ BRT	3.75 300		3.75 300		6.25 500		6.25 500	8.75 700	28 2,300

[1] Assumes one acre required for every 80 parking spaces.
[2] Based on preliminary parking requirement estimates.

Residences and Businesses Displaced Mitigation

The federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) and the State of California Relocation Act (Chapter 16, Section 7260 et seq. of the Government Code) contain specific requirements that govern the manner in which a government entity can acquire property for public use. Both pieces of legislation seek to 1) ensure consistent and fair treatment for owners of real property, 2) encourage and expedite acquisition by agreement in order to avoid litigation and relieve congestion in the courts, and 3) promote confidence in public land acquisition. Under these Acts, eligible residents, businesses, and non-profit organizations that may be displaced by construction and operation of MTA transit-related projects will receive certain relocation services and payments. All would be given advanced notice of the eligibility requirements for relocation assistance and payments. The acquisition and relocation program would be administered by the MTA Real Estate Section to assure compliance with all regulations.

Owners of private property have federal and state constitutional guarantees that their property will not be taken or damaged for public use unless they first receive just compensation. Just compensation is measured by the "fair market value" of the property taken. All real property acquired by MTA would be appraised to determine its fair market value. An offer of just compensation, which shall not be less than the approved appraisal, would be made to each property owner.

4.3 ENVIRONMENTAL JUSTICE

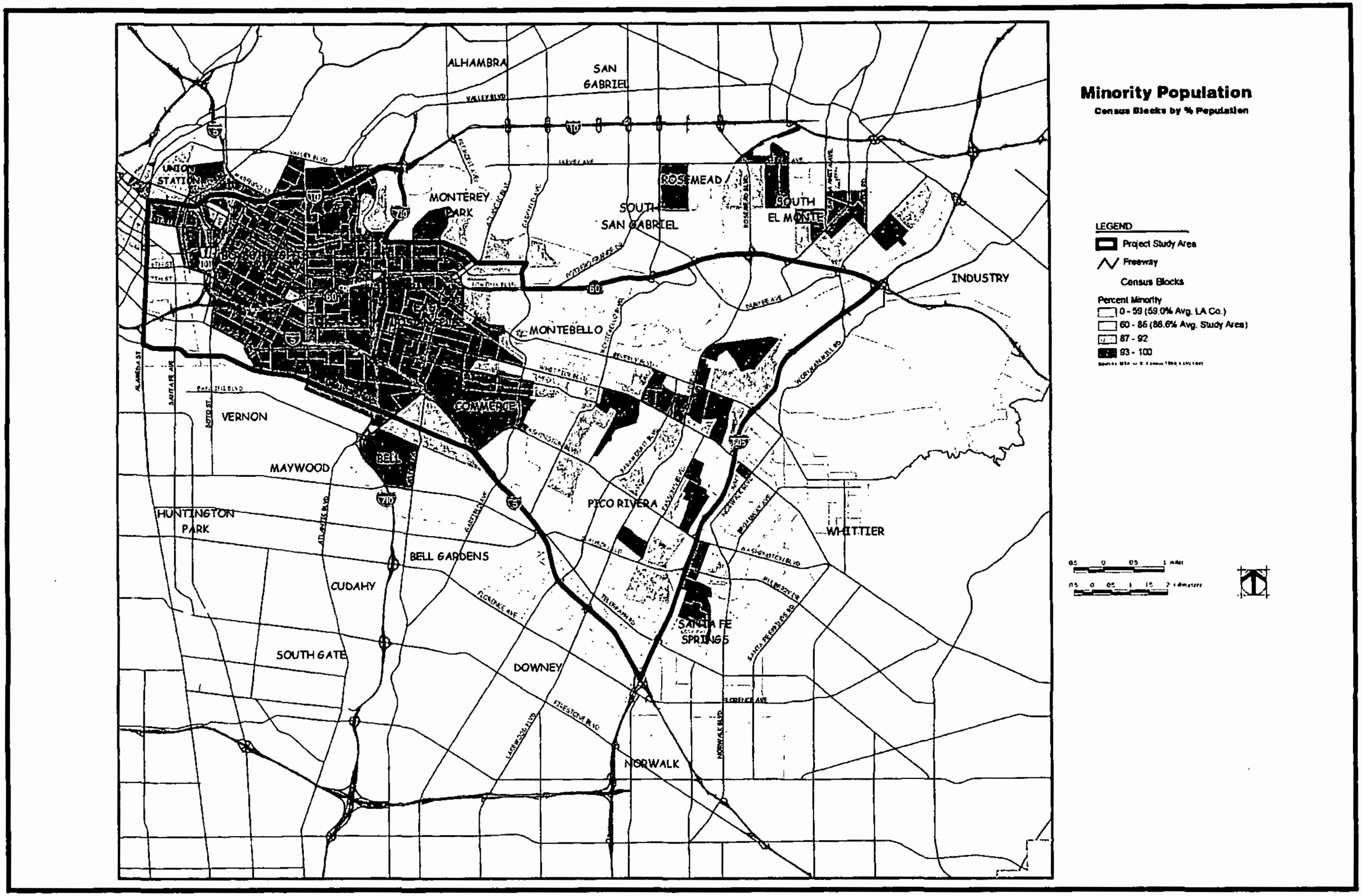
4.3.1 Affected Environment

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, signed by President Clinton on February 11, 1994, requires that federal agencies consider and address disproportionately high adverse environmental effects of proposed federal projects on minority and low-income populations.

Study Area Demographics

Minorities account for about 87 percent of the population living in the Eastside Transit Corridor Study area according to the 1990 U.S. Census data. This is substantially higher than the minority make-up for all of Los Angeles County, which is 59 percent. Minorities include all people of the following origins: Black; American Indian, Eskimo, or Aleut; Asian or Pacific Islander; other races; White Hispanic; Black Hispanic; American Indian, Eskimo, or Aleut Hispanic; Asian or Pacific Islander Hispanic; and other race Hispanic. People of Hispanic origin are the largest minority living within the study area. As portrayed in Figure 4-16, minorities account for 93 percent or more of the population of most of the study area west of Garfield Avenue. For nearly all of the study area east of Garfield Avenue, minorities make up 60 percent or more of the total population. The majority of the census blocks containing less than 60 percent minority populations are situated in the extreme northern, southern, and southwestern portions of the entire study area, and are not, in most cases, adjacent to the proposed alignments of the build alternatives.

For the 1990 Census, the average poverty threshold for a family of four was $12,674, according to the U.S. Census Bureau. Poverty thresholds are applied on a national basis and are not adjusted for regional, state, or local variations in the cost of living. Within the study area, 20 percent of the families were below the poverty level. This compares to



Eastside Transit Corridor Study

Percent Minority Population

Eastside Corridor Transit Consultants

Figure 4-16

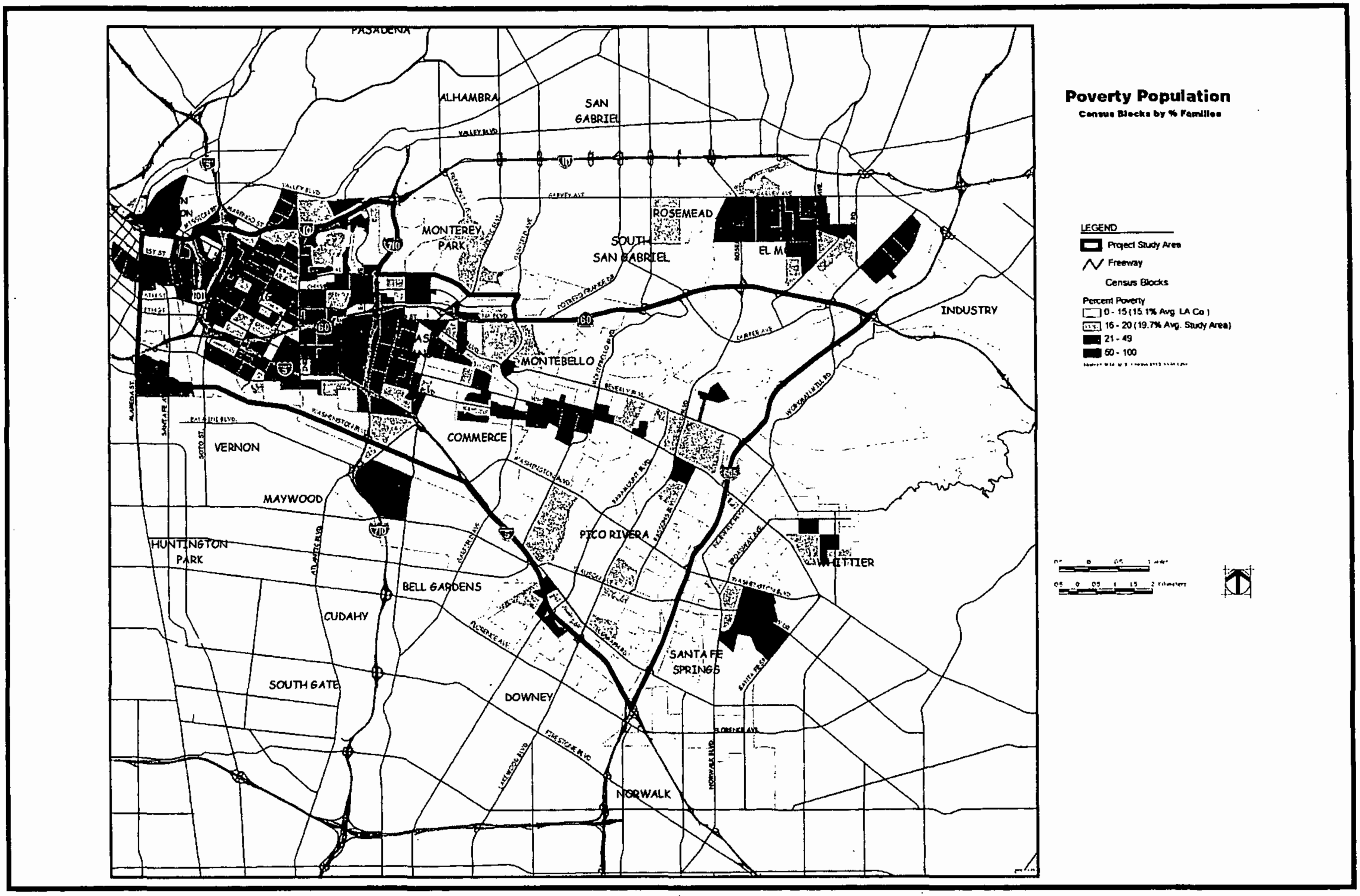
15.1 percent for all of Los Angeles County. Figure 4-17 displays the locations in the study area where more than 15 percent (the county average) of the families have a poverty-level income. Note that most of the concentration of low-income population lives west of Atlantic Boulevard in and around the communities of Boyle Heights and East Los Angeles. Additional low-income populations can be found further east near Beverly Boulevard between Atlantic Boulevard and Garfield Avenue and adjacent to Whittier Boulevard in the vicinity of Montebello and Rosemead Boulevards. Other pockets of low-income areas are also scattered in other portions of the study area.

As noted in previous studies, the Eastside Transit Corridor Study area is one of the most transit-dependent and transit-oriented communities in Los Angeles County. Many of the highest MTA and Montebello Transit ridership bus routes are in the area. Throughout the entire study area, about ten percent of the workers 16 years and older use public transportation to get to and from work. This compares to 6.5 percent on a countywide basis. Figure 4-18 graphically portrays the locations where such workers rely solely on public transportation. As shown, the highest concentrations of census blocks where more than 6.5 percent (the county average) of these workers use public transportation are located west of Eastern Avenue. Another area of high concentration of census blocks is between Eastern Avenue and Montebello Boulevard. In some areas of Boyle Heights and the Central City, more than a quarter of such persons must use public transportation. Figure 4-19 shows absolute numbers of persons 16 years of age and older who use public transportation to get to work. Again, the study area west of Eastern Avenue contains the highest concentration of census blocks where more than 125 households require public transportation.

Another indicator often used to determine extent of transit-dependence is the number of zero-car households, or occupied housing units with no available vehicles. Within the Eastside Transit Corridor Study area, a total of 15.5 percent of households do not have access to a car. This compares to 11.2 percent on a countywide basis. As portrayed in Figure 4-20, the western portion of the study area between Union Station and about Garfield Avenue contains a large concentration of households (12 percent or more which is higher than the county average) not having access to a vehicle. There are also several census blocks where at least half of the households do not have access to a vehicle. Most are in Central City, Boyle Heights, and East Los Angeles. However, another census block is located east of the I-605 south of Washington Boulevard. Figure 4-21 displays numbers (in ranges) of zero-car households. The highest concentration of census blocks that have more than 125 households with no access to a vehicle is west of Atlantic Boulevard. However, census blocks containing a similar range are also scattered throughout the rest of the study area. Four locations contain census blocks with over 300 households with no available vehicle. One is just west of Soto Street between Chavez Avenue and 1st Street. The other can be found east of I-710 between Floral Drive and the Pomona Freeway. Two other areas are located on the west side of Alameda Street near 1st Street and Union Station, respectively.

Major Issues of the Eastside Communities

Historically, the eastside residential communities of Boyle Heights in the City of Los Angeles and East Los Angeles in the unincorporated portion of the County of Los

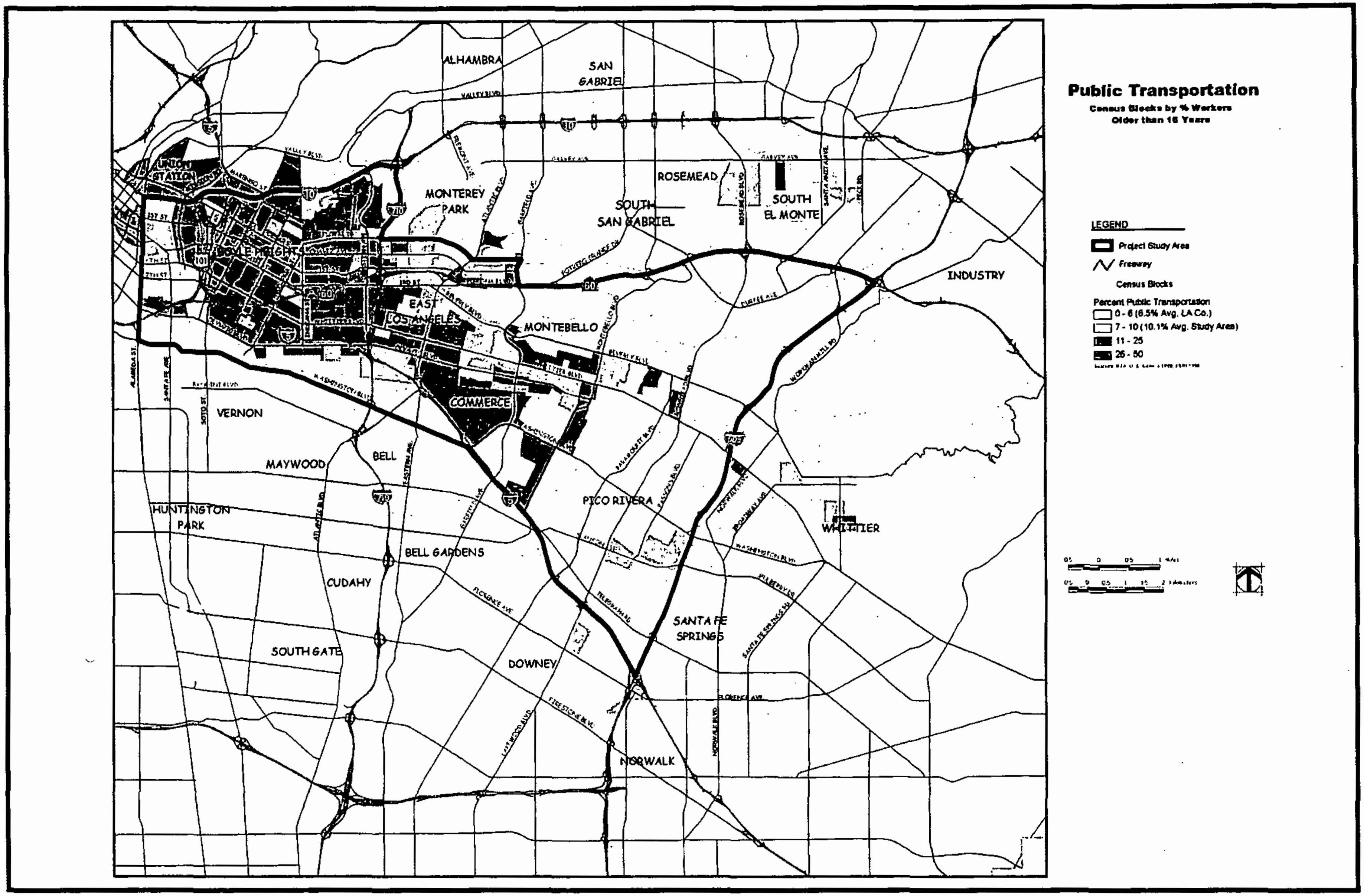


Eastside Transit Corridor Study

Percent Poverty Population

Eastside Corridor Transit Consultants

Figure 4-17



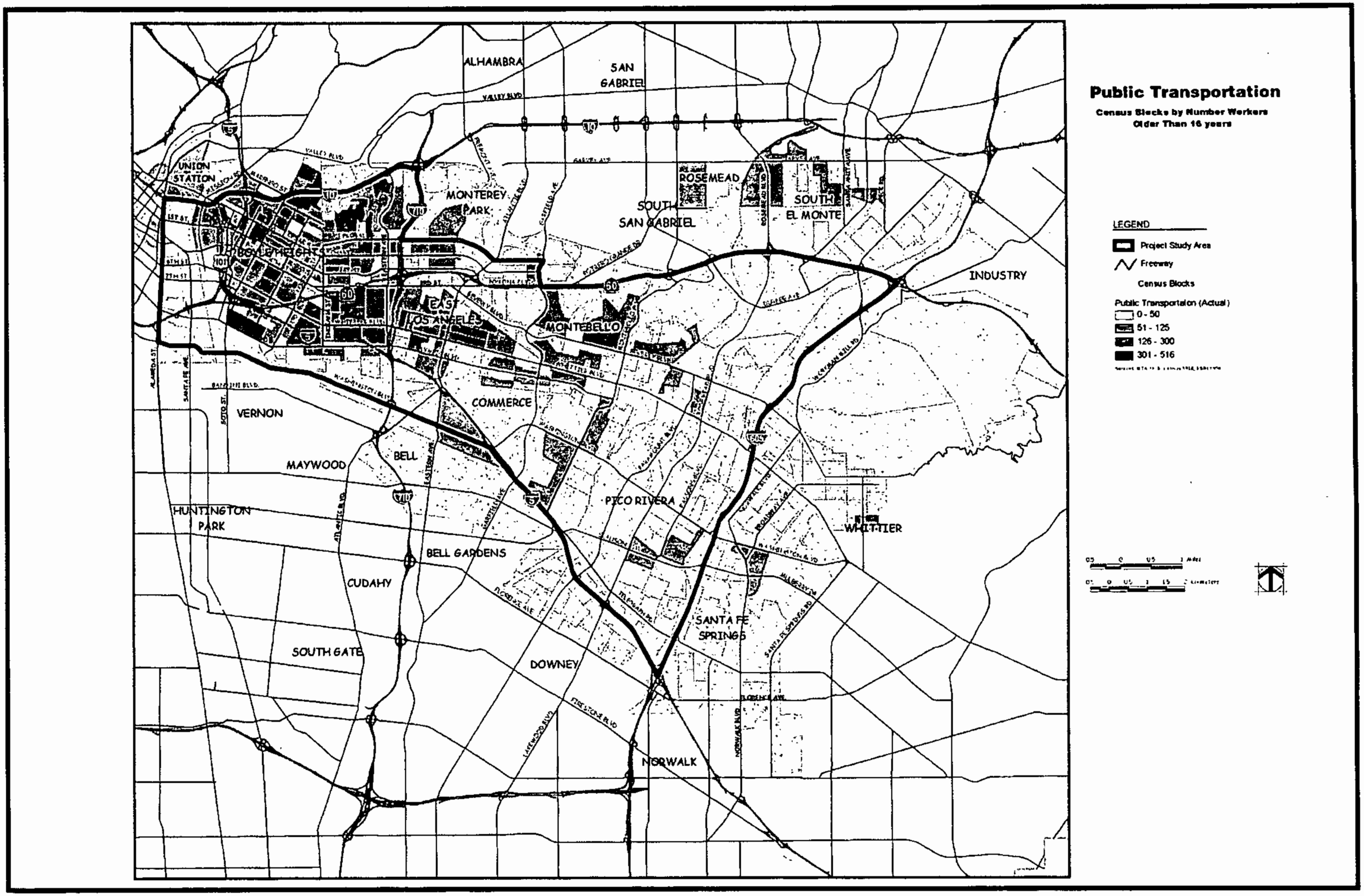
Eastside Transit Corridor Study

Public Transportation

Census Blocks by Percent Workers

Eastside Corridor Transit Consultants

Figure 4-18

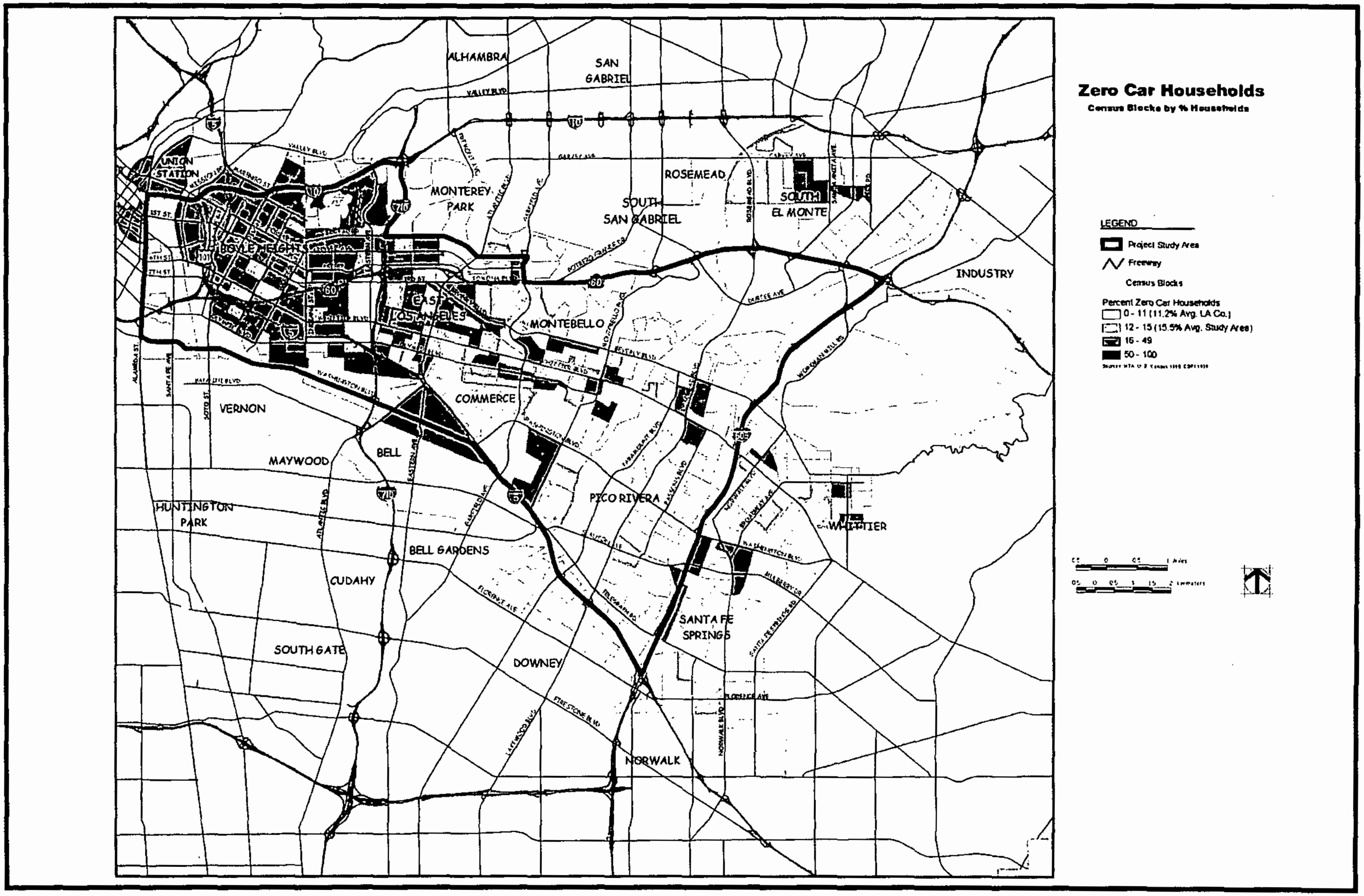


Eastside Transit Corridor Study

Public Transportation
Census Blocks by Number Workers

Eastside Corridor Transit Consultants

Figure 4-19



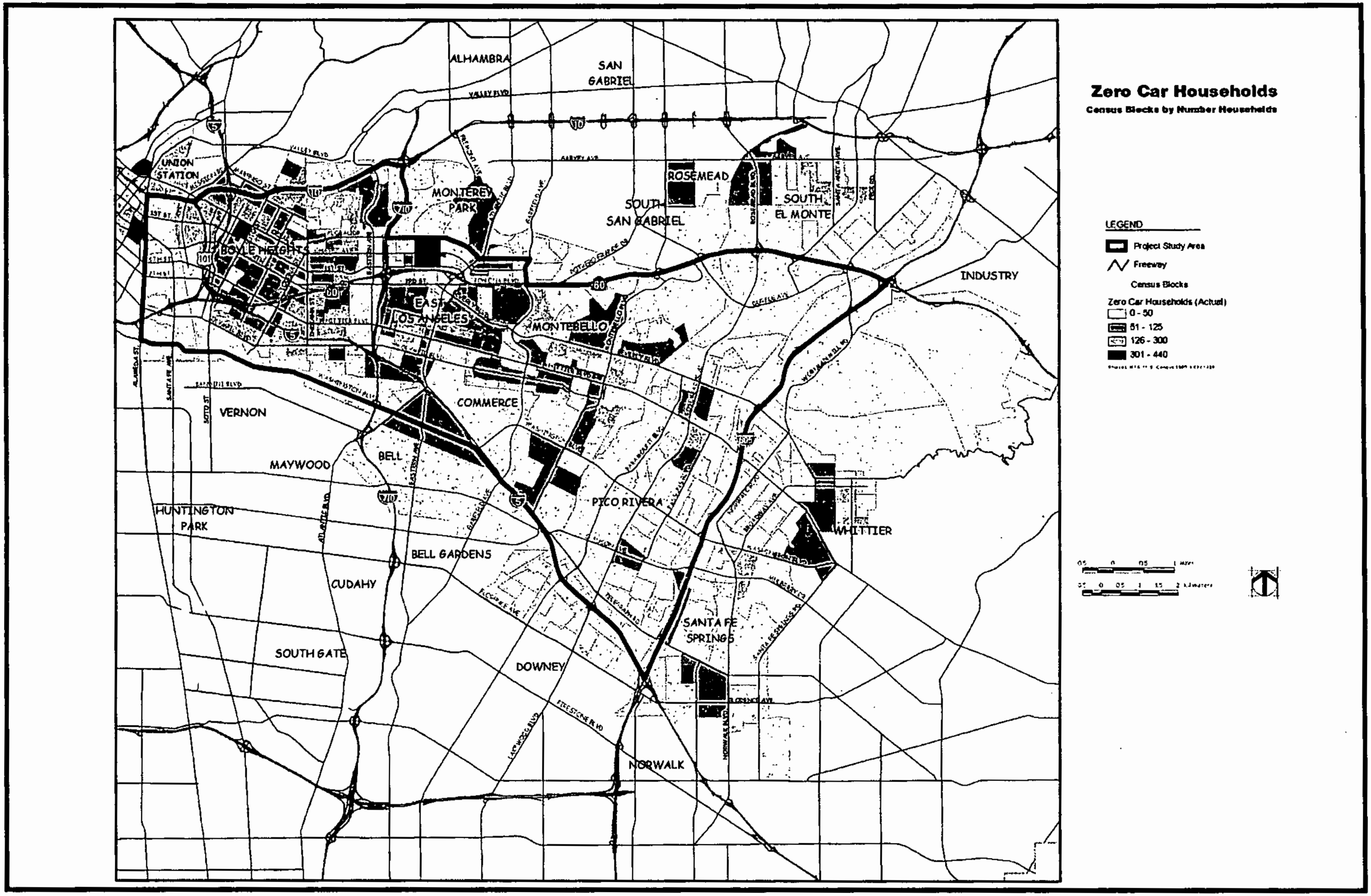
Eastside Transit Corridor Study

Zero Car Households

Census Blocks by Percent Households

Eastside Corridor Transit Consultants

Figure 4-20



Eastside Transit Corridor Study

Zero Car Households

Census Blocks by Number Households

Eastside Corridor Transit Consultants

Figure 4-21

Angeles, have been affected by a variety of institutional and transportation-related projects. Because of their unique location, east of the Los Angeles Central Business District, all of the major railroad trunk lines were located along the northern, western, and southern edges of Boyle Heights and East Los Angeles along natural valleys or flat terrain. The initial industrial sectors and railroad stockyards were developed along these railroad lines.

From about 1945 to 1967, the Boyle Heights and East Los Angeles communities were subjected to 30 years of freeway construction as a result of implementing the current regional freeway network. Five freeways traverse these communities, mostly through residential areas resulting in impacts on neighborhood cohesiveness and noise and visual impacts on nearby residences, schools, parks, and other public facilities. In addition, the area has been exposed to increases in automobile and truck traffic due to the location of freeway on- and off-ramps and the East Los Angeles freeway interchange.

It has been estimated that about 2,900 housing units were removed and 10,000 persons were displaced as a result of the freeway construction in the Boyle Heights community alone. Because the freeways were built prior to enactment of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), no environmental impact reports were prepared for any of these freeway projects. Current provisions for relocation benefits to displaced persons were non-existent. These issues are of major concern to both current and former residents of the Boyle Heights and East Los Angeles communities.

The local communities, as a whole, are generally supportive of increased transit service as long as the adverse impacts of the system do not outweigh the benefits. All of the build alternatives are expected to improve transit mobility, access to transit, and result in travel time savings as compared to the No-Build and TSM Alternatives. The benefits are estimated in the environmental issues section below. During preparation of the SEIS/SEIR in Phases II and III of this study, a more detailed analysis of the benefits and adverse impacts of the preferred alternative(s) will be conducted. Upon completion of the Final SEIS/SEIR, the FTA will make a final determination as to whether or not high and adverse impacts of the transit project will fall disproportionately on minority and/or low-income populations. Factors that they will consider in making this determination include: (1) adverse impacts, (2) mitigation and enhancement measures incorporated into the project, and (3) benefits.

4.3.2 Evaluation Methodology

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, signed by President Clinton on February 11, 1994, requires that federal agencies consider and address disproportionately high adverse environmental effects of proposed federal projects on minority and low-income populations. For this evaluation, definitions of minority and low-income areas were established based on guidance provided by the Council on Environmental Quality (CEQ). CEQ's *Environmental Justice Guidance Under the National Environmental Policy Act*, December 10, 1997, states, "Minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis." It goes on to state that "The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, a census tract, or other similar unit that is chosen so as to not artificially dilute or inflate the affected minority population." For this analysis, Los Angeles County was selected as the unit of geographic analysis for comparison. Minorities account for 59.0 percent of the total county population. Therefore, locations within the Eastside Transit Corridor Study area with higher percentages of such populations than the County's were considered minority areas. Minorities include all people of the following origins: Black; American Indian, Eskimo, or Aleut; Asian or Pacific Islander; other races; White Hispanic; Black Hispanic; American Indian, Eskimo, or Aleut Hispanic; Asian or Pacific Islander Hispanic; and other race Hispanic.

Staff at the U.S. Census Bureau was consulted to determine the appropriate definition for poverty status. They indicated that the statistic, "Ratio of Income in 1989 to Poverty Level" should be used. This statistic was derived by the Census by testing the income of each family against the appropriate poverty threshold (48 thresholds were used based on family size and number of members under 18 years) to determine the poverty status of that family. Several ranges of ratios are reported. All families below a ratio of 1.0 are considered to be in poverty. Note that 1989 income was used since it was the last full year of income prior to when the Census was taken. Using this statistic, it was determined that low-income families account for 15.1 percent of the families within the county. Therefore, any locations within the study area with higher percentages than the County's were considered low-income areas.

The 1990 Census data was used to determine populations since this is the most recent data available. A Geographic Information System (GIS) was used to collect and map data by census block for the entire study area as well as for areas within a half mile of the stations. In addition to minority and low-income populations, data was collected on workers 16 and older using public transportation and on numbers of zero-car households. These two statistics are reflective of the extent of transit-dependence within the corridor. The percentages for the County for these two statistics were also used as a comparison to determine areas of high concentrations of such workers and zero-car households within the study area.

Factors to consider in determining whether a project will have "disproportionately high adverse environmental effects" include its potential adverse impacts; mitigation and enhancement measures that will be incorporated into the project; and off-setting benefits. The other sections of this chapter address the major impacts of the alternatives being considered at this conceptual level of design. This evaluation considers potential benefits of the project and generally discusses the efforts to date to solicit input from the public in considering the alternatives. No intent has been made at this time to judge whether adverse impacts will fall disproportionately on minority and low-income populations. It is ultimately the responsibility of the FTA to make this determination for transit projects involving federal funding. This will be done after the Locally Preferred Alternative (LPA) has been selected, and FTA has reviewed the Final SEIS/SEIR, the alternatives considered, public comments and testimony, and the public involvement process itself.

Potential benefits of the project include improved transit mobility, access to transit, and travel time savings as compared to the No-Build and TSM Alternatives. To estimate the extent of the benefits, the analysis considers the numbers of persons served within each of the populations mentioned that would be within a half-mile of each of the individual station areas. The total numbers of such persons for all of the station areas associated with each alternative are also reported. Note that where station areas are located less than one mile apart, the individual station data includes double-counting where the half-mile radii of each station overlap. The total of persons served, as reported for the total alternative, has been adjusted to account for the overlap and does not double-count.

To assess transit mobility and accessibility, computer-modeling was relied upon to estimate the Year 2020 daily person trips, transit trips, and transit mode share within the corridor, and the results for the build alternatives were compared to each other and to the No-Build and TSM Alternatives. Although these measures apply to the entire corridor, they can also be used as an indicator of transit mobility and accessibility within minority and low-income areas since the corridor contains many areas that fit the definitions.

4.3.3 Environmental Issues

The criteria being evaluated include: 1) minority, low-income, workers 16 and older using public transportation, and zero-car household populations within 1/2 mile of the stations, 2) corridor daily person trips and transit trips, 3) corridor daily transit mode share, and 4) rail expenditures in the Eastside Transit Corridor Study area.

Introduction

As previously noted, Executive Order 12898 requires that federal agencies consider and address disproportionately high adverse environmental effects of proposed federal projects on minority and low-income populations. Minorities account for about 87 percent of the population in the Eastside Transit Corridor Study area. This is substantially higher than the minority make-up for all of Los Angeles County, which is approximately 59 percent. About twenty percent of the families in the study area have a poverty-level income as defined by the U.S. Census Bureau. This is somewhat higher than the estimated 15 percent for the county as a whole.

Factors to consider in determining whether a project will have "disproportionately high adverse environmental effects" include its potential adverse impacts; mitigation and enhancement measures that will be incorporated into the project; and off-setting benefits. The other identified issues in this document address the major impacts of the alternatives being considered at this conceptual level of design. This section evaluates potential benefits of the project and generally discusses the efforts to date to solicit input from the public in considering the alternatives. There is no intent to make a judgment at this time whether adverse impacts will fall disproportionately on minority and low-income populations. It is ultimately the responsibility of the FTA to make this determination for transit projects involving federal funding. This will be done after the Locally Preferred Alternative (LPA) has been selected, and FTA has reviewed the Final SEIS/SEIR, the alternatives considered, public comments and testimony, and the public involvement process itself.

Potential Benefits

Residents of the Eastside Communities have complained for years that the area has a disproportionate share of major railroad trunk lines and freeways cutting through significant portions of their neighborhoods and causing adverse impacts, but they have not benefited from their fair share of public investments for transit. Approximately 2.3 percent of the MTA's rail investments have been to the Eastside communities. No MTA rail services are currently operating in the Eastside (except for Metrolink) as all the expenditures have been for planning, design, right-of-way acquisition, and relocation of businesses and residents. The new transit system is perceived by many area residents as an overdue public investment that will improve neighborhoods that have been overlooked in the past and that will strengthen local businesses.

It is anticipated that the transit project will improve transit mobility and access to transit as compared to the No-Build and TSM Alternatives. To estimate the extent of the benefits, this analysis provides a comparison of the alternatives with regard to the following criteria:

- Specific demographic characteristics of those who would be best served (those within one-half mile of the stations) by each transit option (Tables 4-13 and 4-14). The characteristics considered include:
  - Minority population;
  - Low-income families;
  - Workers 16 and older using public transportation; and
  - Zero-car households.
- Corridor daily person trips and transit trips (Table 4-15); and
- Corridor daily transit mode share (Table 4-16).

Tables 4-13 and 4-14 present the population characteristics for a half-mile radius around each of the stations for the alternative itself and also by station. The data reported for the individual stations include a half-mile radius around each station. Where stations are located less than a half-mile apart, the individual station data includes double-counting where the half-mile radii of each station overlap. The totals reported for the alternative, as shown in Table 4-13, have been adjusted to account for the overlap and do not double-count.

As presented in Table 4-13, BRT Alternative 2 and LRT Alternative 3 would both serve the highest numbers and percentages of the populations considered. On the other hand, the hybrid heavy rail and LRT Alternative 7 would serve the lowest numbers and percentages of these populations. Even so, the total population served within a half-mile of the stations for this alternative is composed of about 91 percent minorities and about 23 percent low-income families, which is higher than both the averages for Los Angeles County and the Eastside Transit Corridor Study area. With regard to the individual stations, Chavez/Soto (included in Alternatives 1 and 8), would serve the highest numbers of all the populations evaluated within one-half mile. The 1st/Chicago Station (included in Alternatives 2, 3, 4, and 5) would serve the second highest numbers of all those populations. The percentages of all the populations served at both stations are higher than the averages for both the county and the study area itself. The Whittier/Norwalk Station (the eastern terminus for all eight build alternatives) would serve the lowest numbers of all the populations considered. However, minorities comprise almost 71 percent of the population served in the vicinity, which is still higher than the average minority population for Los Angeles County.

TABLE 4-13
DEMOGRAPHICS SUMMARY BY ALTERNATIVE[1]

Alternative	Minority Population		Low-Income Families		Workers 16 and Older Using Public Transportation		Zero-Car Households	
	No.	% of Total Pop.	No.	% of Total Families	No.	% of Workers 16 and Older	No.	% of Total Residential Units
Los Angeles County	5,228,442	59.0	1,308,255	15.1	267,210	6.5	333,562	11.2
Study Area	406,865	86.6	89,205	19.7	18,203	10.1	19,414	15.5
No-Build	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TSM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alternative 1 – BRT	127,817	92.5	31,583	24.2	7,585	15.1	8,587	23.8
Alternative 2 – BRT	141,353	93.8	36,967	25.8	8,521	16.2	9,553	25.1
Alternative 3 – LRT	141,353	93.8	36,967	25.8	8,521	16.2	9,553	25.1
Alternative 4 – BRT	124,194	92.3	31,586	24.8	7,347	15.2	8,530	24.3
Alternative 5 – LRT	124,194	92.3	31,586	24.8	7,347	15.2	8,530	24.3
Alternative 6 – LRT	122,522	93.2	31,523	25.4	6,733	14.9	8,120	24.3
Alternative 7 – HRT/LRT	100,294	91.4	23,312	22.7	5,100	13.0	6,024	21.1
Alternative 8 – HRT/BRT	126,496	92.8	30,919	24.0	7,430	15.0	7,918	22.6

[1]Includes the total served within one-half mile of all of the stations included in each alternative.
Source: 1990 U.S. Census Data.

To assess potential increases in transit mobility and accessibility, Tables 4-15 and 4-16 present the predicted daily person trips, transit trips, and transit mode share within the corridor for all of the alternatives. Table 4-16 also shows the number of increased daily transit trips that each build alternative would provide as compared to the No-Build and TSM Alternatives. Although all of these measures apply to the entire corridor, they can also be used as an indicator of transit mobility and accessibility within minority and low-income areas since the corridor contains many areas that fit the definitions. Alternative 7 would result in the highest number of daily transit trips (180,750), followed closely by Alternative 5 (180,350). Alternatives 1 and 2 would result in the lowest number of trips of the build alternatives (174,500 each).

TABLE 4-14 DEMOGRAPHICS SUMMARY FOR 1/2 MILE RADIUS FROM INDIVIDUAL STATIONS AND FOR TOTAL STATIONS BY ALTERNATIVE[1]								
Alternative/ Station	Minority Population		Low-Income Families		Workers 16 and Older Using Public Transportation		Zero-Car Households	
	No.	% of Total Pop.	No.	% of Total Families	No.	% of Workers 16 and Older	No.	% of Total Residen-tial Units
Los Angeles County	5,228,442	59.0	1,308,255	15.1	267,210	6.5	333,562	11.2
Study Area	406,865	86.6	89,205	19.7	18,203	10.1	19,414	15.5
Alternative 1								
Total:	127,817	92.5	31,583	24.2	7,585	15.1	8,587	23.8
By Station:								
1st/Alameda	4,204	80.6	1,660	46.2	300	26.0	942	70.6
Union Station	7,356	86.5	1,239	44.6	270	32.2	570	60.5
Chavez/Boyle	15,671	98.4	5,372	34.6	1,530	26.5	1,363	33.6
Chavez/Soto	24,112	99.0	7,772	32.5	2,345	25.3	1,868	32.5
4th/Soto	18,339	98.4	5,669	31.0	1,917	26.6	1,556	33.7
4th/Evergreen	16,538	99.0	4,112	24.9	1,334	20.5	1,113	27.0
4th/Lorena	14,296	98.6	3,433	23.8	891	17.7	724	22.0
3rd/Rowan	15,199	99.2	4,282	28.2	982	19.2	892	26.2
3rd/Mednik	10,049	98.5	2,603	25.8	332	9.4	546	21.5
Beverly/Atlantic	7,723	95.8	1,591	19.9	254	8.2	376	16.4
Beverly/Gerhart	9,206	95.2	1,882	19.5	416	9.6	446	14.7
Beverly/Garfield	6,309	88.1	1,321	18.5	211	7.8	278	13.3
Beverly/Wilcox	6,651	79.4	953	11.6	218	6.2	350	12.1
Beverly/Montebello	5,218	73.7	785	11.2	177	5.8	370	15.1
Beverly/4th	5,637	75.5	1,006	13.8	160	6.4	353	16.8
Whittier/Rosemead	7,553	91.7	1,311	16.2	181	5.9	365	16.4
Whittier/Passons	6,006	89.5	1,110	16.9	114	4.3	286	15.0
Whittier/Norwalk	3,389	70.8	358	7.6	109	3.9	120	6.4
Alternative 2								
Total:	141,353	93.8	36,967	25.8	8,521	16.2	9,553	25.1
By Station:								
Union Station	7,356	86.5	1,239	44.6	270	32.2	570	60.5
1st/Alameda	4,204	80.6	1,660	46.2	300	26.0	942	70.6
1st/Utah	11,270	97.0	4,705	42.0	1,011	28.2	1,167	38.8
1st/Boyle	16,921	97.6	6,080	36.3	1,672	27.6	1,591	36.3
1st/Chicago	20,402	98.4	6,547	32.4	2,127	27.1	1,757	34.5
4th/Soto	18,339	98.4	5,669	31.0	1,917	26.6	1,556	33.7
4th/Evergreen	16,538	99.0	4,112	24.9	1,334	20.5	1,113	27.0
4th/Lorena	14,296	98.6	3,433	23.8	891	17.7	724	22.0
3rd/Rowan	15,199	99.2	4,282	28.2	982	19.2	892	26.2
3rd/Mednik	10,049	98.5	2,603	25.8	332	9.4	546	21.5
Whittier/Arizona	16,494	98.4	4,525	27.2	888	14.8	890	22.2
Whittier/Atlantic	13,118	97.4	2,920	21.8	693	14.4	754	21.9
Whittier/Gerhart	10,321	96.3	2,047	19.2	470	11.6	419	15.1
Whittier/Garfield	8,413	88.0	1,688	17.8	331	10.4	372	13.8
Whittier/Wilcox	7,212	84.0	1,601	18.9	316	10.2	403	15.0
Whittier/Montebello	6,461	80.7	1,453	18.3	245	9.3	477	20.6
Whittier/Rosemead	7,553	91.7	1,311	16.2	181	5.9	365	16.4
Whittier/Passons	6,006	89.5	1,110	16.9	114	4.3	286	15.0
Whittier/Norwalk	3,389	70.8	358	7.6	109	3.9	120	6.4

Source: 1990 U.S. Census Data.

TABLE 4-14
DEMOGRAPHICS SUMMARY FOR 1/2 MILE RADIUS FROM INDIVIDUAL STATIONS AND FOR TOTAL STATIONS BY ALTERNATIVE[1]

Alternative/ Station	Minority Population		Low-Income Families		Workers 16 and Older Using Public Transportation		Zero-Car Households	
	No.	% of Total Pop.	No.	% of Total Families	No.	% of Workers 16 and Older	No.	% of Total Residential Units
Alternative 3								
Total:	141,353	93.8	36,967	25.8	8,521	16.2	9,553	25.1
By Station:								
Union Station	7,356	86.5	1,239	44.6	270	32.2	570	60.5
1st/Alameda	4,204	80.6	1,660	46.2	300	26.0	942	70.6
1st/Utah	11,270	97.0	4,705	42.0	1,011	28.2	1,167	38.8
1st/Boyle	16,921	97.6	6,080	36.3	1,672	27.6	1,591	36.3
1st/Chicago	20,402	98.4	6,547	32.4	2,127	27.1	1,757	34.5
4th/Soto	18,339	98.4	5,669	31.0	1,917	26.6	1,556	33.7
4th/Evergreen	16,538	99.0	4,112	24.9	1,334	20.5	1,113	27.0
4th/Lorena	14,296	98.6	3,433	23.8	891	17.7	724	22.0
3rd/Rowan	15,199	99.2	4,282	28.2	982	19.2	892	26.2
3rd/Mednik	10,049	98.5	2,603	25.8	332	9.4	546	21.5
Whittier/Arizona	16,494	98.4	4,525	27.2	888	14.8	890	22.2
Whittier/Atlantic	13,118	97.4	2,920	21.8	693	14.4	754	21.9
Whittier/Gerhart	10,321	96.3	2,047	19.2	470	11.6	419	15.1
Whittier/Garfield	8,413	88.0	1,688	17.8	331	10.4	372	13.8
Whittier/Wilcox	7,212	84.0	1,601	18.9	316	10.2	403	15.0
Whittier/Montebello	6,461	80.7	1,453	18.3	245	9.3	477	20.6
Whittier/Rosemead	7,553	91.7	1,311	16.2	181	5.9	365	16.4
Whittier/Passons	6,006	89.5	1,110	16.9	114	4.3	286	15.0
Whittier/Norwalk	3,389	70.8	358	7.6	109	3.9	120	6.4
Alternative 4								
Total:	124,194	92.3	31,586	24.8	7,347	15.2	8,530	24.3
By Station:								
Union Station	7,356	86.5	1,,239	44.6	270	32.2	570	60.5
1st/Alameda	4,204	80.6	1,660	46.2	300	26.0	942	70.6
1st/Utah	11,270	97.0	4.705	42.0	1,011	28.2	1,167	38.8
1st/Boyle	16,921	97.6	6,080	36.3	1,672	27.6	1,591	36.3
1st/Chicago	20,402	98.4	6,547	32.4	2,127	27.1	1,757	34.5
4th/Soto	18,339	98.4	5,669	31.0	1,917	26.6	1,556	33.7
4th/Evergreen	16,538	99.0	4,112	24.9	1,334	20.5	1,113	27.0
4th/Lorena	14,296	98.6	3,433	23.8	891	17.7	724	22.0
3rd/Rowan	15,199	99.2	4,282	28.2	982	19.2	892	26.2
3rd/Mednik	10,049	98.5	2,603	25.8	332	9.4	546	21.5
Beverly/Atlantic	7,723	95.8	1,591	19.9	254	8.2	376	16.4
Beverly/Gerhart	9,206	95.2	1,882	19.5	416	9.6	446	14.7
Beverly/Garfield	6,309	88.1	1,321	18.5	211	7.8	278	13.3
Beverly/Wilcox	6,651	79.4	953	11.6	218	6.2	350	12.1
Beverly/Montebello	5,218	73.7	785	11.2	177	5.8	370	15.1
Beverly/4th	5,637	75.5	1,006	13.8	160	6.4	353	16.8
Whittier/Rosemead	7,553	91.7	1,311	16.2	181	5.9	365	16.4
Whittier/Passons	6,006	89.5	1,110	16.9	114	4.3	286	15.0
Whittier/Norwalk	3,389	70.8	358	7.6	109	3.9	120	6.4

[1]Where stations are located less than one mile apart, the individual station data includes double-counting where the radii of each station overlaps. The total shown for each alternative has been adjusted to account for the overlap and does not double-count.

Source: 1990 U.S. Census Data

TABLE 4-14
DEMOGRAPHICS SUMMARY FOR 1/2 MILE RADIUS FROM INDIVIDUAL STATIONS AND FOR TOTAL STATIONS BY ALTERNATIVE[1]

Alternative/ Station	Minority Population		Low-Income Families		Workers 16 and Older Using Public Transportation		Zero-Car Households	
	No.	% of Total Pop.	No.	% of Total Families	No.	% of Workers 16 and Older	No.	% of Total Residential Units
Alternative 5								
Total:	124,194	92.3	31,586	24.8	7,347	15.2	8,530	24.3
By Station:								
Union Station	7,356	86.5	1,239	44.6	270	32.2	570	60.5
1st/Alameda	4,204	80.6	1,660	46.2	300	26.0	942	70.6
1st/Utah	11,270	97.0	4,705	42.0	1,011	28.2	1,167	38.8
1st/Boyle	16,921	97.6	6,080	36.3	1,672	27.6	1,591	36.3
1st/Chicago	20,402	98.4	6,547	32.4	2,127	27.1	1,757	34.5
4th/Soto	18,339	98.4	5,669	31.0	1,917	26.6	1,556	33.7
4th/Evergreen	16,538	99.0	4,112	24.9	1,334	20.5	1,113	27.0
4th/Lorena	14,296	98.6	3,433	23.8	891	17.7	724	22.0
3rd/Rowan	15,199	99.2	4,282	28.2	982	19.2	892	26.2
3rd/Mednik	10,049	98.5	2,603	25.8	332	9.4	546	21.5
Beverly/Atlantic	7,723	95.8	1,591	19.9	254	8.2	376	16.4
Beverly/Gerhart	9,206	95.2	1,882	19.5	416	9.6	446	14.7
Beverly/Garfield	6,309	88.1	1,321	18.5	211	7.8	278	13.3
Beverly/Wilcox	6,651	79.4	953	11.6	218	6.2	350	12.1
Beverly/Montebello	5,218	73.7	785	11.2	177	5.8	370	15.1
Beverly/4th	5,637	75.5	1,006	13.8	160	6.4	353	16.8
Whittier/Rosemead	7,553	91.7	1,311	16.2	181	5.9	365	16.4
Whittier/Passons	6,006	89.5	1,110	16.9	114	4.3	286	15.0
Whittier/Norwalk	3,389	70.8	358	7.6	109	3.9	120	6.4
Alternative 6								
Total:	122,522	93.2	31,523	25.4	6,733	14.9	8,120	24.3
By Station:								
Union Station	7,356	86.5	1,239	44.6	270	32.2	570	60.5
1st/Alameda	4,204	80.6	1,660	46.2	300	26.0	942	70.6
1st/Utah	11,270	97.0	4,705	42.0	1,011	28.2	1,167	38.8
1st/Boyle	16,921	97.6	6,080	36.3	1,672	27.6	1,591	36.3
1st/Lorena	14,541	99.1	3,485	23.9	937	18.5	744	22.7
3rd/Rowan	15,199	99.2	4,282	28.2	982	19.2	892	26.2
3rd/Mednik	10,049	98.5	2,603	25.8	332	9.4	546	21.5
4th/Lorena	14,296	98.6	3,433	23.8	891	17.7	724	22.0
Whittier/Arizona	16,494	98.4	4,525	27.2	888	14.8	890	22.2
Whittier/Atlantic	13,118	97.4	2,920	21.8	693	14.4	754	21.9
Whittier/Gerhart	10,321	96.3	2,047	19.2	470	11.6	419	15.1
Whittier/Garfield	8,413	88.0	1,688	17.8	331	10.4	372	13.8
Whittier/Wilcox	7,212	84.0	1,601	18.9	316	10.2	403	15.0
Whittier/Montebello	6,461	80.7	1,453	18.3	245	9.3	477	20.6
Whittier/Rosemead	7,553	91.7	1,311	16.2	181	5.9	365	16.4
Whittier/Passons	6,006	89.5	1,110	16.9	114	4.3	286	15.0
Whittier/Norwalk	3,389	70.8	358	7.6	109	3.9	120	6.4

[1]Where stations are located less than one mile apart, the individual station data includes double-counting where the radii of each station overlaps. The total shown for each alternative has been adjusted to account for the overlap and does not double-count.
Source: 1990 U.S. Census Data

TABLE 4-14
DEMOGRAPHICS SUMMARY FOR 1/2 MILE RADIUS FROM INDIVIDUAL STATIONS AND FOR TOTAL STATIONS BY ALTERNATIVE[1]

Alternative/ Station	Minority Population		Low-Income Families		Workers 16 and Older Using Public Transportation		Zero-Car Households	
	No.	% of Total Pop.	No.	% of Total Families	No.	% of Workers 16 and Older	No.	% of Total Residential Units
Alternative 7 Total:	100,294	91.4	23,312	22.7	5,100	13.0	6,024	21.1
By Station:								
Union Station	7,356	86.5	1,239	44.6	270	32.2	570	60.5
1st/Boyle	16,921	97.6	6,080	36.3	1,672	27.6	1,591	36.3
1st/Lorena	14,541	99.1	3,485	23.9	937	18.5	744	22.7
3rd/Rowan	15,199	99.2	4,282	28.2	982	19.2	892	26.2
3rd/Mednik	10,049	98.5	2,603	25.8	332	9.4	546	21.5
Beverly/Atlantic	7,723	95.8	1,591	19.9	254	8.2	376	16.4
Beverly/Gerhart	9,206	95.2	1,882	19.5	416	9.6	446	14.7
Beverly/Garfield	6,309	88.1	1,321	18.5	211	7.8	278	13.3
Beverly/Wilcox	6,651	79.4	953	11.6	218	6.2	350	12.1
Beverly/Montebello	5,218	73.7	785	11.2	177	5.8	370	15.1
Beverly/4th	5,637	75.5	1,006	13.8	160	6.4	353	16.8
Whittier/Rosemead	7,553	91.7	1,311	16.2	181	5.9	365	16.4
Whittier/Passons	6,006	89.5	1,110	16.9	114	4.3	286	15.0
Whittier/Norwalk	3,389	70.8	358	7.6	109	3.9	120	6.4
Alternative 8 Total:	126,496	92.8	30,919	24.0	7,430	15.0	7,918	22.6
By Station:								
Union Station	7,356	86.5	1,239	44.6	270	32.2	570	60.5
1st/Boyle	16,921	97.6	6,080	36.3	1,672	27.6	1,591	36.3
Chavez/Soto	24,112	99.0	7,772	32.5	2,345	25.3	1,868	32.5
4th/Soto	18,339	98.4	5,669	31.0	1,917	26.6	1,556	33.7
4th/Evergreen	16,538	99.0	4,112	24.9	1,334	20.5	1,113	27.0
4th/Lorena	14,296	98.6	3,433	23.8	891	17.7	724	22.0
3rd/Rowan	15,199	99.2	4,282	28.2	982	19.2	892	26.2
3rd/Mednik	10,049	98.5	2,603	25.8	332	9.4	546	21.5
Beverly/Atlantic	7,723	95.8	1,591	19.9	254	8.2	376	16.4
Beverly/Gerhart	9,206	95.2	1,882	19.5	416	9.6	446	14.7
Beverly/Garfield	6,309	88.1	1,321	18.5	211	7.8	278	13.3
Beverly/Wilcox	6,651	79.4	953	11.6	218	6.2	350	12.1
Beverly/Montebello	5,218	73.7	785	11.2	177	5.8	370	15.1
Beverly/4th	5,637	75.5	1,006	13.8	160	6.4	353	16.8
Whittier/Rosemead	7,553	91.7	1,311	16.2	181	5.9	365	16.4
Whittier/Passons	6,006	89.5	1,110	16.9	114	4.3	286	15.0
Whittier/Norwalk	3,389	70.8	358	7.6	109	3.9	120	6.4

[1]Where stations are located less than one mile apart, the individual station data includes double-counting where the radii of each station overlaps. The total shown for each alternative has been adjusted to account for the overlap and does not double-count.
Source: 1990 U.S. Census Data

TABLE 4-15
CORRIDOR DAILY PERSON AND TRANSIT TRIPS
(YEAR 2020)

Alternative	Daily Person Trips	Daily Transit Trips
No-Build	3,532,600	149,100
TSM	3,540,900	165,300
1 – BRT	3,542,600	174,500
2 – BRT	3,542,900	174,500
3 – LRT	3,546,100	178,700
4 – BRT	3,542,800	174,900
5 – LRT	3,546,500	180,350
6 – LRT	3,546,700	179,550
7 – HRT/LRT	3,546,000	180,750
8 – HRT/BRT	3,544,400	177,150

Source: MTA and Parsons Brinckerhoff, February, 2000.

TABLE 4-16
CORRIDOR DAILY TRANSIT MODE SHARE
AND COMPARISON OF DAILY TRANSIT TRIPS TO
NO-BUILD AND TSM ALTERNATIVES
(YEAR 2020)

Alternative	Daily Transit Trips	% of Total Trips	Increased Trips Over No-Build and TSM
No-Build	149,100	4.2%	
TSM	165,300	4.7%	No-Build: 16,200
1 – BRT	174,500	4.9%	No-Build: 25,400 TSM: 9,200
2 – BRT	174,500	4.9%	No-Build: 25,400 TSM: 9,200
3 – LRT	178,700	5.0%	No-Build: 29,600 TSM: 13,400
4 – BRT	174,900	4.9%	No-Build: 25,800 TSM: 9,600
5 – LRT	180,350	5.1%	No-Build: 31,250 TSM: 15,050
6 – LRT	179,550	5.1%	No-Build: 30,450 TSM: 14,250
7 – HRT/LRT	180,750	5.1%	No-Build: 31,650 TSM: 15,450
8 – HRT/BRT	177,150	5.0%	No-Build: 28,050 TSM: 11,850

Source: MTA and Parsons Brinckerhoff, February, 2000.

As noted, higher numbers of transit trips are anticipated for all of the build alternatives as compared to the No-Build and TSM Alternatives. The increase in transit trips for the build alternatives range between 31,650 (Alternative 7) and 25,400 (Alternatives 1 and 2) as compared to the No-Build Alternative. The TSM Alternative also results in an increase over the No-Build Alternative (16,200 trips); however, the results are not as dramatic as for any of the build alternatives. A comparison to the TSM Alternative shows that projected increases for the build alternatives range from 15,400 additional trips (Alternative 7) to 9,200 additional trips (Alternatives 1 and 2). The results of the preceding analysis indicate that provision of a quality fixed guideway urban transit project will enhance transit access to minority and low-income populations and will also result in increases in ridership as compared to implementation of either the No-Build or TSM Alternatives.

Public Involvement Program

Opportunities for public participation in the Eastside Transit Corridor Study have been provided by the MTA since the initiation of the study in July 1999. Serious efforts have been made to conduct meetings within the affected neighborhoods of Boyle Heights, East Los Angeles, Montebello and Pico Rivera. These meetings were held at Resurrection Parish Hall, Saint Alphonsus School Auditorium, Centro Maravilla Community Service Center, and the Montebello Council Chambers. These locations were selected in order to make these meetings more accessible to the residents who would be most affected by the project. The distribution of 20,000 flyers was done by the local Churches bulletin, the Boyle Heights, East Los Angeles, Montebello, and Pico Rivera Chamber of Commerces, and the various community groups. Project fact sheets and meeting announcements have been published in both English and Spanish. An additional 5,000 flyers were translated into Japanese and distributed by the Little Tokyo Service Center. The meetings have had interpreters available, as needed, to translate the proceedings into Spanish or Japanese for those who do not speak fluent English. Three community scoping meetings were held in August and September 1999 at locations in Boyle Heights, East Los Angeles, and Montebello. About 70 people attended the meeting in East Los Angeles. Over 100 persons attended each of the other two meetings. The purpose of the scoping meetings was to solicit input regarding the range of alternatives and transit modes being considered, the study area, and major social, economic, or environmental issues related to the alternatives.

A second round of public meetings was held in October 1999 in Boyle Heights, East Los Angeles and along Whittier Blvd. in the East Los Angeles commercial core district. Approximately 60 persons attended the meeting in Boyle Heights, 35 persons attended the meeting in East Los Angeles, and 50 persons attended the meeting on Whittier Boulevard. The purpose was to discuss the narrowed list of eight build alternatives and station locations being considered in this document and to solicit additional public input. Focus meetings were held in the City of Montebello and the City of Pico Rivera the third week of November 1999 to discuss the alternative routes and the impacts along their commercial corridors. A third round of public meetings was convened in early January 2000. The meetings were held in Boyle Heights, Little Tokyo Arts District, East Los Angeles, and Montebello. The purpose was to present the findings of the comparison of the alternatives and to again solicit public input prior to the presentation of the findings to the MTA Board of Directors and their selection of a preferred alternative(s) that will be carried forward for further evaluation in Phase II of the study that involves preparation of a SEIS/SEIR..

A Review Advisory Committee (RAC), comprised of local residents, business owners, elected official representatives, and community organizations meet on a monthly basis to discuss the progress of the study and to request input from its members. The RAC was originally formed during the initial planning phase of the suspended Red Line project and their involvement continues with the current project. The committee's role is to inform MTA of the important issues and concerns of the Eastside communities related to the planning, design, construction, and operation of the transit project. Focus meetings have also been held with individual community groups and organizations as well as with elected officials at various times since the inception of this study. Additional opportunities for public participation will continue to be offered as the study proceeds through the planning and design phases.

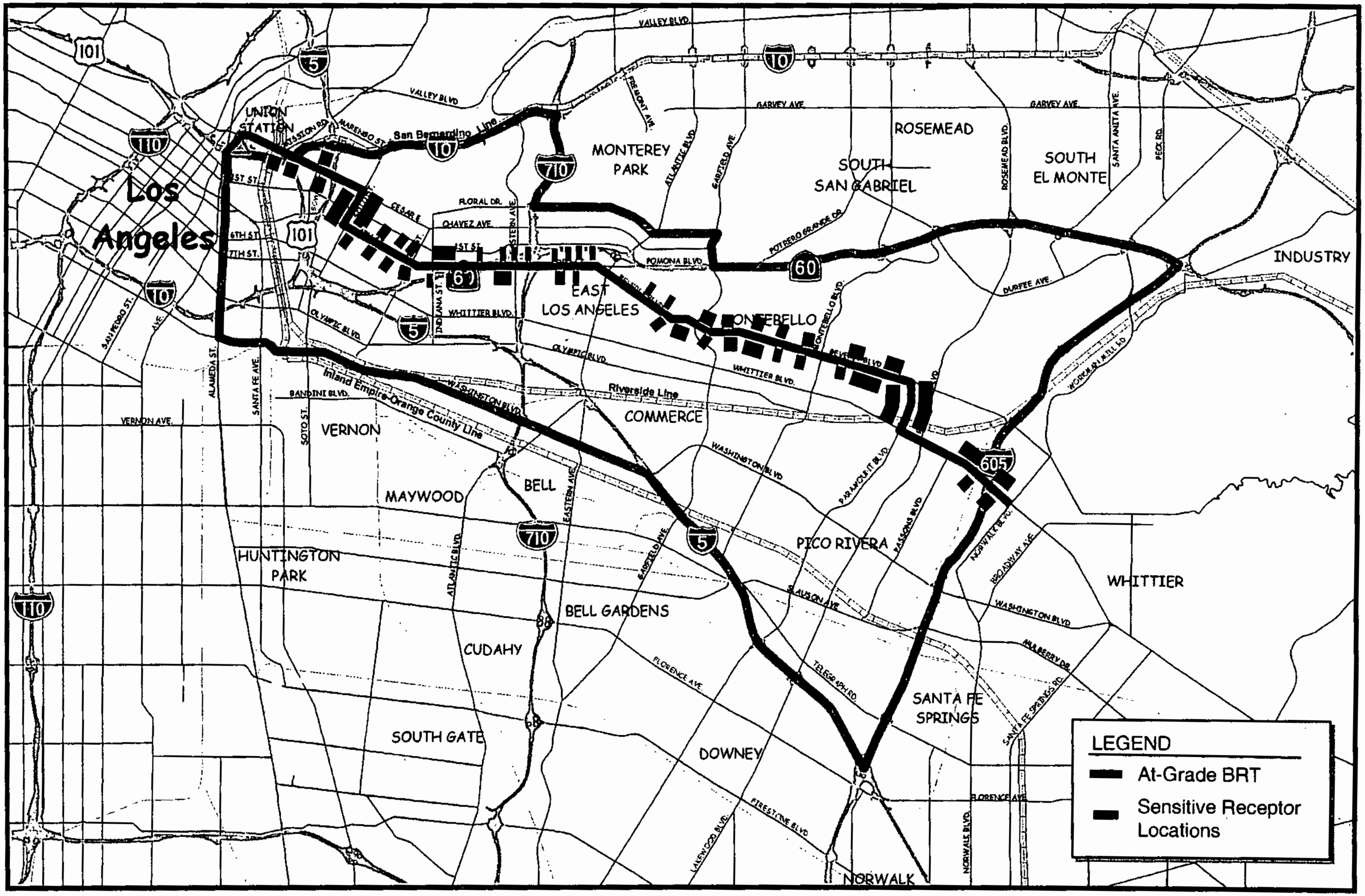
4.4 VISUAL AND AESTHETIC

4.4.1 Affected Environment

A project area's visually affected environment consists of a visual interaction of three physical elements: the area's sensitive visual resources, sensitive views, and sensitive visual receptors. These visual elements interact to create an environment that can be potentially affected by any noticeable, physical changes. Additionally, any changes in shade/shadow or light/glare may visually change an environment.

The Eastside Transit Corridor project area is located within a dense urban environment that consists of an intermittent mixing of distinct residential neighborhoods, neighborhood and community commercial uses, cultural resources, community facilities, and open space elements. Cesar Chavez Avenue, 1st Street, and 4th Street served as corridors for the Pacific Electric Railway until 1963. There are no visible remnants of this system within the area. Given that the system has been out of use for nearly 37 years, the majority of people living and working in the area are likely to have no memory of the system or its place in the visual environment. With the exception of most commercial uses, all of these land uses may be considered sensitive visual resources.

Several neighborhoods in the project area are located near the corridor and station alternatives, and have a direct or partially screened view. Cultural resources, such as buildings and cemeteries eligible for listing in the National Register of Historic Places, are also located within view of several of the proposed alternatives. Other community facilities, such as religious facilities, schools, daycare centers, hospitals, and museums, are located adjacent to the proposed alternatives in many cases. Open space elements, such as parks and cemeteries are intermittently located within view of the proposed alternatives as well; bicycle and pedestrian trails, which are considered open space elements, intersect and are within views of the corridor and station alternatives. The major concentrations of sensitive receptor locations are displayed in Figures 4-22 through 4-29.



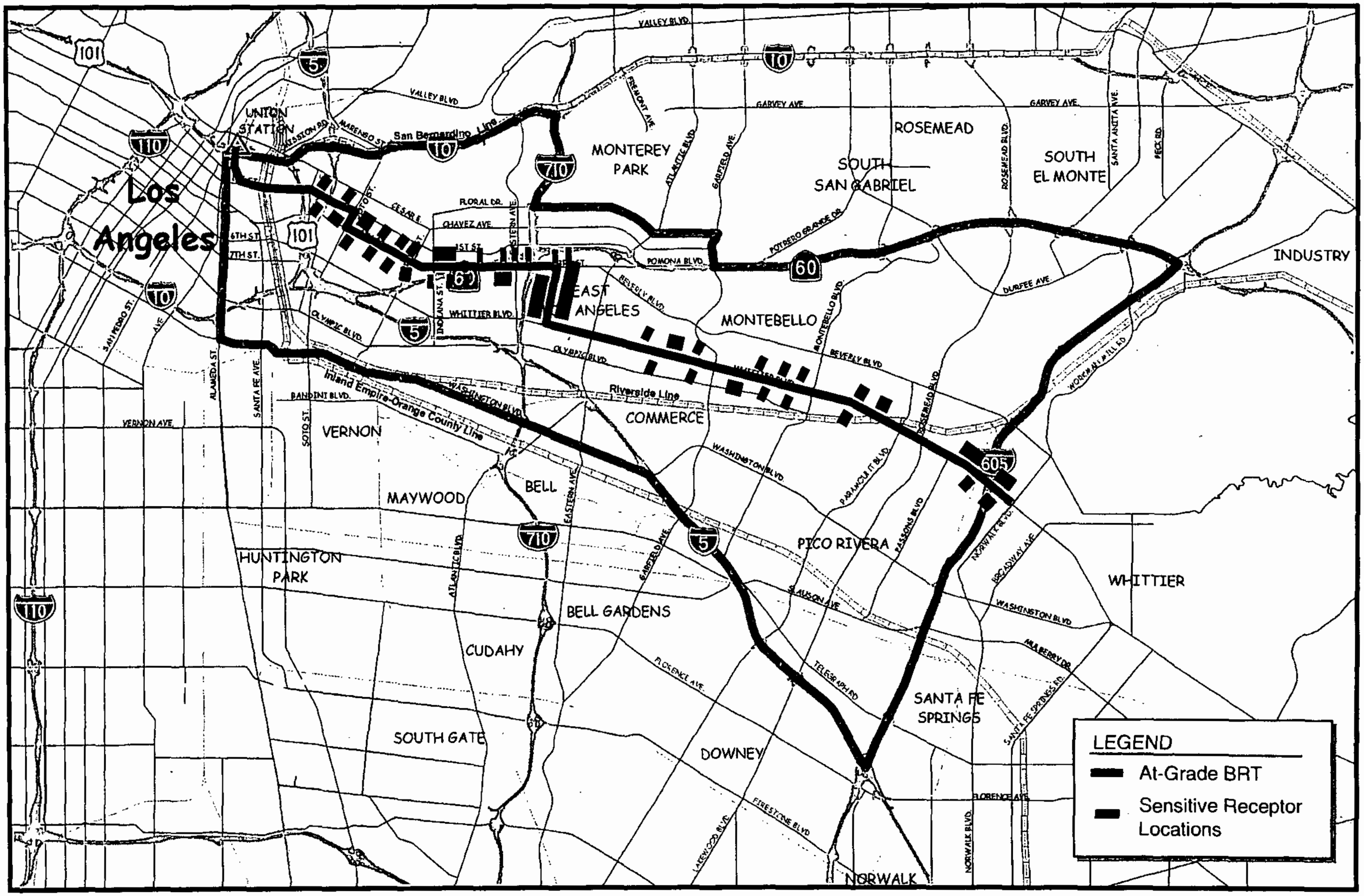
Eastside Transit Corridor Study

Sensitive Receptor Locations

Alternative 1

Eastside Corridor Transit Consultants

Figure 4-22



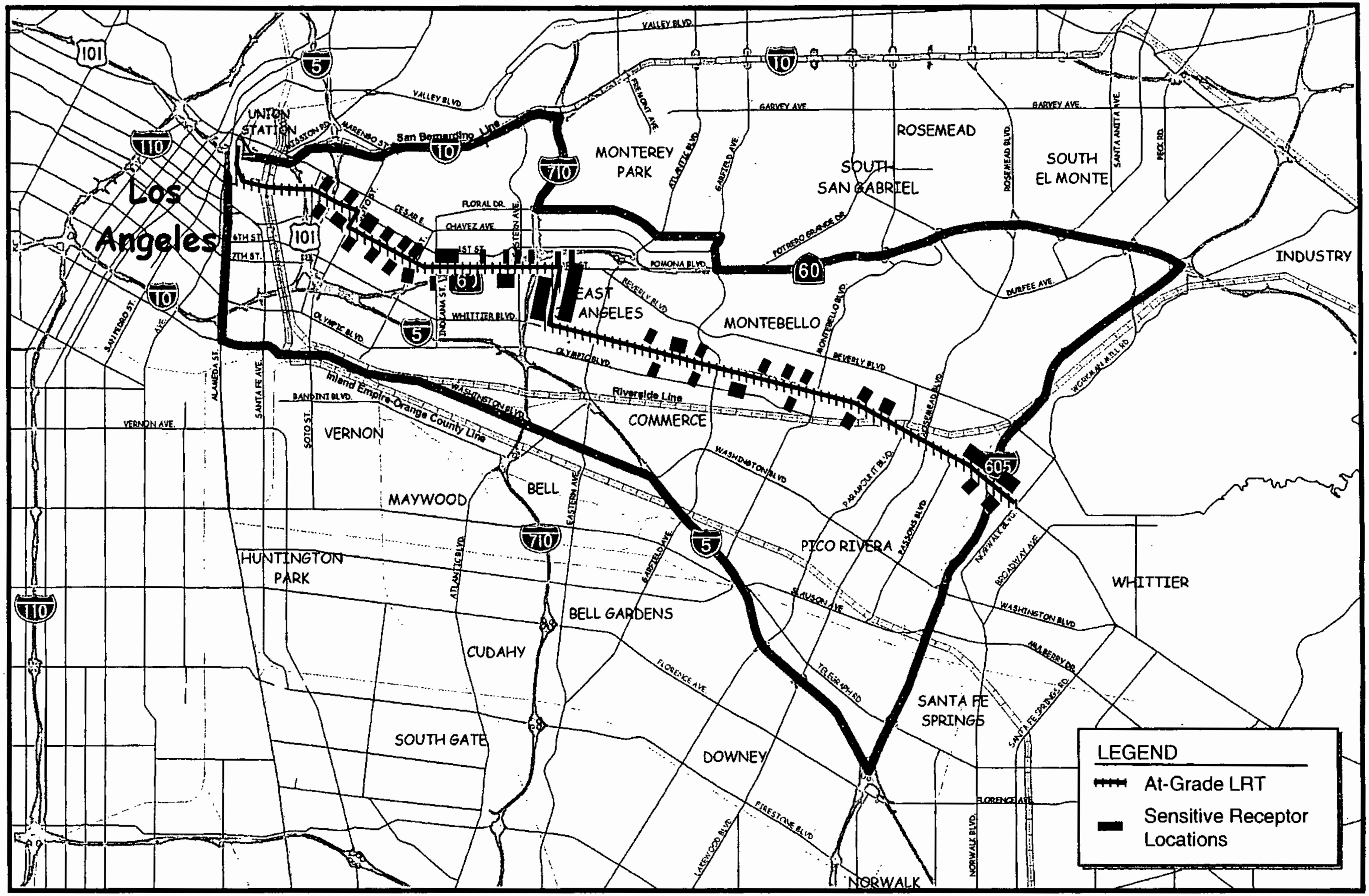
Eastside Transit Corridor Study

Sensitive Receptor Locations

Alternative 2

Eastside Corridor Transit Consultants

Figure 4-23



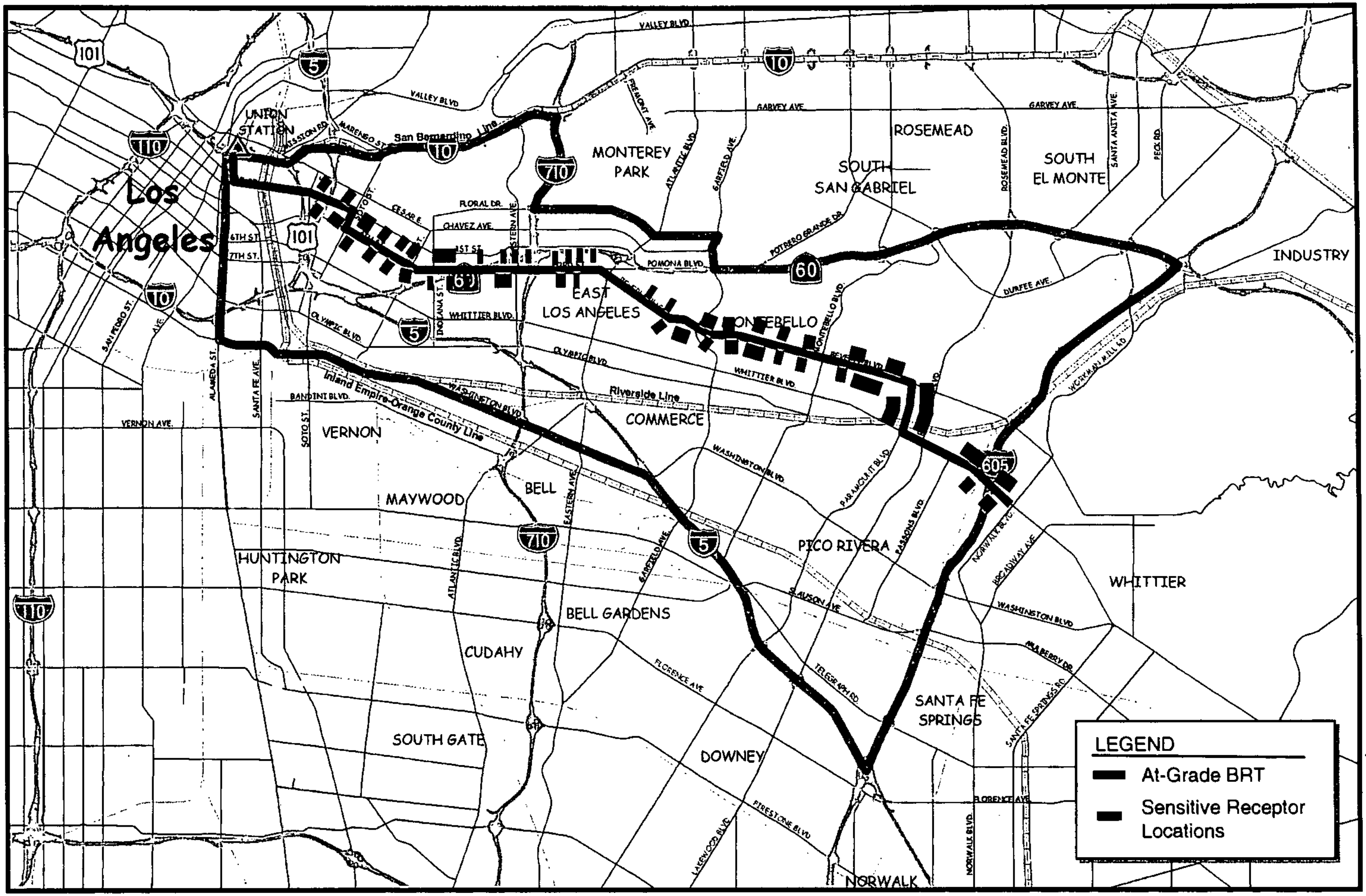
Eastside Transit Corridor Study

Sensitive Receptor Locations

Alternative 3

Eastside Corridor Transit Consultants

Figure 4-24

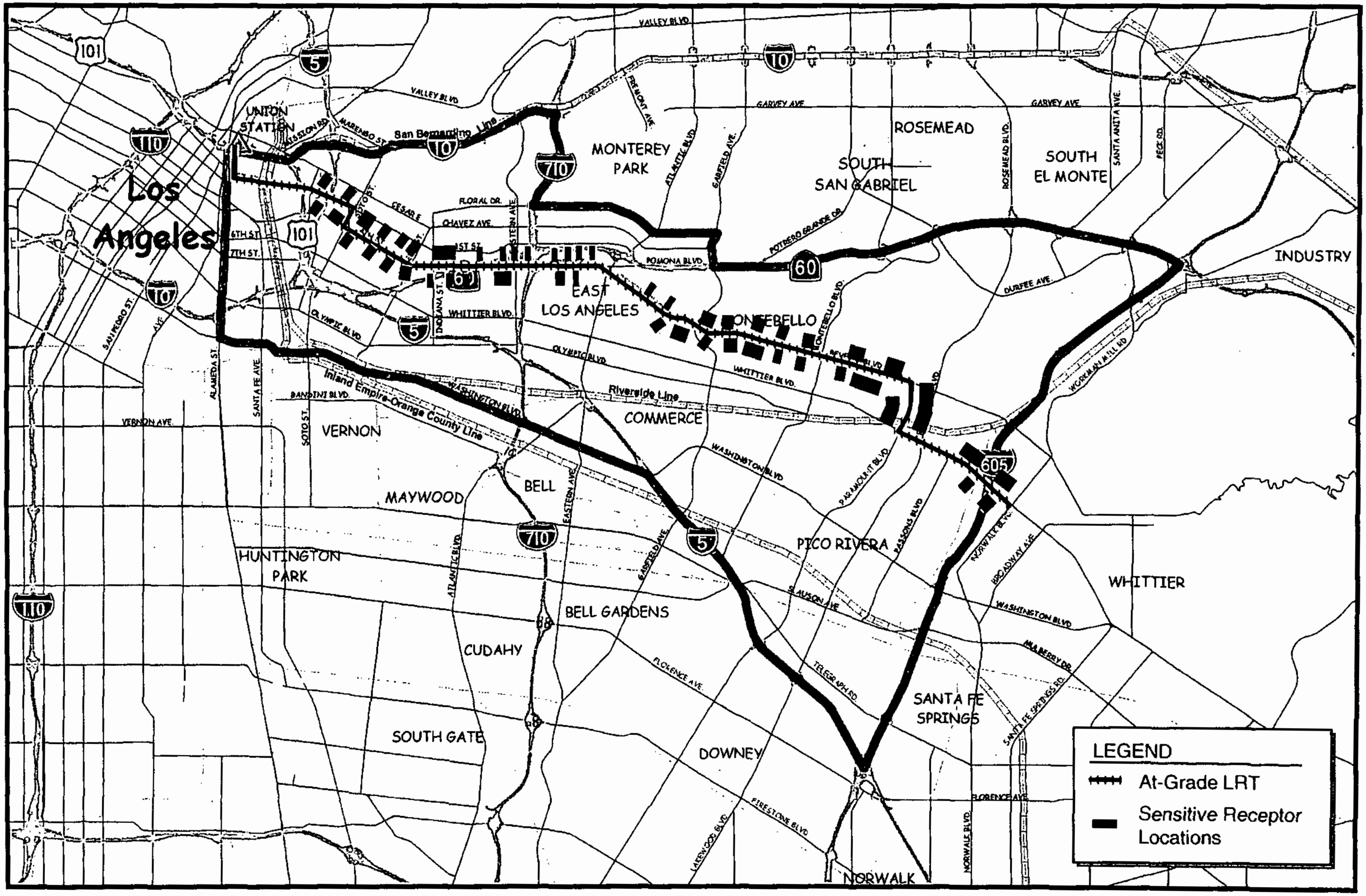


Eastside Transit Corridor Study

Sensitive Receptor Locations
Alternative 4

Eastside Corridor Transit Consultants

Figure 4-25



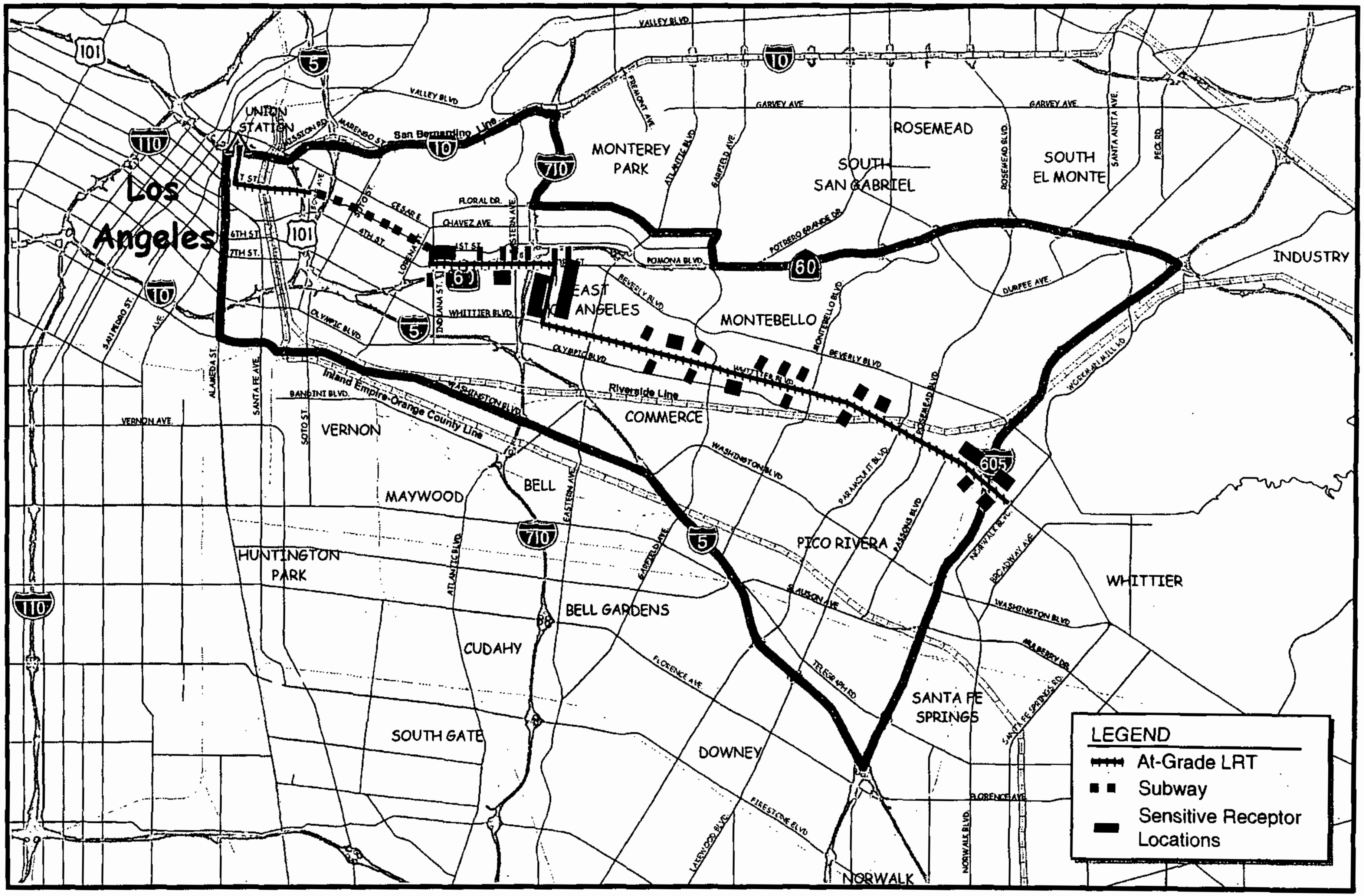
Eastside Transit Corridor Study

Sensitive Receptor Locations

Alternative 5

Eastside Corridor Transit Consultants

Figure 4-26



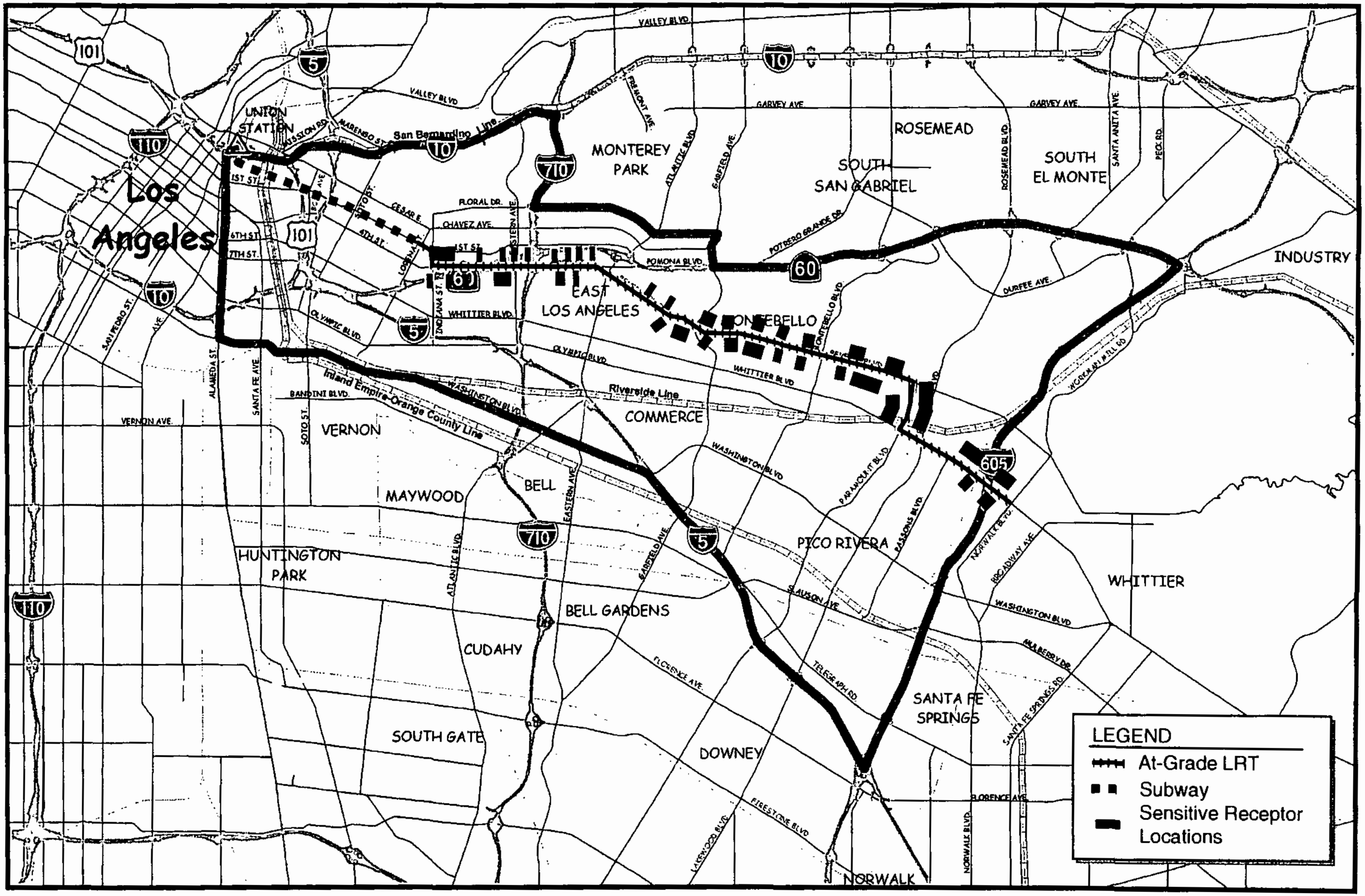
Eastside Transit Corridor Study

Sensitive Receptor Locations

Alternative 6

Eastside Corridor Transit Consultants

Figure 4-27



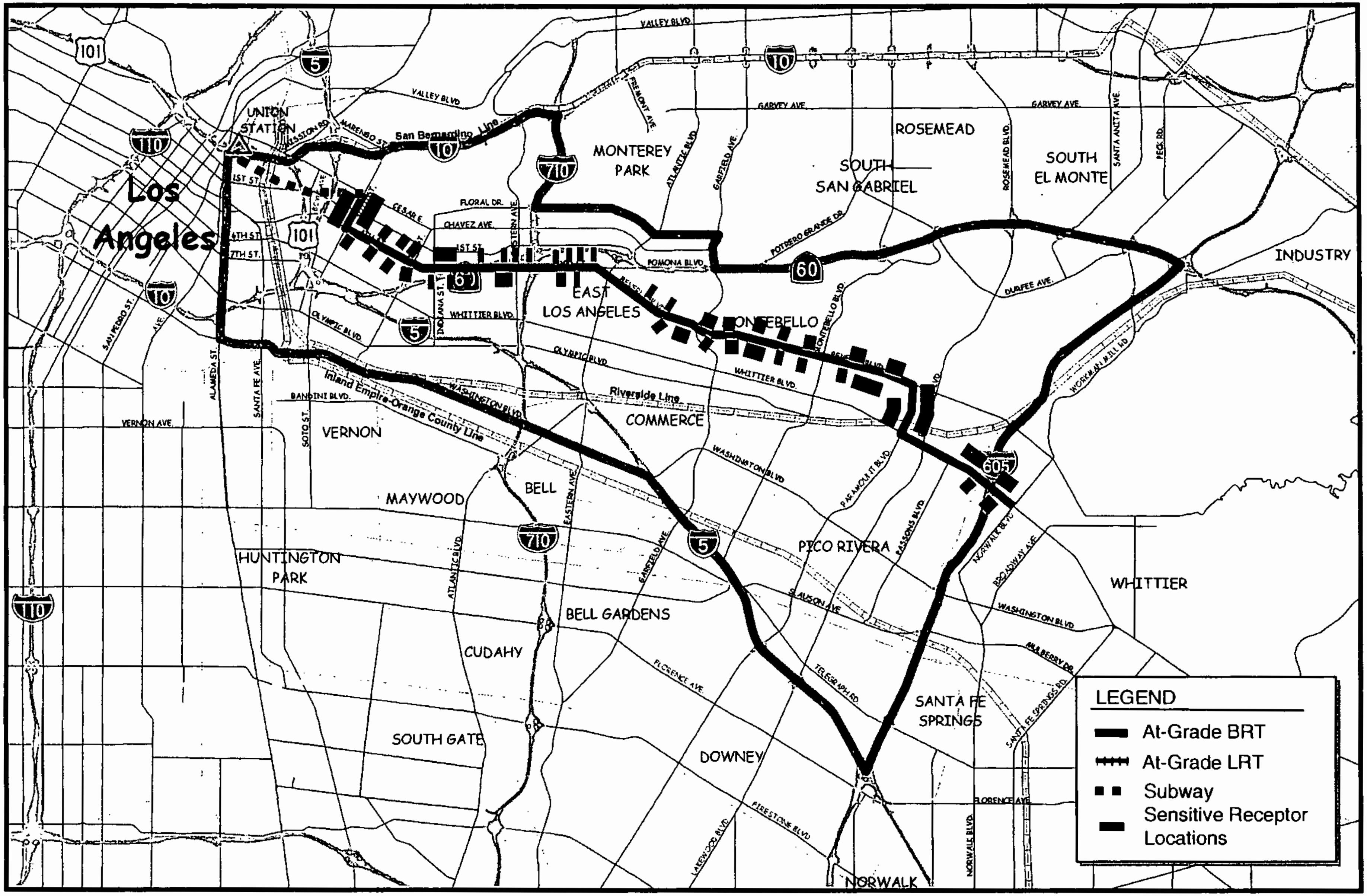
Eastside Transit Corridor Study

Sensitive Receptor Locations

Alternative 7

Eastside Corridor Transit Consultants

Figure 4-28



Eastside Transit Corridor Study

Sensitive Receptor Locations

Alternative 8

Eastside Corridor Transit Consultants

Figure 4-29

Sensitive views in the project area include prominent views of cultural resources, landmarks, and hillside topography in the background. Sensitive views differ from visual resources in that they are the interaction between sensitive receptors and sensitive visual resources. Sensitive views can vary depending on the angle of view, screening features, or duration of view by visual receptors. Other sensitive views can be considered as direct views of parks, local wall murals/paintings, cemeteries, and other open space such as rivers and schools. Additionally, views of street landscaping are considered as sensitive views, especially in such a dense, urban environment.

Sensitive visual receptors are the people who are sensitive to visual quality change due to a familiarity with the view, because they have a sense of ownership of the visual environment, or because the activity they are engaged in is visually oriented. Although anyone may be a sensitive viewer, for this preliminary screening-level study only residential areas, schools, parks, and cemeteries were considered to be sensitive visual receptors. Sensitive visual receptors within the project area are primarily considered the residents within the project viewshed, who would have a day-to-day view of the physical changes of the project. Other sensitive receptors to visual quality in the area consist of people that attend nearby schools, visit cemeteries, and utilize parks and trails, as they are open space areas that would be within view of the project.

Shade and shadow are fairly limited in the area, as most of the buildings are one and two stories in height, and landscaping is not prominent. Sources of light and glare mainly consist of overhead street lighting, commercial lighted signs, and car headlights.

4.4.2 Evaluation Methodology

The total number of residences and other visually sensitive receptors that currently have a view of the corridor alternatives and their proposed station areas was calculated by counting those receptors currently adjacent to the corridor (first row receptors). The counts were accomplished using 1999 aerial photographs, field observations, and existing land use maps prepared for the project.

Viewshed zones are defined by the visual dominance of any corridors or structures in view. Along each alignment alternative, the number of residences and other highly visually sensitive uses (schools, cemeteries, parks, and other community facilities) within viewshed zones were identified. Only the first row of visual receptors was considered, which generally varies in distance from zero feet (or adjacent to the proposed alignment) to 30 feet from the alignment. Most sensitive receptors are generally one story in height, but sometimes consist of two-story buildings or open areas (parks and cemeteries).

For this analysis, single-family and multi-family residences were each counted as one visual sensitive receptor. Mixed uses in the project area, which consisted of a retail commercial shop at the street level with a residence on the second level, were also counted as one sensitive receptor per building. Cemeteries, parks, and bicycle and equestrian trails were counted as one receptor each. People using these mostly neighborhood facilities are particularly sensitive to visual change; therefore these facilities are separately identified to ensure impacts are equally evaluated.

Except where subway stations and park-and-ride facilities would be located, it is not anticipated that the project would result in property takes. In locations where subway stations are proposed, surface structures associated with those stations may have an impact on adjacent sensitive receptors. The same is also true for sensitive visual receptors around BRT stops and LRT stations. Park-and-ride lots would be at-grade, but park-and-ride structures may be two- to three-stories in height[2]. It was assumed that the alternatives would result in the removal of some landscaping along the alignments. This includes landscaped medians along the LRT alternatives.

4.4.3 Environmental Issues

Visual and Aesthetic Comparative Evaluation

No visual impacts would occur as a result of the No-Build Alternative. For the TSM Alternative, there would be a negligible changed view to adjacent sensitive receptors given that this alternative involves low capital costs and little construction.

Alternatives 1 through 8 vary in the number of visual sensitive receptors potentially affected as a result of the different alignments and modes. Figures 4-22 through 4-29 display the locations of the major concentrations of sensitive receptors along each alternative alignment. The number of potential visually affected sensitive receptors is listed in Table 4-17. From a quantitative perspective, Alternatives 6 and 7 would potentially affect the least amount of sensitive receptors along the alignments. This is due primarily to the alternatives' incorporation of a partial subway mode, which would result in less at-grade impacts on sensitive visual receptors. Alternative 1 would potentially affect the most sensitive receptors of all alternatives. The quantitative analysis does not take into account the differences in visual impacts due to the different transit modes. This issue is addressed below.

Through the following quantitative and qualitative analysis, impacts on different receptor types are listed and described according to alternatives.

Residential: Single-family, multi-family, and mixed residential uses would have an introduced view of the facilities associated with the alternatives. Because of the nature of residential uses, residential visual receptors would be the most sensitive to all changes because the residents are the most familiar with their surroundings and have the most pride in associated views. The LRT Alternatives (3, 5, 6, and 7) would have more of a visual affect on these receptors with the loss of median landscaping (where it already exists), new station platforms, and overhead canopies associated with stations. Second floor views of the LRT associated electric cables and catenary system would potentially be visually affected. In various locations, BRT and LRT alternatives would result in as much as six inches of sidewalk being removed on each side, which would be visually negligible. Subway stations would be noticeable from few residences, given the relatively sparse residential uses along the western portion of the alignments.

[2] No information is currently available on the specific locations of park-and-ride facilities, or the actual heights of such facilities. If such information becomes available, the heights of potential park-and-ride structures may result in an increase in the number of visually affected sensitive receptors in the project area.

TABLE 4-17 POTENTIAL IMPACTS ON VISUAL SENSITIVE RECEPTORS[1]								
Mode/ Alternative	Residences[2]			Schools	Parks	Trails	Cemeteries	Total[3]
	SFR	MFR	Mixed					
No-Build	0	0	0	0	0	0	0	0
TSM	0	0	0	0	0	0	0	0
BRT 1	268	216	39	7	7	2	2	541
BRT 2	234	183	36	5	7	2	2	427
LRT 3	234	183	36	5	7	2	2	427
BRT 4	228	192	52	5	9	2	2	490
LRT 5	228	192	52	5	9	2	2	490
LRT 6	173	85	24	4	5	2	3	296
HR/LRT 7	166	88	32	4	5	2	3	300
HR/BRT 8	228	203	36	5	6	2	2	482

[1] This quantitative analysis does not take into account the differences in visual impacts due to the different transit modes. For example, LRT has an overhead catenary system associated with that mode, while BRT does not.
[2] SFR = Single-family Residential Unit
MFR = Multi-family Residential Unit
Mixed = Commercial and Residential Mixed Unit
[3] The total impacts number for each alternative may increase when specific park-and-ride location and height information becomes available.

Source: Land Use analysis overlain on 1999 Aerial Photography, Barrio Planners Incorporated.

Overall, residents may experience more potential adverse visual affects with LRT alternatives compared to BRT alternatives (Alternative 5 would potentially have the most impacts) because of the loss of median landscaping and overhead catenary system associated with the LRT mode. Subway alternatives 6 and 7 would result in less visual impacts on residents.

Schools: Schools would have introduced views of the facilities associated with all alternatives. Most schools in the project corridor are located along the western portion and include San Antonio de Padua, Seventh Day Adventist, Utah Street, First Street, Breed Street, Roosevelt High, Our Lady of Talpa, Romona High, Our Lady Lourdes, Griffith Junior High, Eastmont Intermediate, and Montebello Intermediate Schools. Potential visual receptors in schools are students and faculty who spend time each day outside in the recreation areas, and would notice the visual changes along the corridors resulting from the project alternatives.

Such changes in views for the four to seven schools affected by the project alternatives would be potentially adverse only in the LRT alternatives due to the loss of landscaped medians in some locations and the addition of overhead electric cables. Stations in LRT Alternatives 3, 5, 6, and 7 would be located near Griffith Junior High, Our Lady Lourdes, Our Lady of Talpa, Roosevelt High, and Utah Street Schools. BRT Alternatives 2 and 4 and HR/BRT Alternative 8 would potentially affect schools the least due to their limited amount of visual changes to the corridor. Alternatives 3 and 5 would potentially affect schools the most because of the physical changes resulting from the LRT mode.

Parks: Parks would have introduced views of the project facilities for all alternatives. Parks are located throughout the corridor, and include El Pueblo de Los Angeles State Historic Park, Pecan Park, LANI Park, Evergreen Park, Belvedere Park, Ashiya Park, Grant Rea Park, Pio Pico State Historic Park, and Whittier Greenspace. Potential visual receptors in parks are people who enjoy passive or active recreation in open spaces, where views may play a large part on the level of enjoyment. Most parks along the corridor are passive parks.

Changes in views for the parks along the project alternatives would be potentially adverse only in the LRT alternatives, due to the loss of landscaped medians and views of the catenary system and electrical cables. Stations for the LRT alternatives would be located near Whittier Greenspace, Evergreen, and LANI Parks. Thus, Alternative 8 would result in the least number of parks being visually affected due to the BRT and heavy rail subway modes. Alternative 5 would potentially have the most adverse effects for visual receptors in parks due to the physical changes of the LRT mode.

Trails: All build alternatives would cross two Class 1 bicycle and equestrian trails (Rio Hondo River Trail and San Gabriel River Trail). People who utilize the trail system would be most sensitive to visual change. Views of the surrounding area are important to these people, but in both cases, the area is already highly developed and paved.

The impact on trail users would be more substantial from a distance rather than at the actual crossings at Whittier and Beverly Boulevards (which cross over the trails). As users approach the crossing, they would lose sight of the LRT or BRT facilities.

Cemeteries: Cemeteries in the project area, which include Cavalry, Serbian, and Evergreen Cemeteries, would have introduced views of the project facilities for all alternatives. Potential visual receptors in cemeteries are people who visit the grounds, and therefore are sensitive to the scenery all around them. Only Alternatives 6 and 7 would be located adjacent to all three cemeteries, while all other alternatives would be located adjacent to two cemeteries (Cavalry and Serbian).

Changes in views along cemeteries would be potentially adverse only in the LRT alternatives, due to the loss of landscaped medians in some locations and addition of overhead electric cables and catenary system. A station would be located adjacent to Evergreen Cemetery for LRT Alternative 6 and HR/LRT Alternative 7. Thus, BRT Alternatives 1, 2, and 4 and HR/BRT Alternative 8 would potentially have the least adverse effects for visual receptors in cemeteries. Alternatives 6 and 7 would potentially have the most adverse effects in cemeteries due to the LRT mode.

Visual and Aesthetic Mitigation

The incorporation of urban design features into the project would help in minimizing potential visual impacts. The following conceptual mitigation incorporates the urban design elements being developed as part of this project.

- Where landscaping is taken from medians that are removed, the urban design of the project would increase streetscape along the sidewalks and other forms of street beautification, where feasible. In locations where no street beautification is feasible, visual impacts would remain.

- Where bus stops, transit shelters, park-and-ride lots or structures, subway stations, and all other structures are to be located, the architecture of the structures would be decorative and compatible with city design guidelines, architectural standards, and the surrounding environment. Furthermore, landscaping could be incorporated near these structures where feasible, and decorative lighting could also be added.

- Proposed platform areas for LRT and BRT alternatives will incorporate decorative paving, pedestrian amenities, landscaping, and enhanced transit shelters.

- Enhancements to existing streets in the proximity of platform areas could also include decorative paving at nearby crosswalks, additional street trees, and landscaping in pockets along revised sidewalks.

- Where sufficient street right-of-way exists, new landscaped medians will be incorporated as part of the urban design features.

- The right-of-way of the LRT alternatives and the bus lanes of the BRT alternatives could include decorative paving or colored concrete as an additional enhancement to existing street conditions.

- Views of the construction area would be screened with fencing to the extent possible, and construction staging areas would be located in areas with few sensitive receptors.

- Areas where landscaping is removed during construction would be replaced as soon as feasible. Revegetation areas would be maintained and managed until established and desired plant coverage is achieved.

4.5 MTA ARTS PROGRAM

4.5.1 Public Art and the Design Process

As part of the process of designing any of the alternatives, whether light rail, dedicated busways, heavy rail or a combination, artists will be hired to participate in the station design process at the same time as the station architects. Prior to hiring any artists, Metro Art staff and Planning staff in change of project planning will invite interested members of the communities (residential, business and institutional) adjacent to stations and the alignment, to form a Metro Art Advisory Group. This Advisory Group will research and assemble information unique to the community. This process of community participation follows FTA policy (Circular 9400.1A) which states: "To create facilities that are integral components of communities, information about the character, makeup, and history of the neighborhood should be developed and local residents and businesses could be involved in generating ideas for the project." The previous research and resources produced for the Metro East Side Extension will be provided to station designers and artists.

Selected members of the Advisory Group will be added to a selection panel who will be charged with selecting artists to participate in the station design team after an open public RFQ. Artists shall be hired prior to, or simultaneous with, the hiring of the architect and other team members. Before the design team begins any design, they will have available to them the research and report provided by the community and assembled by Metro Art and Planning (the Community Profile). That information will help provide a starting point for station design decisions.

A budget will be established for public art which will be based on a percentage of the hard costs (construction costs) for the project and will cover design fees and fabrication of art elements, engineering/architectural support, administration, and conservation. Again, as directed by the FTA (Circular 9400.1A), "Funds spend on the art component of the project should be appropriate to the overall costs of the transit project and adequate to have an impact. The FTA guidelines propose that these costs should not exceed 5% of overall construction costs" (i.e., New York City 's is 1%, Miami's is 1.5%, Chicago's is 1.33%, Philadelphia's is 1%, Seattle's is 1%, San Francisco's is 1% and Sacramento's is 2%) and also recommend that the agency "provide adequate administrative and technical support."

Artwork and artist ideas will be presented as part of the overall station designs. Fabrication of art elements and their future conservation will be the responsibility of Metro Art. Metro Art will ensure that the community continues to participate and is educated about the artwork and design before, during and after the construction process.

4.5.2 Graphics and Wayfinding

The quality of graphic signage and wayfinding within the system and within the adjacent neighborhood greatly affect the ease and comfort with which patrons will use the system. Station names, station identification, directional signage, logos, maps, and informational signage shall adhere to the MTA Graphics Standards. The guiding principals for the standards are to simplify Metro signage systems in a way that makes sense for patrons, using uniformity in text styles, a rational hierarchy of sign sizes, clear directional arrows, etc.

4.6 AIR QUALITY

4.6.1 Affected Environment

The purpose of this section is to describe the existing and the future air quality conditions in the South Coast Air Basin region and the Eastside Transit Corridor Study area. The section begins with a discussion of the air quality regulatory background. It then describes the major pollutants of concern and their adverse effects. Information about the regional and local climate and meteorological factors that affect air quality is next presented, followed by a discussion of the local air quality conditions. The section also includes a presentation of sensitive receptors in the project area that may be sensitive to air pollution and concludes with a general discussion of the future baseline air quality conditions.

Regulatory Setting

Clear Air Act Amendments of 1990

The Clean Air Act amendments of 1990 (Amendments) direct the EPA to implement strong environmental policies and regulations that will ensure cleaner air quality. The amendments apply to proposed transportation projects such as the alternatives being considered in this Eastside Transit Corridor Study. According to Title I, Section 101, Paragraph F of the Amendments, "No federal agency may approve, accept or fund any transportation plan, program or project unless such plan, program, or project has been found to conform to any applicable (state) implementation plan (SIP) in effect under this act." Title I of the Amendments defines conformity as follows:

- Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards; and
- That such activities will not:
  - Cause or contribute to any new violation of any National Ambient Air Quality Standard (NAAQS) in any area;
  - Increase the frequency or severity of any existing violation of any NAAQS in any area; or
  - Delay timely attainment of any NAAQS or any required interim emissions reductions or other milestones in any area.

Until the SIP is approved, the U.S. EPA has stated that two aspects of conformity must be demonstrated during this interim period as a part of the environmental review phase of a project:

- The elimination or reduction of the severity and number of violations of the carbon monoxide standards in the area substantially affected by the project.
- The reduction in annual ozone and carbon monoxide emissions consistent with the deadlines established for each type of designated non-attainment area.

The determination of conformity is to be based on the most recent estimates of pollutant emissions and such estimates are to be determined from the most recent population, employment, travel, and congestion estimates as determined by the responsible metropolitan planning organization or other agency authorized to make such estimates.

For this project, the Southern California Association of Governments (SCAG) growth forecasts will be used.

Air Quality Management Plan

The South Coast Air Quality Management District is required to produce plans to show how air quality will be improved within the South Coast Air Basin. The Air Quality Management Plan (AQMP) was adopted by the AQMD Governing Board on November 15, 1996. The purpose of the plan is to set forth a comprehensive program that will lead to compliance with the State Implementation Plan requirements under Title I of the federal Clean Air Act (CAA) and the California Clean Air Act (CCAA).

National and State Ambient Air Quality Standards

As required by the Clean Air Act, National Ambient Air Quality Standards ("NAAQS") have been established for six major air pollutants: carbon monoxide, nitrogen oxides, ozone, particulate matter, sulfur oxides, and lead. These standards as well as standards established by the State of California are summarized in Table 4-18. The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation and other aspects of the general welfare. Note that the table shows the standard for $PM_{2.5}$. The EPA promulgated this standard in July 1997.

The process by which the standard was set was challenged and on May 14, 1999, the U.S. Court of Appeals for the District of Columbia Circuit issued an opinion regarding the final NAAQS for ozone and particulate matter. The court found that "Congress and the EPA did not identify an intelligible principle for determining the degree of residual risk to public health permissible" under the standard. The EPA has asked the U.S. Department of Justice to appeal this decision and that it be overturned. On June 18, 1999, the Court ruled that the $PM_{2.5}$ standard should remain in place. However, the Court will allow parties to apply for the standard to be vacated if "the presence of this standard threatens a more imminent harm". The EPA strongly disagreed with the decision. On June 28, 1999 the EPA and the Department of Justice filed a petition for rehearing *en banc* asking the entire D.C. circuit to reverse the decision of the panel. According to a discussion with Andy Panson, Air Pollution Specialist, CARB, the court has not yet acted on the petition for rehearing.

Pollutants of Concern

"Air Pollution" refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by affecting health, reducing visibility, damaging property or reducing the productivity or vigor of crops or natural vegetation. Some of the more common pollutants are discussed below.

TABLE 4-18
STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Period	California Standard[1]	Federal Standards[2]	
		Concentration[3]	Primary[3,4]	Secondary[3,5]
Ozone (O_3)	1 hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)[6]	Same as Primary Standard
	8 hour	--	0.08 ppm (157 $\mu g/m^3$)	
Respirable Particulate Matter (PM_{10})	Annual Geometric Mean	30 $\mu g/m^3$	--	Same as Primary Standard
	24 hour	50 $\mu g/m^3$	150 $\mu g/m^3$	
	Annual Arithmetic Mean	--	50 $\mu g/m^3$	
Fine Particulate Matter ($PM_{2.5}$)	24 hour	No Separate Standard	65 $\mu g/m^3$	Same as Primary Standard
	Annual Arithmetic Mean		15 $\mu g/m^3$	
Carbon Monoxide (CO)	8 hour	9.0 (10 mg/m^3)	9.0 (10 mg/m^3)	None
	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	
	8 hr. (Tahoe)	6 ppm (7 mg/m^3)	--	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	--	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard
	1 hour	0.25 ppm (470 $\mu g/m^3$)	--	
Sulfur dioxide (SO_2)	Annual Arithmetic Mean	--	0.030 ppm (80 $\mu g/m^3$)	--
	24 hour	0.04 ppm (105 $\mu g/m^3$)	0.14 ppm (365 $\mu g/m^3$)	--
	3 hour	--	--	0.5 ppm (1300 $\mu g/m^3$)
	1 hour	0.25 ppm (655 $\mu g/m^3$)	--	--
Lead	30 days average	1.5 $\mu g/m^3$	--	--
	Calendar Quarter	--	1.5 $\mu g/m^3$	Same as Primary Standard
Visibility Reducing Particulates	8 hour (10 am to 6 pm PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer—visibility of ten miles or more (0.07-30 miles or more for Lake Tahoe) due to particles when the relative humidity is less than 70 percent.	No Federal Standards	
Sulfates	24 hour	25 $\mu g/m^3$		
Hydrogen Sulfide	1 hour	0.03 ppm (42 $\mu g/m^3$)		

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM 10 , and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded.
2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. For PM 2.5 , the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 2°C and a reference pressure of 760 mm of mercury. Most measurements of air quality are to be corrected to a reference temperature of 2°C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
5. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
6. New federal 8-hour ozone and fine particulate matter standards were promulgated by U.S. EPA on July 18,1997. The federal 1-hour ozone standard continues to apply in areas that violated the standard.

Ppm = part per million by volume; $\mu g/m^3$ = micrograms per cubic meter

Source: California Air Resources Board, *Federal and State Air Quality Standards 1999* (1/25/99)

Ozone. Ozone (O_3) is a colorless gas and is the chief component of urban smog. Ozone affects lung function by irritating and damaging the respiratory system. In addition, ozone causes damage to vegetation, buildings, rubber, and some plastics (California Air Resources Board Almanac, 1999). Ozone is one of a number of substances called photochemical oxidants that are formed when reactive organic compounds (ROC) and nitrogen oxides (precursor emissions), both byproducts of the internal combustion engine, react in the presence of ultraviolet sunlight. Ozone is present in relatively high concentrations within the Basin, and the damaging effects of photochemical smog are generally related to the concentrations of ozone. (SCAQMD, 1993). Meteorology and terrain play major roles in ozone formation. Generally, low wind speeds or stagnant air coupled with warm temperatures and cloudless skies provide for the optimum conditions.

Carbon Monoxide. Carbon monoxide (CO) is a gas that, in the human body, interferes with the transfer of oxygen to the blood. It can cause dizziness and fatigue, and can impair central nervous system functions. CO is a product of incomplete combustion emitted, along with carbon dioxide, by motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and diesel-powered trains. In urban areas, CO is emitted primarily by automobiles and other types of motor vehicles. CO is a non-reactive air pollutant that dissipates relatively quickly, so ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic. CO concentrations are influenced by local meteorological conditions, primarily wind speed, topography, and atmospheric stability. When a surface-based temperature inversion combines with calm atmospheric conditions (a typical situation at dusk in urban areas between November and February), CO from automobile exhaust can become locally concentrated. The highest CO concentrations measured in the South Coast Air Basin are typically recorded during the winter. Excesses of the State CO standard in South Coast Air Basin tend to occur near major motor vehicle traffic corridors when meteorological conditions allow CO to accumulate.

Nitrogen Dioxide. Nitrogen dioxide (NO_2) is a byproduct of fuel combustion. The principal form of nitrogen oxide produced by combustion is nitric oxide (NO), but NO reacts quickly to form NO_2, creating the mixture of NO and NO_2 commonly called No_x. Nitrogen dioxide acts as an acute irritant and, in equal concentrations is more injurious than NO at atmospheric concentrations; however, NO_2 is only potentially irritating. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in children (two to three years old) has also been observed at concentrations below 03 parts per million (ppm). Nitrogen dioxide absorbs blue light; the result is a brownish-red cast to the atmosphere and reduced visibility. NO_2 also contributes to the formation of PM_{10}. (SCAQMD, 1993).

Sulfur Oxides. Sulfur oxides, primarily sulfur dioxide (SO_2), are a product of combustion of high-sulfur fuels, such as many grades of coal and oil. In recent years, restrictions on the use of high-sulfur fuels and other air pollution control measures have substantially reduced ambient concentrations of SO_2 throughout the U.S. SO_2 is a human respiratory irritant. It also combines with moisture in the atmosphere to form sulfuric acid which, in turn, damages vegetation and slowly erodes the exterior facades of buildings and other structures in urban areas. SO_2 concentrations have been reduced by the increasingly stringent controls placed on stationary source emissions of SO_2 and limits on the sulfur content of fuels. The SO_2 concentrations have been reduced to levels well below state and national standards; further reductions in emissions are needed to attain compliance with standards for sulfates and PM_{10}, of which SO_2 is a contributor.

Suspended Particulate Matter. Suspended, or respirable, particulate matter (PM_{10}) consists of suspended particles less than 10 microns in diameter. Particulates in this size category can be inhaled, irritating the human respiratory tract and aggravating pre-existing respiratory disease. Very small particles of substances such as lead, sulfates, and nitrates can cause lung damage directly, can be absorbed into the blood stream and cause damage elsewhere in the body, and can transport absorbed gases, such as chlorides or ammonium, into the lungs and cause injury. Particulates also damage and discolor surfaces on which they settle, and reduce regional visibility.

Particulates in the atmosphere result from natural sources, such as wind erosion and ocean spray, and from human activities. Man-made sources include many types of dust- and fume-producing industrial and agricultural operations; fuel combustion and vehicle travel; grading, excavating, demolition, and blasting from construction; and atmospheric chemical and photochemical reactions. Motor vehicle traffic is the major source of PM_{10}. In urban areas, PM_{10} concentrations generally are higher in winter when more fuel is burned and meteorological conditions favor the concentration of primary air pollutants.

Climate and Meteorological Factors that Affect Air Quality

Regional Climate

California covers a total area of approximately 164,000 square miles. The Pacific Ocean is the western boundary of California, forming a coastline more than 1,200 miles long. California offers a wide range of scenery and climates. The climate is primarily influenced by the North Pacific high-pressure cell, which produces low-level wind flows over the eastern North Pacific Ocean, particularly during the summer. The high pressure cell, a semi-permanent feature of the Northern Hemispheric circulation, produces a predominantly northwesterly flow of maritime air over the California coastal waters pattern [South Coast Air Quality Management District (SCAQMD), 1993]. During winter, the Pacific High weakens and moves south, resulting in weaker less-persistent northwesterly winds along the California Coast than in the warmer half of the year.

As the air mass approaches the coast of California, this large-scale circulation pattern is modified to a more-westerly flow by continental influences. The differential heating between the land area of California and the adjacent Pacific Ocean modifies the predominant flow, enhancing it during the warmer half of the year and weakening it during the colder portion. On a local and regional basis, the air flow in California is channeled by its mountain ranges and valleys. The coastal mountain ranges limit the flow of maritime air into the interior of California. These mountains are generally higher than the inversion layer, and limit the inland penetration of marine air flows to low points in the coastal mountain range.

South Coast Air Basin

Due to the wide variety of climates, physical features, and emission sources, California is divided into 15 air basins to better manage air quality problems. The proposed project is located within the South Coast Air Basin, a 6,530 square-mile area bounded by the Pacific Ocean to the west; by the San Gabriel, San Bernadino, and San Jacinto mountains to the north and the east; and by the San Diego County line to the south (Figure 4-30). The South Coast Air Basin, which includes all of Orange County, the nondesert portions of Los Angeles and the western urbanized portions of Riverside and San Bernadino Counties, generates about one-third of the States total criteria pollutant emissions. The climate in the South Coast Air Basin is characterized by warm summers, mild winters, infrequent rainfall, moderate onshore daytime breezes, and moderate humidity.

The topography and climate of Southern California combine to make the Basin an area of high air pollution potential. During the summer, onshore flows of cool, moist marine air enter the South Coast Air Basin. The warm upper layer of air forms a cap over the cool marine layer, preventing air pollutants near the ground from dispersing upward. During the winter, night and early morning temperature inversions occur close to ground level due to radiant cooling of the land. These inversions limit vertical mixing of the air near to ground, and of the air pollutants contained in that layer.

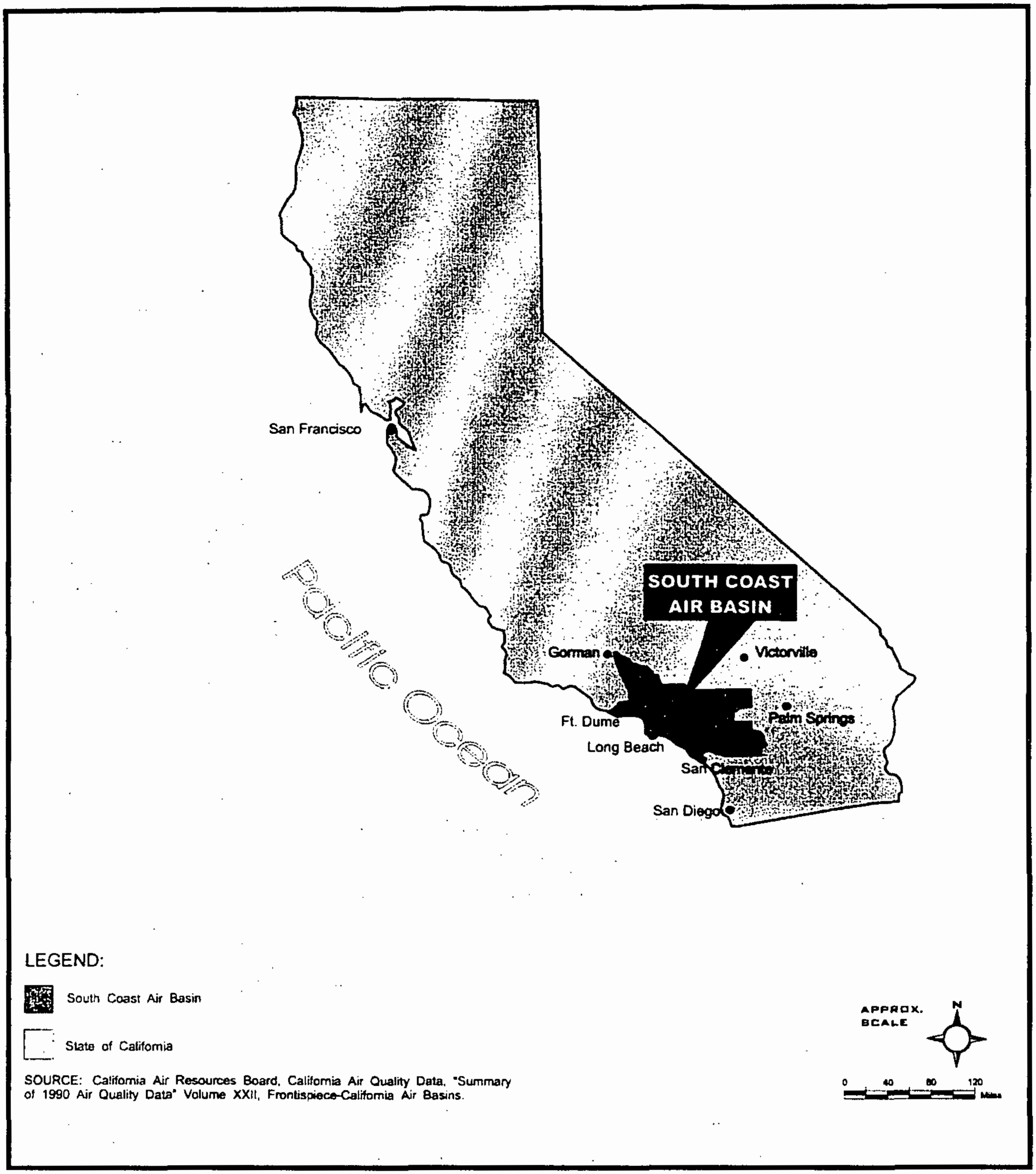
Local Climate

Los Angeles is located in the southern part of the state on the Pacific Ocean. Geographically, it extends more than 40 miles from the mountains to the sea. The Los Angeles area experiences more days of sunlight than any other major urban area in the nation except for Phoenix. Sunlight is needed for the photochemical reactions, which produce ozone, one of the regulated criteria air pollutants. The combination of low-temperature inversions; meteorological conditions such as light winds, shallow vertical mixing and extensive sunlight; and topographical features such as adjacent mountain ranges hinder dispersion of air pollutants, thus contributing to poor air quality.

Los Angeles County is designated as a "non-attainment area" for ozone, carbon monoxide, and PM_{10}. The County is in attainment with regard to sulfur dioxide and nitrogen dioxide emissions. [South Coast Air Quality Management District, Air Quality Data, 1997]. (See Figure 4-31).

Local Meteorology

Wind data was assessed for two locations, the Los Angeles Station and the Pico Rivera station. The evaluation concluded that winds blow primarily from the west-southwest (20 percent of the time) with an average wind speed of 2.41 m/s (5.39 mi/h) near the Los Angeles station. At the Pico Rivera Station predominant wind direction is southwest (23 percent of the time) with an average wind speed of 2.07 m/s (4.63 mi/h).

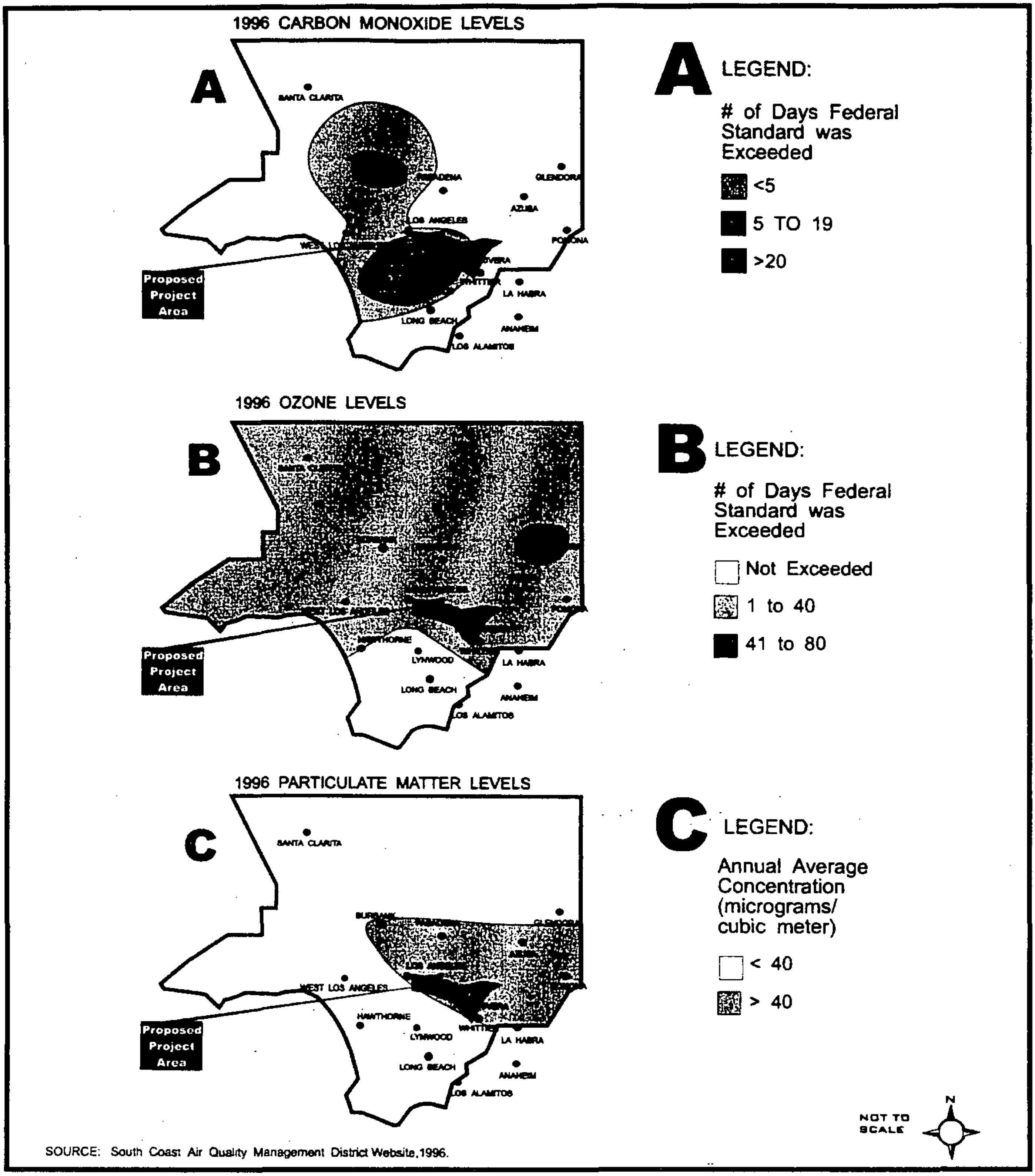


SOURCE: California Air Resources Board, California Air Quality Data, "Summary of 1990 Air Quality Data" Volume XXII, Frontispiece-California Air Basins.

Eastside Transit Corridor Study **South Coast Air Basin**

Eastside Corridor Transit Consultants

Figure 4-30



Eastside Transit Corridor Study

Carbon Monoxide, Ozone, and Particulate Matter Levels

Eastside Corridor Transit Consultants

Figure 4-31

Local Air Quality Conditions

Monitoring Stations

The South Coast Air Quality Management District operates a regional air quality monitoring network that provides information on average concentrations of those air pollutants for which the state or federal agencies have established ambient air quality standards. Air quality monitoring data were analyzed to assess existing concentrations of carbon monoxide and particulate matter in the project area. The Pico Rivera and Los Angeles-North Main Station are the stations located closest to the proposed project area (See Figure 4-32).

Pico Rivera. The Pico Rivera air quality monitoring station is located within the project area at the eastern boundary at 3713-B San Gabriel River Parkway in Pico Rivera. Table 4-19 displays the 1996 to 1998 air quality data from this station.

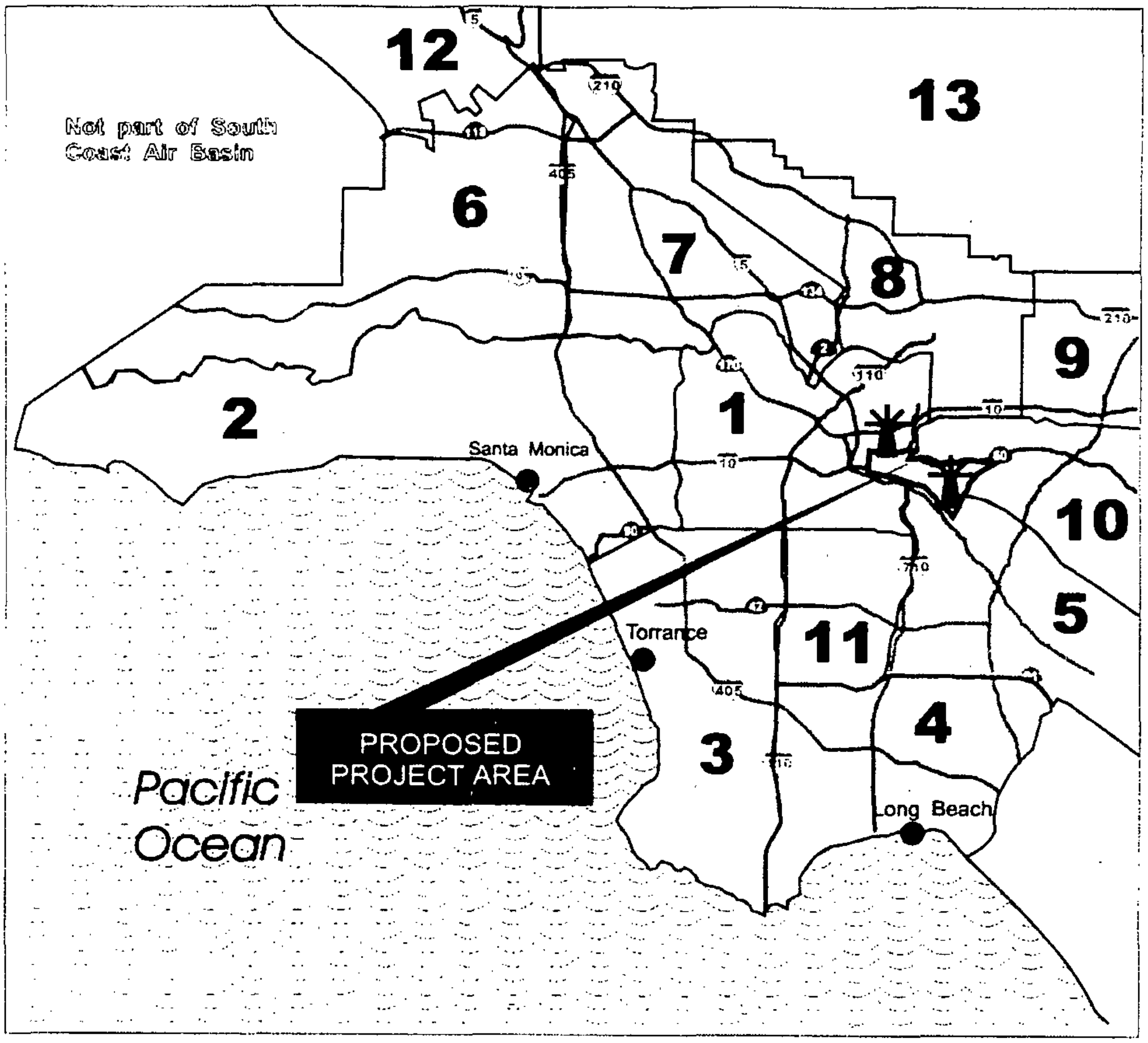
Los Angeles-North Main Street. The Los Angeles-North Main Street air quality monitoring station is located less than a mile from the northeastern boundary of the project area. This station is located at 1630 N. Main Street in Los Angeles. Table 4-19 presents the 1996 to 1998 air quality data from this station.

Sensitive Receptors in the Project Area

Some land uses are considered more sensitive to air pollution than other uses due to their occupants, activities, or resources. Facilities such as schools, hospitals, child-care centers, convalescent homes, and parks are considered sensitive to poor air quality because the individuals who typically occupy these sites are especially sensitive to the effects of air pollutants. Individuals that are generally more susceptible to air-quality-related health problems (e.g., respiratory infections) than the general public are considered to be sensitive receptors. Sensitive receptors include children, the elderly, the acutely ill, and the chronically ill, especially those individuals with cardio-respiratory diseases. Locations of most of the sensitive receptors in the Eastside Transit Corridor Study area are presented in the *Public and Community Facilities* section.

Future Baseline Air Quality

The California Air Resources Board (CARB) as part of their planning process to meet the requirements of the National and State Clean Air acts estimates future mobile emissions for each air basin within the State. For the South Coast Air Basin, CARB has also identified mobile emissions for each county within the basin. Table 4-20 illustrates the mobile emissions estimate for Los Angeles County for the years 1999 and 2020. As can be seen, although vehicle miles of travel within the County is expected to increase by approximately 18 percent, overall mobile emissions are expected to decline from 26 to 83 percent due to a cleaner vehicle fleet. The cleaner fleet is a result of reduced emissions from new vehicles and removal of older higher emission vehicles over the 20-year period.



LEGEND: Monitoring Station

Air Monitoring Areas in Los Angeles County:

1. Central Los Angeles
2. Northwest Coastal
3. Southwest Coastal
4. South Coastal
5. Southeast Los Angeles County
6. West San Fernando Valley
7. East San Fernando Valley
8. West San Gabriel Valley
9. East San Gabriel Valley
10. South San Gabriel Valley
11. South Central Los Angeles
12. Santa Clarita Valley
13. San Gabriel Mountains

APPROX. SCALE 0 3.0 6.0 9.0 Miles

SOURCE: South Coast Air Quality Management District Air Monitoring Areas Map, 1989

Eastside Transit Corridor Study ***Air Monitoring Areas***

Eastside Corridor Transit Consultants

Figure 4-32

TABLE 4-19
AIR QUALITY SUMMARY FOR STUDY AREA MONITORING STATIONS, 1996-1998

Air Pollutant	Standard Exceedance	Los Angeles-North Main Street			Pico Rivera		
		1996	1997	1998	1996	1997	1998
Carbon Monoxide (CO)	Maximum 8-hr concentration (ppm)	8.37	7.80	6.17	8.05	6.09	6.07
	Days > 9.5 ppm (federal 8-hr. standard)	0	0	0	0	0	0
	Days > 9 ppm (state 8-hr. standard)	0	0	0	0	0	0
Ozone (O^3)	Maximum 1-hr Concentration (ppm)	0.144	0.120	0.148	0.141	0.133	0.183
	Maximum 8-hr. Concentration (ppm)	0.095	0.091	0.111	0.104	0.101	0.112
	Days > 0.12 ppm (federal 1-hr. standard)	4	0	5	9	6	10
	Days > 0.08 ppm (federal 8-hr. standard)	7	3	9	11	7	12
	Days . 0.09 ppm (state 1-hr. standard)	24	6	17	32	18	31
Nitrogen Dioxide (NO^2)	Maximum 1-hr Concentration (ppm)	0.243	0.198	0.170	0.172	0.149	0.140
	Days > 0.09 ppm (state 1-hr. standard)	0	0	0	0	0	0
Sulfur Dioxide (SO^2)	Maximum 1-hr Concentration (ppm)	0.034	0.033	0.037			
	Days > 0.14 ppm (federal 24-hr standard)	0	0	0	n/a	n/a	n/a
	Days > 0.05 ppm (state 24-hr. standard)	0	0	0			
Suspended Particulates (PM^{10})	Maximum 24-hr. concentration (μg/m³)	138	103	80			
	Samples > 150 μg/m³ (federal 24-hr standard)	0	0	0			
	Samples > 50 μg/m³ (state 24-hr standard)	11	15	11	n/a	n/a	n/a

n/a = pollutant not monitored; ppm = part per million by volume; μg/m³ = micrograms per cubic meter.

Source: California Air Quality Data Summaries 1996-1998, California Air Resources Board..

TABLE 4-20
CRITERIA POLLUTANT EMISSIONS REDUCTION

Pollutant	Year 1999 (Tons/Day)	Year 2020 (Tons/Day)	Percent Change
Total Organic Gases (TOG)	175.71	50.03	-72%
Reactive Organic Gases (ROG)	157.42	46.03	-71%
CO	1,631.76	804.74	-51%
NO_X	249.97	185.11	-26%
PM_{10}	54.60	9.07	-83%
SO_X	15.10	7.71	-49%
Daily VMT	187,404,000	221,827,000	18%

Source: California Air Resources Board, Burden 7G output - Los Angeles County

As can be seen in the table, carbon monoxide accounts for the vast majority of mobile emissions. The anticipated reduction in CO emissions would have a corresponding effect on ambient air quality levels in Los Angeles County. Because the CARB mobile emissions estimates take into account both the growth in vehicle miles of travel as well as improved emission rates, the CO reductions can be directly applied to ambient background CO concentrations at the Downtown LA and Pico Rivera monitoring stations, consistent with US EPA guidance, to provide a future year estimate of background CO levels.

The current CO levels at the Downtown LA and Pico Rivera stations are 7.5 ppm and 6.7 ppm, respectively for the 8-hour averaging period. The corresponding 1-hour concentrations (assuming a typical persistence factor of 0.7) are 10.7 ppm and 9.6 ppm. For the year 2020 these levels would be reduced ("rolled back") by 51 percent, resulting in 8-hour concentrations of 3.7 ppm and 3.3 ppm for Downtown LA and Pico Rivera stations, respectively. One-hour concentrations would be reduced to 5.2 ppm and 4.7 ppm at the two monitoring stations (Table 4-21).

TABLE 4-21
EXISTING AND FUTURE CO CONCENTRATIONS IN PROJECT AREA (PPM)

Averaging Time	Downtown Los Angeles Station		Pico Rivera Station	
	1999	2020	1999	2020
1-Hour	10.7	5.2	9.6	4.7
8-Hour	7.5	3.7	6.7	3.3

Ppm = part per million by volume
Source: Terry A. Hayes Associates based on Burden 7G reductions between 1999 and 2020.

4.6.2 Evaluation Methodology

The methodology used to assess potentially significant air quality impacts associated with the alternatives has a twofold purpose. First, the assessment addresses –at the sub-regional level– the mobile emissions changes in the area substantially affected by the project alternatives. To conduct this mobile emissions assessment requires highway network performance output indicators from the MTA transportation model, including:

- Vehicle hours of travel by facility type;
- Vehicle miles of travel by facility type; and
- Average network speed for peak period and daily conditions.

In addition, the energy consumption calculations provided are used to address greenhouse gas (carbon dioxide, or CO_2) as required by the FTA's Section 5309 New Starts Criteria.

With these transportation network statistics as inputs, mobile emissions are calculated applying the applicable California Air Resources Board (CARB) mobile emissions factors (EMFAC 7G series, represented in grams per mile) to the vehicle miles of travel statistics. Selection of the specific EMFAC7G emissions factor is based on the network speed (measured in miles per hour) estimated for each alternative. The results of these calculations are quantified in tons per year.

The estimated CO_2 (greenhouse gases) emissions were also predicted for all eight build alternatives and then compared to the projected emissions of the No-Build and TSM Alternatives. This is based on energy consumption calculations (measured in British Thermal Units) and conversion to CO_2 emissions applying the appropriate factors presented in the FTA's *Technical Guidance on Section 5309 New Starts Criteria* (July 1999).

4.6.3 Environmental Issues

The criteria being evaluated include: 1) criteria pollutant/precursor emissions measured in annual tons of carbon monoxide (CO), particulate matter (PM_{10}), nitrogen oxides (NO_X), and volatile organic compounds (VOC), the latter two being precursors to ozone, and 2) greenhouse gas emissions measured in annual tons of carbon dioxide (CO_2). An air quality impact analysis was conducted using FTA Office of Planning Section 5309 New Starts Criteria to calculate criteria pollutant/precursor emissions and greenhouse gas emissions for each alternative being considered.

Criteria Pollutant/Precursor Emissions

Criteria pollutant/precursor emissions were calculated using estimated regional vehicle miles of travel (VMT) for the five county region consisting of Los Angeles, Orange, Riverside, San Bernardino and Ventura counties; and emission factor data for the year 2020. VMT data was provided by the MTA transportation model[3], and emission factors were derived using the California Air Resources Board (CARB) EMFAC7G emissions model[4]. Estimated VMT for each project alternative and emission factor data are presented in Tables 4-22 and 4-23, respectively.

The current MTA Board policy calls for the entire bus fleet to be comprised of CNG-fueled buses by year 2020. The emissions shown in Table 4-24 assume a CNG bus fleet and are dependent on MTA maintaining this policy. In the event the MTA policy is rescinded, then the estimates shown in Table 4-25 would apply for use of clean-diesel powered buses. This information is presented for comparison purposes only.

Tables 4-26 and 4-27 show the estimated air quality benefits of each build alternative when compared to the No-Build and TSM Alternatives, respectively. The analysis indicates that Alternative 6 would achieve the greatest criteria pollutant/precursor emission reductions among all build alternatives. All of the build alternatives would result in emissions reductions as compared to the TSM Alternative and would also result in reductions as compared to the No-Build Alternative except in the case of NO_x where three alternatives (Alternatives 4, 5, and 8) would produce higher emissions.

[3] The estimated average weekday traffic volumes provided by the transportation model was multiplied by a factor of 315 to estimate annual VMT.

[4] Emission factors for CNG vehicles do not exist at this time; however, data from Natural Gas Vehicle Coalition suggest that a 70% reduction for CO, and an 87% reduction for NO_X, VOC and PM_{10} are reasonable.

TABLE 4-22 YEAR 2020 ESTIMATED ANNUAL VEHICLE MILES OF TRAVEL[1] (x 100,000)							
Alternative	Light Duty Auto (LDA)	Light Duty Truck (LDT)	Medium Duty Truck (MDT)	Heavy Duty Truck (HDT)	Urban Bus (UB)	Motorcycle (MCY)	Total
No-Build	1,108,801	466,948	144,417	69,735	2,447	5,837	1,798,185
TSM	1,109,060	467,057	144,451	69,735	2,529	5,837	1,798,669
1	1,108,202	466,696	144,339	69,735	2,585	5,837	1,797,393
2	1,107,881	466,561	144,297	69,735	2,589	5,837	1,796,900
3	1,107,776	466,516	144,283	69,735	2,544	5,837	1,796,692
4	1,108,553	466,844	144,385	69,735	2,591	5,837	1,797,944
5	1,108,643	466,881	144,396	69,735	2,548	5,837	1,798,040
6	1,107,325	466,327	144,225	69,735	2,543	5,837	1,795,992
7	1,108,241	466,712	144,344	69,735	2,548	5,837	1,797,417
8	1,108,557	466,845	144,385	69,735	2,583	5,837	1,797,942

[1] LDA, LDT and MDT VMT was estimated by the MTA transportation model and assigned to vehicle type per SCAG estimated distribution percentages of 69.1%, 29.1% and 9% for LDA, LDT and MDT, respectively. The MTA transportation model also estimated the LA County UB VMT. HDT, non-LA County UB and MCY VMT are SCAG estimates.

Source: MTA transportation model and SCAG, compiled by Terry A. Hayes Associates

TABLE 4-23 YEAR 2020 EMISSION FACTORS (grams/VMT)				
Vehicle Class	VOC	CO	NO_X	PM_{10}
Light Duty Auto	0.17	2.77	0.35	0.02
Light Duty Truck	0.16	3.90	0.62	0.02
Heavy Duty Truck	0.22	5.32	1.36	0.28
Urban Bus, Diesel	1.78	1.72	13.58	0.07
Urban Bus, Compressed Natural Gas (CNG)	0.23	0.52	1.77	0.01
Motorcycle	2.54	11.42	1.12	0.05

Source: Derived from the California Air Resources Board (CARB) EMFAC7G Emissions Factor Model

TABLE 4-24 YEAR 2020 ESTIMATED EMISSIONS WITH CNG BUS FLEET (TONS PER YEAR)				
Alternative	**VOC**	**CO**	**NO_X**	**PM_{10}**
No Build	40,233	695,446	154,799	7,444
TSM	** 40,242	**695,596	**154,837	**7,445
1	40,219	695,116	154,773	7,441
2	40,209	694,936	154,746	7,440
3	40,205	694,874	154,728	7,439
4	40,229	695,314	154,805	7,443
5	40,231	695,362	154,804	7,443
6	* 40,192	*694,620	*154,689	*7,437
7	40,219	695,136	154,769	7,441
8	40,229	695,316	154,804	7,443
Maximum**	40,242	695,596	154,837	7,445
Minimum*	40,192	694,620	154,689	7,437
Range	51	976	149	8
Source: Terry A. Hayes Associates				

TABLE 4-25 YEAR 2020 ESTIMATED EMISSIONS WITH DIESEL BUS FLEET (TONS PER YEAR)				
Alternative	**VOC**	**CO**	**NO_X**	**PM_{10}**
No Build	40,650	695,771	*157,986	7,461
TSM	**40,674	**695,932	158,131	**7,463
1	40,659	695,459	158,140	7,459
2	40,651	695,280	158,118	7,458
3	40,639	695,212	158,041	7,457
4	40,671	695,658	**158,179	7,461
5	40,665	695,701	158,123	7,461
6	*40,626	*694,958	158,001	*7,455
7	40,653	695,475	158,087	7,459
8	40,669	695,659	158,168	7,461
Maximum**	40,674	695,932	158,179	7,463
Minimum*	40,626	694,958	157,986	7,455
Range	48	974	193	8
Source: Terry A. Hayes Associates				

TABLE 4-26
BUILD ALTERNATIVES CHANGES IN EMISSIONS COMPARED TO NO-BUILD ALTERNATIVE[1]
(TONS PER YEAR)

Alternative	VOC	CO	NO_X	PM_{10}
1	(14.08)	(329.83)	(25.51)	(2.69)
2	(23.36)	(509.82)	(52.59)	(4.20)
3	(27.60)	(571.77)	(70.59)	(4.75)
4	(3.62)	(131.48)	**6.31	(1.02)
5	**(2.08)	**(83.48)	5.82	**(0.64)
6	*(40.84)	*(825.65)	*(110.04)	*(6.88)
7	(13.87)	(309.71)	(29.30)	(2.54)
8	(3.71)	(130.03)	5.15	(1.01)

[1]Assumes current MTA Board policy of maintaining a CNG bus fleet by 2020.

*Highest reduction compared to No-Build Alternative.
**Least reduction or highest increase (in case of NO_x) compared to No-Build Alternative.

Source: Terry A. Hayes Associates

TABLE 4-27
BUILD ALTERNATIVES REDUCTIONS IN EMISSIONS COMPARED TO TSM ALTERNATIVE[1]
(TONS PER YEAR)

Alternative	VOC	CO	NO_X	PM_{10}
1	(23.77)	(480.35)	(64.10)	(4.00)
2	(33.05)	(660.34)	(91.18)	(5.51)
3	(37.29)	(722.29)	(109.18)	(6.06)
4	(13.31)	(282.00)	**(32.28)	(2.33)
5	**(11.77)	**(234.00)	(32.77)	**(1.95)
6	*(50.53)	*(976.17)	*(148.64)	*(8.19)
7	(23.56)	(460.23)	(67.89)	(3.85)
8	(13.40)	(280.55)	(33.44)	(2.32)

[1]Assumes current MTA Board policy of maintaining a CNG bus fleet.

*Highest reduction compared to TSM Alternative.
**Least reduction compared to TSM Alternative.

Source: Terry A. Hayes Associates

Greenhouse Gas

Greenhouse gas emissions were calculated using VMT, energy consumption factors, and CO_2 conversion factors. Energy consumption factors and CO_2 conversion factors are shown in Tables 4-28 and 4-29, respectively.

TABLE 4-28 ENERGY CONSUMPTION FACTORS	
Vehicle Type	**BTU/Vehicle Mile**
Passenger Vehicle (auto, van, light truck)	6,233
Transit Bus[1]	41,655
Rail (light or heavy)	77,739

[1]Until better data becomes available, FTA advises use of this factor for buses regardless of fuel type.

Source: Oak Ridge National Laboratory, Transportation Energy Book: Edition 16, 1996.

TABLE 4-29 CONVERSION FACTORS (BTU CONSUMPTION TO CO_2)	
Fuel Type	**Conversion Factor**
Gasoline	0.0765
Diesel	0.0788
Compressed Natural Gas (CNG)	0.0585
Electricity	0.0665

Sources: Cambridge Systematics, Inc. based on data from the Energy Information Administration, U.S. Department of Energy

For comparative purposes, greenhouse gas emissions were estimated for each project alternative assuming both CNG and diesel bus fleets, and are shown in Tables 4-30 and 4-31, respectively.

TABLE 4-30 YEAR 2020 CO_2 EMISSIONS WITH CNG BUS FLEET COMPARISON[1] (TONS/YEAR)			
Alternative	**Tons of CO_2/year**	**Alternative vs. No-Build**	**Alternative vs. TSM**
No Build	100,313,736		(42,363)
TSM	100,356,099	42,363	
1	100,310,416	(3,319)	(45,683)
2	100,289,396	(24,339)	(66,703)
3	100,277,475	(36,261)	(78,624)
4	100,336,098	22,363	(20,001)
5	100,338,240	24,505	(17,859)
6	100,246,122	(67,613)	(109,977)
7	100,312,792	(944)	(43,307)
8	100,337,248	23,512	(18,851)

[1]Current MTA Board policy calls for the entire bus fleet to be comprised of CNG-fueled buses by year 2020.

Source: Terry A. Hayes Associates

TABLE 4-31 YEAR 2020 CO_2 EMISSIONS WITH DIESEL BUS FLEET COMPARISON (TONS/YEAR)			
Alternative	**Tons of CO2/year**	**Alternative vs. No-Build**	**Alternative vs. TSM**
No Build	100,520,654		(49,311)
TSM	100,569,965	49,311	
1	100,528,993	8,339	(40,972)
2	100,508,344	(12,310)	(61,621)
3	100,492,600	(28,053)	(77,364)
4	100,555,166	34,512	(14,799)
5	100,553,696	33,042	(16,269)
6	100,461,198	(59,456)	(108,767)
7	100,528,222	7,568	(41,743)
8	100,555,685	35,031	(14,280)
Source: Terry A. Hayes Associates			

As shown, CO_2 emissions for all of the build alternatives are anticipated to be lower than the TSM Alternative. Alternatives 1, 2, 3, 6, and 7 also are lower than the No-Build Alternative. Alternative 6 is anticipated to achieve the greatest CO_2 emissions reductions among all the alternatives being considered..

4.7 NOISE AND VIBRATION

4.7.1 Affected Environment

Noise and Vibration Metrics and Standards

The Federal Transit Administration (FTA) has developed standards and criteria for assessing noise impacts related to transit projects. These standards, outlined in *Transit Noise and Vibration Impact Assessment* (FTA, 1995), are based on community reaction to noise. The standards evaluate changes in existing noise conditions using a sliding scale. The higher the level of existing noise, the less room there is for the transit project to contribute additional noise.

The basic unit of measurement for noise is the decibel. To better account for human sensitivity to noise, decibels are measured on the "A-scale," abbreviated dBA. This section focuses on average noise conditions over a 24-hour period. Noise that occurs at night (between 10:00 p.m. and 7:00 a.m.) is given a significant ten dBA penalty. This is known as a Day Night Equivalent Level (Ldn). A rural area with no major roads nearby would average around 50 dBA (Ldn); a noisy residential area close to a major arterial would average around 70 dBA. Most of the residential areas in the Eastside Transit

Corridor Study area fall within the range of Ldn 65 dBA to 75 dBA. Figure 4-33 provides other typical Ldn values for rural and urban areas.

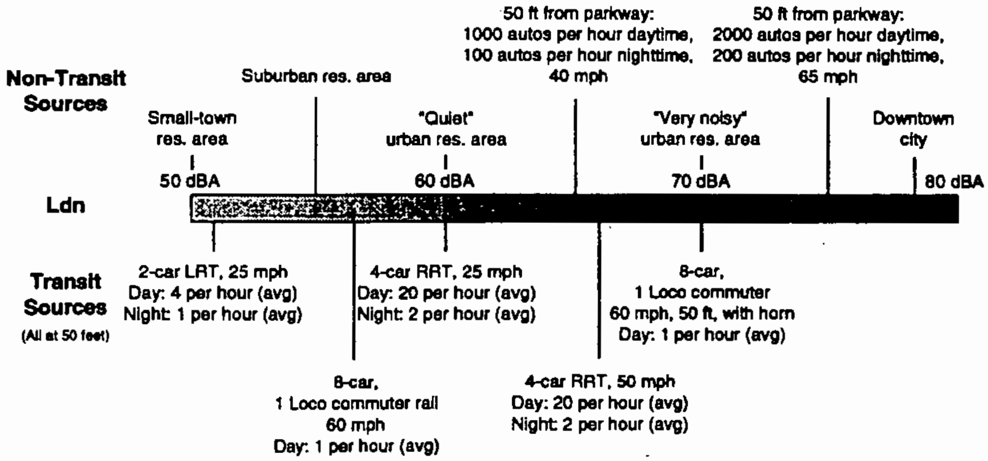


Figure 4-33
Typical Ldn Values

Noise Criteria

Some land use activities are more sensitive to noise than others (parks, churches, and residences are more noise sensitive than industrial and commercial areas). The FTA Noise Impact Criteria group 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 use that depends on quiet as an important part of operations, including schools, libraries, and churches.

Ldn is used to characterize noise exposure for residential areas (Category 2) and maximum 1-hour Leq (during the period that the transit facility is in use) is utilized for other noise sensitive land uses such as school buildings (Categories 1 and 3).

There are two levels of impact included in the FTA criteria, as shown in Figure 4-34. The interpretation of these two levels of impact are summarized below:

- Severe: Severe noise impacts are considered "significant" as this term is used in the National Environmental Policy Act (NEPA) and implementing regulations. Noise mitigation will normally be specified for severe impact areas unless there is no practical method of mitigating the noise.

- Impact: In this range, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-indoor sound insulation, and the cost effectiveness of mitigating noise to more acceptable levels. For purposes of clarification, the impact category will be referred to as moderate impact to better differentiate from severe impact.

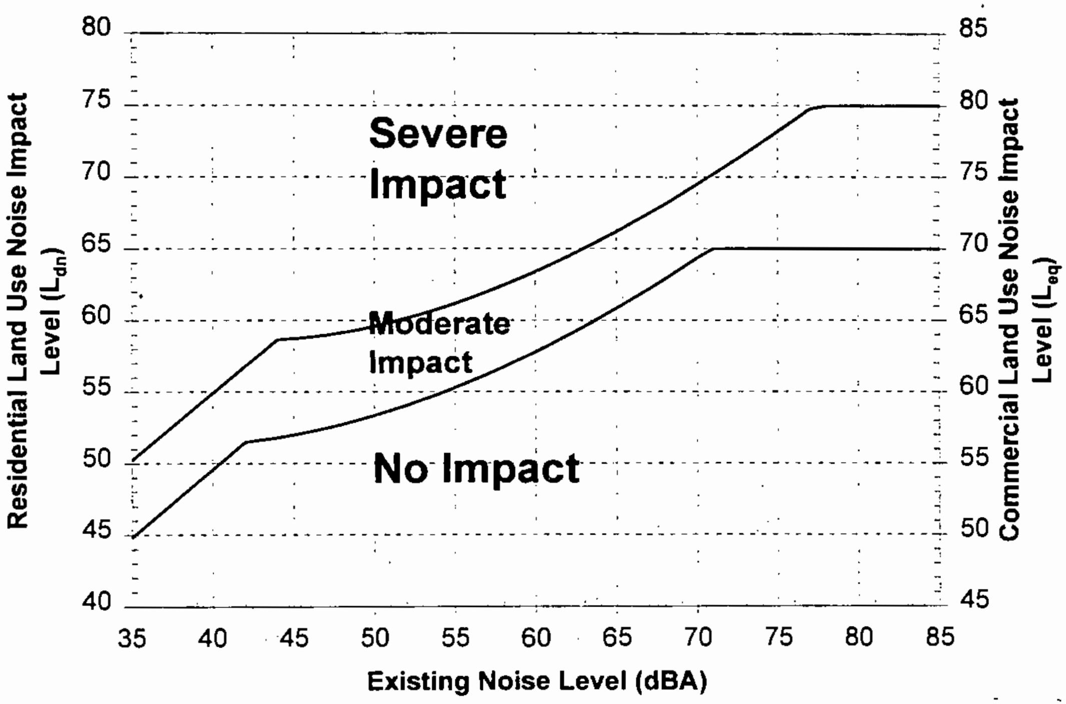


Figure 4-34
FTA Noise Impact Criteria

Vibration Criteria

The FTA has developed impact criteria for acceptable levels of ground-borne noise and vibration (April 1995). Experience with ground-borne vibration from rail systems and other common vibration sources suggests that:

- Ground-borne vibration from transit trains should be characterized in terms of the root mean square (rms) vibration velocity amplitude. The rms level represents an average of the signal, which is the way the human body responds to vibration. This is in contrast to vibration from blasting and other construction procedures that have the potential of causing building damage. When looking at potential for building damage, ground-borne vibration is usually expressed in terms of the peak particle velocity (PPV).

- The threshold of vibration perception for most humans is around 65 VdB[5]; levels in the 70 to 75 VdB range are often noticeable but acceptable, and levels greater than 80 VdB are often considered unacceptable.

- For urban transit systems with 10 to 20 trains per hour throughout the day, limits for acceptable levels of residential ground-borne vibration are usually between 70 and 75 VdB.

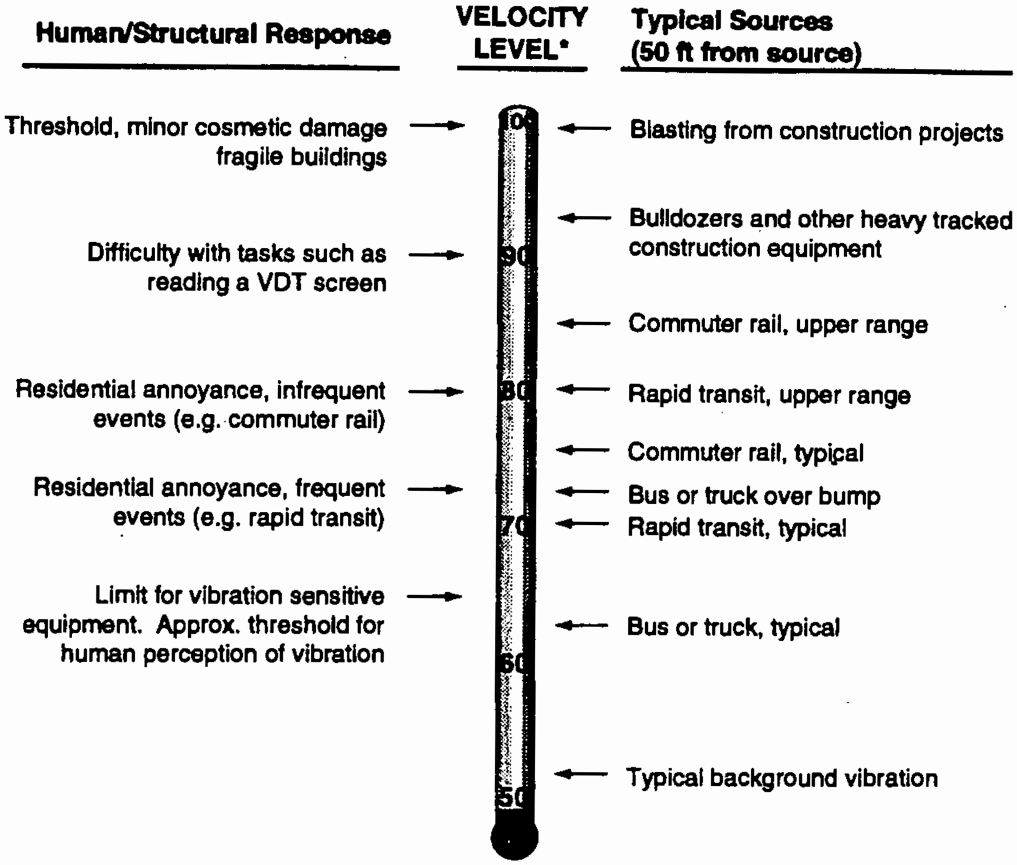
- For human annoyance, there is some relationship between the number of events and the degree of annoyance caused by the vibration. It is intuitive to expect that more frequent vibration events, or events that last longer, will be more annoying to building occupants. Because of the limited amount of information available, there is no clear basis for defining this tradeoff. To account for most commuter rail systems having fewer daily operations than the typical urban transit line, the criteria in the FTA guidance manual include an 8 VdB higher impact threshold if there are fewer than 70 trains per day.

- Ground-borne vibration from any type of train operations will rarely be high enough to cause any sort of building damage, even minor cosmetic damage. The only real concern is that the vibration will be intrusive to building occupants or interfere with vibration-sensitive equipment.

- The vibration of floors and walls may cause a rumble noise. The rumble is the noise radiated from the motion of the room surfaces. In essence, the room surfaces act like a giant loudspeaker. This is called ground-borne noise. Ground-borne noise could be a potential impact for underground transit operations. It is not considered for at-grade or above-ground transit operations because the air-borne noise levels from the train passby that transmit through the window/wall construction of a building would exceed the ground-borne noise at the inside of a building.

Table 4-32 summarizes the FTA impact criteria for ground-borne vibration and ground-borne noise. These criteria are based on previous standards, criteria, and design goals including ANSI S3.29 (Acoustical Society of America, 1983) and the noise and vibration guidelines of the American Public Transit Association (APTA, 1981). Typical levels of ground-borne vibration from different transit operations are presented in Figure 4-35.

[5] VdB is the decibel notation used for vibration. It represents the vibration velocity level referenced to 1VdB = 1×10^{-6} inches per second.



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Figure 4-35
Typical Levels of Ground-Borne Vibration

Existing Noise and Vibration Environment

The primary source of existing noise and vibration within the project study area is from traffic movements along the major arterials and local streets. At this level of impact analysis, existing noise and vibration measurements were not conducted. Noise measurements that were conducted for the Metro Red Line Eastside Extension Final Engineering Design and the previous AA/DEIS/DEIR were used to characterize the existing noise environment and estimate typical existing day/night noise levels for receptors located on the major streets of each proposed alignment (Table 4-33).

The FTA Vibration Impact Criteria (Table 4-32) was used to identify locations where potential impacts may occur based on existing land use activities. If needed, these locations would be surveyed for ambient vibration levels at a later stage of project development.

TABLE 4-32 FTA GROUND-BORNE VIBRATION AND NOISE IMPACT CRITERIA				
	Ground-Borne Vibration Impact Levels (Vdb)		Ground-Borne Noise Impact Levels	
Land Use Category	**Frequent Events[1]**	**Infrequent Events[2]**	**Frequent Events[1]**	**Infrequent Events[2]**
Category 1: Buildings where low ambient vibration is essential for interior operations.	65VdB[3]	65VdB[3]	[4]	[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB	40 dBA	48 dBA

Notes:
1. "Frequent Events" is defined as more than 70 vibration events per day.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day.
3. This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes.
4. Vibration-sensitive equipment is not sensitive to ground-borne noise.

VdB is the decibel notation used for vibration. It represents the vibration velocity level referenced to 1VdB = 1×10^6 inches per second.
Source: Transit Noise and Vibration Impact Assessment, FTA, April, 1995.

TABLE 4-33 ESTIMATED EXISTING NOISE LEVELS		
	Maximum One-Hour L_{eq} (dBA)	**24-Hour Noise Level L_{dn} (dBA)**
Beverly Boulevard	73-75	74-76
Whittier Boulevard	73-75	74-76
First Street	71-73	72-74
Third Street	69-71	70-72
Fourth Street	69-71	70-72
Chavez Avenue	70-72	71-73

Existing Land Use

The project area is located within a dense urban environment, which includes residential, commercial, institutional, and open space land uses. These types of land uses, although located throughout much of the project area, vary in concentration for the different project alternatives. Although most of the project area is comprised of residential uses, there are other existing uses such as commercial and retail activities that would not be considered noise and vibration sensitive receptors.

Alternative 1: This alternative is for bus rapid transit (BRT) entirely at grade level, and travels from west to east from 1st/Alameda to Union Station along Cesar Chavez Avenue to Soto Street, south along Soto Street to 4th Street, east along 3rd Street and Beverly Boulevard to Paramount Avenue, south along Paramount Avenue to Whittier Boulevard, and east along Whittier Boulevard to Norwalk Boulevard. The majority of noise and vibration sensitive receptors along this alternative are residential uses, in one- to two-story wood frame buildings. Other sensitive receptors range from low- to mid-rise hospitals, nursing homes, medical specialty clinics (i.e., laser treatment eye clinics), churches, schools, cemeteries, parks, and recreational facilities.

Alternative 2: This alternative is for BRT entirely at grade level; but unlike Alternative 1, it travels south from Union Station to 1st Street, east along 1st Street to Soto Street, south along Soto Street to 3rd Street, east along 3rd Street to Arizona Avenue, south along Arizona Avenue to Whittier Boulevard, and east along Whittier Boulevard to Norwalk Boulevard. Although Whittier Boulevard has more non-residential sensitive receptors than Beverly Boulevard, it contains more churches and parks.

Alternative 3: This alternative is identical in location to Alternative 2, but will consist of at-grade light rail facilities.

Alternative 4: This alternative is similar to Alternative 1, with the exception that BRT routes would be located on surface streets to the south along 1st Street as opposed to Cesar Chavez Avenue, and the corridor would begin at Union Station instead of 1st/Alameda. Noise and vibration sensitive receptors are similar to Alternative 1.

Alternative 5: This alternative is the same as Alternative 4, except that it consists of at-grade light rail facilities.

Alternative 6: This alternative is similar to Alternative 2, except that it incorporates at-grade light rail facilities, includes a small portion of Indiana Street between 1st Street and 3rd Street, and consists of a LRT subway system from 1st/Boyle to 1st/Lorena. Overall, this alternative has less residential sensitive receptors than Alternative 5 but more non-residential sensitive receptors. Vibration sensitive receptors such as wood frame residential buildings, medical facilities, and interior land use activities such as schools and churches would be of concern for the underground sections of this alternative.

Alternative 7: This alternative is similar to Alternative 5, except that it includes a small section of Indiana Street between 1st Street and 3rd Street. It also includes a section of heavy rail subway operating between Union Station and Lorena Street. The subway tunnel extends directly under multi-family residential housing between the Los Angeles River and Boyle Street. It continues under 1st Street to Lorena Street where there is a mix of residential and commercial receptors.

Alternative 8: This alternative is similar to Alternative 1, except that it consists of a heavy rail subway system from Union Station to Soto Street. The subway tunnel extends under single- and multi-family residential housing and mixed residential/commercial areas.

4.7.2 Evaluation Methodology

The methodology used to estimate impacts due to noise and vibration is presented below.

Transit Noise Assessment

Noise impact from transit operations is a function of the transit vehicle, speed and number of cars, type of track, the number of trains in the daytime and nighttime hours, and the distance that the tracks are from sensitive receptors. The FTA Noise Analysis procedure was used to develop projections of noise from transit operations over distance. The sound exposure level (SEL) source reference noise from the *Transit Noise and Vibration Impact Assessment,* FTA, 1995 was used for BRT and LRT (Table 4-34). Each transit source SEL was then adjusted for speed and converted to noise exposure (expressed as Day Night Equivalent Level [L_{dn}]) at different distances and presented in Figure 4-36. The term L_{dn} is further defined in section 4.7.1. The operating schedules used for the noise projections are summarized in Table 4-35.

TABLE 4-34
TRANSIT NOISE REFERENCE LEVELS - SEL AT 50 FEET

Type of Vehicle	Speed (mph)[1]	Reference Sound Exposure Level (SEL) – dBA	Approximate Maximum Passby Noise Level – L_{max} (dBA)
LRT	50	82	80
BRT	50	80	78

[1]The speeds shown above are *reference* sound levels at 50 feet, per FTA noise assessment guidance, and do not reflect the actual operating speed for the Eastside Transit Corridor LRT and BRT.

TABLE 4-35
SCHEDULE USED FOR NOISE PROJECTIONS

Mode	*Hours of Operation*	Headway (each direction)[1]
BRT	6 a.m. to 9 a.m.(peak) 9 a.m. to 3 p.m. (off-peak) 3 p.m. to 7 p.m. (peak) 7 p.m. to 12 midnight (off-peak) 5 a.m. to 6 a.m. (off peak)	50 second peak 10 minute off-peak
LRT	6 a.m. to 9 a.m.(peak) 9 a.m. to 3 p.m. (off-peak) 3 p.m. to 7 p.m. (peak) 7 p.m. to 12 midnight (off-peak) 5 a.m. to 6 a.m. (off peak)	5 minute peak 12 minute off-peak
Heavy Rail	5 a.m. to 12 midnight	Vibration from underground heavy rail is assessed as a single event with two levels of criteria: ♦ One event every 2 minutes (peak) ♦ One event every 4 minutes (off-peak)

[1]Headway is the time, in minutes, between transit operations.

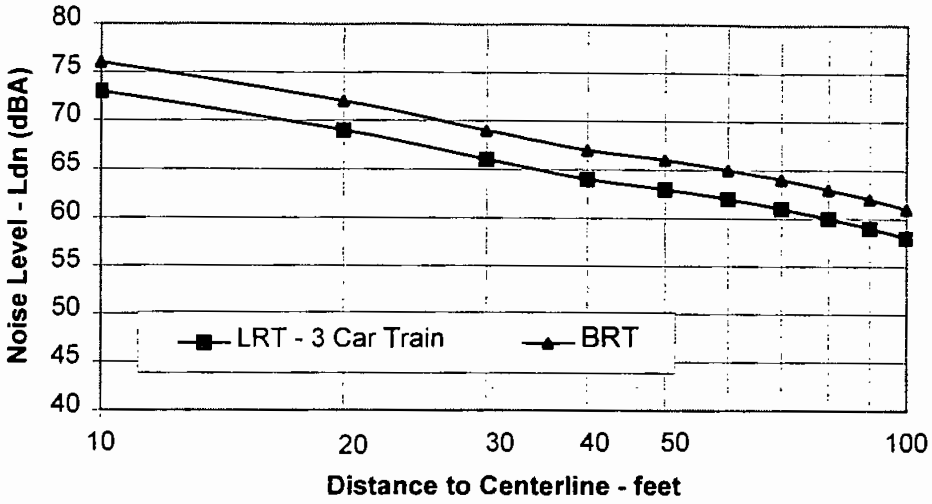


FIGURE 4-36
L_{DN} VS. DISTANCE FROM TRACK CENTERLINE

Transit Ground-Borne Vibration Assessment

Vibration impacts were assessed for both LRT and heavy rail subway operations. BRT, which is a rubber-tired vehicle, would generate minimal ground vibrations that are not expected to approach or exceed the FTA Vibration Impact criteria.

The procedures used to evaluate potential impacts from ground-borne vibration and ground-borne noise follows those outlined in the FTA manual, *Transit Noise and Vibration Impact Assessment*. It uses generalized data to develop a curve of vibration level as a function of distance from the track. The vibration levels at different distances are estimated by reading values from the curve and applying adjustments to account for factors such as vehicle technology, vehicle speed, type of building, and track and wheel condition. This level of general assessment deals only with the overall vibration velocity level and does not consider frequency spectrum. The projected vibration levels for LRT and heavy rail subway operating at 30-35 mph and 50 mph, respectively, are presented in Figure 4-37.

The ground vibration levels for the heavy rail subway operations were also adjusted to estimate the ground-borne noise levels that would occur within buildings at different distances from the tunnel centerline. These levels are presented in Figure 4-38 as noise level vs. distance.

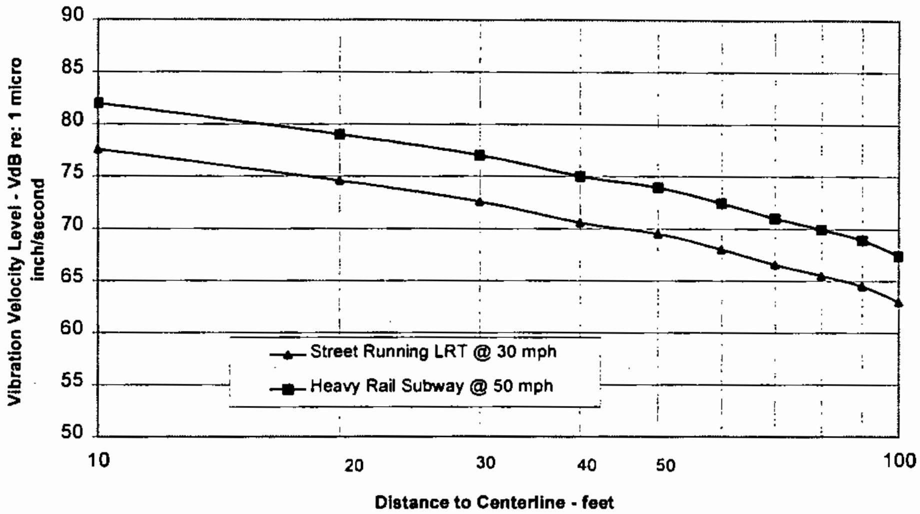


FIGURE 4-37
PROJECTED GROUND-BORNE TRANSIT VIBRATION

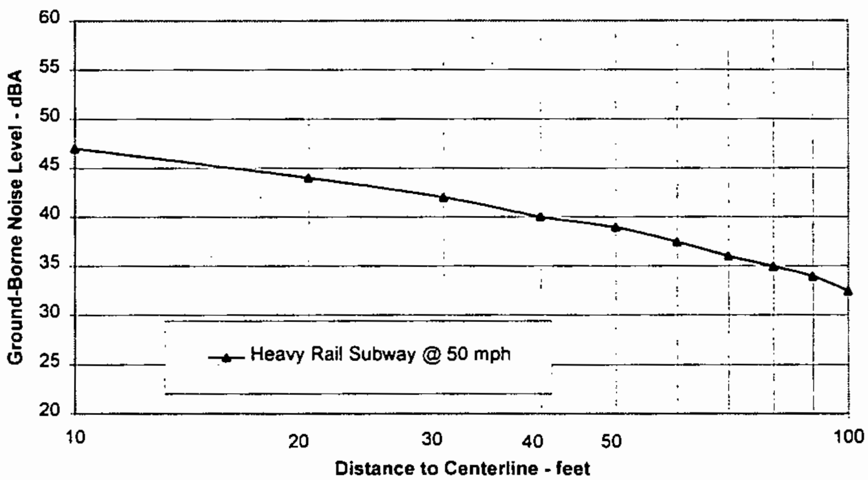


FIGURE 4-38
GROUND-BORNE NOISE – HEAVY RAIL SUBWAY OPERATIONS

4.7.3 Environmental Issues

The criterion evaluated includes the number of potential sensitive noise and vibration receptors.

Introduction

The assessment of potential impacts from each of the project alternatives considers the following types of transit noise and vibration:

- Wayside noise – the airborne noise generated by the passby of a transit vehicle.
- Ground-borne noise – the secondary effects of vibration on a building structure that results in an audible rumbling sound on the inside of a building.
- Ground-borne vibration – the feelable movement of the building floors, rattling of windows, shaking of items on shelves.

Potential effects of the BRT would be wayside noise. As a rubber tired vehicle, ground vibration levels would be minimal, and would not exceed the FTA criteria. The effects of LRT would be both wayside noise and ground-borne vibration. LRT generated ground-borne noise inside buildings would be minimal when compared to the wayside noise that would transmit to the inside of a building through the exterior window/walls. Heavy rail would operate underground and would not generate any wayside noise. Ground-borne vibration and ground-borne noise would be the primary concern of this technology.

The level of detail of the noise impact assessment is limited to estimating the future operating noise and vibration levels over distance for each of the transit technologies: BRT, LRT and heavy rail. These projections, along with the estimated existing noise levels presented in the Affected Environment section, were used to determine the distances from the centerline of each alternative alignment where a noise impact would occur. In the case of ground vibration, a similar analysis was prepared using the FTA Vibration Impact criteria.

The comparison of the alternatives is based on the number of different building structures and land uses that would be impacted by the transit operation. Future traffic noise is expected to be about the same as the existing noise levels for each of the alternatives. Therefore, no further traffic noise analysis was prepared.

Noise and Vibration Impacts

Noise Impacts

This section discusses the potential noise impacts that would occur on structures along the build alternative alignments. Noise impacts are categorized as either moderate or severe. Wayside noise impacts are discussed for both BRT and LRT technologies. Heavy rail or LRT operating underground would not generate wayside noise. Ground-borne noise is discussed below for both heavy rail and LRT.

General noise exposure projections were also developed along each of the major segments of the alternative alignments. The projections incorporate the train speed, expected number and length of trains during the daytime (7 A.M. to 10 P.M.) and nighttime (10 P.M. to 7 A.M.) hours. The results, presented in Table 4-36, are the different distances from the centerline of the BRT or LRT alignments where a severe, moderate, or no noise impact would occur. The BRT technology would result in noise impacts at greater distances from the alignment than the LRT. However, both technologies are expected to impact the first row of building structures along the alternative alignments. The only difference would be the category of noise impact that would occur. The incident of severe impacts with the BRT would be higher than the LRT.

The number of buildings and parks that would be noise impacted under each alternative is presented in Table 4-37. These represent first row buildings that would either be severely or moderately impacted depending on their setback from the street. Alternatives 6, 7 and 8 include a subway segment where LRT would operate under Alternative 6 and heavy rail would operate under Alternatives 7 and 8. Both LRT and heavy rail have the potential for ground-borne noise impacts within the buildings in close proximity to the subway tunnel. Without information on the depth of the tunnel, the building count presented in Table 4-37 represents those structures that are within 70 feet of the centerline of the subway. At this distance the expected ground-borne noise level would be 35 dBA or less which is the FTA ground-borne noise criteria for residential buildings. Alternative 1 would have the highest number of noise impacted buildings and parks and Alternative 6 the fewest.

TABLE 4-36
NOISE IMPACT DISTANCES FROM CENTERLINE OF TRANSIT ALIGNMENT

Street	Existing Ldn (dBA)	Severe Impact			Moderate Impact			No Impact		
		Transit Level (dBA)	Distance from Alignment (feet)		Transit Level (dBA)	Distance from Alignment (feet)		Transit Level (Dba)	Distance from Alignment (feet)	
			LRT	BRT		LRT	BRT		LRT	BRT
Beverly/ Whittier Boulevards	75	74	<10	<15	66	10-35	15–55	<65	>35	>55
First Street	73	72	<15	<20	66	15-35	20–55	<65	>35	>55
Third/Fourth Streets	71	71	<15	<25	66	15-35	25-55	<65	>35	>55
Cesar Chavez Avenue	72	72	<15	<20	66	15-35	20-55	<65	>35	>55

TABLE 4-37 SUMMARY OF POTENTIAL NOISE-IMPACTED BUILDINGS AND LAND USES								
Use	Alternatives[1]							
	1	2	3	4	5	6	7	8
Single Family Residences	307	270	270	280	280	223 (26)	224 (26)	290 (26)
Multi-Family Residences	216	183	183	192	192	105 (20)	124 (36)	219 (16)
Hospitals	4	0	0	3	3	1 (1)	4 (1)	4 (1)
Schools	7	5	5	5	5	6 (2)	8 (4)	7 (2)
Churches	13	18	18	15	15	18 (1)	13 (1)	12
Parks	7	7	7	9	9	5	5	6
Totals	554	483	483	504	504	358 (50)	378 (68)	538 (45)

[1]The numbers shown without parentheses represent those uses affected by wayside noise. The values in parentheses represent the number of buildings that would have ground-borne noise impacts from the LRT or heavy rail operations in the subway segment of the alternative.

Vibration Impacts

The projected ground-borne vibration levels presented in Figure 4-37 in the methodology section of this chapter indicate that, for the street running LRT technology, residential buildings that are 30 feet or closer and commercial buildings 20 feet or closer to the track centerline would be impacted. The subway segments of LRT and heavy rail would operate at a higher speed than the street-running LRT. Ground vibration impacts would be at 70 feet or closer to the tunnel invert for residential buildings and 40 feet or closer for commercial buildings. These distances were used as a screening guideline to identify potential differences in the different alternative alignment locations and to estimate the numbers of buildings affected by ground vibration. For the heavy rail and LRT alternatives, the number of building structures that would have ground vibration impacts are the same as the noise-impacted buildings presented in Table 4-37. Outdoor land uses, such as parks, which are listed in the table, are not affected by ground-borne vibration. More detailed analysis would be required in the next phase of project development.

Comparison of Impacts of At-Grade vs. Subway Modes

Noise levels from underground operations of either LRT or heavy rail (ground-borne noise) are normally heard as a low level rumbling sound on the inside of buildings and is not perceptible on the outside of a building. The wayside noise of LRT or BRT at-grade operations, as heard on the inside of a building, would vary depending on whether the windows were open or closed. In general, even with closed windows, noise levels from underground rail operations would result in lower interior noise levels than at-grade operations. The outside at-grade rail noise levels would be significantly higher than ground-borne noise from underground operations which are generally not perceptible outdoors.

Potential vibration impacts from at-grade LRT operations would be less than from underground operations because of the lower operating speeds. Vibration is not of concern for BRT because they use rubber tired vehicles. Note that mitigation for residual impacts of ground-borne noise and vibration are more feasible than for wayside noise impacts of street-running LRT or BRT modes (see discussion of mitigation below for more information).

Wayside noise levels of BRT operations would be higher than LRT. As a result, adverse noise impacts of BRT would occur at further distances from the transit alignment than LRT. Because the first row of buildings is generally in close proximity of the alignments, both modes would result in impact on those structures.

Mitigation

Several mitigation strategies are described in this section. The techniques that may need to be implemented will be determined during the SEIR/SEIS process after a locally preferred alternative has been selected, and more detailed analysis is conducted.

Noise Mitigation

Sound walls are considered the most effective noise control measure for at-grade transit systems. In order to be effective, the walls must block the direct view of the noise source and must be solid with minimal openings. The use of sound walls along at-grade segments where BRT or LRT is in the roadway median would not be feasible since it would affect normal traffic movements and would restrict emergency vehicle access.

Where sound walls are not feasible, sound insulation of the affected buildings could be considered for those locations that are severely noise impacted. Insulating affected structures can reduce noise levels inside homes that would be noise impacted. This technique does not reduce exterior noise levels.

Mitigation of heavy rail subway ground-borne noise can be achieved by trackwork design. The use of resilient rail fasteners is an effective measure to attenuate ground-borne noise by providing vibration reduction at frequencies of 40 Hz and above.

Ground-Borne Vibration Mitigation

The potential vibration mitigation measures include:

Speed reductions: Although this is not a desirable option because of the negative impact on schedules and capacity, speed reductions are sometimes a practical means of reducing the levels of ground-borne vibration.

Maintenance procedures: Effective maintenance of wheel and rail condition is essential for minimizing ground-borne vibration. Recent research suggests that optimizing the wheel and rail profiles in conjunction with regular wheel truing and rail grinding will keep vibration and noise at the lowest possible levels. Another benefit is that this approach can maximize wheel and rail life.

Ballast mats: A ballast mat installation consists of a concrete slab and a one- to two-inch thick rubber sheet. Normal ballast and tie track is constructed on top of the rubber sheet. Ballast mats have been used on a number of North American transit systems. They are effective at attenuating vibration at frequencies greater than about 30 Hz. Ballast mats could be used for the street running LRT segments that run on embedded trackwork .

High-resilience direct fixation fasteners: The track modulus for normal direct fixation track is in the range of 6,000 to 12,000 lb./in/in. With high-resilience fasteners, the stiffness can be reduced in the range of 1,500 to 3,000 lb./in/in. This approach can provide a five dB or greater attenuation at frequencies greater than 30 Hz. High-resiliency fasteners would be used for the heavy rail subway segments. As discussed above, resilient rail fasteners can also be used to mitigate ground-borne noise.

Resiliently Supported Ties: The resiliently supported tie system consists of concrete ties supported by rubber pads. The rails are fastened directly to the concrete ties using standard rail clips. Existing measurement data indicate that resiliently supported ties may be very effective in reducing low-frequency vibration in the 15 to 40 Hz range. This makes them particularly appropriate for heavy rail subway transit systems.

Floating Slabs: Floating slabs can be very effective at controlling ground-borne vibration and noise. They basically consist of a concrete slab supported on resilient elements, usually rubber or a similar elastomer. The primary disadvantage of floating slabs is that they tend to be the most expensive of the vibration control treatments. Floating slabs are most often used in subway sections of trackwork but can also be used for street running LRT that are within close proximity to sensitive building structures.

4.8 GEOTECHNICAL

4.8.1 Affected Environment

Geology

This section summarizes the geologic setting and the general topographic, geologic materials, and groundwater features of the study area. For a complete discussion of geologic and seismic conditions, the reader is referred to the *Geologic/Seismic Hazards Evaluation, Eastside Transit Corridor Study Area, Los Angeles County, California, prepared for Eastside Corridor Transit* Consultants, by Law/Crandall, Project Number 70131-9-0387, dated December 1999.

Geologic Setting

The Eastside Transit Corridor Study area is located in the north-central portion of the Los Angeles Coastal Plain. The coastal plain is an alluviated lowland area that is bounded on the north by the Santa Monica Mountains and the Elysian, Repetto, and Puente Hills; on the east and southeast by the Santa Ana Mountains and the San Joaquin Hills. A deep structural basin underlies the coastal plain. Parts of the basin have undergone deposition of sediments since late Cretaceous time and continuous marine deposition and subsidence of the basin have been ongoing since middle Miocene time. Numerous oil fields are located in the basin and within the study area.

The proposed build alternatives are located along the southern flank of the Elysian and Repetto Hills and generally traverse a dissected Pleistocene age terrace in an east-west direction. The Los Angeles River traverses the proposed build alternatives in the western portion of the study area, and the Rio Hondo River traverses the proposed alternatives in the eastern portion. Younger Holocene age alluvial deposits are present in the vicinity of both of the rivers.

Regionally, the study area is in the Peninsular Ranges geomorphic province, which is characterized by northwest-trending mountain ranges separated by sediment-floored valleys (Yerkes et al., 1965). The northwest trend is further indicated by the dominant geologic structural features of the province, which include northwest to west-northwest trending faults and fault zones such as the Newport-Inglewood fault zone and the Whittier fault zone. The relationship of the build alternatives to local geologic features is depicted in Figure 4-39.

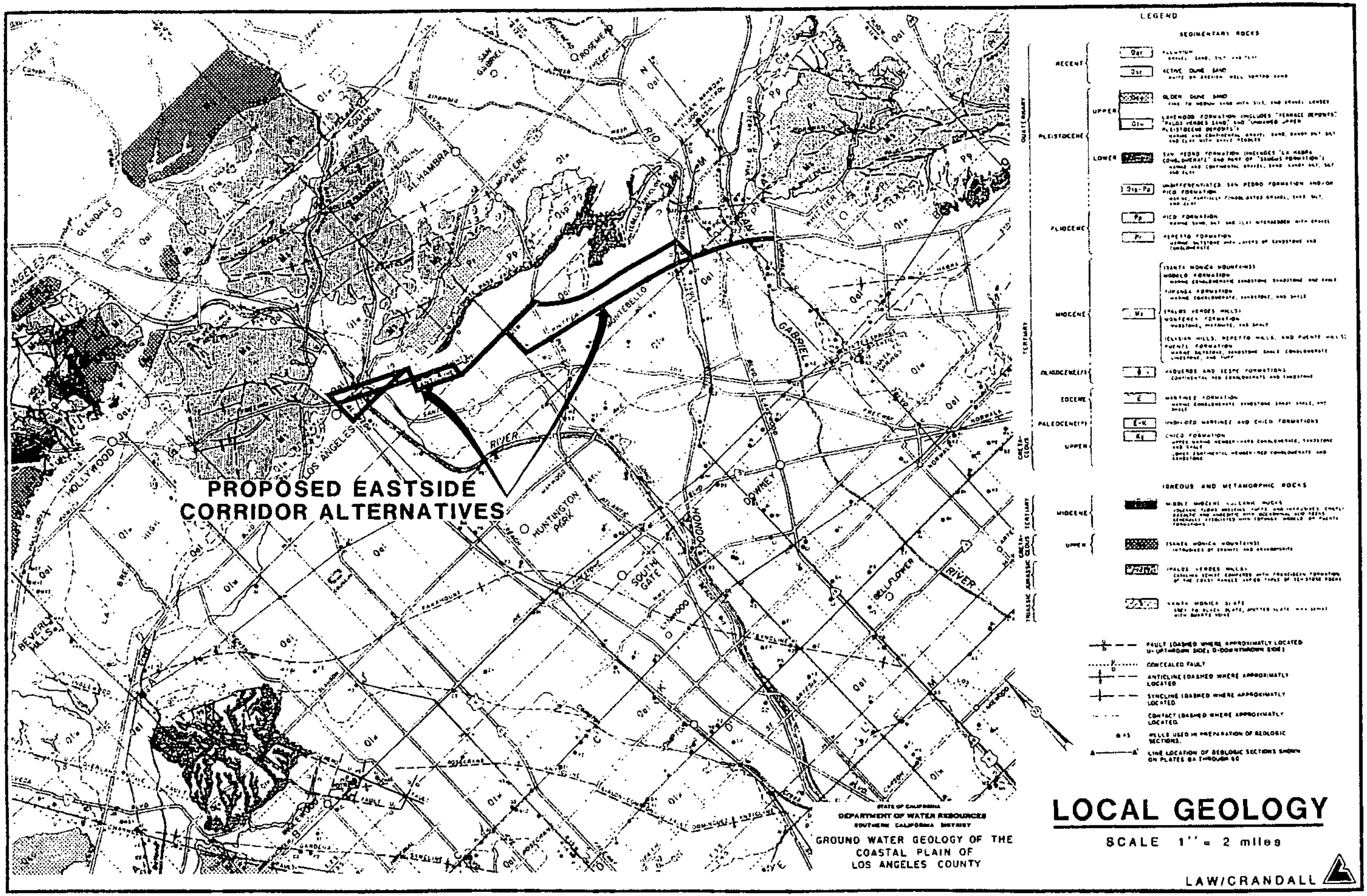
The study area is underlain by the Elysian Park Thrust, which is generally accepted as the source of the 1987 Whittier Narrows earthquake. This thrust fault is a concealed, deep thrust fault that, in part, expresses itself at the surface as the Elysian Park Hills and the Repetto Hills and results in active folding along the trace of the Coyote Pass Escarpment. The escarpment is a gentle south-facing and east-west trending topographic feature northeast of downtown Los Angeles (Woodward-Clyde Consultants, 1997). The result of the fault investigations along the Coyote Pass Escarpment performed for the project indicate that this structure is active, resulting in monoclinal folding and deformation of the near-surface alluvial deposits and the underlying Fernando Formation and Puente Formation bedrock.

Topography

The Los Angeles Coastal Plain slopes gently southward toward the ocean. The gently sloping topography is interrupted by the Palos Verdes Peninsula in the southwest, a northwest-trending series of low-lying hills (associated with the Newport-Inglewood fault zone) in the west, and the Coyote Hills in the northeastern portion of the coastal plain, respectively. In the study area, the topography generally slopes gently to the south or south-southwest. The exception is in the area between the Los Angeles River and Atlantic Boulevard where the topography consists of low-lying hills.

Geologic Materials

The build alternatives traverse the physiographic features known as the Downey Plain (west of the Los Angeles River) and the Montebello Plain (east of that river) and numerous river and stream drainages. The Downey and Montebello Plains are mantled by Pleistocene age terrace and alluvial deposits and forms an alluvial fan originating from the Repetto and Merced Hills. These hills are comprised of sedimentary bedrock of the Pliocene age Fernando Formation. The bedrock that underlies the build alternatives consists of the Fernando Formation and the older Miocene age Puente Formation. The numerous river and stream drainages that are traversed by the proposed alternatives dissect the Downey Plain and the Montebello Plain and include the Los Angeles and Rio Hondo Rivers. These drainages are in-filled with Holocene age alluvial deposits.



Eastside Transit Corridor Study

Local Geology

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Figure 4-39

Locally, artificial fills mantle the Pleistocene age terrace deposits and Holocene age alluvial deposits.

Artificial Fill (af)

Artificial fill locally mantles the Holocene age alluvium and Pleistocene age terrace and alluvial deposits along the proposed alternatives. The artificial fills are generally associated with commercial and residential development and may be certified engineered fills. However, areas of uncompacted or uncertified artificial fill may be locally found along any of the proposed alternatives. The artificial fill materials would likely consist mostly of manmade materials as well as earth materials derived from the underlying bedrock, alluvial, and terrace deposits.

Alluvium (Qal)

The Holocene age alluvial deposits locally in-fill the numerous drainages that dissect the Montebello Plain. These deposits consist of silty to sandy gravel and may be locally cobble- and boulder-rich (Yerkes et al., 1977). The Holocene age alluvial deposits are stream channel deposits and flood plain deposits (Dibblee, 1989). Yerkes et al. (1977) identify petroleum deposits (gas, free oil, or tar) within the alluvial deposits in the vicinity of the western end of the study area. Near the proposed alternatives, the Holocene alluvial deposits are approximately 100 feet thick within the Los Angeles River and Rio Hondo drainages (Department of Water Resources, 1961; Yerkes et al., 1977).

Older Alluvium/Terrace Deposits (Qlw)

The Pleistocene age terrace and alluvial deposits are weakly consolidated gravel, sand, and silt that are locally cobble and boulder-rich (Yerkes et al., 1977; Dibblee, 1989). These sediments were deposited on alluvial fans and within stream channels (Dibblee, 1989). The Pleistocene age terrace and alluvial deposits are between 20 and 200 feet thick throughout most of the alignments of the proposed alternatives (Department of Water Resources, 1961; Yerkes et al., 1977; Dibblee, 1989).

Bedrock

Bedrock beneath the proposed alternatives consists of the Pliocene age Fernando Formation and the older Miocene age Puente Formation. The Fernando Formation (alternatively called the Repetto Formation) consists of nonmarine sandstone, conglomerate, and the marine Repetto Member that is mostly massive claystone (Yerkes et al., 1977; Dibblee, 1989). Thin calcareous beds locally occur within the Fernando Formation (Yerkes et al., 1977). The Fernando Formation is approximately 4,000 feet thick in the vicinity of the proposed alternatives. The Miocene age Puente Formation underlies the Fernando Formation and consists of mostly soft, thin-bedded, silty to clayey shale (Dibblee, 1989). Locally, it contains calcareous nodules and thin, fine-grained sandstone. The Puente Formation is several thousand feet thick in the vicinity of the proposed alternatives (Dibblee, 1989).

Groundwater

The proposed alternatives are located along the northeastern boundary of the Central Groundwater Basin that extends westerly in the subsurface from the Repetto Hills to the Newport-Inglewood fault zone (Department of Water Resources, 1961). The uppermost groundwater-bearing unit beneath the study area varies laterally and consists of one or more of the following: the Gaspur, Exposition-Artesia, Gardena and Gage Aquifers. Groundwater levels beneath the proposed alternatives vary along the alignments.

Current and historic groundwater levels in the study area have been evaluated based on the following:

- Groundwater information from monitoring wells installed for the previous MTA eastside extension project;
- Groundwater information from previous geotechnical investigations in the immediate area;
- Available groundwater data from the County of Los Angeles Department of Public Works; and
- Groundwater information from the general plans for the cities of Commerce, Montebello, Pico Rivera, and Whittier.

Groundwater levels in the eastern study area, east of Lorena Street, have been historically greater than 50 feet beneath the existing ground surface, except in the Rio Hondo area. In this area, groundwater levels have been historically at a depth of approximately 30 feet or less, within the Holocene age alluvial deposits (east of 3rd Street to Norwalk Boulevard).

In the study area, west of Lorena Street, groundwater levels have been previously documented in geotechnical reports by GeoTransit Consultants (1995, 1996a, 1996b, 1996c, 1996d). Based on available information, groundwater levels in the area of 1st Street and Lorena Street are approximately 80 to 100 feet beneath the existing ground surface. The groundwater levels become locally more shallow to the west. Groundwater levels in the vicinity of the intersections of 1st Street/Boyle Avenue and Chavez Avenue/Soto Street have been documented between approximately 30 to 83 feet beneath the existing ground surface. Groundwater levels west of the Los Angeles River, between Union Station on the north and 1st Street on the south, are reportedly 30 to 45 feet beneath the existing ground surface.

Previously undocumented perched groundwater conditions may be locally present in the study area along all of the proposed alternatives. Also, groundwater levels in the area west of Lorena Street are known to have significant historic fluctuations. Recorded groundwater level fluctuations are on the order of 12 feet in one month, 69 feet in one year, and 183 feet in 10 years (GeoTransit Consultants, 1995, 1996a, 1996b, 19996c, 1996d). Potential groundwater fluctuations must be considered in the design and construction of the tunnel and subsurface station facilities in the project area.

Faults and Seismicity

Faults

The numerous faults in Southern California include active, potentially active, and inactive faults. The criteria for these major groups are based on criteria developed by the California Division of Mines and Geology (CDMG) for the Alquist-Priolo Earthquake Fault Zoning Program (Hart, 1997). By definition, 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. A list of nearby active faults and the distance in miles between the proposed alternatives and the nearest point on the fault, the maximum magnitude, and the slip rate for the fault is listed in Table 4-38. A similar list for potentially active faults is presented in Table 4-39. The faults in the vicinity of the site are displayed in Figure 4-40.

Seismicity

Historic Earthquakes

Figure 4-41 shows the locations of major faults and earthquake epicenters in southern California. Several earthquakes of moderate[6] to major magnitude have occurred within the last 65 years that have produced significant ground shaking in the vicinity of the study area. The earliest of these was the March 10, 1933 magnitude 6.4 Long Beach earthquake. The epicenter of this earthquake was located about 26 miles south-southeast of the proposed alternatives.

The epicenter of the February 9, 1971, San Fernando earthquake, magnitude 6.6, was about 26 miles north-northwest of the proposed alternatives. Surface rupture occurred on various strands of the San Fernando fault zone as a result of this earthquake, including the Tujunga and Sylmar faults. The magnitude 5.9 Whittier Narrows earthquake occurred on October 1, 1987, on a previously unrecognized fault, now believed to be the Elysian Park Thrust. The earthquake epicenter was located about 2.4 miles north of the proposed alternatives. The Sierra Madre earthquake occurred on June 28, 1991, along the Sierra Madre fault zone. The epicenter of the magnitude 5.8 earthquake was located in the San Gabriel Mountains about 17 miles north-northeast of the proposed alternatives.

On June 28, 1992, two major earthquakes occurred east of Los Angeles. At 4:58 a.m., a magnitude 7.5 earthquake occurred in the High Desert region and is known as the Landers earthquake. The epicenter was located about 91 miles east-northeast of the proposed alternatives. The second event occurred at 8:04 a.m. near Big Bear Lake and had a magnitude of 6.6; the epicenter was about 71 miles east-northeast of the proposed alternatives.

[6] Moderate earthquakes are those with magnitudes of 6.0 to 6.9; major earthquakes are those with magnitudes of 7.0 to 7.9; great earthquakes are those with magnitudes of 8.0 or greater (California Division of Mines and Geology, 1986).

TABLE 4-38
MAJOR NAMED FAULTS CONSIDERED TO BE ACTIVE[1] IN SOUTHERN CALIFORNIA

Fault (in alphabetical order)	Maximum Magnitude[2]	Fault Type	Slip Rate (mm/yr.)	Alternative Number(s)	Distance From Alternative (Miles)[3]	Direction From Alternative
Anacapa-Dume	7.3	RO	3.0	1-8	26	WSW
Compton-Los Alamitos Thrust	6.8	RO	1.5	1-5,8	4.1	SW
				6,7	4.4	SW
Cucamonga	7.0	RO	5.0	1-8	24	NE
Elsinore (Glen Ivy Segment)	6.8	SS	5.0	1-8	24	ESE
Elysian Park Thrust	6.7	RO	1.5	1-8	0.0	---
Hollywood	6.4	RO	1.0	1	4.2	NNW
				2-8	4.5	NNW
Malibu Coast	6.7	RO	0.3	1-8	24	W
Newport-Inglewood Zone	6.9	SS	1.0	1	6.7	SW
				2-5	6.1	SW
				6-8	6.2	SW
Northridge Thrust	6.9	RO	1.54.0	1-8	15.5	NW
Oak Ridge	6.9	RO	4.0	1-8	38	NW
Palos Verdes	7.1	SS	3.0	1	18	SW
				2-8	17.5	SW
Raymond	6.5	RO	0.5	1	4.5	N
				2-8	4.7	N
San Andreas (Southern Segment)	7.4	SS	24.0	1-8	33	NE
San Cayetano	6.8	RO	6.0	1-8	40	NW
San Fernando	6.7	RO	2.0	1	15.5	NW
				2-8	16	NW
San Gabriel	7.0	SS	1.0	1,6-8	17	N
				2-5	17.5	N
San Jacinto (San Bernardino Segment)	6.7	SS	12.0	1-8	38	NE
Santa Monica	6.6	RO	1.0	1	9.4	W
				2-5	9.3	W
				6-8	9.2	W
Sierra Madre	7.0	RO	3.0	1,4,5,7,8	10.5	NE
				2,3,6	11.0	NE
Simi-Santa Rosa	6.7	RO	1.0	1-8	31	NW
Verdugo	6.7	RO	0.5	1	6.7	N
				2-5	7.3	N
				6-8	7.0	N
Whittier	6.8	SS	2.5	1-8	1.8	NNE

[1]Slemmons, 1979. SS=Strike Slip NO=Normal Oblique RO=Reverse Oblique
[2]CDMG, 1996.
[3]Approximate distance.

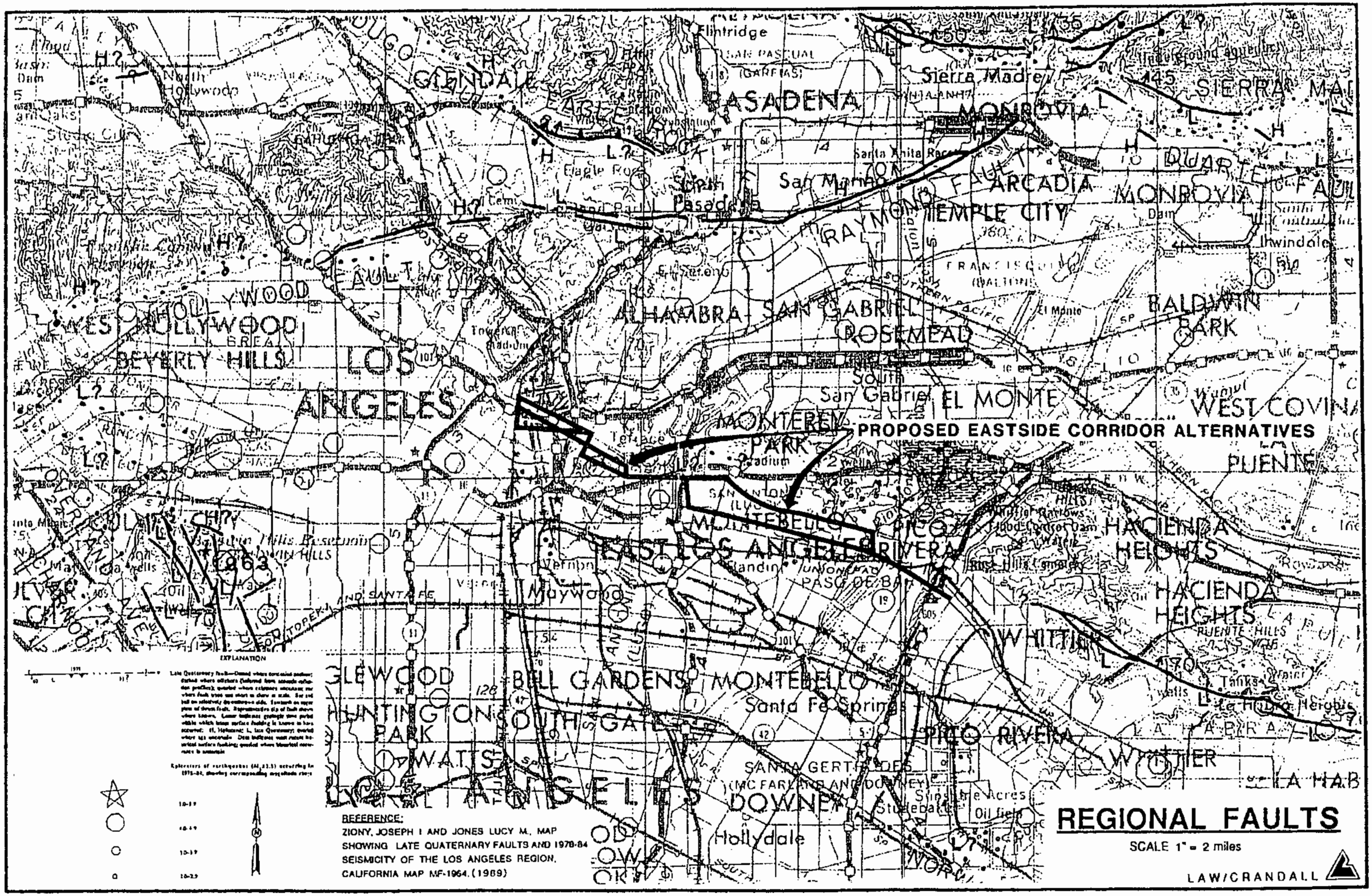
TABLE 4-39
MAJOR NAMED FAULTS CONSIDERED TO BE POTENTIALLY ACTIVE[1] IN SOUTHERN CALIFORNIA

Fault (in alphabetical order)	Maximum Magnitude		Fault Type	Slip Rate (mm/yr.)	Alternative Number(s)	Distance From Alternative (Miles)[9]	Direction From Alternative
Charnock	6.5	(1)	SS	0.1	1,6,7,8	11.0	SW
					2-5	10.5	SW
Chino-Central Avenue	6.7	(5)	NO	1.0	1-8	19.0	E
Clamshell-Sawpit	6.5	(5)	RO	0.5	1,4,5,7,8	12.0	NNE
					2,3,6	12.5	NNE
Coyote Pass	6.7	(2)	RO	0.1	1-5,8	0.5	N
					6,7	0.2	N
Duarte	6.7	(1)	RO	0.1	1,4,5,7,8	11.0	NE
					2,3,6	11.5	NE
Holser	6.5	(5)	RO	0.4	1-8	35	NW
Indian Hill	6.6	(2)	RO	0.1	1-8	14.0	NE
Los Alamitos	6.2	(2)	SS	0.1	1-8	11.0	SSW
MacArthur Park	5.7	(8)	RO	3.0	1	1.1	SW
					2-5	0.7	W
					6-8	0.8	WSW
Northidge Hills	6.6	(7)	SS	1.2	1	17	NW
					2-8	17.5	NW
Norwalk	6.7	(1)	RO	0.1	1-8	5.2	SSW
Overland	6.0	(1)	SS	0.1	1	9.6	SW
					2-5	9.4	SW
					6-8	9.5	SW
San Jose	6.5	(5)	RO	0.5	1-8	14.5	NE
Santa Cruz Island	6.8	(5)	RO	1.0	1-8	57	W
Santa Susana	6.6	(5)	RO	5.0	1-8	24	NW

[1]Slemmons, 1979.
[2]Mark, 1977
[3]Blake, 1995
[4]Dolan et al., 1995.
[5]CDMG, 1996.
[6]Anderson, 1984.
[7]Wesnousky, 1986.
[8]Hummon et al., 1994.
[9]Approximate distance.

SS=Strike Slip
NO=Normal Oblique
RO=Reverse Oblique

On January 17, 1994, a magnitude 6.7 Northridge earthquake occurred on a previously unknown blind thrust fault that is now known as the Northridge Thrust. The Northridge Thrust is located beneath the majority of the San Fernando Valley and is considered to be



Eastside Transit Corridor Study

Regional Faults

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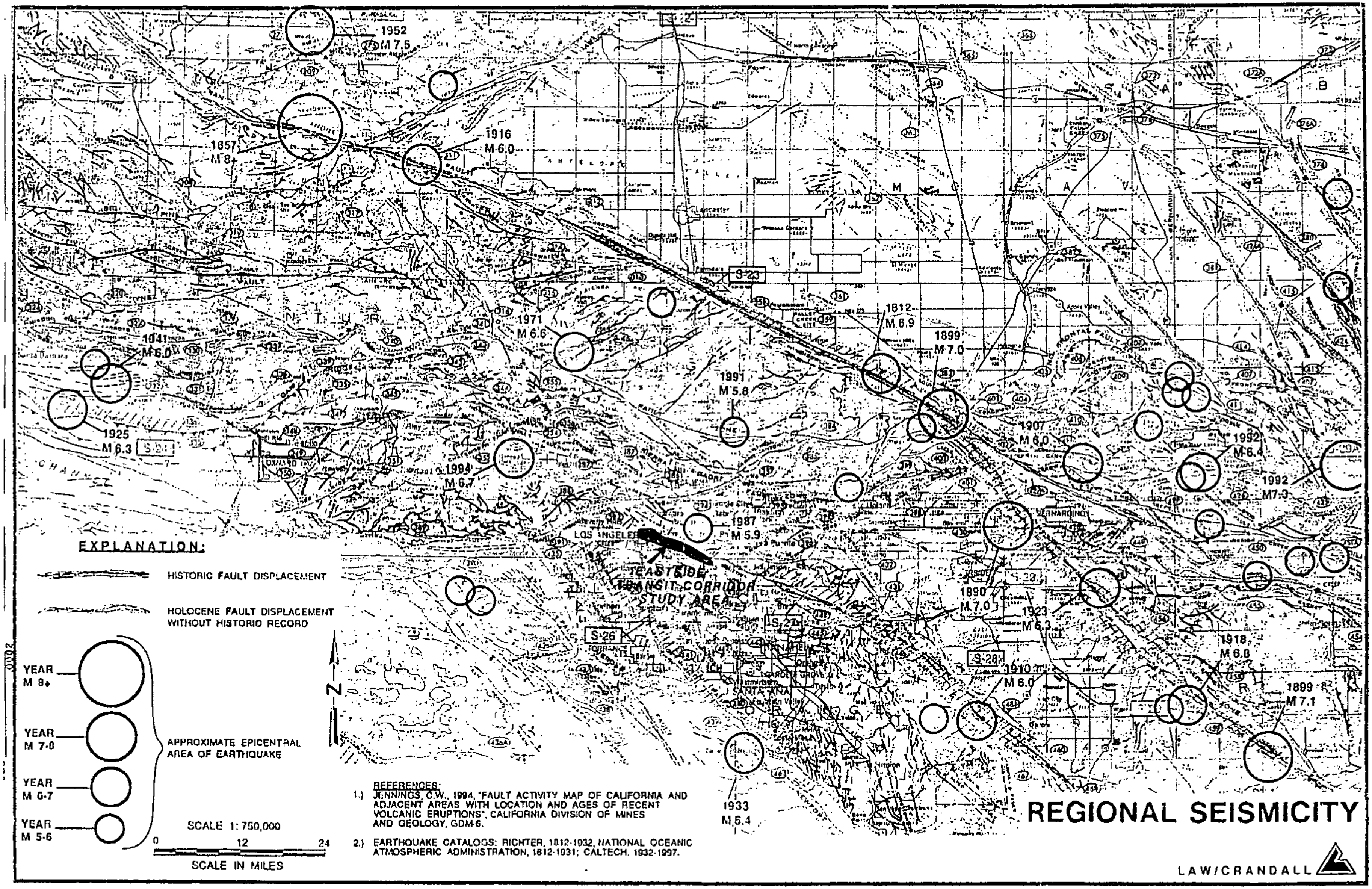
Figure 4-40



Eastside Transit Corridor Study — **Regional Seismicity**

Eastside Corridor Transit Consultants

Figure 4-41

the eastern extension of the active Oakridge fault. The epicenter of the Northridge earthquake was located about 20 miles northwest of the proposed alternatives.

Most recently, the magnitude 7.1 Hector Mine earthquake occurred on October 16, 1999. The earthquake is believed to have occurred on the Lavic Lake fault, previously thought to have been inactive. The epicenter of the Hector Mine earthquake is located approximately 110 miles east-northeast of the proposed alternatives.

Ground Shaking

Significant ground shaking could occur in the study area as a result of earthquakes on any of the documented or undocumented nearby active or potentially active faults. The *Seismic Shaking Hazard Map of California* (CDMG, 1999) indicates the estimated peak ground acceleration with a ten percent probability of being exceeded in 50 years in the study area ranges from 0.4g to 0.6g. The location of the proposed alternatives in relation to known active or potentially active faults indicates that the proposed alternatives are not exposed to a greater seismic risk than other sites in the study area.

Investigations for the previous Red Line East Side Extension provided site specific acceleration data, and design criteria was developed for the Little Tokyo, 1st/Boyle, 1st/Lorena, and Chavez/Soto Stations. For design of these stations, horizontal peak ground accelerations of 0.45g and 0.95g were used for the Operating Design Earthquake (ODE) having a 200 year average recurrence interval and the Maximum Design Earthquake (MDE) having a 2,000 year average recurrence interval, respectively (Woodward-Clyde Consultants, 1997).

Liquefaction

Liquefaction is the transformation of submerged granular soils into a liquid-like mass due to excess pore pressure developed in response to earthquake ground shaking. Liquefaction potential is greatest where the groundwater level is shallow, and submerged loose, fine sands occur within a depth of about 50 feet or less. Liquefaction potential decreases as grain size and clay and gravel content increase. As ground acceleration and shaking duration increase during an earthquake, liquefaction potential increases.

According to the Los Angeles County Seismic Safety Element (1990), the City of Los Angeles Seismic Safety Element (1996), and the California Division of Mines and Geology (1999), portions of the alternatives are located within areas identified as having a potential for liquefaction. General locations are presented below.

- Union Station south to Turner Street (vicinity of Alternatives 2 through 6);
- Alameda Street from Turner Street north to Chavez Avenue (vicinity of Alternative 1);
- Union Station to the west side of US 101 (vicinity of subway portions of Alternative 7 and 8);
- Chavez Avenue from Alameda to I-10 (vicinity of Alternative 1);

- Area east of proposed Boyle Station to just west of the proposed Chavez/Soto Station (vicinity of subway portion of Alternative 8);
- 1st Street from east of Boyle to just west of Soto (vicinity of Alternatives 2 through 7);
- 1st Street from Fickett to Saratoga (vicinity of Alternatives 6 and 7);
- 1st Street from Julien to Concord (vicinity of Alternatives 6 and 7);
- 4th Street from Fickett to Saratoga (vicinity of Alternatives 1 through 5 and 8);
- 4th Street from Evergreen to Concord (vicinity of Alternatives 1 through 5 and 8);
- 3rd Street from Eastman to Bonnie Beach (vicinity of all build alternatives);
- Beverly Boulevard from Findlay to Garfield and from Rea Drive to Paramount Boulevard (vicinity of Alternatives 1, 4, 5, 7, and 8);
- Paramount Boulevard from Beverly Boulevard to Whittier Boulevard (vicinity of Alternatives 1, 4, 5, 7, and 8)
- Whittier Boulevard from Findlay to Mobile and from Bluff Road to Norwalk Boulevard (vicinity of Alternatives 2, 3, and 6); and
- Whittier Boulevard from Paramount Boulevard to Norwalk Boulevard (Alternatives 1, 4, 5, 7, and 8).

However, the results of investigations for the previous East Side Extension of the Red Line suggest that the potential for liquefaction in the study area is actually generally low to very low. Further discussion of the liquefaction potential and analysis of the alternatives proposed in this current Re-Evaluation MIS can be found in section 4.8.3 as well as in the 1999 Geologic/Seismic Hazards Evaluation report prepared by Law/Crandall.

Areas of Potential Ground Deformation Hazard

Three of the eight proposed alternatives cross the Coyote Pass Escarpment. The escarpment is an area of surface deformation believed to be a result of fault movement along the Elysian Park Thrust, a deep thrust fault that underlies the area. The buried thrust is considered active, and there is a potential for ground deformation (active folding) of the bedrock and the overlying alluvial sediments in the vicinity of the escarpment during the design life of the proposed project.

4.8.2 Evaluation Methodology

Categories of potential geotechnical impacts in the Reevaluation MIS/SEIS/SEIR are set forth by the California Environmental Quality Act (CEQA), the California Public Resources Code, and State CEQA Guidelines. Potential impacts associated with geotechnical considerations have been identified from a review of available published and unpublished geotechnical literature pertinent to the proposed project. These include, but are not limited to: the safety elements of the general plans for the City and County of Los Angeles, and the Cities of Commerce, Montebello, Pico Rivera, and Whittier; aerial photographs; Official Alquist-Priolo Earthquake Fault Zone Maps; Official Seismic Hazard Zone Maps; geologic and topographic maps and other publications by the California Division of Mines and Geology, U.S. Geological Survey, and California

Division of Oil and Gas; Wildcat Oil and Gas Maps; and available geotechnical reports pertinent to the project.

The analysis of potential areas where liquefaction could occur along the alternative alignments and where the alignments cross existing faults were determined specifically from: 1) the Los Angeles County Seismic Safety Element (1990), 2) the City of Los Angeles Safety Element (1996), 3) the Seismic Hazard Zone Maps published by the California Division of Mines and Geology (1999), and 4) Alquist-Priolo Earthquake Fault Zone Maps. Based on criteria set forth in these documents, areas identified as having a potential for liquefaction are areas of either current or historically high groundwater (at a depth of less than 50 feet). These areas might or might not have soils that have the potential to liquefy, even if the groundwater was shallow. Pertinent soil data from the previous geotechnical reports for the MTA Red Line were reviewed to provide a more specific analysis of the liquefaction potential, where applicable.

4.8.3 Environmental Issues

This section addresses two criteria related to geologic and seismic hazards: 1) portion of alignment subject to liquefaction potential, and 2) portion of alignment that traverses the Coyote Pass Escarpment (as a measure of ground deformation potential). In addition to these criteria, this section also addresses potential tunneling impacts of the subway alternatives and potential measures to mitigate their adverse effects. For a complete discussion of geologic and seismic conditions, the reader is referred to the *Geologic/Seismic Hazards Evaluation, Eastside Transit Corridor Study Area, Los Angeles County, California, prepared for Eastside Corridor Transit* Consultants, by Law/Crandall, Project Number 70131-9-0387, dated December 1999.

Liquefaction

Liquefaction is the transformation of submerged granular soils into a fluid mass due to excess pore water pressure developed in response to earthquake ground shaking. Liquefaction potential is greatest where the groundwater level is shallow, and submerged loose, fine sands occur within a depth of about 50 feet or less. Liquefaction potential decreases as grain size and clay and gravel content increase. As ground acceleration and shaking duration increase during an earthquake, liquefaction potential increases.

According to the Los Angeles County Seismic Safety Element (1990), the City of Los Angeles Seismic Safety Element (1996), and the California Division of Mines and Geology (1999), portions of the build alternatives are located within areas identified as having a potential for liquefaction.

The areas along each alignment that are identified based on generalized liquefaction hazard mapping in the above referenced sources as having a potential for liquefaction are summarized in Table 4-40. As noted, there is a potential for liquefaction to adversely affect portions of all of the build alternatives. Liquefaction could have an equally significant impact on both the subway and the at-grade sections of the alternatives. The degree of significance of the impact of liquefaction cannot be determined without a comprehensive geotechnical investigation that would identify the depth and thickness of potentially liquefiable layers and the degree of settlement anticipated.

TABLE 4-40
POTENTIAL LIQUEFACTION AREAS

Alt.[2]	% of Total Alignment with Identified Hazard	Potential Liquefaction Area Locations[1,2]
No-Build	0	N/A
TSM	0	N/A
1	40%	◆ On Alameda from Turner Street north to Cesar Chavez. ◆ On Cesar Chavez from Alameda to Interstate 10. ◆ On 4th Street from Fickett to Saratoga and from Evergreen to Concord. ◆ On 3rd Street from Eastman to Bonnie Beach. ◆ On Beverly Boulevard from Findlay to Garfield and from Rea Drive to Paramount Boulevard. ◆ On Paramount Boulevard from Beverly Boulevard to Whittier Boulevard. ◆ On Whittier Boulevard from Paramount Boulevard to Norwalk Boulevard.
2	35%	◆ From Union Station south to Turner Street. ◆ On 1st Street from east of Boyle to just west of Soto. ◆ On 4th Street from Fickett to Saratoga, and from Evergreen to Concord. ◆ On 3rd Street from Eastman to Bonnie Beach. ◆ On Whittier Boulevard from Findlay to Mobile and from Bluff Road to Norwalk Boulevard.
3	35%	◆ Same as Alternative 2
4	38%	◆ From Union Station south to Turner Street. ◆ On 1st Street from east of Boyle to just west of Soto. ◆ On 4th Street from Fickett to Saratoga, and from Evergreen to Concord. ◆ On 3rd Street from Eastman to Bonnie Beach. ◆ On Beverly Boulevard from Findlay to Garfield and Rea Drive to Paramount Boulevard. ◆ On Paramount Boulevard from Beverly Boulevard to Whittier Boulevard. ◆ On Whittier Boulevard from Paramount Boulevard to Norwalk Boulevard.
5	38%	◆ Same as Alternative 4.
6	36%	◆ From Union Station south to Turner Street. ◆ On 1st Street from east of Boyle to just west of Soto, from Fickett to Saratoga, and from Julien to Concord. ◆ On 3rd Street from Eastman to Bonnie Beach. ◆ On Whittier Boulevard from Findlay to Mobile and from Bluff Road to Norwalk Boulevard.
7	43%	◆ Union Station to the west side of US 101. ◆ On 1st Street from east of Boyle to just west of Soto, from Fickett to Saratoga, and from Julien to Concord. ◆ On 3rd Street from Eastman to Bonnie Beach. ◆ On Beverly Boulevard from Findlay to Garfield and Rea Drive to Paramount Boulevard. ◆ On Paramount Blvd. From Beverly Blvd. To Whittier Blvd. ◆ On Whittier Boulevard from Paramount Boulevard to Norwalk Boulevard.
8	42%	◆ Union Station to the west side of US 101. ◆ From east of Boyle Station to just west of Chavez/Soto Station. ◆ On 4th Street from Fickett to Saratoga and from Evergreen to Concord. ◆ On 3rd Street from Eastman to Bonnie Beach. ◆ On Beverly Boulevard from Findlay to Garfield and Rea Drive to Paramount Boulevard. ◆ On Paramount Boulevard from Beverly Boulevard to Whittier Boulevard. ◆ On Whittier Boulevard from Paramount Boulevard to Norwalk Boulevard.

[1] Areas are listed west to east along each alternative.
[2] Based on generalized liquefaction hazard mapping. Note that most of the lengths of the alignments are considered to have low to very low susceptibility to liquefaction based on site-specific investigations near the alignments.

The percentages of the total length of each alternative with an identified potential for liquefaction based on the generalized hazard mapping are summarized in Table 4-40. Comparison of the percentage of the total length of each alternative with an identified potential for liquefaction indicates that Alternatives 2 and 3 have the least potential, and Alternatives 7 and 8 have the greatest potential to be affected by liquefaction. However, results of previous investigations suggest that the potential for liquefaction along the proposed alternatives is generally low to very low. Accordingly, the percentages presented in Table 4-40 may be overly conservative.

Prior to construction, a comprehensive geotechnical investigation would be completed for those portions of the selected alternative alignment where liquefaction may be possible to fully define the horizontal and vertical extent of loose granular soils above and below the water table. Should soils subject to liquefaction be found, more conservative site preparation and foundation design measures would be taken. Depending on the specific conditions encountered, such measures could include compaction of soils or alternative ground improvement methods; permanent lowering of the water table or raising of the alignment grade; special foundations such as pilings or additional underpinnings; and lowering of tunnel alignments (if an alternative is selected that includes a subway segment) below liquefiable soils into the denser underlying soils.

Previous investigations for the Eastside Extension of the MTA Red Line by GeoTransit Consultants (1995, 1996a, 1996b, 1996c, and 1996d) have included an evaluation of the liquefaction potential along a previously proposed tunnel alignment in the study area, west of Lorena Street. The results of these evaluations indicate that the potential for liquefaction along the entire previously proposed alignment between Union Station to the previously proposed First/Lorena Station is low to very low, based on field and laboratory testing. The previous alignment is coincident with the currently proposed alternative alignments in the following areas:

- Near the intersection of Santa Fe and First Street;
- Near the intersection of First Street and Boyle Avenue;
- Near the intersection of Cesar Chavez and Soto Street; and
- Along First Street between Saratoga Street and Lorena Street.

Since soil conditions can vary significantly within the same city block, only the data from these specific areas (where the currently proposed alternatives intersect the previous alignment of the Eastside extension) is specific enough to utilize for the currently proposed alternatives. Law/Crandall has performed numerous investigations along, and in the immediate vicinity of, the proposed alternative alignments. Previous geotechnical investigations by Law/Crandall were reviewed to further evaluate the liquefaction potential along the portions of the alternatives not specifically covered by the previous investigations by GeoTransit Consultants. However, no specific soil data was available to provide further analysis of the liquefaction potential in the Rio Hondo area.

Based on the previous soil data from Law/Crandall and GeoTransit Consultants, the potential for liquefaction affecting any of the proposed alternatives west of Lorena Street is low to very low. Based on the previous soil data from Law/Crandall, the potential for liquefaction affecting any of the proposed alternatives east of Lorena Street (with the exception of the Rio Hondo area) is also low to very low. A comprehensive geotechnical investigation will be necessary to specifically evaluate the potential for liquefaction along the proposed alternative alignments in the Rio Hondo area, and to verify that the potential for liquefaction is low to very low along the currently proposed alternative alignments. When comparing the percentages of the build alternatives with the potential for liquefaction based on soil data from adjacent geotechnical investigations, no alternative has a greater or lesser potential to be affected by liquefaction than another.

Ground Deformation Hazard

The proposed build alternatives are not within, and do not traverse, a currently established Alquist-Priolo Earthquake Fault Zone for surface fault rupture hazards. The nearest Alquist-Priolo Earthquake Fault Zone, established for the East Montebello Hills fault, is located 1.8 miles to the north of the build alternatives. Based on the available geologic data, active or potentially active faults with the potential for surface fault rupture are not known to be located within the study area. The potential for surface fault rupture due to fault plane displacement propagating to the surface across the proposed alternative routes during the design life of the proposed project is considered low. Therefore, surface fault rupture is not anticipated to have a significant impact on the proposed alternatives.

Three of the eight proposed alternatives cross the Coyote Pass Escarpment. The potential for future movement along the trend of the escarpment should be considered in the design and construction of the proposed project (GeoTransit Consultants, 1996a). As summarized in Table 4-41, Alternative 1 crosses the Coyote Pass Escarpment at grade on Soto Street between approximately Michigan Avenue and 1st Street, a distance of approximately 300 feet. Alternatives 2 through 6 do not cross the Coyote Pass Escarpment. These alternatives are located south of the mapped location of the escarpment, and the potential for ground deformation affecting these alternatives is not considered significant. The proposed tunnel segment of Alternative 7 crosses the Coyote Pass Escarpment beginning north of the 1st/Boyle Station to approximately the I-5 Freeway (approximately 800 feet). The proposed tunnel segment of Alternative 8 crosses the Coyote Pass Escarpment, beginning north of the 1st/Boyle Station to approximately Michigan Avenue (approximately 800 feet) and along the portion of the proposed at-grade segment on Soto Street between approximately Michigan Avenue and 1st Street (approximately 300 feet). The portion of the tunnel segment of Alternatives 7 and 8 that cross the escarpment would be most significantly affected by future ground deformation occurring along the Coyote Pass Escarpment. The at-grade segments of Alternatives 1 and 8 that cross the Coyote Pass Escarpment would be minimally affected. The alternatives ranked in order of potential to be significantly affected by the Coyote Pass Escarpment is as follows:

- Alternative 8–1.7% of the total alignment crosses the escarpment (approximately 800 lineal feet of proposed tunnel segment and 300 lineal feet of proposed at-grade dedicated busway).

- Alternative 7 – 1.3% of the total alignment crosses the escarpment (approximately 800 lineal feet of proposed tunnel segment).

- Alternative 1–0.4% of the total alignment crosses the escarpment (approximately 300 feet of proposed at-grade dedicated busway)

- Alternatives 2 through 6–These alternatives do not cross the escarpment.

Impact Associated with Tunneling

Tunneling conditions along the suspended previous Metro Red Line Eastside Extension alignment from Union Station to First Street and Lorena Street (suspended project) were explored extensively. Mitigation measures for tunneling impacts were developed and incorporated into an essentially complete final design prior to project suspension. Tunneling conditions and the appropriate mitigation measures for the new proposed alternatives with tunnel sections are expected to be similar to those of the suspended project. The sections below present anticipated tunneling conditions that will need to be addressed for design and likely mitigation measures that will need to be implemented to address those conditions.

TABLE 4-41
PORTIONS OF ALTERNATIVES THAT TRAVERSE THE COYOTE PASS ESCARPMENT

Alt.	% of Total Alignment that Crosses Escarpment	Total Crossing Distance
No-Build	0	N/A
TSM	0	N/A
1	0.4	300 feet of at-grade busway on Soto Street between about Michigan Ave. and 1st St.
2	0	N/A
3	0	N/A
4	0	N/A
5	0	N/A
6	0	N/A
7	1.3	800 feet of tunnel segment from 1st/Boyle Station to about the I-5 freeway.
8	1.7	800 feet of tunnel segment from north of 1st/Boyle Station to about Michigan Avenue. 300 feet of at-grade busway on Soto Street between about Michigan Avenue and 1st Street.

Geotechnical Conditions

Based on the previous geotechnical investigations for the suspended project and available publications in the vicinity of the proposed alternatives with tunnel sections (Alternatives 6, 7, and 8), there is a potential for running conditions during construction of the tunnel in the vicinity of the Los Angeles River where poorly graded, poorly cemented sand and gravel and boulders are present. There is also a potential along the entire proposed subway tunnel for slow raveling conditions in areas where silty sands and clayey sands are encountered during construction. Additionally, there is a potential for difficulty in excavation and slow tunnel advancement due to encountering cobbles in the tunnel face in the subway segments in the vicinity of the Los Angeles River. The potential for difficult excavation could create face stability problems that could require special equipment. Additionally, mixed face conditions could be encountered in areas where bedrock might be shallow.

The "soft ground" tunneling conditions present the potential for some surface settlement and related building settlement where the tunnel passes near surface structures. Surface settlement results from "ground loss", observable at the ground surface as a settlement trough. The settlement trough width and settlement magnitude is a function of the tunneling method and ground control techniques employed. The settlement trough is also strongly influenced by tunnel depth; shallower tunnels result in greater ground surface settlement but narrower settlement trough widths. Where existing buildings are near the tunnels' zone of influence, analyses of existing buildings and building protection measures may be required.

Geotechnical Mitigation Measures

To address the ground conditions discussed above and to reduce surface settlement, pressure-face, Tunnel Boring Machines (TBM) and pre-cast, bolted, gasketed lining systems were proposed for the suspended project. Additional benefits to be derived from this tunneling machine technology and the lining system are discussed below.

The pressure-face technology maintains positive fluid or soil pressure on the tunnel face which decreases the potential for ground loss and soil instability at the tunnel face (sloughing, caving), which in turn reduces soil deformations and surface settlement. In combination with the face pressure, grout is installed immediately behind the installed precast liners to fill the annular space between the precast segments (tunnel rings) and the ground. This technology provides an additional measure to reduce surface settlement. Settlement potential can be further reduced by grouting as needed and by the short interruption of water service during tunneling and careful monitoring of the settlement.

As previously described, approximately 800 feet of the proposed tunnel segment of Alternatives 7 and 8 cross the Coyote Pass escarpment. The potential for future movement along the trend of the escarpment would need to be considered in the design and construction of the portion of the proposed tunnel segment that crosses the escarpment. For the previous Eastside Extension alignment, previous designs for tunnels crossing the escarpment used steel liners for added ductility. This or similar considerations should be made in the design and construction of any proposed tunnel segment across the Coyote Pass Escarpment (GeoTransit Consultants, 1996a).

Environmental Conditions

Based on maps from the California Division of Oil and Gas, the proposed tunnel segments will traverse several existing oil fields. Also, based on available publications and subsurface information from previous geotechnical investigations in the vicinity of the proposed tunnel segments, there is documented subsurface methane and hydrogen sulfide gases, as well as free oil and tar, and petroliferous bedrock. Therefore, there is a potential for shallow oil and hazardous gases to be encountered in the tunnel segments of the build alternatives.

Environmental Mitigation Measures

To address the environmental issues discussed above, a closed-system of transporting cuttings and special tunnel liners were proposed for the suspended project. Using a pressure-face TBM (in combination with the gasketed lining system described above), excavated soil is transported through a closed system to a separation plant at the surface where special ventilation and mitigation measures can be implemented to contend with contaminated soil. These or similar methods would be required for Alternatives 7 and 8. Alternative 6 is less likely to encounter hazardous gas (Law/Crandall, 1999), and may not require such mitigation measures.

4.9 HAZARDOUS SUBSTANCES

4.9.1 Affected Environment

Hazardous substances are defined as substances, materials or waste, or exposure to which results, or may result, in adverse affects on health or safety. This generally includes substances defined as hazardous substances under the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and under Sections 25316 and 25317 of the California Health and Safety Code, which identifies substances, materials, or waste requiring hazardous substance removal, petroleum and petroleum by-products, waste oil, crude oil, and natural gas.

In general, there is a high potential for encountering hazardous substances within the project area. This potential is associated with facilities observed during the area reconnaissance, identified historical sources of hazardous substances, and known contaminated properties and hazardous waste sites under regulatory supervision. Based on the field reconnaissance and the regulatory database review, approximately 105 sites were identified where there is a potential for encountering existing hazardous substances. In addition, there are two former coal gasification plants located within the alignment of Alternatives 7 and 8. The historical oil field maps, topographic maps, previous reports, and aerial photographs detailed numerous areas of oil field activity, commercial/residential development, and areas of hydrogen sulfide and methane gas at potentially lethal levels when within confined spaces.

Several severe construction constraints or hazard areas were identified within our survey along the proposed alignments for Alternatives 7 and 8. The constraints and hazards include:

- The Union Station and Boyle Heights former oil field areas and contaminants associated with oil fields such as hydrogen sulfide and methane gas;
- The former site of six large (approximately 30,000 to 60,000 gallons) gasoline above ground storage tanks (now demolished) located near the Friedman Bag Company at the northwest corner of Ducommun and Vignes Streets; and
- Construction through the site of two former coal gasification plants: So-Cal Butadiene (Commercial Street through Chavez Avenue beneath Union Station) and So-Cal Ducommun Street (immediately southeast of So-Cal Butadiene plant).

There are numerous individual light industrial and commercial properties along the proposed routes that may pose hazardous waste concerns that are not identified within this section. Further investigation of these sites will be conducted for the selected alternative.

There are a large number of abandoned oil wells within the respective oil field areas. Some wells may be encountered during construction activities that have not been abandoned or properly abandoned. Hydrogen sulfide and methane noted in area subsurface investigations are potentially associated with the former oil well activities. Unidentified petroleum deposits may also be encountered during construction. The numerous sources of potential contamination and migration via groundwater flow could make it difficult to precisely determine the impacted areas. However, the design for the suspended Metro Red Line project developed and included means for dealing with these impacts (see Section 4.9.3).

A summary of the findings by geographic section is provided below, and a tabulation of the sites by build alternative is provided in the *Environmental Issues* section below.

Union Station to Boyle Avenue

Industrial and warehouse operations exist from the western terminus at Union Station to the Boyle Avenue boundary for each of the proposed rail alternatives. Additionally, the Division of Oil and Gas and Munger Oil Field maps, as well as historical topographic maps and aerial photographs, indicate the Union Station Field to have been beneath this area along with numerous oil wells and storage tanks prior to the development of many of the businesses observed in the area. The reconnaissance included Alameda Street, Commercial Street, 1st Street, Cesar Chavez Avenue, Center Street, and the associated roadways.

The proposed subway Alternatives 7 and 8 go underneath industrially developed property that has historically contained oil and gas production wells where hydrocarbons, hydrogen sulfide, methane gas, and various volatile organic compounds could be a concern. Details on findings from previous environmental investigations in the area are discussed in Section 4.9.3.

Additionally, the regulatory search identified two former coal gasification sites in the direct path of the proposed tunnels. More information on these sites can also be found in Section 4.9.3. Furthermore, the So-Cal Gas/Alisco manufactured gas plant (MGP) at Center/Commercial Street was noted on the Cal-Site Voluntary Cleanup Program (VCP) database and a county SLIC regulatory listing was noted at 501 Center Street. SLIC listings are known sites that either have ground water impact or potential for ground water impact.

Commercial and warehouse development noted during the reconnaissance included six former, large (approximately 30,000 to 60,000 gallons) gasoline above ground storage tanks at the Friedman Bag Company (LUST listed without corrective action in progress) at the northwest corner of Ducommun and Vignes Streets. The tanks have since been dismantled and taken off-site. Numerous monitoring wells (most likely related to the above ground storage tanks) were noted on Ducommun, Vignes, Jackson, and Commercial Streets.

Boyle Avenue to Indiana Street

Small commercial buildings, gas stations, automotive service stations, and interspersed residential neighborhoods exist from the Boyle Avenue boundary to the Indiana Street boundary for each of the proposed build alternatives. Additionally, the California Division of Oil and Gas and Munger Oil Field maps as well as historical topographic maps and aerial photographs indicate the Boyle Heights Field to have been beneath this area along with numerous oil wells and storage tanks prior to the development of many of the businesses observed during the field reconnaissance. The reconnaissance included Soto Street, 4th Street, 1st Street, Cesar Chavez Avenue, and the associated roadways.

The subway portions of Alternatives 6 and 7 would be underneath commercially and residentially developed property located along 1st Street to the Lorena Street Station (east of the Los Angeles River). Hydrogen sulfide presence is not considered to be a significant problem in this area. Alternative 8 is proposed as a subway east from the Boyle Street boundary to the Soto Street/Cesar Chavez intersection. No evidence of oil/gas production wells within the historical materials referenced were identified, but it is likely that a limited amount of this area has experienced exploratory drilling or associated holding ponds at some point prior to residential and commercial development during the early part of this century (1900-1920's).

Indiana Street to South Atlantic Boulevard

Small commercial buildings, gas stations, automotive service stations, dry-cleaning facilities, and interspersed residential neighborhoods exist from the Indiana Street boundary to the Atlantic Boulevard boundary for each of the proposed build alternatives. The California Division of Oil and Gas and Munger Oil Field maps as well as historical topographic maps and aerial photographs did not indicate known oil field operations, however a low level of concern for adjacent oil field activity and potential historic oil/gas exploration does exist. The field reconnaissance included Indiana Street, 4th Street, 1st Street, Whittier Boulevard, Beverly Boulevard, Atlantic Boulevard, McDonnell Street, Ford Boulevard, and the associated roadways.

South Atlantic Boulevard to Poplar Avenue

Small commercial buildings, gas stations, automotive service stations, dry-cleaning facilities, and interspersed residential neighborhoods exist from the Atlantic Boulevard boundary to the Poplar Avenue boundary for each of the proposed build alternatives. The California Division of Oil and Gas and Munger Oil Field maps as well as historical topographic maps indicate that the Montebello Oil Field included Beverly Boulevard and Whittier Boulevard from approximately Garfield Avenue to the Rio Hondo River. The field reconnaissance included Whittier Boulevard, Beverly Boulevard, Atlantic Boulevard, Poplar Avenue, and the associated roadways.

Poplar Avenue to Norwalk Boulevard

Small commercial buildings, gas stations, automotive service stations, dry-cleaning facilities, large retail shopping centers, and interspersed residential neighborhoods exist from the Poplar Avenue boundary to the eastern terminus at Norwalk Boulevard for each of the proposed build alternatives. The California Division of Oil and Gas and Munger Oil Field maps as well as historical topographic maps and aerial photographs did not indicate known oil field operations; however the Whittier Oil Field is within 1,000 feet to the north and east of the eastern terminus. The field reconnaissance included Whittier Boulevard and the associated roadways.

An update of this assessment will be conducted once the alternative mode and alignment are selected and design is further refined. The update will specifically address the areas to be acquired for construction and operation of the transit system. As part of this update, the environmental concern from the properties discussed in this assessment will be re-evaluated to plan further investigation and characterization efforts.

4.9.2 Evaluation Methodology

The methods used to identify existing hazardous substances included field reconnaissance of the major thoroughfares and associated side streets along each of the proposed build alternatives. The following were reviewed: federal, state, and county databases of known or potentially contaminated sites within approximately 1,000 feet (standard industry practice) of the proposed alternative routes; historical aerial photographs; portions of selected previous reports; historic oil field maps; and area topographic maps. No specific regulatory agency files were viewed to determine status of the listed sites. Such files will be reviewed during the SDEIS/SDEIR phase that follows this study, pending authorization of the MTA Board. The regulatory databases reviewed include:

- National Priorities List of the U.S. Environmental Protection Agency (NPL);
- Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS);
- Emergency Response Notification System (ERNS);
- Resource Conservation and Recovery Information System (RCRIS) including transport, storage, and disposal (TSD) facilities;
- California Department of Health Bond Expenditure Plan (BEP) for Hazardous Substance Clean up;
- California Environmental Protection Agency and the Department of Toxic Substances (CAL-SITES);
- California Regional Water Quality Control Board, Leaking Underground Storage Tank Listings (LUSTs); and
- Underground Storage Tank Listings (USTs).

Also reviewed were:

- Historic Aerial photographs (from 1928, 1947, 1952, 1968, 1976, 1989-90, and 1994) at the University of California at Santa Barbara (UCSB);

- Portions of the previous AA/DEIS/DEIR and FEIS;
- *AA/*DEIS/*DEIR Metro Red Line East Side Extension Final Environmental Impact Statement* by Geotransit Consultants, *Stage II Environmental Assessment Eastside Expansion Metro Red Line Project* by Geotransit Consultants dated April 18, 1994;
- California Division of Oil, Gas, and Geothermal Resources (DOG) and Munger historic oil field maps of the Montebello, Whittier, Union Station, and Boyle Heights oil fields sheets dated July 1, 1968.
- United States Geological Service (USGS) topographic maps for *Los Angeles* (1928, 1953 and 1966/1981), *El Monte* (1953), *Whittier* (1945 and 1965), *Alhambra* (1926) and *South Gate* (1964/1981).
- *Final Report, Metro Red Line Segment 3 East Side Extension, Phase II Environmental Investigation Report, Contract Unit C0502 – Line Section Union Station to 1st/Boyle and Little Tokyo Station*, Volumes I and II. By Enviro-Rail, dated May 1997.
- *Final Report, Metro Red Line Segment 3 East Side Extension, Phase II Environmental Investigation Report, Contract Unit C0501 – 1st/Boyle Station*, By Enviro-Rail, dated May 1997.
- *Stage 1 Supplemental Gas Investigation, Metro Red Line Segment 3 East Side Extension, Contract Unit C0502, Los Angeles, California*, Volumes I and II, By Enviro-Rail, dated March 1998.
- *Stage 2 Supplemental Gas Study (Draft), Metro Red Line Segment 3, East Side Extension, Contract Unit C0502, Los Angeles, California*, Volumes I and II, April 1998.
- *Environmental Summary Report, Prepared for MTA, Metro Red Line Segment 3, East Side Extension, Contract Unit C0502, Los Angeles, California*, By Enviro-Rail, dated June 9, 1998.

Each of the identified sites was classified as high, moderate, or low based on its potential for detrimental environmental impact on the proposed alternatives. The classification of each site was based on type of operation, proximity to the alignment, anticipated hydrogeologic gradient, field observations, and historical and regulatory information.

4.9.3 Environmental Issues

The criterion evaluated includes number of pre-existing contaminated sites in the vicinity of each alternative.

Introduction

Potential impacts for this work are defined as the potential introduction of human health and/or wildlife to hazardous waste by project activities or an increase in the likelihood of hazardous substance migration. The construction activities are most likely to encounter pre-existing hazardous substances where subsurface construction activity will be required near locations identified: 1) with historic coal-gasification plants, 2) within known old oil fields, or 3) in areas with known historic soil and ground-water contamination, gasoline stations, dry-cleaning facilities, auto repair facilities, and commercial manufacturing, or shipping facilities.

A complete discussion of the potential areas of concern is presented in the *Environmental Setting* chapter. This section summarizes the major areas of concern along the proposed alignments and provides a comparison of the potential impacts of each build alternative under consideration. No impacts are anticipated with the No-Build and TSM Alternatives since no major construction activity is associated with either alternative.

To assist in the comparison of the alternatives, each contaminated site that was identified in proximity to the alternatives was classified as high, moderate, or low based on its potential for detrimental environmental impact. The classification of each site is based on type of operation, proximity to the alignment, anticipated hydrogeologic gradient, field observations, and historical and regulatory information. In general, the classification criteria is:

High – sites with known or probable soil/ground-water contamination, and sites where remediation is incomplete or undocumented,

Moderate - sites with identified soil contamination, remediation in progress, or groundwater contamination does not appear to be migrating toward the proposed alternatives,

Low – sites that have completed remediation or have historically utilized only small amounts of known contaminants (e.g. Resource Conservation and Recovery Act Information System [RCRIS] –small quantity generators, underground storage tanks [USTs]).

The evaluation also considered the proposed mode of transit for the alternative; bus guideways (built at grade), at-grade light rail (minimal subsurface construction activity) and light rail or heavy rail/subway (extensive subsurface construction activity). Therefore, higher levels of concern are associated with subway construction through identified sites, and lower levels of concern are associated with surface light rail and bus guideways, based on the potential impact during construction.

Comparative Evaluation

Table 4-42 presents a comparison of the alternatives by the potential to encounter hazardous substances during construction activities.

As shown, the alternatives that include subway segments (Alternatives 6, 7 and 8) have the highest potential for concern due to the extensive subsurface excavation required in the vicinity of contaminated sites. Of the alternatives involving subway segments, Alternative 7 has the highest potential for concern, and Alternative 6 has the least potential for concern since the tunneled segment of Alternative 6 is not located where most of the major areas of concern are concentrated. However, as mentioned, all three alternatives have an overall high potential for concern. Because the other alternatives involve LRT or BRT construction with limited subsurface construction activity, the potential to encounter hazardous substances is primarily limited to the proposed construction at stations. The BRT Alternatives have the lowest potential for concern followed closely by the LRT alternatives. In general, the major areas of concern are located in the western portion of the study area between Union Station and Indiana Street. A comparison of the alternatives by geographic location is presented in the following paragraphs.

TABLE 4-42
POTENTIAL FOR ENCOUNTERING PRE-EXISTING HAZARDOUS SUBSTANCE SITES BY ALTERNATIVE

Alternative	Potential for Concern[1]		
	High	Moderate	Low
1	1	9	5
2	1	11	3
3	1	15	6
4	1	14	4
5	4	11	8
6	9	10	40
7	17	8	44
8	15	4	8

[1]The assignment of a low to high potential for concern is based on the presumed construction activity for completion of the alternative when compared to historical, regulatory, and field reconnaissance information.

Union Station to Boyle Avenue

Alternatives 1 through 5 are at-grade BRT or LRT alternatives that would involve only limited subsurface construction activity. The potential for encountering hazardous substances is primarily associated with the station construction and limited subsurface development in existing roadways. However, the elevated structures associated with the Baseline and Evergreen Options for connecting to Union Station under LRT Alternatives 3 and 5 may require mitigative actions if such substances are found during the excavation required for the structures.

The subsurface activity involved in the subway segment for Alternative 6 is also limited in this area, and most of the low to moderate potential for encountering hazardous substances is also primarily associated with the station construction and limited subsurface development in existing roadways. Also, mitigative actions may be necessary for the elevated structures associated with the Baseline and Evergreen Options for connecting to Union Station.

Alternatives 7 and 8 are proposed subways through industrially developed property that has historically contained oil and gas production wells. The 1994 Stage II Environmental Site Assessment (ESA) by Geo Transit Consultants (GTC) identified soil contamination in the "Union Station area" to be minor (close to and below ground water). Further geotechnical and environmental investigations during final design of the suspended East Side Extension Red Line found the groundwater generally above the tunnel invert, and to be contaminated with hydrocarbons, hydrogen sulfide (H_2S), and various volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). The NIOSH *Chemical Hazards Pocket Guide* published by the U.S. Department of Health and Human Services notes a TWA (time-weighted average) level of 10 ppm for workers and an IDLH (immediately dangerous to life or human health) level of 100 parts per million by volume (ppmv) for H_2S. It also notes a LEL (lower explosive limit) of 50,000 ppmv for methane gas. H_2S is detected by humans at or above 0.02 ppmv concentrations. Total petroleum hydrocarbons (TPH), VOCs (benzene, toluene, ethylbenzene, vinyl chloride, and cis-1,2-dichloroethene) and SVOCs (napthalene and acenapthene) were identified at levels exceeding the threshold levels in ground water established by the California Department of Health Services (CDHS). It is likely that the areas currently being evaluated for tunneling of the proposed subway alternatives would encounter similar subsurface conditions to those detailed in the above noted Stage II ESA.

Further studies into subsurface gas concentrations in the Union Station area were undertaken during final design of the East Side Extension between 1996 and 1998. As reported in the Environmental Summary Report prepared for the Red Line Tunnel Contract, several locations were identified where methane gas accumulated to concentrations exceeding the LEL (noted as 53,400 ppmv in the report) in capped wells. H_2S gas was found to accumulate to concentrations exceeding 20,000 ppmv in some wells located between the 1st Street Bridge and Union Station. A supplemental gas study conducted by MTA/Enviro-Rail (May 1997) between 1st Street and Union Station found H_2S was present only as a dissolved compound in groundwater in the area north of 1st Street. No significant concentration of H_2S was found along the remaining contact area. No free H_2S was found either above or below the groundwater. The source of free H_2S gas in the capped wells is believed to be the partitioning of dissolved H_2S gas from the groundwater. It is anticipated that deep excavations between Temple Street and Union Station will encounter H_2S in groundwater at concentrations ranging from a few parts per million to approximately 200 mg/l. The remainder of the alignment should not encounter significant dissolved H_2S in the groundwater. Methane gas however may be present in significant concentrations along the alignment, including the area between the 1st Street Bridge to Union Station, the 1st Street/Boyle Station area, and portions of the alignment in the vicinity of Boyle Heights.

Additionally, the regulatory search identified two former coal-gasification sites in the direct path of the proposed tunnels for Alternatives 7 and 8. The Southern California Butadiene Division Southern (Commercial Street through Cesar Chavez Avenue beneath Union Station) and the California Gas Company Ducommun Street Plant (immediately southeast of the Butadiene Division coal-gas site) were large coal-gas facilities operational from the late 1800's through the 1930's. Furthermore,,the So-Cal Gas/ Alisco manufactured gas plant (MGP) at Center/Commercial Street was noted on the Cal-Site Voluntary Cleanup Program (VCP) and a SLIC county regulatory listing was noted at 501 Center Street. SLIC listings are known sites that either have groundwater impact or potential for groundwater impact. The potential for adverse hazardous substance impacts in this segment related to tunneling is high.

Commercial and warehouse development noted during the field reconnaissance included six former gasoline above ground storage tanks at the Friedman Bag Company (LUST listed without corrective action in progress) at the northwest corner of Ducommun and

Vignes Streets. The above ground storage tanks have recently been dismantled and taken off-site. Numerous monitoring wells (most likely related to the above ground storage tanks) were noted on Ducommun, Vignes, Jackson, and Commercial Streets in similar locations to the wells noted in the previous Stage II ESA. Further geotechnical and environmental investigations during final design of the suspended East Side Extension Red Line found the groundwater generally above the tunnel invert, and to be contaminated with hydrocarbons, hydrogen sulfide (H_2S), and various volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs).

Boyle Avenue to Indiana Street

Alternatives 1 through 5 are at-grade BRT or LRT alternatives that would involve only limited subsurface construction activity. The low to moderate potential for encountering hazardous substances is primarily associated with the station construction and limited subsurface development in existing roadways.

The proposed subway segment of Alternative 6 passes underneath commercially and residentially developed property located along 1st Street to the Lorena Street Station. The proposed subway section of Alternative 7 passes through commercially and industrially developed properties. The potential for encountering subsurface H_2S gas in the subway segments of Alternatives 6 and 7 along the commercial and residential areas of 1st Street to Lorena Street is low. However, the potential for adverse hazardous substance impacts in the segment of Alternative 7 related to tunneling in the industrially developed area is moderate to high.

Alternative 8 is proposed as a subway east from the Boyle Avenue survey boundary to the Chavez/Soto intersection. No evidence of oil/gas production wells were identified within the historical materials referenced, but it is likely that a limited amount of this area has experienced exploratory drilling or associated holding ponds at some point prior to residential and commercial development at the early part of this century (1900-1920's). A low to moderate potential exists for adverse hazardous substance impacts in this segment related to tunneling.

Indiana Street to Norwalk Boulevard

Small commercial buildings, gas stations, automotive service stations, dry-cleaning facilities, and interspersed residential neighborhoods are the major uses adjacent to all of the build alternatives. The Montebello Oil Field included Beverly Boulevard and Whittier Boulevard from about Garfield Avenue to the Rio Hondo River. Also, the Whittier Oil Field is within 1,000 feet to the north and east of the eastern terminus of the project at Norwalk Boulevard.

Within this area, all of the build alternatives would involve at-grade BRT or LRT facilities that would involve only limited subsurface construction activity. The potential for encountering hazardous substances is primarily associated with the station construction and limited subsurface development in existing roadways.

Mitigation

When hazardous substances would be disturbed by construction activities, mitigation will be required that conforms to the applicable county, state, and federal requirements. Depending upon the amount of affected media encountered during construction activities, three options may be used for mitigation.

Removal – One mitigation option will be to identify, remove, and dispose as Class I, II or III and dispose at a facility licensed to accept such waste material.

Recycling - Treatment or recycling at regulated recycling facilities of impacted material that may not require landfilling is an option.

Combination - An off-site remediation facility could be utilized to remediate the waste material to a Class III standard and then dispose of it as clean fill at a Class III landfill.

The findings of previous reports indicate that perched groundwater with extensive contamination will likely be encountered during subsurface construction activities. Groundwater is normally required to be treated on-site to acceptable local and state criteria and then may be discharged into the sanitary sewer or storm water system, as directed. Based on the type of contamination identified, on-site remediation may not be an option.

As with any project, appropriate subsurface investigation is recommended prior to subsurface construction activities to assess the potential for contamination of soil and groundwater. Historically, oil fields and coal-gasification plants have been extremely costly to mitigate. Note that some of the contamination immediately adjacent to Union Station was removed in the recently completed remediation of a site at the southeast corner of the intersection of Vignes and Ramirez Streets. However, other site(s) are still of concern, especially with regard to the alignments of Alternatives 7 and 8.

If subway Alternatives 7 or 8 were selected for implementation, H_2S will be encountered during tunneling or deep excavations unless mitigated. Besides nuisance odor problems, under extreme conditions, gas in confined and unventilated areas within the excavations or disposal plants could accumulate to potentially hazardous levels. During final design of the suspended East Side Extension subway tunnels, the MTA identified several methods to mitigate H_2S exposure during tunnel construction and operations. These included both specialized excavation methods and H_2S treatment methods.

Excavation methods include the use of pressure-face Tunnel Boring Machines (TBMs) and bolted, gasketed tunnel liners. The pressure-face (slurry shield) TBM provides a contained excavation system such that worker exposure to the excavated face and spoil is reduced or eliminated. The pressure face machine is used in combination with a gasketed, pre-cast or pre-fabricated lining system, to minimize water and gas intrusion during tunneling and operations. For further protection during construction and operations, continuous and automated gas monitoring would be maintained and additional ventilation provided if gas concentrations exceeded action levels. Similar gas monitoring and ventilations systems are currently in use in the operating Red Line system.

Various chemical treatment alternatives are available which can be used in combination with the pressure-face TBMs. A series of bench-scale and field tests conducted by the MTA identified other H_2S mitigation methods to eliminate or reduce the potential for hydrogen sulfide gas exposure during tunnel construction. One chemical treatment method (pretreatment) involves reducing the dissolved hydrogen sulfide content in the groundwater ahead of the tunneling operation by injecting large quantities of clean water treated with dilute hydrogen peroxide. Another method (suppression) involves maintaining a high pH in the tunneling slurry by adding sufficient quantities of sodium hydroxide. A maintained pH of 10 for the slurry keeps the H_2S in the groundwater in a dissolved state. A third, oil-field-proven mitigation method, (precipitation) consists of precipitating dissolved sulfide out of the slurry by using a zinc compound. Most likely a combination of the above mentioned methods would be used for worker safety.

4.10 WATER RESOURCES

4.10.1 Affected Environment

Applicable Legislation, Regulations, Guidance

Several of the Eastside Corridor alternative alignments include at grade arterial crossings of the Los Angeles, Rio Hondo, and San Gabriel Rivers. Other alternatives include combinations of these crossings and a below grade facility. There are several Federal and State laws and regulations which provide for the protection of the water and water-related resources. The following is a listing of the applicable laws and the agencies responsible for protection of the water resources.

The State Water Resources Control Board under Section 402 of the Clean Water Act establishes a permitting system for the discharge of any pollutant (except for dredge or fill) into the waters of the United States. The permit is also called the National Pollution Discharge Elimination System (NPDES) permit. Each state is required to divide water bodies into segments for planning and implementation purposes. In California, the planning function is performed by the Regional Water Quality Control Board (RWQCB).

The jurisdiction of the RWQCB relative to the NPDES permits extends to the "waters of the United States" which is defined as: (1) navigable waters, (2) tributaries of navigable waters, and (3) wetlands.

Potential project impacts on the three major waterways may include construction activities related to seismic strengthening of existing roadway bridges, and the discharge from dewatering activities related to structures or below ground rail construction.

The United States Army Corps of Engineers (COE) under Section 404 of the Clean Water Act is responsible for a permit program for the discharge of dredged or fill material into waters of the United States. The current plan for the Eastside Transit

Corridor does not call for discharge of any dredged or fill material into the three major waterways.

State Department of Fish and Game (CDFG) under Section 1601 of the California Fish and Game Code requires agencies to notify the CDFG of "...any project which will divert, obstruct or change the natural flow of bed, channel or bank of any river, stream or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit, or will use material from the streambed designated by the department..." Seismic retrofitting of the bridge may occur for some of the existing bridges. Such activity may classify the project as being within the CDFG's jurisdiction regarding Section 1601. MTA will work in cooperation with the CDFG and will obtain any required permits from the agency.

City of Los Angeles, Department of Public Works – The Los Angeles River is designed and owned by the United States Army Corps of Engineers and maintained by the County of Los Angeles. The Rio Hondo and San Gabriel Rivers are also maintained by the County of Los Angeles. No further flood control permitting activity is required with the City of Los Angeles regarding the river crossings although any construction on the bridges would require permitting. MTA will work in coooperation with the regulating agencies and will obtain any required permits prior to construction.

County of Los Angeles, Department of Public Works – All three rivers are maintained by the County of Los Angeles so any activity in the waterways will require a permit. The project may require the placement of additional bridge piers into the waterways, and possible seismic strengthening of the existing structure may require temporary construction in the channel.

<u>Surface Water</u>

General Watershed Conditions

As previously noted, there are three major surface water features in the project area. The Los Angeles River runs from north to south along the western portion of the project area, and the Rio Hondo and San Gabriel Rivers both run from northeast to southwest at the east end of the project study area.

The metropolitan area adjacent to all three rivers is densely populated with residential, commercial, and industrial development. Surface runoff has increased as a consequence of the impervious surfaces related to the development. Peak runoff rates for the coastal plain areas have also increased due to elimination of natural ponding areas and improved hydraulic efficiency of water carriers such as streets and storm drain systems.

The topography of the coastal plain is gradually sloped from the foothills of the San Gabriel Mountains to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River. Two prominent hill formations are located in the lower reach of the Los Angeles River watershed, the Dominguez Hills on the west side of the River about four miles north of the coast (elevation 200 feet), and Signal Hill in the City of Long Beach (elevation 110 feet).

The soil is considered alluvial and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well drained with relatively few perched water or artesian areas. Large deposits are present along the coast. Extensive pumping for oil has caused land subsidence in the lower reach.

The climate to the south of the San Gabriel Mountains is considered subtropical. The precipitation contributing to these three river basins is primarily in the form of orographic rainfall[7] associated with extra-tropical cyclones during the months of November through April. Snowfall is common at elevations of 5,000 feet during major storms followed by rapid melting. Major storms consist of one to several frontal systems which may last up to four or more days. Precipitation is greatly intensified due to the San Gabriel Mountains which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to the rapid concentrations of storm runoff quantities. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains.

All three rivers are flood control facilities emptying into the Pacific Ocean. They were not constructed to serve as conveyance for domestic water supplies. Percolation and water recharge basins are located along portions of each of the rivers, generally upstream of the study area.

Los Angeles River

The Los Angeles River originates at the western end of the San Fernando Valley in Southern California. The channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built (beginning in the late 1930s) by the Los Angeles County Flood Control Department (LACFCD) and United States Army Corps of Engineers (COE) to minimize the flooding in the county. Through the project area the channel has a concrete bottom and sides. The channel is trapezoidal with an additional smaller trapezoidal low flow channel. At the top of the banks the channel is approximately 250 feet wide and 25 to 30 feet deep. The low flow channel is 28 feet wide. The river flow is partially regulated by the Sepulveda, Pacoima, Big Tejunga, Hansen, and Devil's Gate dams and by several spreading grounds, reservoirs, and debris basins located along the length of the river. The river is also subject to flow diversions from Big Tejunga Creek, Arroyo Seco, and other domestic and irrigation diversions.

The portion of the river that is located in the study area extends from Cesar Chavez Avenue on the north to Washington Boulevard on the south, just east of Union Station. The study area is considered in the middle reach of the Los Angeles River (the reach between Highway 101 and the confluence with the Rio Hondo River).

[7] Orographic rainfall is rainfall influenced by landforms such as mountains that force storms to travel up and over the mountains.

Rio Hondo River

The Rio Hondo originates from the eastern part of Los Angeles County in the San Gabriel Mountains and flows through the Whittier Narrows Dam east of the Montebello Hills. The river flows southwest through the Cities of Montebello, Pico Rivera, Bell Gardens, Downey, and South Gate to its confluence with the Los Angeles River just north of Imperial Highway. The Rio Hondo River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built (beginning in the late 1930s) by the LACFCD and COE to minimize the flooding in the county.

San Gabriel River

The San Gabriel River originates in the eastern part of Los Angeles County in the San Gabriel Mountains and flows through the Whittier Narrows Dam east of the Montebello Hills. The river flows southwest through the Cities of Montebello, Pico Rivera, Santa Fe Springs, and others on its way to the Pacific Ocean. The San Gabriel River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built (beginning in the late 1930s) by the LACFCD and COE to minimize the flooding in the county.

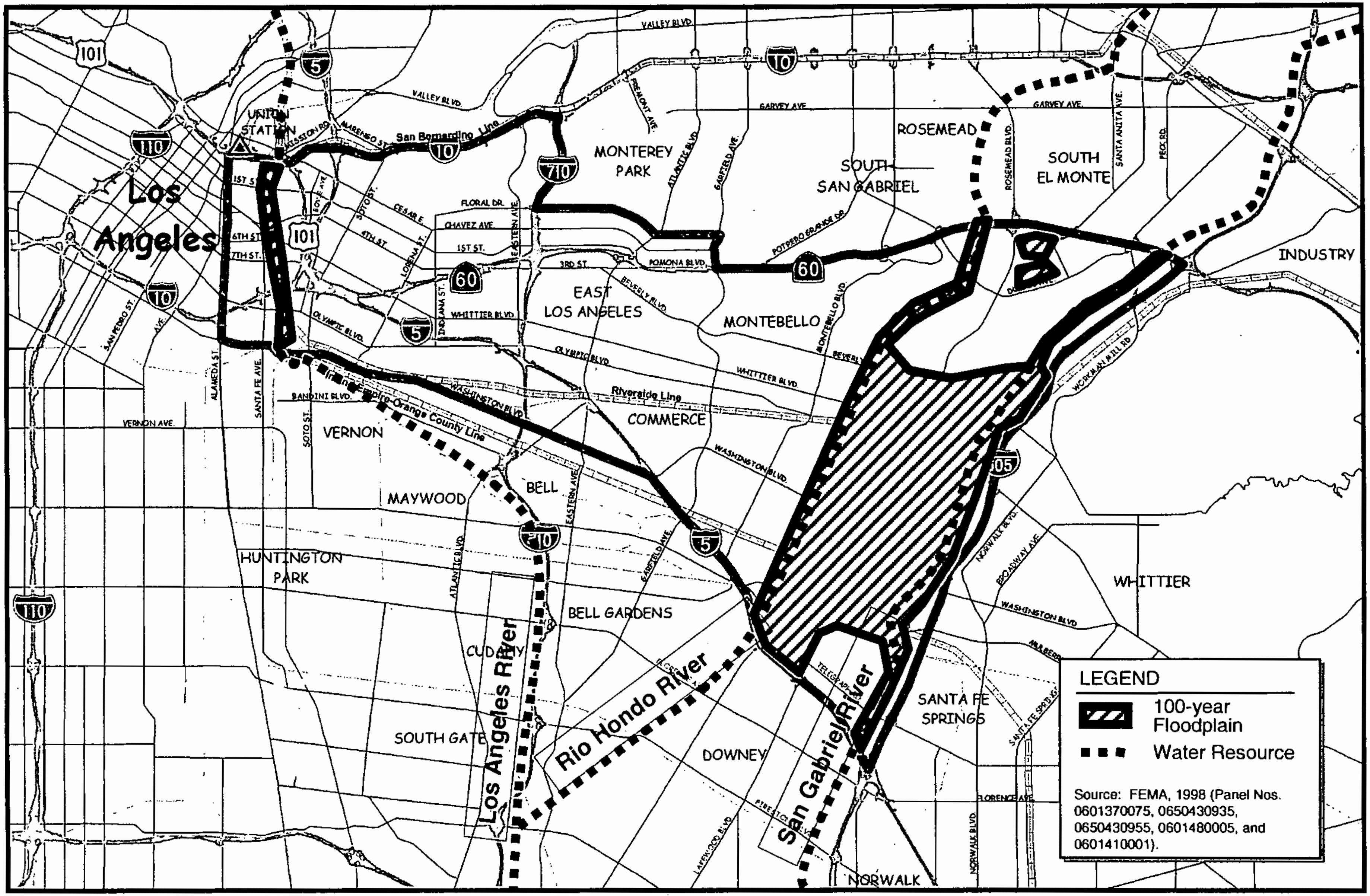
Floodplains

The floodplains of the three rivers are extensively studied and mapped in the recent Federal Emergency Management Agency (FEMA) Flood Insurance Studies for the Cities of Los Angeles and Pico Rivera dated May 4, 1999 and July 6, 1998, respectively. Other relevant FEMA Flood Insurance Studies include the County of Los Angeles, and the City of Montebello, both published in 1980. Figure 4-42 displays the existing defined 100-year floodplains for the Los Angeles, Rio Hondo, and San Gabriel Rivers as presented in the current Flood Insurance Studies.

Los Angeles River

The Los Angeles River basin has a long history of flooding which has caused extensive property damage and loss of lives. The major storms include January 1914, 1934, 1943 and 1956, February 1978 and 1980, and March 1938 and 1983. As previously mentioned, the portion of the river that is located in the study area is considered in the middle reach of the Los Angeles River. The channel capacity of the middle reach can safely convey the 100-year flow within the channel banks.

The upper reach of the Los Angeles River, the reach immediately upstream of the study reach, is not certified to adequately handle the 100-year flood. Overbank areas are susceptible to flooding caused by overtopping and failure of levee structures. Water escaping the channel in the left overbank of the upper reach may result from levee failure between the Santa Fe Railroad crossing and the Broadway Street Bridge immediately north of the study area. As identified on the current FEMA floodplain mapping, the 100-year flow in the Los Angeles River is fully contained in the channel at the Cesar Chavez Avenue and 1st Street bridges.



Eastside Transit Corridor Study

Water Resources and Floodplain

Eastside Corridor Transit Consultants

Figure 4-42

Rio Hondo River

The Rio Hondo levees along the study reach are not certified to adequately carry the 100-year flood. Overbank areas are susceptible to flooding caused by overtopping and failure of levees at Beverly and Whittier Boulevards.

The right levee (looking downstream) is not subject to overtopping from the 100-year flood between the Whittier Narrows Dam and Stewart and Grey Road, far below the study area. Therefore, portions of the study area to the west of the river are not subject to flooding from the Rio Hondo.

The left levee (looking downstream) is subject to overtopping from the 100-year flood for almost the entire reach below the Whittier Narrows Dam through the study reach. The FEMA Flood Insurance Studies for both the cities of Pico Rivera and Los Angeles include an extensive study of the predicted flooding from the river. Areas of 100-year flood inundations include all of Beverly and Whittier Boulevards between the Rio Hondo and San Gabriel Rivers, and Paramount Boulevard between Beverly and Whittier Boulevards.

The US Army Corps of Engineers has identified the Rio Hondo River as a priority for flood control improvements. Current and planned construction of river improvements along the Rio Hondo will increase capacity of the river so that the 100-year flood will be completely contained within the riverbanks. According to the Los Angeles District of the US Army Corps of Engineers, it is anticipated that the construction of all flood improvements on the Rio Hondo will be complete by the end of 2000. These improvements are not expected to adversely affect the existing bridge crossings planned for project use.

San Gabriel River

Because of the flood protection provided by the Whittier Narrows Dam, the reach of the San Gabriel River within the study area fully contains the 100-year flood. Streets and structures within the study area are not threatened by the 100-year flood of the San Gabriel River.

Groundwater

The Eastside Transit Corridor alignment is located in the Los Angeles Forebay groundwater area of the Central Basin along the Coastal Plain of Los Angeles County. The forebay area extends generally in a fan pattern around the Los Angeles River. The Eastside Transit Corridor area is underlain by the Lakewood and San Pedro (lowest) formations. The Lakewood formation is exposed on the surface of the La Brea and Montebello plains and extends underneath the recent alluvium on the Downey Plain. The aquifer in the Lakewood formation, which consists of sand, sandy clay, clay, and gravel, ranges in thickness from 0 to 100 feet and extends to depths of 100 to 375 feet (up to 250 feet below sea level). The Lakewood formation, which includes the Exposition, Gardena, and Gage aquifers, ranges from 0 to more than 220 feet thick in the southern part of the area.

The Exposition aquifer consists of as many as three separate sand and gravel members that have a maximum thickness of 80 feet and varies in depth from 100 to 160 feet. The Gardena aquifer, which covers most of the Los Angeles Forebay area, has sand and gravel members that range in thickness from 0 to 60 feet and extends to a maximum depth of 290 feet (100 feet below sea level).

The Gage aquifer, which mostly has been eroded away and replaced by the Gardena aquifer, consists of sand, sandy clay, and some gravel with a thickness of five to 100 feet and extends to a depth of 375 feet (250 feet below sea level). The Gage aquifer is the basal member of the Lakewood formation and rests on the underlying San Pedro formation.

The San Pedro formation is the lowest formation in the Los Angeles Forebay area. The aquifers of the San Pedro formation consist of various amounts of sand, sandy clay, clay, gravel and gravelly sand that range in thickness of 0 to 430 feet and extends to depths of 475 to 1600 feet (up to 1440 feet below sea level). This formation which contains the Hollydale, Jefferson, Lynwood, Silverado, and Sunnyside aquifers is about 1050 feet thick in the Los Angeles Forebay area.

The Silverado aquifer is found throughout most of the Los Angeles Forebay area and is the most significant aquifer for public water supply. This aquifer is protected from contamination from the surface by overlying low permeable strata. The aquifer consists of gravelly sand with some interbedded clay and ranges in thickness from 20 to 150 feet and extends to a maximum depth of 1070 feet (880 feet below sea level).

The Hollydale aquifer consists of sand and sandy clay with some gravel members that range in thickness from 0 to 60 feet and extends to a maximum depth of 475 feet (350 feet below sea level). The Jefferson aquifer consists of sand and sandy clay with some gravel members that range in thickness from 0 to 60 feet and extends to a maximum depth of 640 feet (450 feet below sea level).

The Lynwood aquifer is present over all of the Los Angeles Forebay area where the San Pedro formation occurs. This aquifer consists of sand and gravel with clay members that range in thickness from 20 to 130 feet and extends to a maximum depth of 720 feet (600 feet below sea level). The Sunnyside aquifer is found over most of the forebay area and consists of mainly sand with interbedded clays that range in thickness from 50 to 430 feet and extends to depths of 1600 feet (1440 feet below sea level).

The Coastal Plain of the Los Angeles County groundwater supply is consumed mainly by municipal users and moderately by industrial and irrigation (limited use) purposes. The storage capacity of the Coastal Plain is estimated to be 31,730,000 acre-feet with a useable capacity of 2,363,000 acre-feet. Injection barriers which consist of injection water wells along the Coastal Plain of Los Angeles County are used by the local water agencies to control the sea water intrusion created by an overdrawn water table. This process of injecting surface water not only prevents sea water intrusion, but also contributes to the fresh water supply in the basin and thereby mitigates overdraft of water supplies.

Groundwater aquifers would be expected to be approximately 150 to 200 feet below the ground surface. Surface water sources can also contribute to the groundwater level as revealed by well data in the vicinity of the Los Angeles River. Analysis from the preliminary geotechnical investigation indicates that groundwater levels along the western segment, west of US Highway 101, were between 30 to 40 feet below ground surface between Union Station and First Street, between 70 to 80 feet deep south of First Street, and 50 to 60 feet deep east of the Los Angeles River. A 1983 study in this area identified groundwater levels up to 55 feet higher than the current levels measured in the vicinity of 3rd and Santa Fe Streets. Farther east along the alignment, groundwater is estimated to be approximately 20 to 60 feet deep between First and Boyle Streets and First and Lorena Streets. East of this area, available regional data suggest that groundwater is deeper than approximately 150 feet. Perched groundwater may be encountered anywhere along the Eastside Corridor.

4.10.2 Evaluation Methodology

The criteria evaluated include: 1) acres of floodplain affected, and 2) number of water crossings along the alignment. The Federal Emergency Management Agency (FEMA) Flood Insurance Studies (1998) for each of the three waterways in the study area (Los Angeles, Rio Hondo, and San Gabriel Rivers) were reviewed to determine the boundaries of the 100-year floodplain relative to the locations of the build alternative alignments. The conceptual plans for each alternative were also reviewed to determine if the planned design would have any effect on the floodplains. The plans were evaluated with respect to the floodplain issues defined in Federal Regulation 23 CFR 650A to determine if potential impacts are possible. The plans were also examined to ascertain the number of water crossings that each alternative will require.

4.10.3 Environmental Issues

The criteria evaluated in this section include: 1) acres of floodplain affected, and 2) number of water crossings along the alignment.

Acres of Floodplain Affected

The Federal Emergency Management Agency (FEMA) has defined the 100-year floodplains for the three waterways within the project study area: the Los Angeles River, the Rio Hondo River, and the San Gabriel River. A graphic depiction of the 100-year floodplain in the study area is presented in the Affected Environment section.

The floodplain issues summarized in Table 4-43 are defined in Federal Regulation 23 CFR 650A as important for the consideration of impacts on floodplains. Each of the floodplain evaluation issues relative to the proposed project is discussed in detail below.

TABLE 4-43 FLOODPLAIN EVALUATION ISSUES										
Issue	Alternative									
	No-Build	TSM	1	2	3	4	5	6	7	8
Is the action a significant longitudinal encroachment?	No	No	No	No	No	No	No	No	No	No
Are the risks associated with the action significant?	No	No	No	No	No	No	No	No	No	No
Will the action support probable incompatible floodplain development?	No	No	No	No	No	No	No	No	No	No
Is the action a significant floodplain encroachment?	No	No	No	No	No	No	No	No	No	No
Are non-routine measures required to minimize floodplain impacts associated with the action?	No	No	No	No	No	No	No	No	No	No
Are there significant impacts on natural and beneficial floodplain values?	No	No	No	No	No	No	No	No	No	No
Are non-routine measures required to restore and preserve the natural and beneficial floodplain values impacted by the action?	No	No	No	No	No	No	No	No	No	No

Is the action a significant longitudinal encroachment? The No Build, TSM, or any of the eight build alternatives would not be considered a longitudinal encroachment to the 100-year floodplains for any of the three waterways with identified floodplains. No fill will be placed in, or encroachment made to, an existing floodplain, nor emergency vehicle access impacted, nor natural or beneficial floodplain values impacted. The transit improvements that are a part of this project will not significantly increase the existing depth or limits of flooding.

As defined by the Federal Highway Administration (FHWA), a longitudinal encroachment is an action within the limits of the base floodplain that is longitudinal to the normal direction of the floodplain. A significant encroachment is an encroachment and any direct support of likely base floodplain development that would involve one or more of the following construction or flood-related impacts: 1) a significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route, 2) a significant risk, or 3) a significant adverse impact on the natural and beneficial floodplain values.

Are the risks associated with the action significant? For the No Build, TSM, or any of the eight build alternatives, the risks associated with the action are not significant. As defined by the FHWA, risk shall mean the consequences associated with the probability of flooding attributable to an encroachment. It shall include the potential for property loss and hazard to life during the service life of the transit facility. The transit improvements that are a part of this project will not significantly increase the existing depth or limits of flooding. At all of the waterway crossings, the transit improvement will utilize an existing street bridge over the waterway. Utilization of the existing street bridges may require seismic strengthening of the bridges. Possible strengthening may include slight widening of the existing bridge piers, anticipated to be a minor impact on the elevations of the floodplains.

Will the action support probable incompatible floodplain development? Implementation of the No Build, TSM, or any of the eight build alternatives will not support probable incompatible floodplain development. The project is consistent with local and regional land use and transportation planning. The proposed transit improvements will improve local and regional access to existing and planned commercial and industrial facilities in the project vicinity.

The defined floodplains for all the waterways within the project are predominantly within the defined, improved channels. The only identified floodplain outside of the river banks is the area between the Rio Hondo and the San Gabriel Rivers due to the less than 100-year capacity of the left bank of the Rio Hondo. Current and planned construction of river improvements along the Rio Hondo River will increase its capacity so that the 100-year flood will be completely contained within its banks. According to the Los Angeles District of the US Army Corps of Engineers, it is anticipated that the construction of all flood improvements on the Rio Hondo River will be complete by the end of the year 2000.

Is the action a significant floodplain encroachment? The No Build, TSM, or any of the eight build alternatives would not be considered a significant floodplain encroachment. Any changes to the flood control facilities will have minimal adverse impacts. At all of the waterway crossings, the transit improvement will utilize an existing street bridge over the waterway. Utilization of the existing street bridges may require seismic strengthening of the bridges. Possible strengthening may include slight widening of the existing bridge piers, anticipated to be a minor impact on the elevations of the floodplains. No fill will be placed in, or encroachment made to, an existing floodplain, nor emergency vehicle access impacted, nor natural or beneficial floodplain values impacted. The transit improvements that are a part of this project will not significantly increase the existing depth or limits of flooding.

As defined by the FHWA, a significant encroachment is a highway encroachment and any direct support of likely base floodplain development that would involve one or more of the following construction or flood-related impacts: 1) a significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route; 2) a significant risk, or 3) a significant adverse impact on the natural and beneficial floodplain values.

Are non-routine measures required to minimize floodplain impacts associated with the action? There are no identified significant impacts on the floodplain. No non-routine measures are required.

Are there significant impacts on natural and beneficial floodplain values? For the No Build, TSM, or any of the eight build alternatives, there are no anticipated significant impacts on the natural and beneficial floodplain values. Environmental technical studies will be conducted to analyze potential impacts. Natural and beneficial floodplain values include, but are not limited to: fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge.

Are non-routine measures required to restore and preserve the natural and beneficial floodplain values impacted by the action? There are no identified significant impacts on the natural and beneficial floodplain values. No non-routine measures are required to restore or preserve the floodplain values.

<u>Number of Water Crossings</u>

There are three major waterways within the project area. Table 4-44 compares the numbers of water crossings for the alternatives. Each at-grade build alternative (Alternatives 1 through 5) crosses over each of the waterways once utilizing an existing bridge. Alternative 6 also crosses each of the waterways once on an existing bridge. Both Alternatives 7 and 8 cross the Rio Hondo and San Gabriel Rivers once on an existing bridge. Both Alternatives 7 and 8 cross under the Los Angeles River in a planned subway tunnel. At each of the waterway crossings is an existing street bridge. No new bridges are planned as part of the transit improvements.

TABLE 4-44
NUMBER WATER CROSSINGS

Criteria	Alternative									
	No-Build	TSM	1	2	3	4	5	6	7	8
Number of water crossings along the alignment	N/A	N/A	3	3	3	3	3	3	2	2

4.11 WETLANDS

4.11.1 <u>Affected Environment</u>

The build alternatives traverse urban areas in Los Angeles County where urban development has often eliminated wetlands and associated natural vegetation and wildlife habitat. The build alternatives are contained in existing public, particularly street, rights-of-way or in tunnels. Stream channels would be crossed on existing structures although there is the possibility that bridges may need to be widened or new structures constructed to accommodate the bus or light rail alternatives. Wetlands are generally considered to be areas that are periodically or permanently inundated by surface or groundwater, and support vegetation adapted to life in saturated soil. Wetlands are recognized as important features on a regional and national level because of their inherent value to fish and wildlife, particularly for providing habitat to special-status species, and for storage areas for storm and flood waters, water recharge, and filtration functions.

Regulatory Setting

Technical standards for delineating wetlands have been developed by the US Army Corps of Engineers (Corps) and the US Fish and Wildlife Service (USFWS). These agencies generally define wetlands through consideration of three criteria: hydrology, soils, and vegetation. The USFWS publishes the National Wetlands Inventory maps that identify and overlay wetland boundaries on US Geological Survey quadrangle maps. The Corps and, in California, the State Department of Fish and Game (CDFG) have jurisdiction over modifications to stream channels, river banks, lakes, and other wetland features. Jurisdiction of the Corps is established through the provisions of Section 404 of the Clean Water Act, which prohibits the discharge of dredged or fill material into "waters," including wetlands and unvegetated "other waters," of the United States without a permit. Jurisdictional authority of the CDFG over wetlands areas is established under Sections 1601-1606 of the California Fish and Game Code, which pertains to activities that would disrupt the natural flow or alter the channel, bed, or bank of any lake, river, or stream. The Wetlands Resource Policy of the CDFG strongly discourages development in, or conversion of, wetlands without acceptable project mitigation that assures there will be no net loss of either wetland habitat values or acreage.

Approach

Because the study area is largely developed and most natural habitat has been disturbed or eliminated by previous development, it is unlikely that wetland resources would occur in the study area except along stream courses. Given this assumption, wetland resources were identified by review of available information for the three principal streams traversing the study area – Los Angeles River, San Gabriel River, and Rio Hondo River.

USFWS National Wetland Inventory (NWI) maps, although dated from the 1970's, were reviewed as a starting point for identifying potential wetlands along the stream channels. Federal, state, and local agencies that have jurisdiction over, or participate in decisions affecting these stream channels were contacted to corroborate or update the information provided by the NWI maps. The Corps provided information on wetland resources in the Whittier Narrows recreational area.

The Los Angeles County Department of Public Works was contacted to determine if the Master Plan for the Los Angeles River, completed in 1996, and a similar plan being developed for the San Gabriel River identified wetland restoration projects along these rivers. Additional information about wetland restoration was provided by the California Coastal Conservancy, which is currently working with several non-governmental agencies and community groups to implement wetland and open space projects along the Los Angeles River.

Simultaneously, a windshield survey was performed along the stream channels in the study area. Vegetation cover in low-lying areas along stream channels was used as the primary indicator of potential wetland habitat during the survey effort and compared with NWI maps. Potential wetland areas were photographed.

Wetland Resources in the Study Area

The USFWS NWI maps were used to help identify locations of potential wetland resources in the study area (Figures 4-43 through 4-45). The maps indicate excavated Riverine (Lower Perennial) wetlands[8] along the entire concrete-lined channel of the Los Angeles River in the study area, including those portions of the channel passing under the Cesar Chavez Avenue, 1st Street, 4th Street, and Whittier Boulevard bridges. However, no obvious wetlands were noted near the Chavez Avenue and 1st Street bridge crossings during the windshield survey. The crossings at 4th Street and Whittier Boulevard were not surveyed because none of the build alternatives would traverse either bridge.

North of I-10 along the Los Angeles River, several wetland restoration projects are being planned at the following locations: the mouth of Arroyo Seco, Chinatown Yard, and Taylor Yard[9]. Wetland restoration is also being planned north of I-10 along an abandoned rail spur that apparently used a former stream bed to traverse Hazard Park west of Soto Street[10].

According to the NWI maps, excavated Riverine (Intermittent) wetlands are also located along the Rio Hondo River at the Beverly Boulevard and Whittier Boulevard channel crossings. During the survey, small pockets of highly disturbed wetlands were noted in the overflow areas of the river on both the north and south sides of the Beverly Boulevard crossing. The NWI maps indicate a presence of Lacustrine (Littoral) wetlands[11] south of Whittier Boulevard along and on either side of the Rio Hondo embankment. The Lacustrine wetlands lie at a lower elevation than the raised concrete-lined channel of the Rio Hondo and cover an extensive area east of the channel. They serve as spreading grounds for flood control and groundwater recharging under the jurisdiction of the Los Angeles County Flood Control District (refer to Water Resources, Section 4.10). During the rainy season, stream flow can be diverted into the spreading grounds, which are designed to quickly absorb the excess water. The California Coastal Conservancy in concert with other state and local agencies is considering the possibility of slowing the absorption rate in certain Los Angeles Basin spreading grounds to establish viable wetland habitat[12]. However, this planning effort has not been extended to the portion of the Rio Hondo and San Gabriel Rivers in the study area.

The NWI maps also show excavated Riverine (Intermittent) wetlands occurring along the San Gabriel River, including the channel crossings at Beverly and Whittier Boulevards. To the north of Beverly Boulevard, extensive Riverine, Lacustrine, and Palustrine[13] wetland areas are situated behind the Whittier Narrows Dam, which stretches across the Rio Hondo and San Gabriel River channels. The wetlands, which are part of the Whittier Narrows Recreation Area, are currently under restoration[14]. To the south, immediately

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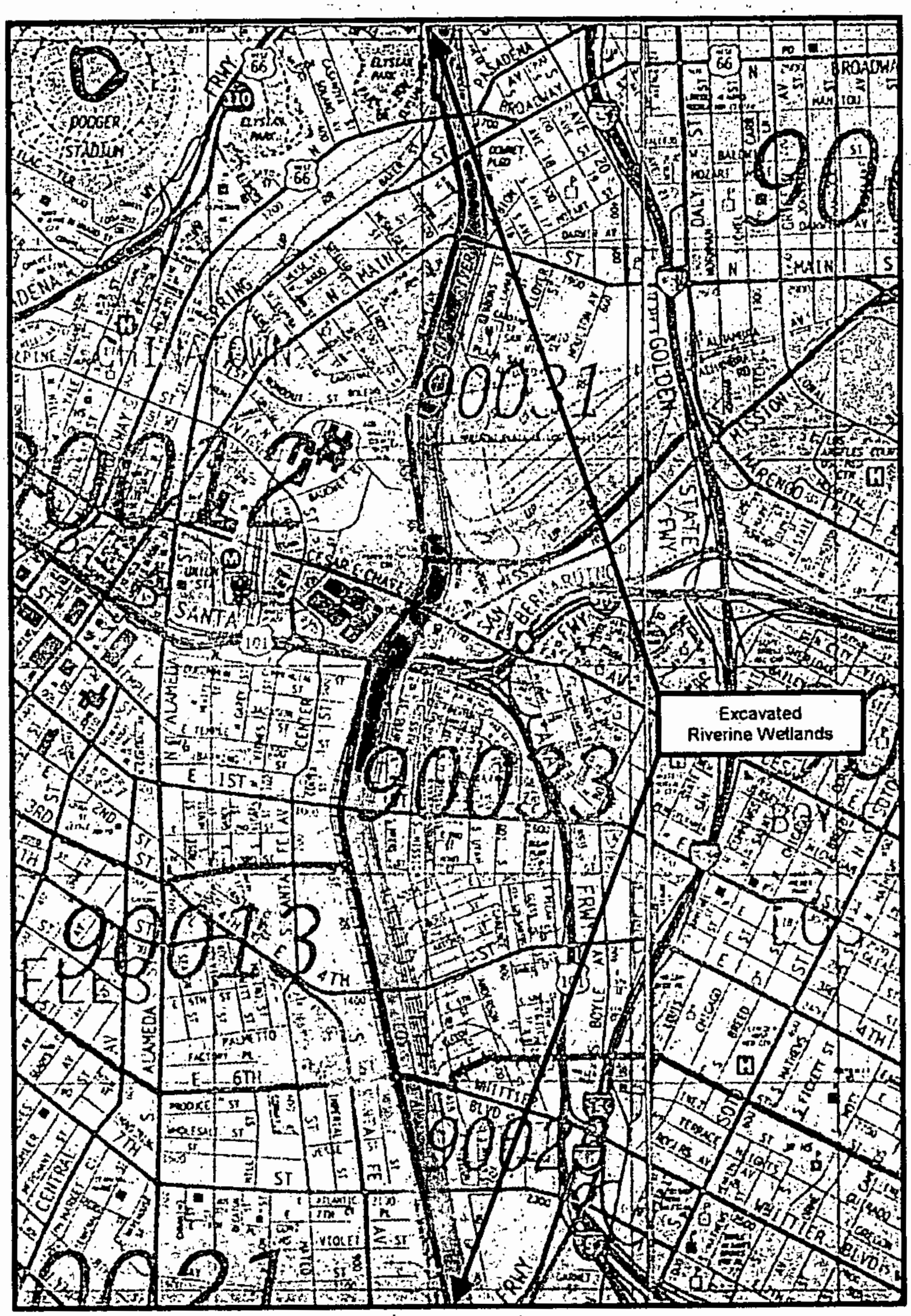
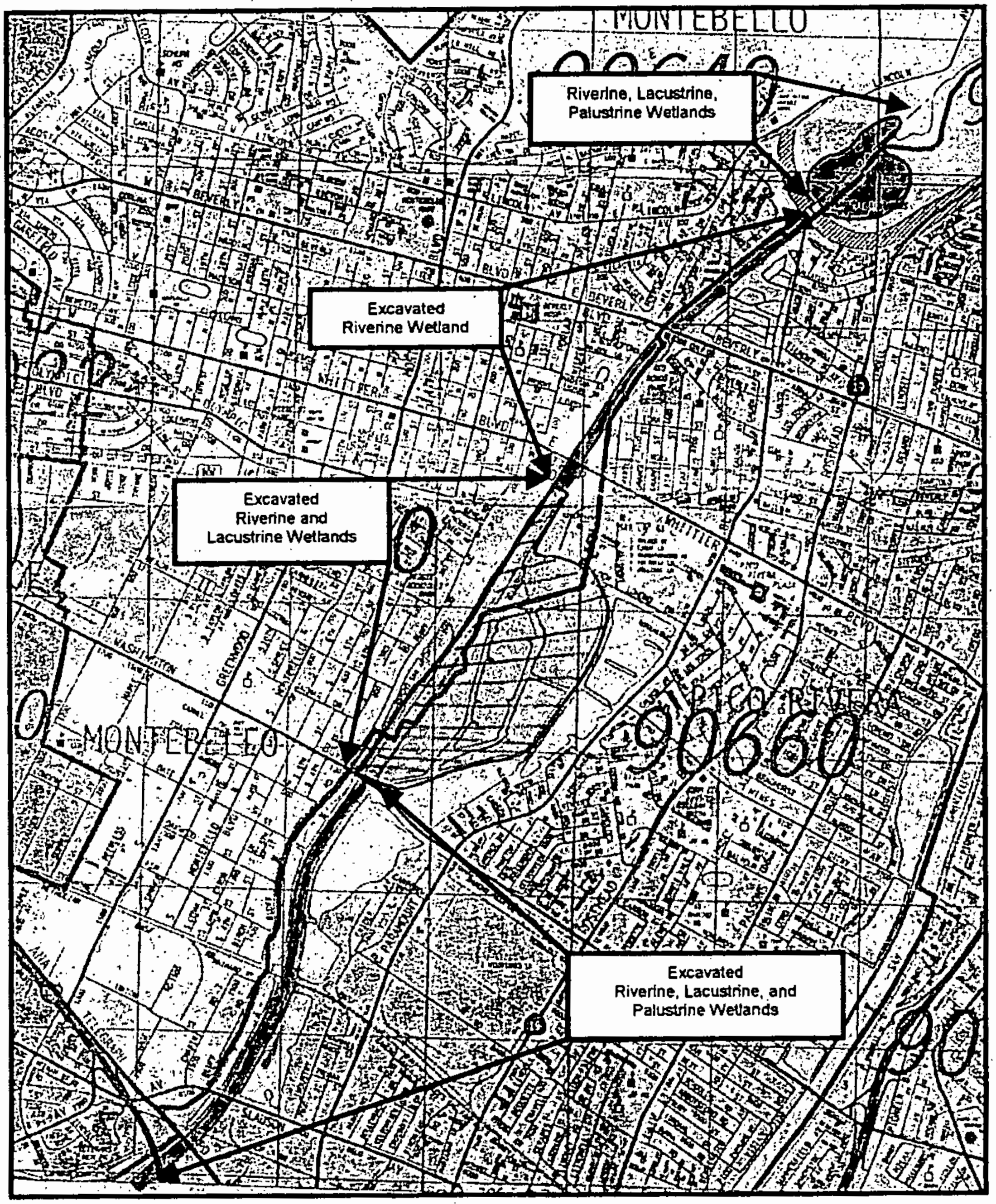
[8] Wetlands occurring in streambeds with water or without water flowing.
[9] Telephone conversation, Chris Kroll, California Coastal Conservancy, Oakland, CA, October 12, 1999.
[10] Telephone conversation, Sean Woods, California Coastal Conservancy, Oakland, CA, October 14, 1999.
[11] Wetlands situated in topographic depression or dammed river channel.
[12] Telephone conversation, Chris Kroll, California Coastal Conservancy, Oakland, CA, October 26, 1999.
[13] Wetlands occurring in upland islands, which may be surrounded by the stream channel.
[14] Telephone conversation, Jonathan Lillien, US Army Corps of Engineers, Los Angeles, CA, October 5, 1999.



WETLANDS ASSOCIATED WITH THE LOS ANGELES RIVER

Source: USFWS National Wetlands Inventory Maps



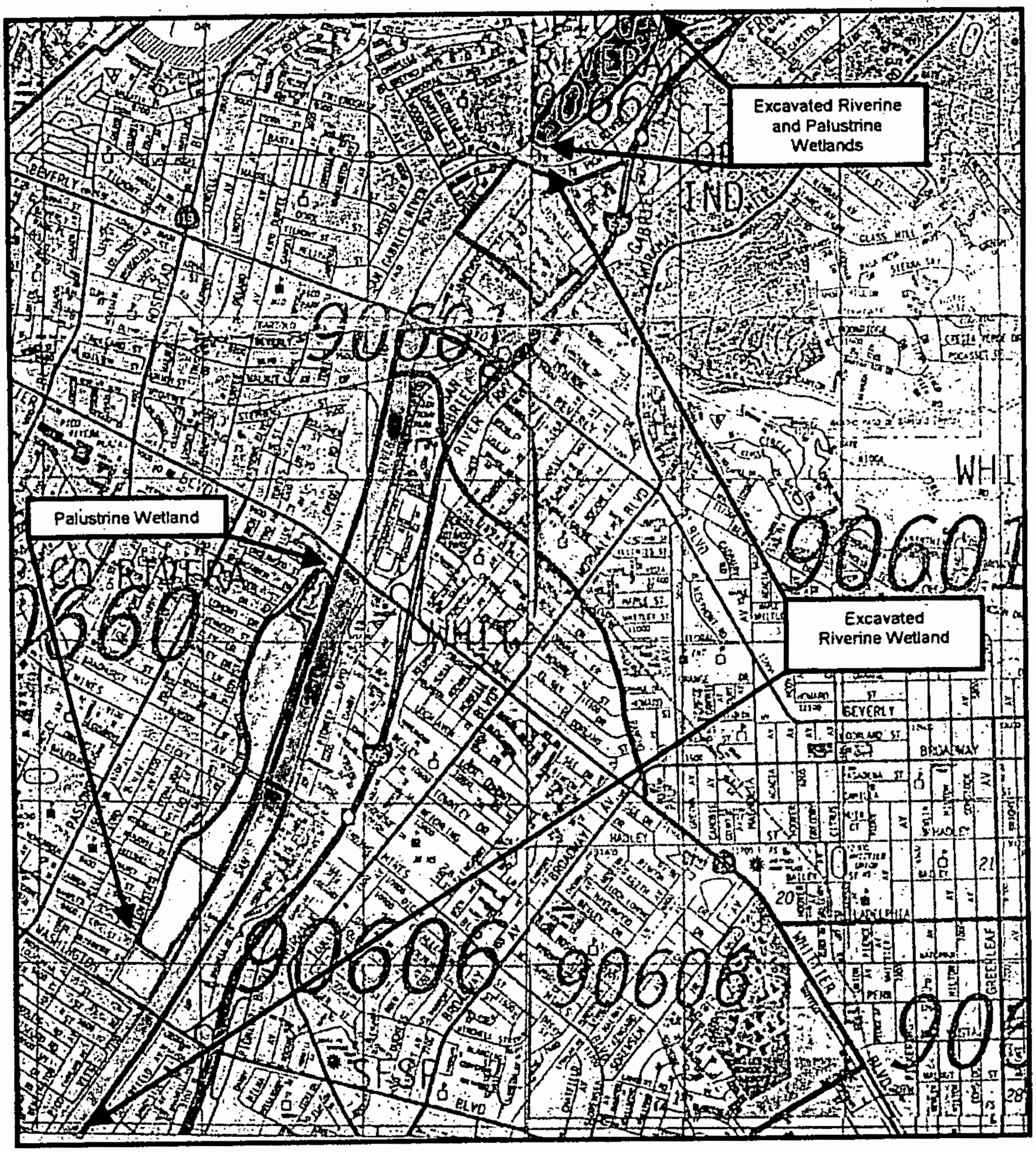
WETLANDS ASSOCIATED WITH THE RIO HONDO RIVER

Source: USFWS National Wetlands Inventory Map

Eastside Transit Corridor Study

Wetlands
Rio Hondo River

Eastside Corridor Transit Consultants



WETLANDS ASSOCIATED WITH THE SAN GABRIEL RIVER

Source: USFWS National Wetlands Inventory Maps west of the San Gabriel channel between Whittier and Washington Boulevards are Palustrine (Flat) wetland areas, which also serve as spreading grounds.

4.11.2 Evaluation Methodology

Because the study area is largely developed and most natural habitat has been disturbed or eliminated by previous development, it is unlikely that wetland resources would occur in the study area except along stream courses. Given this assumption, wetland resources were identified by review of available information for the three principal streams traversing the study area – Los Angeles River, San Gabriel River, and Rio Hondo River.

USFWS National Wetland Inventory (NWI) maps, although dated from the 1970's, were reviewed as a starting point for identifying potential wetlands along the stream channels. Federal, state, and local agencies that have jurisdiction over, or participate in decisions affecting these stream channels were contacted to corroborate or update the information provided by the NWI maps. The Corps provided information on wetland resources in the Whittier Narrows recreational area.

The Los Angeles County Department of Public Works was contacted to determine if the Master Plan for the Los Angeles River, completed in 1996, and a similar plan being developed for the San Gabriel River identified wetland restoration projects along these rivers. Additional information about wetland restoration was provided by the California Coastal Conservancy, which is currently working with several non-governmental agencies and community groups to implement wetland and open space projects along the Los Angeles River.

Simultaneously, a windshield survey was performed along the stream channels in the study area. Vegetation cover in low-lying areas along stream channels was used as the primary indicator of potential wetland habitat during the survey effort and compared with NWI maps. Potential wetland areas were photographed.

4.11.3 Environmental Issues

This section evaluates the acres of wetland affected.

Comparative Evaluation

Table 4-45 displays the wetlands impacts by alternative.

No Build and TSM Alternatives. The No Build and TSM Alternatives include no new facilities or structures in the study area. Consequently, wetland resources in and around the Los Angeles, Rio Hondo, and San Gabriel Rivers would not be affected by these alternatives.

Build Alternatives (1-8). At this stage of project development, no new structures are being proposed to carry BRT or LRT across the Los Angeles, Rio Hondo, and San Gabriel Rivers. In addition, the existing crossings of the Los Angeles River at Cesar Chavez Avenue and 1st Street and the Rio Hondo and San Gabriel Rivers at Beverly

Boulevard and Whittier Boulevard are expected to have adequate carrying capacity to accommodate all build alternatives. At the current conceptual level of design, the existing crossings would not need to be widened nor would new support piers be required. As a result, wetland resources along these stream courses would not be affected by project implementation. If, during the later stages of design, it is determined that bridge widening or additional piers may be required, then impacts on wetlands are likely.

TABLE 4-45
WETLAND RESOURCE AREAS ALONG THE ALIGNMENTS[1]

Alternative	Number of Acres Potentially Affected
No-Build	0
TSM	0
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0

[1] If seismic retrofit work were undertaken as part of project implementation, wetland resources in the stream channel immediately adjacent to the bridge support structures may be temporarily affected. This impact could apply to all build alternatives and may affect less than an acre of land at three bridge crossings.

Mitigation

No mitigation is required under the existing plans for the build alternatives. The plans call for the alignment of Alternatives 1, 4, 5, 7, and 8 to follow Paramount Boulevard to transition between Beverly Boulevard and Whittier Boulevard. If, for some reason, the transition area is modified to follow the embankment of the Rio Hondo River, wetlands in and along the stream course may be affected by project construction, triggering Section 404 and California Department of Fish and Game (CDFG) permitting procedures. Additionally, if seismic retrofit work of existing bridge structures were to be included as part of project implementation, temporary construction impacts on wetland resources may occur in the river channels immediately surrounding the existing bridge support piers. In this case, bridge retrofit work may be limited to the dry season in accordance with the US Corps of Army Engineers and CDFG permitting procedures. Wetland resources that were temporarily affected would be returned to their original condition.

For Alternatives 7 and 8, which incorporate a subway extension from Union Station to Soto and Lorena Streets, respectively, subway construction under the Los Angeles River channel would employ tunneling procedures to ensure that the wetlands situated in the concrete-lined channel would not be directly or indirectly affected.

4.12 ENERGY

4.12.1 Evaluation Methodology

This section assesses the impact of the alternatives on transportation-related energy consumption for the region in 2020 (refer to Section 4.12.2 for the results of the evaluation). The analysis estimates the total amount of energy expected to be consumed by each of the alternatives. The direct (operational) energy impacts were assessed using the following methodology.

Direct energy consumption involves energy used by the operation of vehicles (automobile, truck, bus, or train) within the corridor. In assessing the direct energy impact, consideration was given to the following factors:

- Annual vehicle miles traveled (VMT) for automobiles, trucks, buses, LRT, and heavy rail vehicles

- Variation of fuel consumption rates by vehicle type.

The direct energy analysis for each alternative was based on projected year 2020 corridor traffic volumes and total VMT. The 2020 daily traffic volumes for the study corridor were provided by the MTA model and annualized using a factor of 315 days per year. The VMT fuel consumption method utilized for this project is outlined in the *Technical Guidance on Section 5309 New Starts Criteria* (FTA, 1999). Energy consumption factors for the various modes identified in Table 4-46 were developed by Oak Ridge Laboratory and published in the 1996 *Transportation Energy Book: Edition 16.*

TABLE 4 - 46
ENERGY CONSUMPTION FACTORS

Mode	Factor
Passenger Vehicles (auto, van, light truck)	6,233 BTU/Vehicle Mile
Transit Bus (all vehicle types)[1]	41,655 BTU/Vehicle Mile
Rail (light or heavy)	77,739 BTU/Vehicle Mile

[1]FTA recommends utilizing a transit bus energy consumption factor of 41,655 BTUs/VMT for all bus types (including alternative fueled buses). Sufficient data has not been available to develop consumption factors for alternative fuels such as CNG (compressed natural gas), LNG (liquefied natural gas), and others.

Source: Oak Ridge Laboratory, 1996.

Direct energy, measured in British thermal units (BTUs)[15], was converted to the equivalent barrels of crude oil for comparison of alternatives. The change in annual BTUs was also calculated for all build alternatives compared to the No Build and TSM Alternatives.

[15] One British thermal unit (BTU) is the quantity of energy necessary to raise one pound of water one degree Fahrenheit.

4.12.2 Environmental Issues

The criterion evaluated includes annual energy savings, expressed in British Thermal Units (BTUs) reduced, compared to the No-Build and TSM Alternatives.

Potential energy consumption of the eight build alternatives were compared to the No-Build and TSM Alternatives. The annual direct energy consumption for each alternative is summarized in Table 4-47, and is discussed below. Table 4-48 compares the annual energy consumption of each of the build alternatives to the No-Build and TSM Alternatives. The No-Build and all of the build alternatives will have somewhat lower energy requirements than the TSM Alternative. Only three of the build alternatives (Alternatives 2, 3 and 6) are projected to result in less energy consumption than the No-Build alternative. With regard to a comparison of the build alternatives to each other, Alternative 6 has the lowest energy requirements while Alternative 8 has the highest such requirements. However, the overall difference in energy requirements between any of the alternatives being considered is not substantial. The remaining discussion focuses on the analysis of each alternative.

No-Build Alternative. Under the No-Build Alternative, the annual VMT for automobiles and trucks within the region is forecast to be 160.46 billion miles in 2020, 191.47 million miles for bus, and 7.06 million miles for LRT. Given the VMT and vehicle fuel consumption on an annual basis, vehicles operating within the region are anticipated to consume approximately 173.9 million barrels of oils or approximately 1,009,000 billion BTUs. Overall, the No-Build Alternative would have moderate energy consumption compared to the TSM and build alternatives.

TSM Alternative. Under the TSM Alternative, the annual VMT for automobiles and trucks within the region is forecast to be 160.50 billion miles in 2020, 199.68 million miles for bus, and 7.92 million miles for LRT. Vehicles operating within the region are anticipated to expend approximately 174.0 million barrels of oils or approximately 1,009,000 billion BTUs. Overall, the TSM alternative would result in the greatest energy consumption of any of the alternatives being considered. On an annual basis, this alternative would consume approximately 110,877 more barrels of oil than the No-Build Alternative.

Alternative 1. Under Alternative 1, the annual VMT for automobiles and trucks within the region is forecast to be 160.38 billion miles in 2020, 205.26 million miles for bus, and 7.92 million miles for LRT. Vehicles operating within the region are anticipated to expend approximately 173.9 million barrels of oils or approximately 1,009,000 billion BTUs. Overall, Alternative 1 would result in moderate energy consumption compared to all other alternatives. On an annual basis, this alternative would consume approximately 17,331 more barrels of oil than the No-Build Alternative. This alternative would result in approximately 93,545 less barrels of oil than the TSM Alternative.

TABLE 4-47
ANNUAL DIRECT ENERGY CONSUMPTION
YEAR 2020

	No-Build Alternative	TSM Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
Vehicle Miles Traveled (VMT):										
Daily Auto/Truck VMT	509,407,249	509,526,244	509,131,723	508,984,658	508,936,211	509,293,289	509,334,444	508,729,095	509,149,867	509,294,820
Annual VMT (billions)	*160.46*	*160.50*	*160.38*	*160.33*	*160.31*	*160.43*	*160.44*	*160.25*	*160.38*	*160.43*
Daily Bus VMT	607,836	633,920	651,604	652,997	638,650	653,448	639,889	638,461	639,793	651,082
Annual VMT	*191,468,440*	*199,684,887*	*205,255,373*	*205,694,161*	*201,174,711*	*205,836,014*	*201,564,990*	*201,115,177*	*201,534,856*	*205,090,735*
Daily Rail VMT	22,404	25,148	25,148	25,148	29,059	25,148	29,059	28,998	30,501	26,828
Annual VMT	*7,057,369*	*7,921,717*	*7,921,717*	*7,921,717*	*9,153,559*	*7,921,717*	*9,153,559*	*9,134,450*	*9,607,783*	*8,450,909*
Energy Consumption (BTUs)[1]: (billions)										
Annual Auto/Truck BTUs[1]	1,000,200	1,000,400	999,630	999,340	999,240	999,940	1,000,000	998,840	999,660	999,950
Annual Bus BTUs[1]	7,976	8,318	8,550	8,568	8,380	8,574	8,396	8,377	8,395	8,543
Annual Rail BTUs[1]	549	616	616	616	712	616	712	710	747	657
TOTAL DIRECT BTUs (billions[2])	**1,009,000**	**1,009,000**	**1,009,000**	**1,009,000**	**1,008,000**	**1,009,000**	**1,009,000**	**1,008,000**	**1,009,000**	**1,009,000**
TOTAL BARRELS OF OIL[3]	**173,912,396**	**174,023,272**	**173,929,727**	**173,883,095**	**173,850,747**	**173,988,590**	**173,988,358**	**173,779,951**	**173,931,748**	**173,990,849**

[1]One British Thermal Unit (BTU) is the quantity of energy necessary to raise one pound of water one degree Fahrenheit.
[2]Rounded.
[3]One barrel of crude oil is equal to 5.8 million btus.

Sources: Vehicle Miles Traveled (PBQD, 2000)
Energy Consumption Factors (Oak Ridge National Laboratory, 1996)

TABLE 4-48 ANNUAL ENERGY SAVINGS				
Alternative	**BTUs (Billions)**[1]	**Barrels Of Oil**	**Change In BTUs vs. No-Build**	**Change In BTUs vs. TSM**
No-Build	1,009,000	173,912,396	NA	NA
TSM	1,009,000	174,023,272	+110,877	NA
1	1,009,000	173,929,727	+17,331	-93,545
2	1,009,000	173,883,095	-29,301	-140,178
3	1,008,000	173,850,747	-61,649	-172,525
4	1,009,000	173,988,590	+76,194	-34,682
5	1,009,000	173,988,358	+75,963	-34,914
6	1,008,000	173,779,951	-132,445	-243,321
7	1,009,000	173,931,748	+19,352	-91,525
8	1,009,000	173,990,849	+78,453	-32,424

[1]Rounded.

Alternative 2. Under Alternative 2, the annual VMT in 2020 within the region is forecast to be 160.33 billion miles for automobiles and trucks, 205.69 million miles for bus, and 7.92 million miles for LRT. Vehicles operating within the region are anticipated to expend approximately 173.9 million barrels of oils or approximately 1,009,000 billion BTUs. Overall, Alternative 2 would result in low energy consumption compared to all other alternatives. On an annual basis, this alternative would consume approximately 29,301 less barrels of oil than the No-Build Alternative. This alternative would result in approximately 140,178 less barrels of oil than the TSM Alternative.

Alternative 3. Under Alternative 3, the annual VMT in 2020 within the region is forecast to be 160.31 billion miles for automobiles and trucks, 201.17 million miles for bus, and 9.15 million miles for LRT. Vehicles operating within the region are anticipated to expend approximately 173.8 million barrels of oils or approximately 1,008,000 billion BTUs. Overall, Alternative 3 would result in the next to the lowest energy consumption compared to all other alternatives. On an annual basis, this alternative would consume approximately 61,649 less barrels of oil than the No-Build Alternative. This alternative would result in approximately 172,525 less barrels of oil than the TSM Alternative.

Alternative 4. Under Alternative 4, the annual VMT in 2020 within the region is forecast to be 160.43 billion miles for automobiles and trucks, 205.84 million miles for bus, and 7.92 million miles for LRT. Vehicles operating within the region are anticipated to expend approximately 174.0 million barrels of oils or approximately 1,009,000 billion BTUs. Overall, Alternative 4 would result in high energy consumption compared to all other alternatives. On an annual basis, this alternative would consume approximately 76,194 more barrels of oil than the No-Build Alternative. This alternative would result in approximately 34,682 less barrels of oil than the TSM Alternative.

Alternative 5. Under Alternative 5, the annual VMT in 2020 within the region is forecast to be 160.44 billion miles for automobiles and trucks, 201.56 million miles for bus, and 9.15 million miles for LRT. Vehicles operating within the region are anticipated to expend approximately 174.0 million barrels of oils or approximately 1,009,000 billion BTUs. Overall, Alternative 5 would result in moderate energy consumption compared to all other alternatives. On an annual basis, this alternative would consume approximately 75,963 more barrels of oil than the No-Build Alternative. This alternative would result in approximately 34,914 less barrels of oil than the TSM Alternative.

Alternative 6. Under Alternative 6, the annual VMT in 2020 within the region is forecast to be 160.25 billion miles for automobiles and trucks, 201.12 million miles for bus, and 9.13 million miles for LRT. Vehicles operating within the region are anticipated to expend approximately 173.8 million barrels of oils or approximately 1,008,000 billion BTUs. Overall, Alternative 6 would result in the least energy consumption compared to all other alternatives. On an annual basis, this alternative would consume approximately 132,445 less barrels of oil than the No-Build alternative. This alternative would result in approximately 243,321 less barrels of oil than the TSM Alternative.

Alternative 7. Under Alternative 7, the annual vmt in 2020 within the region is forecast to be 160.38 billion miles for automobiles and trucks, 201.53 million miles for bus, and 9.61 million miles for LRT. Vehicles operating within the region are anticipated to expend approximately 173.9 million barrels of oils or approximately 1,009,000 billion BTUs. Overall, Alternative 7 would result in moderate energy consumption compared to all other alternatives. On an annual basis, this alternative would consume approximately 19,352 more barrels of oil than the No-Build alternative. This alternative would result in approximately 91,525 less barrels of oil than the TSM Alternative.

Alternative 8. Under Alternative 8, the annual VMT in 2020 within the region is forecast to be 160.43 billion miles for automobiles and trucks, 205.09 million miles for bus, and 8.45 million miles for LRT. Vehicles operating within the region are anticipated to expend approximately 174.0 million barrels of oils or approximately 1,009,000 billion BTUs. Overall, Alternative 8 would result in high energy consumption compared to all other alternatives. It has the highest energy requirements of any of the build alternatives. On an annual basis, this alternative would consume approximately 78,453 more barrels of oil than the No-Build Alternative. This alternative would result in approximately 32,424 less barrels of oil than the TSM Alternative.

4.13 CULTURAL/PALEONTOLOGIC RESOURCES

4.13.1 Affected Environment

Cultural Resources

Legal Background

The major state and federal laws that apply to historic resources and their preservation are discussed in this section.

The California Register of Historical Resources

In 1992, the California legislature established the California Register of Historical Resources based on the federal model which established the National Register of Historic Places (National Historic Preservation Act of 1966). The California Register is to be used as a guide by state and local agencies, private groups, and citizens to identify the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change. The California Register, as instituted by the California Public Resources Code (PRC), includes all California properties already listed in the National Register and those formally determined to be eligible, as well as specific listings of State Historical Landmarks and State Points of Historical Interest (Public Resources Code [PRC] Section 5024.1(d)).

> "Historical resource" includes, but is not limited to, any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California [AB 2881,§1075.1 (j)].

The California Register may also include historical resources that have been nominated for listing in accordance with specified procedures and determined by the State Historical Resources Commission (the Commission) to be significant (PRC 5024.1(e)). The types of resources that may be included in the California Register pursuant to the nomination process, with the concurrence of the Commission, include:

- Individual historic resources;
- Resources that contribute to the significance of an historic district;
- Resources identified as significant in historic resource surveys;
- Resources identified as city or county historic landmarks pursuant to ordinance, if the State Office of Historic Preservation (State Office) has determined that the criteria used for designation are consistent with the California Register criteria adopted by the Commission;
- Local landmarks or historic properties designated under any municipal or county ordinance.

The criteria in essence parallel those for the National Register of Historic Places (National Register), but stipulate that some properties which may not retain sufficient integrity to meet National Register standards, may still be eligible to the California Register. Archaeological resources may still retain sufficient integrity if they contain substantial cultural value even though major constituents have been removed or destroyed.

If the owner of the property objects to the nomination, and the property is not listed in the California Register for that reason, the Commission may then formally designate the property as *eligible* for listing (PRC 5024.1(f)(5)) and it would thereby be entitled to the same level of concern for preservation.

California Environmental Quality Act (CEQA)

CEQA applies to discretionary projects such as new construction. It associates a "substantial adverse change" in the significance of an historic resource with a significant impact on the environment. The term "substantial adverse change" is defined as demolition, destruction, relocation, or alteration of the historical resource or its immediate surroundings such that the significance of the resource would be materially impaired (PRC Section 5020.1). This means that if an historic resource is present and would be adversely affected by a project, then either a mitigated Negative Declaration or an Environmental Impact Report must be prepared.

The lead agency must resolve two questions: Is there a significant resource that may be impacted by the proposed project, and will it result in a substantial adverse change to the extent that the significant resource is materially impaired or lost. CEQA specifically states that a resource need not be listed on any register to be found historically significant (Section 21084.1). Once the lead agency has made a determination of significance, and determined that a substantial adverse change will occur to the resource, then the mitigated Negative Declaration or an Environmental Impact Report must address ways to lessen the adverse affect on the resource.

National Register of Historic Places

The National Register is the official Federal list of cultural resources that have been nominated by State Offices as being historically significant at the local, state, or national level. As established by the National Historic Preservation Act of 1966, properties listed in the National Register must meet certain criteria for historic significance and possess integrity. Significance may be found in four aspects of American history or prehistory recognized by the National Register Criteria:

- Association with historic events or activities;
- Association with the lives of important persons;
- Distinctive design or physical characteristics; or
- Potential to provide important information about prehistory or history.

To be eligible, a property must meet at least one of the criteria. Qualities of integrity must also be evident, measured by the degree to which the resource retains its historic location, design, setting, materials, workmanship, feeling, and association. In general, the resource must be 50 years of age to be considered for the National Register, but there are exceptions and overriding considerations to the criteria.

Significance Criteria

Under CEQA, impacts must be considered when a proposed undertaking has the potential to affect prehistoric or historical resources deemed to be significant. The criteria for eligibility to the National Register of Historic Places have been employed as a model for the California Register of Historical Resources, as well as many local preservation ordinances, and provide the highest standard for evaluating the significance of historical resources. While a resource may still be considered historically significant at a local or state level if it does not meet the National Register standards, one that does is clearly significant.

As defined by the National Historic Preservation Act of 1966 and the criteria for eligibility to the National Register of Historic Places, an historic property must possess the quality of significance in American history, architecture (interpreted in the broadest sense to include landscape architecture and planning), archaeology, engineering and culture, and

- Be associated with events that have made a significant contribution to the broad patterns of our history; or
- Be associated with the lives of persons significant in our past; or
- Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Have yielded, or may be likely to yield, information important in prehistory or history.

The quality of integrity is measured by the degree to which the resource retains its historic location, design, setting, materials, workmanship, feeling, and association. The researcher asks such questions as: (1) To what degree does the resource or landscape convey its historic character? (2) To what degree has the original fabric been retained? (3) Are changes irrevocable or can they be corrected so that the property retains integrity? Specific features of a landscape may include spatial relationships, vegetation, original property boundary, topography/grading, site-furnishings, design intent, architectural features, and circulation system. There are exceptions and overriding considerations to these criteria but, in general, the resource must be 50 years of age.

Cultural Setting

At the time of Euroamerican exploration, the project area was inhabited by the Tongva (Gabrieleño) Indians, whose territory encompassed the greater Los Angeles basin area. The Tongva were hunter-gatherers who followed a seasonal round of annual movement to the locations of favored resources, where they collected and processed food and material for tools, shelter, and so on. These Native Americans had a stable lifestyle based on vegetal foods such as acorns, grass seeds, bulbs and greens and meat sources such as deer, fish, and shellfish. Urban development has obscured the Tongva presence in the Los Angeles basin; a few archaeological sites and isolated finds attest to their presence.

The Tongva were subsumed early into the Spanish/Mexican mission system, and many of their sites were abandoned. Based on information from elsewhere in Tongva territory, from comparison with adjacent tribes, and by referring to geographical principles of settlement location, the locations of archaeological sites can be predicted. Water sources such as springs and small streams were attractive locations, as were oak groves and stands of seed-bearing grass and shrubs. Large water courses such as the Los Angeles and San Gabriel Rivers were not attractive for settlement, although plant resources such as basketmaking reeds and grasses would have been collected. Settlement associated with large water courses was usually on elevated ground nearby, as at archaeological site CA-LAN-182a near Pio Pico State Historical Park, set back from the bank of the San Gabriel River.

Spanish and Mexican settlement after the 1770s introduced economic reliance on domesticated plants and animals. The population was small and tended to be concentrated in centers such as the early pueblo of Los Angeles, with a few people living on scattered ranchos. Some of the same resources that influenced Native American settlement were also important to the Hispanic population, although the Spanish and Mexican custom was to build with adobe and establish a permanent residence. As with the Tongva, dwellings were not in large river beds or immediately adjacent. The Pio Pico residence is an example, set near the San Gabriel River, but not in the bed or on the immediate bank.

Other settlers built a small number of adobe structures on the bluff overlooking the Los Angeles River, in the area now known as Boyle Heights. Early settlement in Los Angeles proper was in the area now known as Olvera Street, up hill from the river and possible flooding. The area east of Alameda Street, downslope from the densest settlement was devoted to vineyards and small fields. Rather than relying on natural small streams, the Spanish and Mexicans created their own water delivery system of ditches (*zanjas*) that distributed water for domestic and agricultural uses.

When Euroamerican settlers arrived in the 1840s and later, they brought with them their own traditions. Most of their dwellings were balloon-frame wood houses or, more rarely, brick for the affluent. They sought urban and industrial development, including transportation. As land in the city center was occupied, they extended settlement into lower-lying areas along the Los Angeles River, for industries such as meatpacking, lumber, and transportation by rail, with associated warehouses for storage. Housing for working people was extended up the bluffs in some of the earliest tract developments in the city.

The area of Boyle Heights and, later, East Los Angeles, remained largely unaltered residential neighborhoods centered on main streets with retail establishments. The residents of this area were often immigrants such as European Jews or Russian Molokans. They built community facilities such as churches and synagogues to serve their populations. Later, native Californian Hispanics and Hispanic immigrants moved into the area and today are the dominant cultural group.

Population east of East Los Angeles grew relatively slowly, and there were still large areas of vacant or agricultural land in the project area as late as the 1920s. This was partly a function of distance and public transportation. Living farther out may have cost less, but the commute to work took longer and cost more than living closer to downtown. Trolleys served the Boyle Heights area from a fairly early date, but as soon as automobiles became available, they were eagerly adopted there and at greater distances from downtown. In the post-World War II era, previously vacant areas were built up in housing tracts for new residents. Houses built in this period were mainly wood frame and stucco in the ranch style.

Patterns Of Settlement

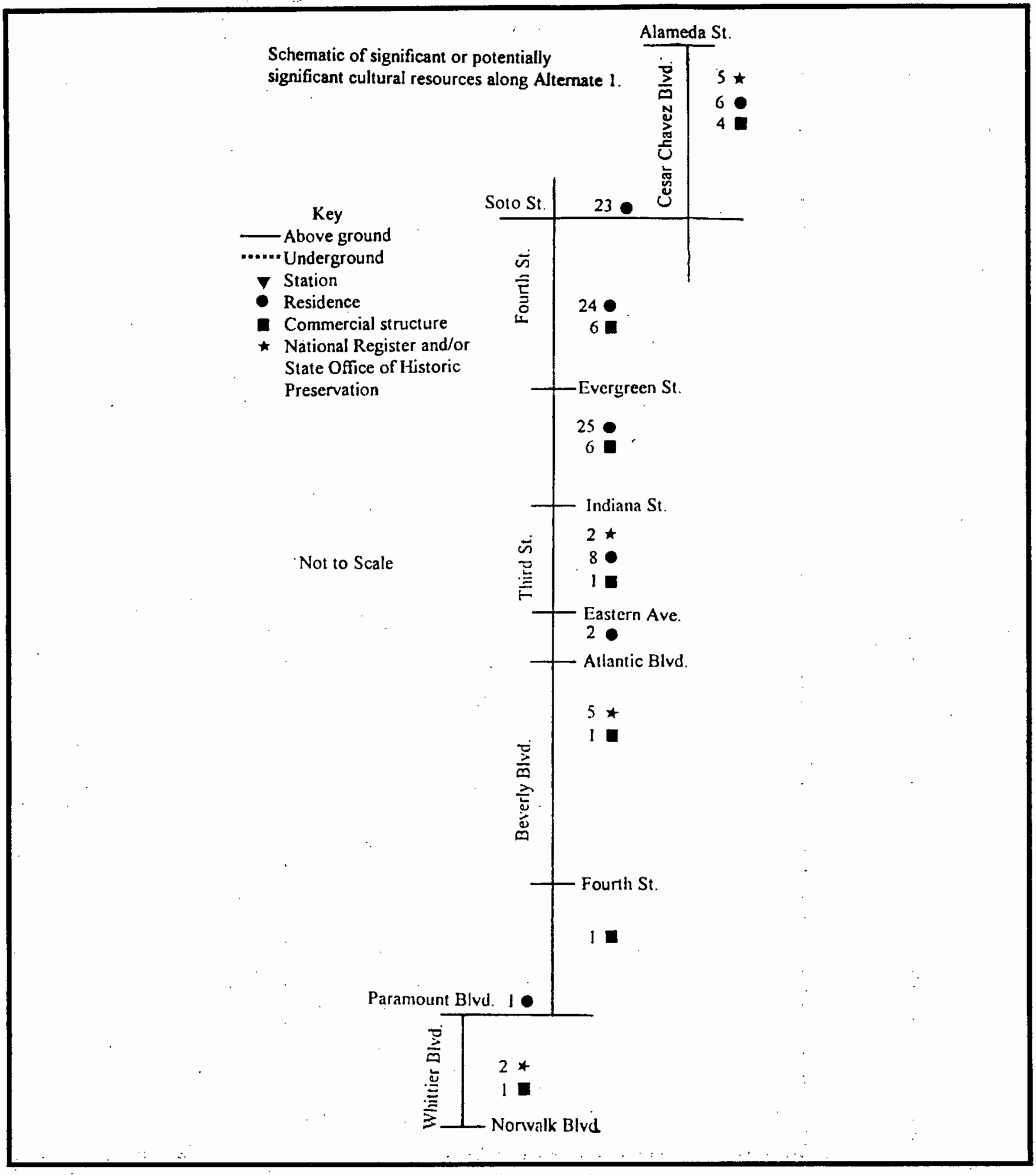
As described in the Cultural Setting section, the alternate routes trend mainly east-west and evidence of settlement decreases in age farther from the center of Los Angeles. The routes, which follow existing roadways, formerly connected hamlets that were established at an early date in the Los Angeles hinterland. Urban development since their founding has connected the hamlets, creating a patchy pattern of older settlements surrounded by more recent development.

The initial stage of research requires a general summary of potential resources or resource areas. To verify the pattern described in the paragraph above, a drive-by survey was conducted along all the alternative routes and through the transition areas between alternatives. Recording was structured by cross streets along the alternatives. The number of potential cultural resources on both sides of each block was tallied in two categories, residential or commercial structures (Figures 4-46 through 4-51). This information will be used to supplement the data already collected for the previous EIS/EIR and that on file in the South Central Coastal Information Center in the Institute of Archaeology at UCLA. Earlier research for the AA/DEIS/DEIR (summarized in the *Social, Economic, and Environmental Impact Assessment Methodology Report*, Los Angeles County Transportation Commission, January 7, 1993) identified many potentially significant standing structures. In the areas of overlap between the current Eastside Corridor project and the project assessed in the AA/DEIS/DEIR, information collected earlier can serve for comparison and contrast.

This Phase I preliminary assessment relied solely on drive-by observations of the built environment; no documentary verifications of age or subsurface archaeological testing were carried out. Figures 4-46 through 4-51 graphically present a summary of observations of residential and commercial structures, grouped along the major alternative routes by cross-streets. Historic and archaeological locations previously registered with the State of California or the National Register of Historic Places are also noted in the figures, and Table 4-49 lists the registered sites. In view of the early Euroamerican settlement of the project area, significant subsurface features or deposits may exist around certain of the oldest structures. This cannot be determined, however, without subsurface testing, which can be carried out according to a systematic plan to verify their presence or absence.

In the area between Alameda Street and Boyle Street, few potentially significant structures were observed, similar to the AA/DEIS/DEIR findings. This area has been researched archaeologically to some extent and several archaeological sites were identified earlier: CA-LAN-7/H, CA-LAN-1575H (Chinatown), and CA-LAN-887H.

Between Boyle Avenue and Soto Street and along First and Fourth Streets to Indiana Street, potentially significant cultural resources were densest, including single-family residences, apartment houses, and commercial structures. The AA/DEIS/DEIR study recorded a high number of resources as well, although a number of those structures are now outside the project area. Evergreen Cemetery, with its historic chapel and city-designated landmark Chinese shrine, is within the Eastside Corridor in Boyle Heights between Chavez Avenue and 1st Street just west of Lorena Street.



Eastside Transit Corridor Study

Cultural Resources

Alternative 1

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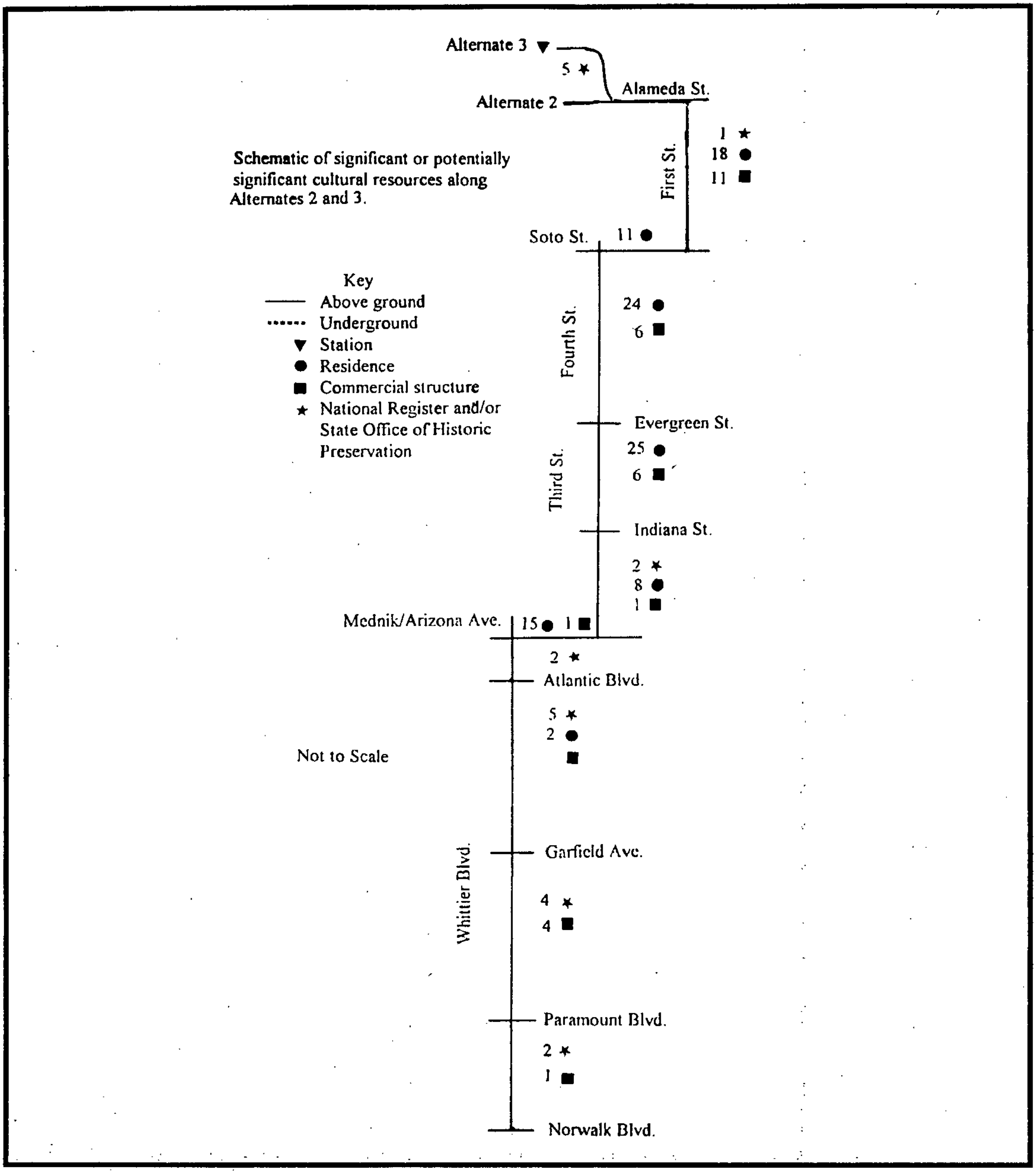
Figure 4-46

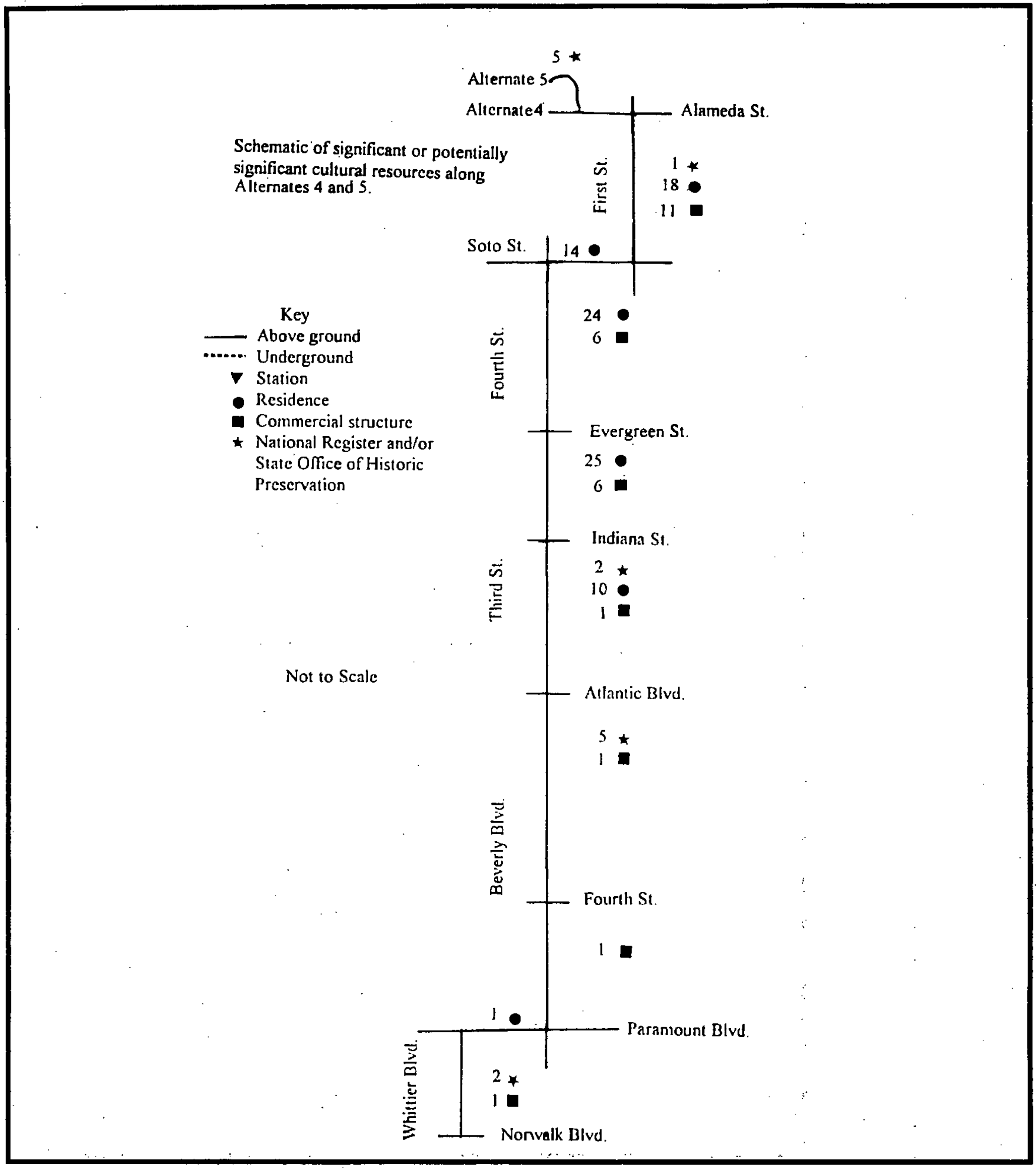


Eastside Transit Corridor Study

Cultural Resources
Alternative 2 and 3

Eastside Corridor Transit Consultants

Figure 4-47

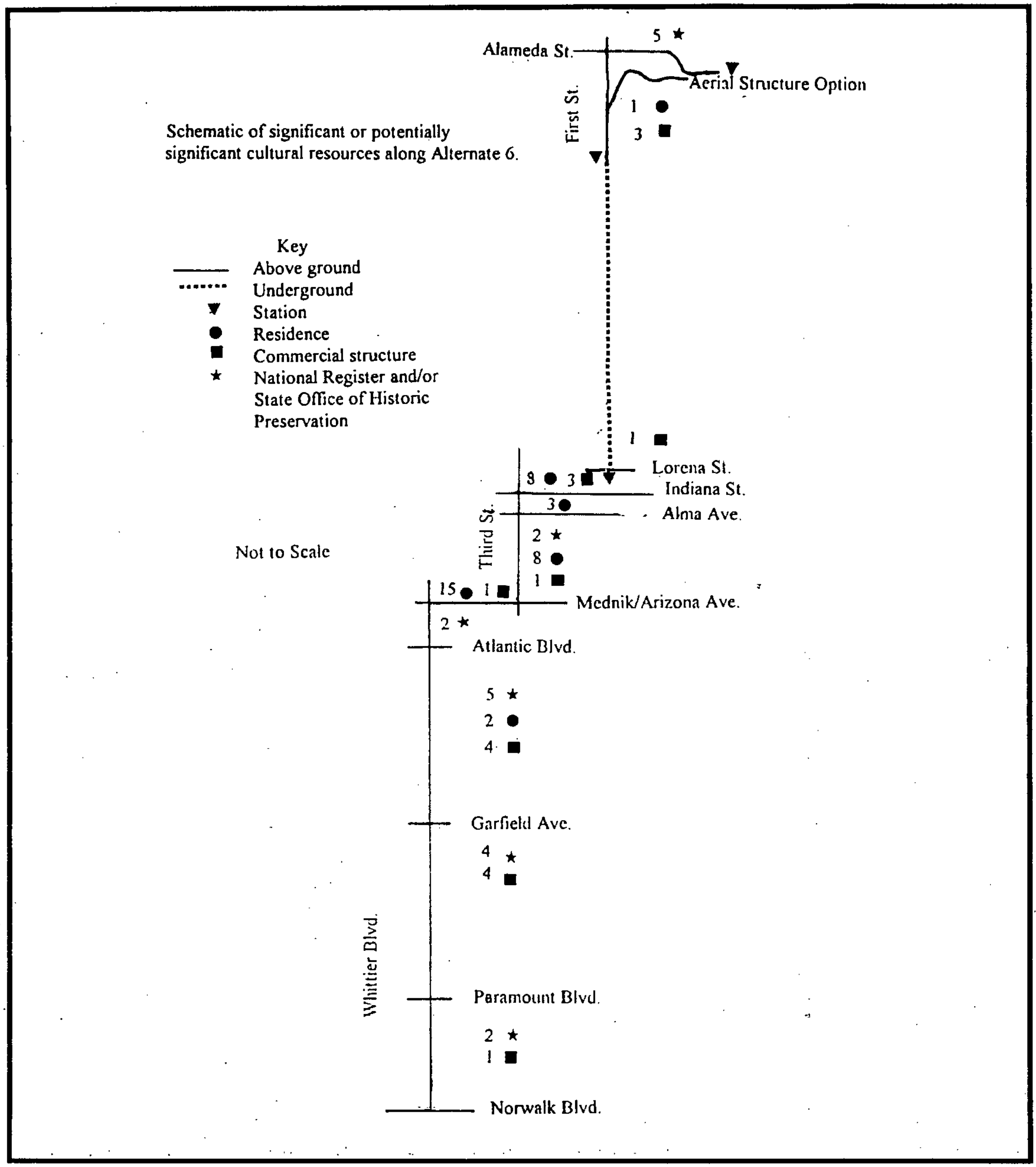


Eastside Transit Corridor Study

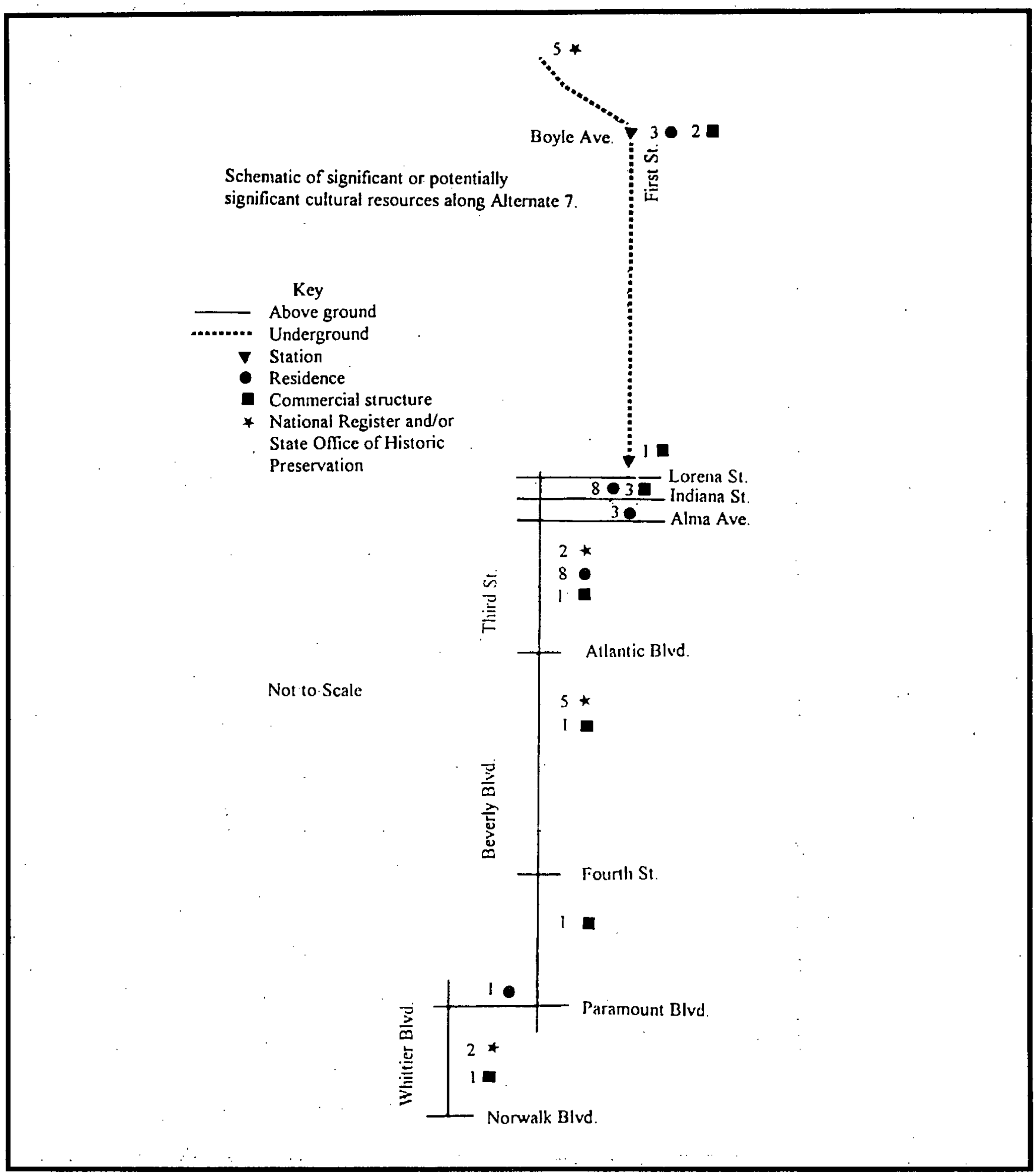
Cultural Resources
Alternative 4 and 5

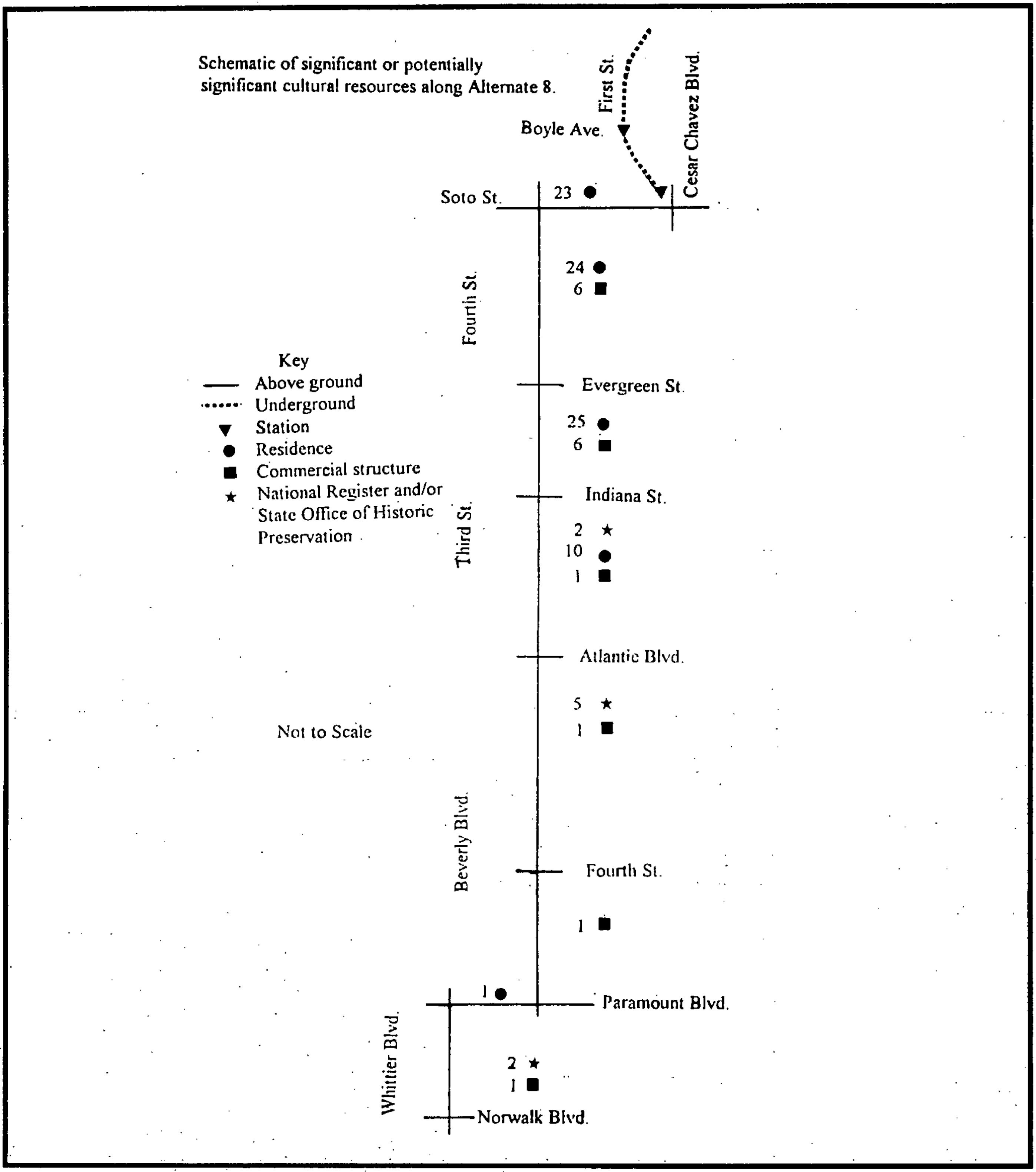
Eastside Corridor Transit Consultants

Figure 4-48



5 ★
Alameda St.
Aerial Structure Option
First St.
1 ●
3 ■
Schematic of significant or potentially significant cultural resources along Alternate 6.
Key
Above ground
Underground
Station
Residence
Commercial structure
National Register and/or State Office of Historic Preservation
1 ■
Lorena St.
8 ● 3 ■
Indiana St.
3 ●
Alma Ave.
Third St.
2 ★
8 ●
1 ■
Not to Scale
15 ● 1 ■
Mednik/Arizona Ave.
2 ★
Atlantic Blvd.
5 ★
2 ●
4 ■
Garfield Ave.
4 ★
4 ■
Whittier Blvd.
Paramount Blvd.
2 ★
1 ■
Norwalk Blvd.


5 ★
Boyle Ave.
3 ● 2 ■
First St.
Schematic of significant or potentially significant cultural resources along Alternate 7.
Key
Above ground
Underground
Station
Residence
Commercial structure
National Register and/or State Office of Historic Preservation
1 ■
Lorena St.
8 ● 3 ■
Indiana St.
3 ●
Alma Ave.
2 ★
8 ●
1 ■
Third St.
Atlantic Blvd.
Not to Scale
5 ★
1 ■
Beverly Blvd.
Fourth St.
1 ■
1 ●
Paramount Blvd.
Whittier Blvd.
2 ★
1 ■
Norwalk Blvd.



Eastside Transit Corridor Study

Cultural Resources
Alternative 8

Eastside Corridor Transit Consultants

Figure 4-51

TABLE 4-49 CULTURAL RESOURCES REGISTERED BY THE STATE OF CALIFORNIA OR NATIONAL REGISTER OF HISTORIC PLACES			
Resource	**Address**	**National Register**	**OHP[1]**
Union Station	Alameda near Cesar Chavez Avenue	X	
El Pueblo De Los Angeles State Historic Park	Alameda near Cesar Chavez Avenue 500 Block of North Main	X	X
Chinatown Site CA-LAN-1575H	Area surrounding Union Station	X	
Archaeological Site CA-LAN-7/H	Near Union Station		X
Archaeological Site CA-LAN-887H	Near Union Station		X
Congregation Talmud Torah/Breed Street Shul	247 North Breed Street		X
First Street Bridge	Bridge crossing of Los Angeles River		X
Evergreen Cemetery	Evergreen Avenue north of 1st Street		X
Church	3762 Third Street		X
New Calvary Cemetery and Mausoleum	4201 Whittier Boulevard		X
Strand Theater	4332 Whittier Boulevard		X
Hotel Ashmun	4530 Whittier Boulevard		X
Alameda Theater	5134 Whittier Boulevard		X
Whittier Atlantic Bowling	5150 Whittier Boulevard		X
Lee's Market	1247 Atlantic Boulevard South		X
Golden Gate Theater	5170-5188 Whittier Boulevard	X	
Amelia's Dress Shop	6039 Whittier Boulevard		X
Tatooland	6144 Whittier Boulevard		X
Casa Garcia Restaurant	6421 Whittier Boulevard		X
Andy's Deli/Guillen's Beauty	1615 Beverly Boulevard		X
Penn Escrow	921 Beverly Boulevard		X
Liquor/Realty	901 Beverly Boulevard		X
Beverly West Office Building	817 Beverly Boulevard		X
El Cid Beauty Salon	801 Beverly Boulevard		X
Whittier Palm Dentistry	1920 Whittier Boulevard		X
Krazy Kone	1519-1521 Whittier Boulevard		X
Odd Fellows Temple	917-923 Whittier Boulevard		X
First Bank of Pico	9235 Whittier Boulevard		X
Pio Pico State Historical Park	6003 Pioneer Boulevard	X	
[1]Listed by the California State Office of Historic Preservation.			

From Soto Street east to Downey Road, and from Downey Road east to Atlantic Boulevard, fewer potentially significant resources were identified, mainly single-family residences. The AA/DEIS/DEIR study also recorded decreases compared to the previous area. As predicted from the examination of historic maps, there are fewer potentially significant structures in the eastern portion of the study area. One National Register structure, the Golden Gate Theater, is located near the intersection of Whittier and Atlantic Boulevards.

From Atlantic Boulevard east to Paramount Boulevard, few potentially significant structures were observed, mainly commercial structures. This area, not covered in the previous AA/DEIS/DEIR, includes Montebello, which was a hamlet in the hinterland of Los Angeles around the turn of the century, and a number of structures have been recorded by the State of California Office of Historic Preservation as potentially having historic significance.

From Paramount Boulevard to Norwalk Boulevard, where all the Eastside Corridor alternates follow Whittier Boulevard, few potentially significant structures were observed. This area also was not covered in the AA/DEIS/DEIR and will require further research. The Pio Pico State Historical Park and National Register site is located in this area (recorded as archaeological site CA-LAN-1179H). A prehistoric site is also in the immediate area, CA-LAN-182a.

Paleontological Resources

Applicable Legislation, Regulations, Guidelines

Paleontologic resources, including fossil remains, associated specimen data and corresponding geologic and geographic site data, fossil sites, and the fossil-bearing stratigraphic rock units, are a limited, nonrenewable, and very sensitive scientific and educational resource and, particularly with regard to fossil sites, are afforded protection under the following federal and state environmental legislation (California Office of Historic Preservation, 1983).

- National Environmental Policy Act of 1969 (NEPA) (P.L. 91-190; 31 Stat. 852, 42 U.S.C. 4321-4327).—Requires that important natural aspects of our national heritage be considered in assessing the environmental consequences of a proposed project.

- Archaeological and Historic Data Preservation Act of 1974 (P.L. 86-253, as amended by P.L. 93-291; 88 Stat. 174, U.S.C. 469).—Provides for the survey, recovery, and preservation of significant paleontologic data when such data might be destroyed or lost due to a federal, federally licensed, or federally funded project.

- California Environmental Quality Act of 1970 (CEQA) (13 Public Resources Code: 21000 *et seq.*).—Requires that public agencies and private interests identify the environmental consequences of their proposed projects on any object or site of significance to the scientific annals of California (Division I, Public Resources Code: 5020.1 [b]).

- Guidelines for the Implementation of CEQA, as amended March 29, 1999 (Title 14, Chapter 3, California Code of Regulations: 15000 *et seq.*).—Define procedures, types of activities, persons, and public agencies required to comply with CEQA, and include definitions of significant impacts on a fossil site (Section 15023, Appendix G [5.c]).

- Public Resources Code, Section 5097.5 (Stats. 1965, c. 1136, p. 2792).—Defines any unauthorized disturbance or removal of a fossil site or remains on public land as a misdemeanor.

- Public Resources Code, Section 30244.—Requires reasonable mitigation of adverse environmental impacts that result from development of public land and affect paleontologic resources.

Existing Resources

Geologic maps and reports covering the corridor were reviewed to determine the stratigraphic rock units underlying each corridor alternative. An archival search was conducted at the Natural History Museum of Los Angeles County to determine the locations of previously recorded fossil sites in each rock unit in and near the corridor, as well as the taxa represented by the fossil remains recovered at these sites. Paleontologic reports were reviewed for additional information regarding these and other previously recorded fossil sites occurring in and near the corridor and in the same rock units.

Surficial geological mapping of all but the southeastern end of the Eastside Transit Corridor is provided by Dibblee (1989, 1999) at a scale of 1:24,000 (Los Angeles and El Monte Quadrangles). Similar mapping of the southeastern end of the corridor past Rosemead Boulevard is provided by Schoellhamer and others (1954) at a scale of 1:96,000 (Whittier Quadrangle). The corridor alternatives are underlain by six late Cenozoic stratigraphically superposed rock units, including, in order of decreasing geologic age, the early Pliocene marine "Repetto" Claystone (lower) Member (unit Tfr) and the upper unnamed late(?) Pliocene to Pleistocene nonmarine sandstone and conglomerate member (unit Tfsc) of the Fernando Formation; Pleistocene older dissected surficial sediments, including uplifted remnants of alluvial sand and gravel north of hill areas (unit Qoa), and slightly elevated and locally dissected alluvial gravel and sand at the base of hill areas (unit Qae on El Monte Quadrangle; included in unit Qa on Los Angeles Quadrangle); and Holocene surficial sediments (undissected alluvial deposits), including alluvial silt, sand, and gravel of valleys and floodplains (unit Qa on El Monte Quadrangle and, in part, on Los Angeles Quadrangle; unit Qal on Whittier Quadrangle), and gravel and sand of major streams (unit Qg) (Dibblee, 1989, 1999; Schoellhamer and others, 1954). Previous investigations regarding paleontologic resources of the rock units in the Eastside Transit Corridor were completed by Lander (1988, 1994) and RMW Paleo Associates (1993).

The "Repetto" Claystone Member of the Fernando Formation (unit Tfr) has yielded fossilized remains representing taxonomically diverse shallow-water marine assemblages composed of extinct species of early Pliocene (Repettian) benthic foraminifers, sponges, corals, bryozoans (moss animals), brachiopods (lamp shells), tube worms, chitons, snails, clams, scaphopods (tusk shells), crabs, barnacles, sea urchins, sharks and rays, fishes, turtles, and sea lions, as well as the wood and seeds of land plants, at numerous previously recorded fossil sites in the downtown Los

Angeles area (Lander, 1990, 1991, 1994, in review; Soper and Grant, 1932). Some of these fossil sites were uncovered under Hill Street as a result of construction of the Metro Red Line (Lander, 1990, 1991, 1994, in review). The shells of marine snails and clams were recorded as occurring in bore logs from the corridor between Union Station and Soto Street (Geotransit Consultants, 1994; Lander, 1994).

The upper unnamed member of the Fernando Formation (unit Tfsc) has yielded the fossilized bones and teeth of an extinct Pliocene to Pleistocene species of horse (*Equus*) at a previously recorded fossil site immediately west of Interstate 710 and approximately 1 mile north of 3rd Street in Monterey Park (Jefferson, 1991).

The older dissected surficial sediments (unit Qae) have yielded fossilized bones and teeth representing a diversity of continental vertebrate species, including extinct late Pleistocene (Ice Age) land mammal species, such as ground sloths, mastodons, mammoths, horses, camels, and bison, at a number of previously recorded fossil sites (including La Brea tar pits) west of downtown Los Angeles and in the Hollywood area (Hay, 1927; Jefferson, 1991a, -b; Lander, 1994, in review; Miller, 1971). Some of these fossil sites were uncovered under Hollywood and Wilshire Boulevards as a result of construction of the Metro Red Line (Lander, in review).

Additional late Pleistocene continental vertebrate remains were recovered at a number of previously recorded fossil sites in the downtown Los Angeles, Union Station, Vernon, and El Sereno areas (Hay, 1927; Jefferson, 1991a, -b; Lander, 1994, in review; Miller, 1971) in areas mapped as being underlain by undissected alluvial deposits (unit Qa). Presumably, these fossil occurrences were recovered in the underlying older dissected surficial sediments (unit Qae) (Lander, in review). One of these fossil sites, which yielded bison remains, was uncovered immediately west of Union Station as a result of tunneling for the Metro Red Line (Lander, in review). The undissected alluvial deposits (unit Qa) have yielded the remains of middle Holocene land plants at a previously recorded fossil site at Union Station (Lander, in review).

The fossil occurrences from these rock units are scientifically highly important because they have allowed determinations of the ages of their respective fossil-bearing strata and reconstructions of the depositional paleoenvironments represented by the sediments comprising the strata.

These fossil occurrences suggest that there is a potential for additional similar fossil remains being encountered in the fossil-bearing rock units at previously recorded and unrecorded fossil sites by construction-related earth-moving activities where these activities would disturb previously undisturbed strata in areas underlain by these rock units.

The gravel and sand of major streams (unit Qg) have not yielded any fossil remains in the region. Moreover, this rock unit probably is too young to contain remains old enough to be considered fossilized. Therefore, there probably is no potential for any fossil remains or previously unrecorded fossil site being encountered by earth-moving activities associated with construction in areas underlain by this rock unit.

4.13.2 Evaluation Methodology

The methodologies for assessing the impacts on cultural and paleontological resources are discussed below. The evaluation can be found in Section 4.13.3.

Cultural Resources

The methodology for comparing the alternative routes is based on a count of historical and prehistoric resources and potential resources along each route, observed in the first tier of structures along each alignment. The absence of records does not necessarily indicate an absence of resources. Because the project routes cross areas that were settled before requirements for cultural resource recording, there are relatively few official records of potentially significant resources.

The count of resources was computed by simply adding recorded resources to resources tentatively identified in a brief field inspection. The detailed sources consulted for this computation were: the National Register of Historic Places; the prehistoric and historic site files at the South Central Coastal Archaeological Information Center at the UCLA Institute of Archaeology; the list of historic properties compiled by the Office of Historic Preservation of the State of California; and the roster of designated historic landmarks of California.

The counts were compiled for each alternative by segments, then totaled to achieve a comprehensive ranking. The alternatives were ranked by their totals from lowest to highest. Higher numbers indicate greater frequency of significant or potentially significant resources.

The resources identified in the field will be evaluated further through documentary and archaeological research that will be conducted after a preferred alternative is selected. Archaeological field testing will ultimately be necessary to establish the significance of many remains along the route selected, and historical architectural research will be required to establish the age and significance of standing structures 50 years of age or more.

Paleontological Resources

Geologic maps and reports covering the corridor were reviewed to determine the stratigraphic rock units underlying each corridor alternative. An archival search was conducted at the Natural History Museum of Los Angeles County to determine the locations of previously recorded fossil sites in each rock unit in and near the corridor, as well as the taxa represented by the fossil remains recovered at these sites. Paleontologic reports were reviewed for additional information regarding these and other previously recorded fossil sites occurring in and near the corridor and in the same rock units. The potential for additional similar fossil remains being uncovered at previously recorded and unrecorded fossil sites that might be encountered by construction-related earth-moving activities for each alternative in previously undisturbed strata was determined, based on the type of transportation mode (subway versus at-grade) to be implemented for the alternative.

4.13.3 Environmental Issues

The criteria being evaluated include: 1) number of potential cultural resources along the alignments, 2) number of National and State Register cultural resources sites along the alignments, and 3) potential for fossil sites and remains being encountered during construction.

Cultural Resources

Introduction

The environmental issues for cultural resources include consideration of both the built environment and the archaeological record, both prehistoric and historical. Prehistoric archaeological remains in the project area are almost completely unknown because of the dense early Euroamerican settlement that would have obscured the surface indications. At this date only subsurface testing will reveal their presence or absence.

One of archaeology's strongest contributions to understanding the historical past is describing the cultures of people who left scant written records. Typically such people are the lower classes and social groups marginal to mainstream society, who did not leave abundant written records of their own. Material culture, the remains people left in the archaeological record, can clarify our understanding of how people lived, what they ate, how they prepared foods, how much disposable income they had, how acculturated they were to the Euroamerican lifestyle, and other questions not easily answered in any other way. The Eastside Corridor is a wonderful laboratory for inquiries such as these; an example of previous work of this type was the excavation and publication of material on the first Los Angeles Chinatown (Greenwood 1996).

Groups in the project area that could well be studied are Californios after statehood; both early and late Jewish immigrants, who recreated selected aspects of their culture in synagogues, schuls, clubs, and shops as well as in their residences; the Molokans, a conservative Christian Russian group who kept their society as closed as possible, even baking their bread in backyard ovens about which little is known; and early urban Japanese immigrants, who would provide data for comparison with other Asian groups such as the Chinese. Historical archaeology is thus a goal-oriented study that can make a contribution to history and transcends simply collecting artifacts.

The built environment amplifies understanding gained through archaeological research. Architectural style reflects not only social and economic choices by individual builders; it can reveal a great deal about what people thought about proper behavior and the loci for activities of different types (Deetz 1977). This is true of dwellings, commercial or retail buildings, and community facilities such as churches and fraternal halls.

The project area reveals the strong American pattern of single-family detached dwellings prevalent through the middle of the 20th century, nearly always of wood frame construction. These residences reflect trends in style, seen in the Queen Anne style of the 1890s, the Craftsman bungalow style of the early 20th century, the pre-World War II Mission Revival and other revival styles, and the Frank Lloyd Wright-influenced ranch style of the post-war period.

Commercial architecture shows differences from dwellings; historic structures in the project area were often constructed of brick, often two stories or more in height. Unlike dwellings, which were typically set back from the street behind a fence demarcating the property, commercial structures were built to meet the property lines, frequently with party walls, and direct entry from the street. This maximized floorspace inside and made access easy for pedestrians and shoppers. Commercial architecture can demonstrate the material correlates of marketing and consumer behavior.

Comparative Evaluation

This section contains a summary of the comparison of potential resources found along each alignment, followed by a detailed discussion and comparison of the alternatives.

<u>Summary Comparison</u>

Table 4-50 provides a preliminary summary of known and potential cultural resources by alternative and by resource type, based upon a review of documentary sources and a drive-by survey. The north-south transitional areas will need further analysis when the route alignments are closer to finalization. Resources that are in the first-tier of structures along each of the alignments were included in the survey since these are the ones with the most potential for adverse effects.

TABLE 4-50
SUMMARY OF POTENTIAL CULTURAL RESOURCES

Alternative	Residences[1]	Commercial[1]	OHP[2]	National Register	Total
No-Build	0	0	0	0	0
TSM	0	0	0	0	0
1	89	20[3]	10	4	123
2	103	34[3]	16[1,2]	5	158
3[4]	103	34[3]	16	5	158
4	89	27[3]	9	5	130
5[4]	89	27[3]	9	5	130
6[4]	37	17[3]	15	5	74
7	23	11	10	4	48
8	81	17	8	1	107

[1]Based on a drive-by survey.
[2]California State Office of Historic Preservation.
[3]One or more commercial areas need more detailed analysis.
[4]Three options for connecting to Union Station are under consideration. Each option may have somewhat differing impacts. The relative impacts of the various options cannot be determined until additional research is completed.

The three options being considered for connection with Union Station are located differently, but each of them has the potential to encounter sub-surface cultural resources. The Baseline and Evergreen Options will encounter historic Chinatown (CA-LAN-1575H) in the station and track area and nineteenth century industrial and transportation remains along Alameda and adjacent streets. The Alameda Option, besides encountering the same nineteenth century industrial and transportation remains, passes adjacent to El Pueblo Historic Park and could encounter Hispanic remains. Unknown Native American remains are also possible in this general area, including human burials. The relative impacts of the various options cannot be predicted until the essential historical research is accomplished.

Detailed Comparison by Street

The following list summarizes known cultural resources for the alternative routes, summarized by cross-streets. Refer to Figures 4-46 through 4-51 in section 4.13.1 for specific geographic locations.

Alternative 1

From Alameda/1st Street to Union Station then east along Cesar Chavez to Soto St.:

At the corner of Alameda and Cesar Chavez, both Union Station and the surrounding area (Chinatown, site CA-LAN-1575H) are on the National Register of Historic Places, as well as portions of El Pueblo Historical Park, archaeological site CA-LAN-7/H, and another archaeological site (CA-LAN-887)

Structures with historic potential along Cesar Chavez Boulevard to Soto Street:

Between Alameda and Vignes: 1 commercial structure
Chavez Bridge over the Los Angeles River
Between Mission and Gallardo: 1 commercial structure
Between Gallardo and Progress: 1 residential structure
Between Bridge and Echandia: 5 residential structures, 1 commercial structure, murals
Between Saint Louis-Chicago-Breed-Soto: continuous historic commercial row structures

Structures with historic potential along Soto Street to Fourth Street:

Between Cesar Chavez and Michigan: 6 apartment buildings (residences)
Between Michigan and First Street: 6 residences
Between Second and Third Streets: 7 residences
Between Third and Fourth Streets: 4 residences

Structures with historic potential along Fourth Street to Third Street:

Between Soto and Evergreen: 24 residences, 6 commercial structures
Between Evergreen and Velasco: 25 residences, 6 commercial structures

Structures with historic potential along Third Street/Beverly to Paramount Boulevard:

Between Indiana and Alma: 3 residences
Between Alma and Hicks: 1 residence; 3762 Third St. East, church, OHP 19-176621
Between Hicks and Ditman: 1 residence
Between Townsend and Rowan: 3 residences; 1 commercial structure
Between Downey and Eastern: New Calvary Cemetery (address on Whittier).

Structures with potential, east on Third/Beverly to Fourth St.:

Between Eastern and Humphries: 1 residence
Between McBride and McDonnel: 1 residence
Between Findlay and Garfield: 1 commercial structure
Between 18th and Vail: 1615 Beverly Blvd., Andy's Deli/Guillens Beauty, OHP 19-178629
Between Tenth and Spruce: 921 Beverly Blvd., Penn Escrow, OHP 19-178631
901 Beverly Blvd., Liquor/Realty, OHP 19-178631
Between Spruce and Montebello: 817 Beverly Blvd, Beverly West Office Building, OHP 19-17632; 801 Beverly Blvd, El Cid Beauty Salon, OHP 19-17633
Between Poplar and Paramount: 1 commercial structures

Structures with potential along Paramount Boulevard between Beverly and Whittier:

1 residence

Structures with potential east on Whittier to Norwalk Boulevard:

Between Lindsey and Delano: 9235 Whittier Boulevard, First Bank of Pico OHP 19-178667
Between Delano and Durfee: 1 commercial structure
Between Pioneer and Redman Boulevard: 6003 Pioneer Boulevard, Pio Pico State Historical Park, NR 19730619-73000408

Alternatives 2 and 3

From Union Station south along/near Alameda to 1st St.:

Union Station and the surrounding block (where CA-LAN-1575H is located) are National Register historical/archaeological properties, as well as portions of El Pueblo Historical Park, archaeological site CA-LAN-7/H, and another archaeological site (CA-LAN-887).

Structures with potential, First Street to Soto Street:

Between Vignes and Santa Fe: 2 commercial structures, First Street Bridge over the Los Angeles River, OHP 19-178628
Between the bridge and Mission Street: 1 residence
Between Utah Street and Clarence Street: 1 commercial structure
Between Gless/Valdez Streets and Boyle Avenue: 11 residences
Between Boyle and State: 1 residence, 1 commercial structure
Between State And Cummings: 2 residences, 1 commercial structure
Between Cummings and Saint Louis: 1 commercial structure
Between Saint Louis and Chicago: 1 commercial structure
Between Chicago and Breed: 3 commercial structures
Between Breed and Soto: 3 residences, 1 commercial structure

Structures with potential, Soto to Fourth Street:

Between Second and Third: 7 residences
Between Third and Fourth: 4 residences

Structures with potential, Fourth Street to Third Street:

Between Soto and Evergreen: 24 residences, 6 commercial structures
Between Evergreen and Velasco: 25 residences, 6 commercial structures

Structures with potential along Third Street/Beverly to Mednik/Arizona:

Between Indiana and Alma: 3 residences
Between Alma and Hicks: 1 residence; 3762 Third St. East, church, OHP 19-176621
Between Hicks and Ditman: 1 residence
Between Townsend and Rowan: 3 residences; 1 commercial structure
Between Downey and Eastern: New Calvary Cemetery (address on Whittier).

Structures with potential along Mednik/Arizona between Beverly and Whittier: 15 residences, 1 commercial

Structures with potential along Whittier from Arizona to Norwalk:

Between Downey and Eastern: 4201 Whittier Boulevard, New Calvary Cemetery (address on Whittier) and Mausoleum, OHP 19-17176536
Between Arizona and Kern: 2 residences, 4530 Whittier Blvd, Hotel Ashmun, OHP19-176564
Between Vancouver and Woods:
    5134 Whittier Boulevard, Alameda Theater, OHP 19-176525
    5150 Whittier Boulevard, Whittier Atlantic Bowling, OHP 19-176560
Between Atlantic and Amalia:
    5170-5188 Whittier Blvd, Golden Gate Theater, NR 19828223-82002192
Between Amalia and Leonard: continuous commercial development, historicity cannot be determined without further research.
Between Leonard and School: 1 commercial structure 6039 Whittier Boulevard, Amelia's Dress Shop, OHP 19-176639
Between School and Harding: 3 commercial structures
Between Saybrook and Hay: 6144 Whittier Boulevard, Tatooland, OHP 19-176629
Between Mobile and Garfield: 6421 Whittier Boulevard, Casa Garcia Restaurant, OHP 19-176527
Between Nineteenth and Eighteenth: 1920 Whittier Boulevard, Whittier Palm Dentistry, OHP 19-180768
Between Eighteenth and Vail: 1519-1521 Whittier Boulevard, Krazy Kone, OHP 19-180772
Between Greenwood and Tenth Street: 2 commercial structures: 917-923 Whittier Boulevard, Odd Fellows Temple, OHP 19-180767
Between Sixth and Fifth Streets: 1 commercial structure
Between Fifth and Fourth Streets: 1 commercial structure
Between Lindsey and Delano: 9235 Whittier Boulevard, First Bank of Pico, OHP 19-178667
Between Delano and Durfee: 1 commercial structure

Between Pioneer and Redman Boulevard: 6003 Pioneer Boulevard, Pio Pico State Historical Park, NR 19730619-73000408

Alternatives 4 and 5

From Union Station south along/near Alameda to First St.:

Union Station and the surrounding block are National Register historical/ archaeological properties including El Pueblo Historical Park, archaeological site CA-LAN-7/H, and another archaeological site (CA-LAN-887)

Structures with potential, First Street to Soto Street:

Between Vignes and Santa Fe: 2 commercial structures
First Street Bridge over the Los Angeles River, OHP 19-178628
Between the bridge and Mission Street: 1 residence
Between Utah Street and Clarence Street: 1 commercial structure
Between Gless/Valdez Streets and Boyle Avenue: 11 residences
Between Boyle and State: 1 residence, 1 commercial structure
Between State And Cummings: 2 residences, 1 commercial structure
Between Cummings and Saint Louis: 1 commercial structure
Between Saint Louis and Chicago: 1 commercial structure
Between Chicago and Breed: 3 commercial structures
Between Breed and Soto: 3 residences, 1 commercial structure

Structures with potential, Soto to Fourth Street:

Between Second and Third: 7 residences
Between Third and Fourth: 4 residences

Structures with potential, Fourth Street to Third Street:

Between Soto and Evergreen: 24 residences, 6 commercial structures
Between Evergreen and Velasco: 25 residences, 6 commercial structures

Structures with potential along Third Street/Beverly to Paramount Boulevard:

Between Indiana and Alma: 3 residences
Between Alma and Hicks: 1 residence; 3762 Third St. East, church, OHP 19-176621
Between Hicks and Ditman: 1 residence
Between Townsend and Rowan: 3 residences; 1 commercial structure
Between Downey and Eastern: New Calvary Cemetery (address on Whittier).

Structures with potential, east on Third/Beverly to Fourth St.:

Between Eastern and Humphries: 1 residence
Between McBride and McDonnel: 1 residence
Between Findlay and Garfield: 1 commercial structure
Between 18th and Vail: 1615 Beverly Blvd., Andy's Deli/Guillens Beauty, OHP 19-178629
Between Tenth and Spruce: 921 Beverly Blvd., Penn Escrow, OHP 19-178631

901 Beverly Blvd., Liquor/Realty, OHP 19-178631

Between Spruce and Montebello: 817 Beverly Blvd, Beverly West Office Building, OHP 19-17632; 801 Beverly Blvd, El Cid Beauty Salon, OHP 19-17633

Structures with potential between Poplar and Paramount: 1 commercial structure

Structures with potential along Paramount Boulevard between Beverly and Whittier: 1 residence

Structures with potential, Whittier Boulevard to Norwalk:

Between Lindsey and Delano: 9235 Whittier Boulevard, First Bank of Pico, OHP 19-178667

Between Delano and Durfee: 1 commercial structure

Between Pioneer and Redman Boulevard: 6003 Pioneer Boulevard, Pio Pico State Historical Park, NR 19730619-73000408

Alternative 6

From Union Station south to 1st and Alameda:

Union Station and the surrounding block (where CA-LAN-1575H is located) are National Register historical/archaeological properties. Structures and archaeological sites would be disturbed by surface earthmoving activities in and adjacent to the station footprint.

Structures with potential, along First St. to Pecan St.:

Between Vignes and Santa Fe: 2 commercial structures, First Street Bridge over the Los Angeles River, OHP 19-178628

Between the bridge and Mission Street: 1 residence

Between Utah Street and Clarence Street: 1 commercial structure

Structures with potential, subway segment

Between Boyle and State: 1 residence, 1 commercial structure in proximity to station footprint

Underground from Boyle/State and First St. to First St. and Lorena St.: 10 residences in proximity to Lorena Street Station

Transitions south from First Street to Third Street on Indiana Street: 8 residences, 2 commercial structures

First St.-Alma St.-Third St.-Indiana loop: 3 residences on Alma St.

Structures with potential, along Third Street to Eastern:

Between Indiana and Alma: 3 residences

Between Alma and Hicks: 1 residence; 3762 Third St. East, church, OHP 19-176621

Between Hicks and Ditman: 1 residence

Between Townsend and Rowan: 3 residences; 1 commercial structure

Between Downey and Eastern: New Calvary Cemetery (address on Whittier)

Between Eastern and Mednik/Arizona: 6 residences

Structures with potential along Mednik/Arizona between Beverly and Whittier: 15 residences, 1 commercial

Structures with potential along Whittier, Arizona/Mednik to Norwalk:

Between Arizona and Kern: 2 residences, 4530 Whittier Blvd, Hotel Ashmun, OHP19-176564

Between Vancouver and Woods: 5134 Whittier Boulevard, Alameda Theater, OHP 19-176525, 150 Whittier Boulevard, Whittier Atlantic Bowling, OHP 19-176560

Between Atlantic and Amalia: 5170-5188 Whittier Blvd, Golden Gate Theater, NR 19828223 82002192

Between Amalia and Leonard: continuous commercial development, historicity cannot be determined without further research.

Between Leonard and School: 1 commercial structure, 6039 Whittier Boulevard, Amelia's Dress Shop, OHP 19-176639

Between School and Harding: 3 commercial structures

Between Saybrook and Hay: 6144 Whittier Boulevard, Tatooland, OHP 19-176629

Between Mobile and Garfield: 6421 Whittier Boulevard, Casa Garcia Restaurant, OHP 19-176527

Between Nineteenth and Eighteenth: 1920 Whittier Boulevard, Whittier Palm Dentistry, OHP 19-180768

Between Eighteenth and Vail: 1519-1521 Whittier Boulevard, Krazy Kone, OHP 19-180772

Between Greenwood and Tenth Street: 2 commercial structures: 917-923 Whittier Boulevard, Odd Fellows Temple, OHP 19-180767

Between Sixth and Fifth Streets: 1 commercial structure

Between Fifth and Fourth Streets: 1 commercial structure

Between Lindsey and Delano: 9235 Whittier Boulevard, First Bank of Pico, OHP 19-178667

Between Delano and Durfee: 1 commercial structure

Between Pioneer and Redman Boulevard: 6003 Pioneer Boulevard, Pio Pico State Historical Park, NR 19730619-73000408

Alternative 7

From Union Station east (underground) to First/Boyle Street station:

Union Station and the surrounding block (where CA-LAN-1575H is located) are National Register historical/archaeological properties.

Structures and archaeological sites surface would be disturbed by surface earthmoving activities in and adjacent to the station footprint.

Between Boyle and State: 1 residence, 1 commercial structure in proximity to station footprint

From Boyle St. Station under First St. to Lorena St. Station:

Structures and archaeological sites would be disturbed by surface earth moving activities in and adjacent to the station footprint.

Proximity of the First/Lorena Station: 1 commercial structure.

Transitions south from First Street to Third Street on Indiana Street: 8 residences, 3 commercial structures

First St.-Alma St.-Third St.-Indiana loop: 3 residences on Alma St.

Along Third to Beverly Blvd:

Between Townsend and Rowan: 3 residences; 1 commercial structure

Between Downey and Eastern: New Calvary Cemetery (address on Whittier).

Structures with potential, east on Third/Beverly to Fourth St.:

Between Eastern and Humphries: 1 residence

Between McBride and McDonnel: 1 residence

Between Findlay and Garfield: 1 commercial structure

Between 18th and Vail: 1615 Beverly Blvd., Andy's Deli/Guillens Beauty, OHP 19-178629

Between Tenth and Spruce: 921 Beverly Blvd., Penn Escrow, OHP 19-178631

901 Beverly Blvd., Liquor/Realty, OHP 19-178631

Between Spruce and Montebello: 817 Beverly Blvd, Beverly West Office Building, OHP 19-17632, 801 Beverly Blvd, El Cid Beauty Salon, OHP 19-17633

Between Poplar and Paramount: 1 commercial structure

Structures with potential along Paramount Boulevard between Beverly and Whittier Boulevards: 1 residence

Structures with potential along Whittier, Fourth to Norwalk:

Between Lindsey and Delano: 9235 Whittier Boulevard, First Bank of Pico, OHP 19-178667

Between Delano and Durfee: 1 commercial structure

Between Pioneer and Redman Boulevard: 6003 Pioneer Boulevard, Pio Pico State Historical Park, NR 19730619-73000408

Alternative 8

From Union Station east (underground) to First/Boyle Street:

Union Station and Chinatown are on the National Register

Structures and archaeological sites would be disturbed by surface earthmoving activities in and adjacent to the station footprint. Possible subsidence issues for structures.

First/Boyle Station: 3 residences, 1 commercial structure in proximity to station footprint

Boyle to Soto and Cesar Chavez (underground):

Structures and archaeological sites would be disturbed by surface earthmoving activities in and adjacent to the station footprint.

Chavez/Soto Station: 2 commercial structures in proximity to station footprint

Structures with potential along Soto Street to Fourth Street:
- Between Cesar Chavez and Michigan: 6 apartment buildings (residences)
- Between Michigan and First Street: 6 residences
- Between Second and Third Streets: 7 residences
- Between Third and Fourth Streets: 4 residences

Structures with historic potential along Fourth Street to Third Street:
- Between Soto and Evergreen: 24 residences, 6 commercial structures
- Between Evergreen and Velasco: 25 residences, 6 commercial structures

Structures with potential along Third Street/Beverly to Paramount Boulevard:
- Between Indiana and Alma: 3 residences
- Between Alma and Hicks: 1 residence; 3762 Third St. East, church, OHP 19-176621
- Between Hicks and Ditman: 1 residence
- Between Townsend and Rowan: 3 residences; 1 commercial structure
- Between Downey and Eastern: New Calvary Cemetery (address on Whittier).

Structures with potential, east on Third/Beverly to Fourth St.:
- Between Eastern and Humphries: 1 residence
- Between McBride and McDonnel: 1 residence
- Between Findlay and Garfield: 1 commercial structure
- Between 18th and Vail: 1615 Beverly Blvd., Andy's Deli/Guillens Beauty, OHP 19-178629
- Between Tenth and Spruce: 921 Beverly Blvd., Penn Escrow, OHP 19-178631
- 901 Beverly Blvd., Liquor/Realty, OHP 19-178631
- Between Spruce and Montebello: 817 Beverly Blvd, Beverly West Office Building, OHP 19-17632, 801 Beverly Blvd, El Cid Beauty Salon, OHP 19-17633
- Between Poplar and Paramount: 1 commercial structure

Structures with potential along Paramount Boulevard between Beverly and Whittier Boulevards: 1 residence

Structures with potential, Whittier Boulevard from Paramount to Norwalk:
- Between Lindsey and Delano: 9235 Whittier Boulevard, First Bank of Pico, OHP 19-178667
- Between Delano and Durfee: 1 commercial structure
- Between Pioneer and Redman Boulevard: 6003 Pioneer Boulevard, Pio Pico State Historical Park, NR 19730619-73000408

<u>Discussion of Alternative Routes</u>

Although eight alternative routes were defined, two pairs (Alternates 2 and 3; Alternates 4 and 5) followed the same routes with different construction details. The drive-by survey followed each route, noting potentially significant resources. After a more detailed investigation, there will be changes in the exact number of resources identified, because on closer examination, more will be discovered and some already identified may fail to meet specific significance criteria.

Comparing the alternatives in terms of gross numbers of resources identified, those alternatives that travel underground from the Union Station area and pass under the western areas of Boyle Heights would affect the fewest potential cultural resources. However, historic resource preservation is only one factor to consider in determining whether to implement a subway or a surface transit system. Construction costs for tunneling would need to be compared in detail with the costs of determinations of significance by the criteria for eligibility to the National Register of Historic Places for each potentially significant resource, and for the measures to mitigate unavoidable impacts, where found warranted. Other factors, as discussed in various sections of this chapter, also need to be considered.

No matter which alternative is ultimately selected, cultural resource investigation of archaeological remains and standing structures will need to be carried out. Many research reports have been prepared for the general vicinity of the Eastside Corridor, but most of them showed no results because relatively few primary data have been recorded. A number of them, variously, failed to take into account the subsurface potential of paved areas, standing structures, and the historical archaeological deposits associated with structures (e.g., Demcak 1996; Maki 1996, 1997; Peak and Associates 1992; Stickel 1994a, 1994b; White and White 1993). Even though the surface appears disturbed or has been paved, archaeological resources may still be present.

A literature search for the Eastside Corridor (Brown 1992) noted a number of other literature searches carried out for projects in the vicinity. Because few of them acknowledged the absence of basic data or addressed known or potential historical resources, they understandably identified few resources. The drive-by survey conducted for this project, although necessarily cursory at this stage, was nonetheless systematic and identified many potential resources.

Comparing the alternative routes, all of them will need to deal with sensitive resources in the Union Station/Alameda area, both historic structures and subsurface remains. This area of Los Angeles was settled even prior to statehood (1850), and both federal and state agencies have identified sensitive resources. Union Station itself is listed on the National Register of Historic Places; the square block where it is located is not only a state-recorded archaeological site, CA-LAN-1575H, but it is also listed on the National Register as the location of historic Chinatown. Site CA-LAN-887/H, a site with both historic and pre- or protohistoric materials, is just to the north. The Pueblo de Los Angeles (area around Olvera Street and the Plaza) is a State Historic Park adjacent to the Union Station area on the west. Alameda Street is one of the oldest transportation corridors in Los Angeles, formerly associated with vineyards, wineries, hotels, the railroad, residential and business neighborhoods. Historic archaeological deposits, including one prehistoric cemetery on the east side, are present along its entire length in the project area. When borings were made at the northwest corner of Temple and Alameda, architectural remains of a mill were found. Late nineteenth century domestic artifacts and refuse bone were also identified from the borings, but no site record was ever filed (Padon 1986). The argument is frequently made that such remains are too disturbed to merit investigation. This is not always the case, however. Subsurface examination of an area near Union Station (CA-LAN-1575H-A) revealed 12 intact features including a privy, nine trash deposits, one architectural, and one landscape feature, a walkway constructed of 100+ up-ended ceramic beer bottles (Greenwood, Foster, and Rasson 1992).

The gradual, but early, conversion of the low-lying areas along the Los Angeles River to industrial use also deposited industrial archaeological remains, a number of them transportation-related (Greenwood 1998a, 1998b). Earlier investigation revealed the remains of *Zanja* 3, part of the first Los Angeles water delivery system (Cultural Resource Group 1987). Thus, this area cannot be dismissed without subsurface investigation. In the case of Alternatives 1 to 5, which will provide surface transportation, such investigation will need to be conducted along the entirety of each route. If underground routes are selected (Alternatives 6, 7, and 8), such investigation will be limited to areas of potential adverse effect, because at the depth of tunneling cultural resources are unlikely to be encountered.

Three concrete bridges will require assessment and, possibly, protection from adverse impacts because of their ages. Two (the First Street Bridge [Alternatives 2 through 6] and the Cesar Chavez Bridge [Alternative 1] cross the Los Angeles River connecting downtown with Boyle Heights. The Fourth Street Bridge crosses Lorena Street. The State Office of Historic Preservation has already recorded the First Street Bridge. Underground crossings of Alternatives 7 and 8 would avoid the two river bridges. All sections of alternative routes that cross the Boyle Heights/East Los Angeles area on the surface have potential to impact many historic resources, both standing structures and archaeological deposits. For residential structures, this is due to the early development of the area as neighborhoods, to the relatively small-sized lots that allowed many houses to be built in a relatively constricted area, and the economic stability of the area that has preserved many structures with little or no modification, even though population replacement has occurred from European Jewish to Hispanic immigrants. For commercial structures it is also due to early development of commercial precincts along major thoroughfares such as Cesar Chavez (formerly Brooklyn Avenue) and First Streets and their maintenance as viable businesses. Even alternative routes that are planned underground will have potential impacts associated with the stations or areas with cut-and-cover construction.

Soto Street is an important cross street in the project area, the route of Alternatives 1 through 5 and 8. Soto Street, despite its busy traffic, remains residential in the project area. It is the location of at least six historic apartment houses of early construction styles. They are of interest because they signal a social change; the overwhelmingly preferred form of housing through the 1920s was a single-family detached dwelling for established households, with single men and women living in rooming houses that were regarded as transitional to the detached form. The apartments were a step up from a rented room for single people and new families, but also the shape of things to come for urban life. These rather rare surviving apartments will require careful consideration as potentially significant cultural resources.

First, Third, and Fourth Streets are somewhat less developed commercially than Cesar Chavez Boulevard, but historic residences are interspersed with historic commercial structures. Mural art is frequent throughout commercial areas of Boyle Heights/East Los Angeles. This is a particular form of cultural resource characteristic of the Hispanic occupation of the area that should be taken into consideration when assessing impacts.

Cemeteries are properties that are sensitive to both public opinion and legal constraints; they are difficult to move in order to enable construction and if they must be avoided, can constrict project areas. One or more sides of Evergreen and New Cavalry cemeteries abut all the alternatives; both of them were once at the margins of settlement but have since been engulfed by urban development. Evergreen Cemetery is one of the oldest in Los Angeles, was a public cemetery, and served many families from the city proper, including many minority ethnic groups. The State Office of Historic Preservation has recorded the chapel. Many Japanese were buried in Evergreen Cemetery before World War II; the Chinese population constructed a shrine in 1888 for funeral observances that is the oldest surviving Chinese structure in Los Angeles and is a Los Angeles City Historic-Cultural Monument. In addition, on the streets around Evergreen Cemetery a number of well-preserved historic houses are extant.

New Calvary Cemetery was also founded early, and it and the mausoleum are recorded by the State Office of Historic Preservation. Each of the alternative routes passes the New Calvary Cemetery on Third Street. The Serbian Cemetery is also adjacent to the project area at the northeast corner of Eastern Avenue and Third Street, diagonally across from New Calvary. Although it is more recent, it is still a cultural resource that must be taken into consideration.

Cultural resources are substantially less frequent east of New Calvary Cemetery because the area was developed later, but the region is not devoid of interest. A number of potentially historic structures, mainly commercial, have been recorded by the State Office of Historic Preservation along Whittier Boulevard. One National Register property, the Golden Gate Theater at the corner of Atlantic and Whittier Boulevards (near Alternatives 2,3, and 6), has also been identified. Historic residences can be expected on surrounding streets.

Settlement in the nineteenth and early twentieth centuries took the form of hamlets along the Los Angeles Road. It had connected Mission San Gabriel with the pueblo during Hispanic times and continued to be the route to outlying El Monte, Whittier, and Montebello. Montebello will be served by transportation in the Eastside Corridor. The density of already-recorded historic properties along Whittier Boulevard rises between Garfield Avenue and Fourth Street (Alternatives 1, 2, 3, and 6), although archaeological investigation of associated deposits has not been carried out. Commercial properties in this area will require more research of fire insurance maps and other sources to determine their age and potential significance.

The use of Beverly Boulevard to avoid historic properties in downtown Montebello (Alternatives 4, 5, 7, and 8) will also require additional assessment of several historic properties located along this route. Beverly Boulevard, however, has among the fewest cultural resources because development is relatively more recent.

Transitional connections between alternative routes will also require investigation. The Alternative Route 1 area between Cesar Chavez Boulevard and Fourth Street (Los Angeles) is like the route itself, dense with historic residences and occasional historic commercial buildings. Overlapping transitional areas in Alternative Routes 2, 3, 4, 5, and 8 will require similar consideration. The Mednik/Arizona transitional area between Third Street and Whittier Boulevard (Alternatives 2, 3, 6) contains a number of older residential areas. Stucco ranch-style residences from the 1940s and 1950s characterize the surroundings of the transition from Beverly Boulevard to Whittier Boulevard along Paramount Boulevard (Alternatives 1, 4, 5, 7, and 8). Although these structures are more recent than those in the other transitional areas, a number of them may still be older than the minimum of 50 years required for consideration as historically sensitive.

Each alternative route follows Whittier Boulevard from Paramount Boulevard to Norwalk Avenue, passing Pio Pico State Historic Park between Pioneer and Redman Avenues. This is a particularly sensitive area, as can be seen in the recognition of this resource by both state and federal authorities. The area is near the bank of the San Gabriel River and thus an environment favorable for prehistoric settlement; site CA-LAN-182 is recorded in the vicinity of the historic buildings. This strongly suggests that excavation for construction will encounter prehistoric remains.

Hispanic settlement is visible in site CA-LAN-1179H, the Pio Pico property that includes an historic adobe house dating to 1852 and formerly included historic outbuildings of various types, including adobe-walled corrals (Woodward and Swiden 1984). Early archaeological efforts at this property were carried out earlier (Sayles 1947; Whitney-Desautels and Hood 1982). Euroamerican settlement was also present in an area called "Jimtown" (no site record or number), adjacent to the Pico property north of Whittier Boulevard. Any subsurface disturbance/construction along either side of Whittier Boulevard in this area is likely to yield archaeological remains of one or more periods from prehistory to the twentieth century.

None of the alternative routes in the Eastside Transit Corridor is without potential historical and archaeological resources. Judicious combination of segments can avoid some areas with dense resources, such as Cesar Chavez Boulevard; but further research will be required for even those alternatives that avoid densely historic developments.

Therefore, any route selected will require some degree of cultural resource investigation. The relative costs of avoidance of resources by tunneling will have to be weighed against the costs of archaeological and architectural assessment of above-ground construction impacts and the mitigation of unavoidable impacts on resources determined to be significant. An efficient research program that integrates archaeology, historical research, and architectural analysis promises to be the most expeditious and cost-effective manner to manage cultural resources in the project area.

Mitigation Measures

Archaeological Resources

A Memorandum of Agreement (MOA) is the preferred mechanism for implementing Section 106 of the National Historic Preservation Act where alternatives under consideration consist of corridors, or where access to properties is restricted. A phased approach may be used to conduct identification and evaluation of historic properties if it is specifically provided for in a MOA.

The MOA may use standard treatments established by the Advisory Council on Historic Preservation under 800.14(d). The process should establish the likely presence of historic properties within the area of potential effects for each alternative through background research, consultation, and an appropriate level of field investigation, taking into account the number of alternatives under consideration, the magnitude of the undertaking and its likely effects, and the views of the State Historic Preservation Officer (SHPO). As specific aspects or locations of an alternative are refined or access is gained, the identification and evaluation of historic properties proceeds in accordance with Sections 800.4(b) (1) and (c) which provide for further research, survey, and testing for significance.

When identification efforts, in accordance with 800.4, indicate that historic properties are likely to be discovered during implementation of an undertaking, the MOA shall include a process to resolve any adverse effects upon resources discovered during the implementation (800.13 (a)). The MOA shall include a provision for monitoring and a mechanism for reporting its implementation (800.6 (4)).

Other elements of the MOA shall provide that:

- Areas subject to physical disturbance by the undertaking are subjected to intensive archaeological study in accordance with a study plan developed in consultation with the SHPO, and submitted in draft to the SHPO for at least 30 days of review and comment.

- If the study indicates the existence of archaeological resources, the MTA will review the potential significance of such resources with the SHPO to determine whether they are significant. MTA may elect to design the project to preserve resources in place or to conduct archaeological data recovery to recover significant data from such resources.

Prior to the initiation of each construction contract, a pre-construction meeting should be held with all resident engineers, inspectors, contractors representatives and foremen to review the procedures to be followed regarding the presence of archaeological and/or paleontological monitors, collecting of artifacts, reporting discoveries, and communications.

As far as management or treatment plans can be formulated at this stage, at the very least, monitoring should be provided full time at each station location, from the time when any demolition approaches the present surface down to below that horizon which may reasonably be expected to yield cultural remains. Work at the other station locations may be supervised on a part-time or spot-check basis until evidence of cultural remains is observed.

When any potentially significant archaeological evidence is observed, work will be halted in that immediate vicinity and the procedures set forth in the MOA and a Treatment Plan will be followed. Briefly, these stipulate that the resource be recorded, identified, and assessed for its significance; if the remains are deemed to be significant, specific recommendations for the mitigation of impacts will be developed and implemented on a case-by-case basis.

Architectural Mitigation Measures

At this conceptual level of design, no need to acquire and/or demolish structures of any type has been identified. However, once an alternative is selected and its design is further refined, it is probable that some properties containing structures will need to be acquired to accommodate the planned park-and-ride lots or facilities for the subway stations, if a subway alternative is selected. If any of these structures are identified as historic, then appropriate mitigation will be necessary. General mitigation strategies for the three following types of actions are discussed below: 1) demolition, 2) relocation, and 3) alternative use.

Demolition

Mitigation of adverse impacts on historic buildings, structures, or features which cannot be preserved or relocated is thorough documentation. The loss of the historical property will still result in an adverse impact, but at a less than significant level. This measure involves comprehensive documentation of the structure as it currently exists, performed prior to the commencement of any alteration, grading, and/or demolition. The documentation shall be consistent with Historic American Buildings Survey (HABS) standards and involve consultation with the SHPO and National Park Service. The documentation usually consists of measured drawings, photographs and written data that provide a detailed record which reflects the aspects of a property's significance.

Relocation

Mitigation measures appropriate for reducing significant adverse changes associated with relocation of the structure may include:

- HABS or comparable recordation.
- Relocation of the historic structure within a physical and historical context similar to that of its original location.
- Installation in an alternative location with associated site and building rehabilitation performed in accordance with *The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.*

Current regulations encourage preservation in place, but recognize that relocation is sometimes necessary and, that if accomplished with appropriate regard for setting and the historic features, the moved structures will retain their eligibility to the California Register.

Significant adverse changes to the resource will be minimized by relocation to a compatible setting. Preference should be given to locations within the immediate neighborhood which share the historical associations of the original site. A less desirable mitigative alternative would be the removal of the structure to a suitable site outside of the neighborhood. Again, the preferred setting would be a neighborhood of similar age.

Alternative Use

Adverse impacts related to reuse of the building for functions other than residential - in either the original or a secondary location - may be mitigated to less than significant level through the following measure:

- Restoration or rehabilitation of the building following The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

Implementation of the above measures, as appropriate to each of the options discussed, will reduce unavoidable adverse impacts to the resource to a less than significant level. The sequence of actions should be to undertake the HABS recordation as promptly as possible, but prior to any disturbance of the building or its setting, followed by the other recommendations depending upon the option selected.

Paleontological Resources

Comparative Evaluation

The potential for fossil sites and remains being encountered by construction in the corridor is assessed below and summarized in Table 4-51 by alternative.

No-Build Alternative. No previously unrecorded fossil site or remains would be encountered if this alternative were implemented because there would be no earth-moving activity.

TSM Alternative. No previously unrecorded fossil site or remains would be encountered if this alternative were implemented because there would be no earth-moving activity.

Alternative 1. This alternative, which crosses unit Qg and fossil-bearing units Tfsc, Qoa, Qae, and Qa (see Dibblee, 1989, 1999; Schoellhamer and others, 1954), would be constructed at grade. No previously unrecorded fossil site or remains would be encountered during construction of the alternative because there would be no earth-moving activity in previously undisturbed strata.

Alternative 2. This alternative, which crosses unit Qg and fossil-bearing units Qoa, Qae, and Qa (see Dibblee, 1989, 1999; Schoellhamer and others, 1954), would be constructed at grade. No previously unrecorded fossil site or remains would be encountered during construction of the alternative because there would be no earth-moving activity in previously undisturbed strata.

Alternative 3. The Alameda Option for connecting with Union Station cross unit Qg and fossil-bearing units Qoa, Qae, and Qa (see Dibblee, 1989, 1999; Schoellhamer and others, 1954) and would be constructed at grade. No previously unrecorded fossil site or remains would be encountered during construction of the alternative because there would be no earth-moving activity in previously undisturbed strata.

Excavation for supports for the elevated segment of the Baseline and Evergreen Options would encounter fossil-bearing units Qa and possibly Tfr . This earth-moving activity would have a potential for encountering previously unrecorded fossil sites and, in unit Tfr, previously recorded fossil sites and additional shells of marine snails and clams (Lander, 1994).

TABLE 4-51
POTENTIAL FOR FOSSIL SITES AND REMAINS BEING ENCOUNTERED DURING CONSTRUCTION

Alternative	Potential
No-Build	None
TSM	None
1	None
2	None
3	Potential in elevated segment (Baseline and Evergreen Options[1])
4	None
5	Potential in elevated segment (Baseline and Evergreen Options[1])
6	Potential in elevated segment (Baseline and Evergreen Options[1]) and LRT (subway) segment
7	Potential in heavy rail (subway segment)
8	Potential in heavy rail (subway segment)

[1]Options under consideration for connection with Union Station.

Alternative 4. This alternative, which crosses unit Qg and fossil-bearing units Tfsc, Qoa, Qae, and Qa (see Dibblee, 1989, 1999; Schoellhamer and others, 1954), would be constructed at grade. No previously unrecorded fossil site or remains would be encountered during construction of the alternative because there would be no earth-moving activity in previously undisturbed strata.

Alternative 5. The Alameda Option for connecting with Union Station crosses unit Qg and fossil-bearing units Qoa, Qae, and Qa (see Dibblee, 1989, 1999; Schoellhamer and others, 1954) and would be constructed at grade. No previously unrecorded fossil site or remains would be encountered during construction of the alternative because there would be no earth-moving activity in previously undisturbed strata.

Excavation for supports for the elevated segment of the Baseline and Evergreen Options would encounter fossil-bearing units Qa and possibly Tfr . This earth-moving activity would have a potential for encountering previously unrecorded fossil sites and, in unit Tfr, previously recorded fossil sites and additional shells of marine snails and clams (Lander, 1994).

Alternative 6. The Alameda Option of this alternative crosses unit Qg and fossil-bearing units Tfsc, Qoa, Qae, and Qa (see Dibblee, 1989, 1999; Schoellhamer and others, 1954), and would be constructed at grade. No previously unrecorded fossil site or remains would be encountered during construction of the at-grade segment because there would be no earth-moving activity in previously undisturbed strata.

Excavation for supports for the elevated segment of the Baseline and Evergreen Options would encounter fossil-bearing units Qa and possibly Tfr . This earth-moving activity would have a potential for encountering previously unrecorded fossil sites and, in unit Tfr, previously recorded fossil sites and additional shells of marine snails and clams (Lander, 1994).

Tunneling and station excavation for the LRT (subway) segment of this alternative would encounter fossil-bearing units Tfr, Qoa, and Qa. These earth-moving activities would have a potential for encountering previously unrecorded fossil sites and, in unit Tfr, previously recorded fossil sites and additional shells of marine snails and clams (Lander, 1994).

Alternative 7. The LRT segment of this alternative crosses unit Qg and fossil-bearing units Tfsc, Qoa, Qae, and Qa (see Dibblee, 1989, 1999; Schoellhamer and others, 1954), and would be constructed at grade. No previously unrecorded fossil site or remains would be encountered during construction of this segment because there would be no earth-moving activity in previously undisturbed strata.

Tunneling and station excavation for the heavy rail (subway) segment of this alternative would encounter fossil-bearing units Tfr, Qoa, and Qa. These earth-moving activities would have a potential for encountering previously unrecorded fossil sites and, in unit Tfr, previously recorded fossil sites and additional shells of marine snails and clams (Lander, 1994).

Alternative 8. The BRT segment of this alternative crosses unit Qg and fossil-bearing units Tfsc, Qoa, Qae, and Qa (see Dibblee, 1989, 1999; Schoellhamer and others, 1954), and would be constructed at grade. No previously unrecorded fossil site or remains would be encountered during construction of this segment because there would be no earth-moving activity in previously undisturbed strata.

Tunneling and station excavation for the heavy-rail (subway) segment of this alternative would encounter fossil-bearing units Tfr, Qoa, and Qa. These earth-moving activities would have a potential for encountering previously unrecorded fossil sites and, in unit Tfr, previously recorded fossil sites and additional shells of marine snails and clams (Lander, 1994).

Mitigation

In areas where there is a potential for fossil sites and remains being encountered in a fossil-bearing rock unit by construction-related earth-moving activities associated with the Eastside Transit Corridor (Alternatives 6 to 8; Baseline and Evergreen Options of Alternatives 3, 5), a vertebrate paleontologist approved by the Natural History Museum of Los Angeles County (LACM) Vertebrate Paleontology Section (VP) will be retained to monitor these activities to allow for the recovery of larger fossil remains uncovered by the activities, and to collect sediment/rock samples to allow for the recovery of smaller fossil remains. The paleontologist will have the authority to divert any earth-moving activity temporarily around a newly discovered fossil or sampling site until the fossil remains or sample have been removed. Samples recovered from each rock unit and processed will not exceed a total weight of 6,000 pounds. All fossils will be prepared to the point of identification, identified by knowledgeable paleontologists, curated and catalogued, and placed in the appropriate LACM fossil collection for permanent storage and maintenance. The mitigation measures will be conducted in compliance with Society of Vertebrate Paleontology (SVP, 1995, 1996) standard measures for mitigating construction-related impacts on paleontologic resources and for the museum repository acceptance of a mitigation program fossil collection, and with LACM requirements. The paleontologist will prepare a comprehensive final report of findings in compliance with SVP (1995) requirements.

Similar measures were employed during construction of the Metro Red Line and resulted in the recovery of numerous fossil remains. Many of these remains represent the first reported fossil occurrences of their respective taxa and include numerous new species. The remains also have been critical in determining the ages of the fossil-bearing strata and in reconstructing the paleoenvironments and paleoclimates of the region.

4.14 PARK AND RECREATION AND OTHER COMMUNITY FACILITIES

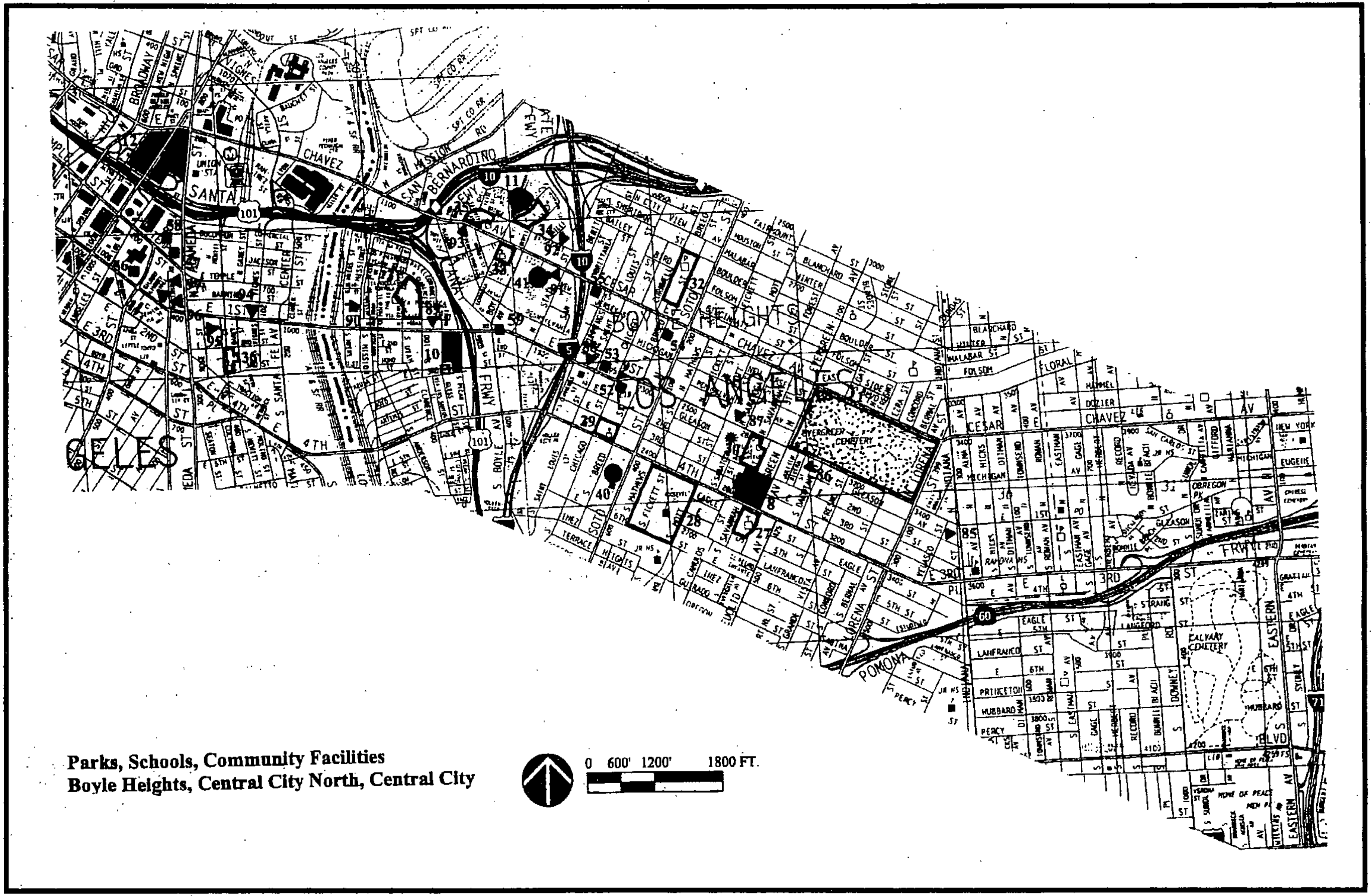
4.14.1. Affected Environment

A variety of public and community type facilities exist in or near the proposed alternative alignments of the Eastside Transit Corridor Study area. A 600-foot distance, north and south of each alternative alignment, was determined to identify potentially affected public and community facilities by the proposed alternative alignments. The types of facilities noted include neighborhood and community parks, Los Angeles County regional trails, cemeteries, schools, hospitals, public facilities such as libraries, fire and police stations, and community facilities such as churches, youth centers and museums. The name of said facilities and their location are identified in Tables 4-52 through 4-57 and are displayed in Figures 4-52 through 4-54.

Parks

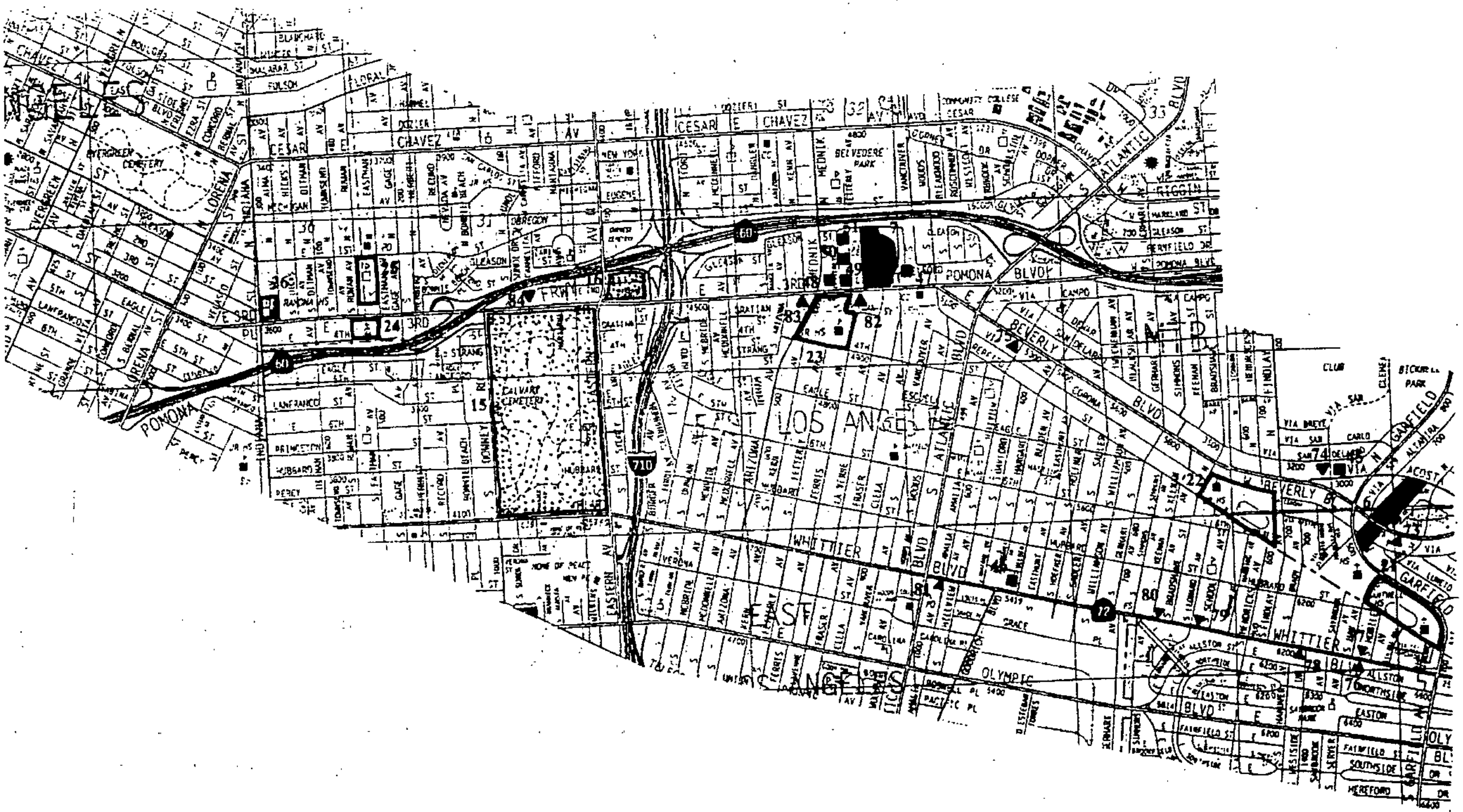
A total of twelve parks (Table 4-52) were identified within 600-feet of the proposed alternative alignments of which two are designated as State Historic Parks. Pio Pico State Historic Park is located in the City of Whittier on Whittier Boulevard, just east of the San Gabriel River. The El Pueblo de Los Angeles State Historic Park is located in the City of Los Angeles along Alameda Street, just north of the Hollywood Freeway.

Parks located in the City of Los Angeles, including the Boyle Heights Community, Central City North District, and Central City are under the jurisdiction of the City's Department of Recreation and Parks. Parks located in the unincorporated communities of East Los Angeles and Southwest Whittier are under the jurisdiction of the County of Los Angeles Department of Parks and Recreation. All other parks that are located in incorporated cities such as Montebello, Pico Rivera and Whittier are under the jurisdiction of the cities respective Parks and Recreation Departments.



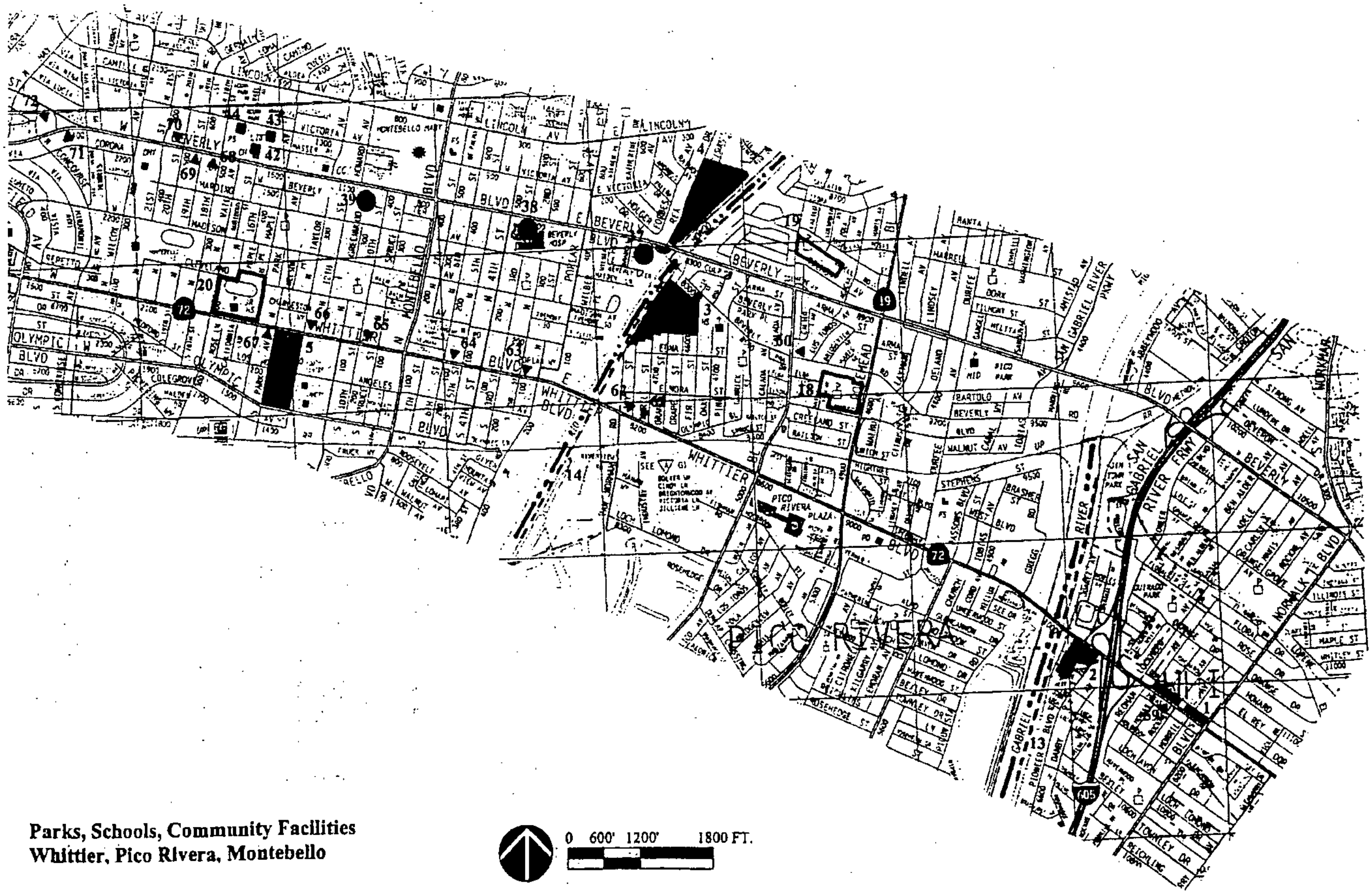
Parks, Schools, Community Facilities
Boyle Heights, Central City North, Central City

Figure 4-52



Parks, Schools, Community Facilities
East Los Angeles, Montebello, Commerce

Figure 4-53



Parks, Schools, Community Facilities
Whittier, Pico Rivera, Montebello

Eastside Transit Corridor Study

Parks, Schools, Community Facilities
Whittier, Pico Rivera, Montebello

Eastside Corridor Transit Consultants

Figure 4-54

TABLE 4-52 PARKS AND REGIONAL TRAILS WITHIN 600 FEET OF EASTSIDE TRANSIT CORRIDOR ALTERNATIVES			
No.[1]	Facility	Location	City/Community
1	Whittier Greenspace	Whittier Boulevard (Norwalk to Carley)	Whittier
2	Pio Pico State Historic Park	Whittier & Pioneer Boulevards	Whittier
3	Rio Hondo Park	Beverly Road & Rio Hondo River	Pico Rivera
4	Grant Rea Park	Beverly Boulevard & Rea Drive	Montebello
5	Montebello Park	Whittier Boulevard & Park Avenue	Montebello
6	Ashiya Park	Beverly Boulevard & Via Altanira	Montebello
7	Belvedere Park	3rd Street & La Verne Avenue	East Los Angeles
8	Evergreen Park	4th Street & Evergreen Avenue	Boyle Heights
9	LANI Park	1st Street & Chicago Street	Boyle Heights
10	Pecan Park	1st Street & Pecan Street	Boyle Heights
11	Prospect Park	Bridge Street & Enchandia Street	Boyle Heights
12	El Pueblo De Los Angeles State Historic Park	Alameda Street & Cesar E. Chavez Avenue	Central City
13	San Gabriel River Trail L.A. County Regiona Trail	San Gabriel River	Whittier
14	Rio Hondo River Trail L.A. County Regional Trail	Rio Hondo River	Montebello

[1]No. corresponds to numbers shown in Figures 4 -52 through 4 -54 .

County Regional Trails

There are two County Regional Trails (see Table 4-52) located along the Rio Hondo River and the San Gabriel River, which fall under the jurisdiction of the Los Angeles County Department of Public Works. The regional trails include horse and bike trails.

Cemeteries

There are three cemeteries (Table 4-53) within close proximity to the proposed alternative alignments including Calvary Cemetery and Serbian Cemetery in the East Los Angeles Community and Evergreen Cemetery in the Boyle Heights Community.

TABLE 4-53 CEMETERIES WITHIN 600 FEET OF EASTSIDE TRANSIT CORRIDOR ALTERNATIVES			
No.[1]	Facility	Location	City/Community
15	Calvary Cemetery	3rd Street & Eastern Avenue	East Los Angeles
16	Serbian Cemetery	3rd Street & Eastern Avenue	East Los Angeles
17	Evergreen Cemetery	1st Street & Evergreen Avenue	Boyle Heights

[1]No. corresponds to numbers shown in Figures 4 -52 through 4 –54.

Schools

A total of nineteen schools (Table 4-54) including public elementary, intermediate and high schools, and several parochial schools are located within 600 feet of the proposal alignments.

The Los Angeles Unified School District has jurisdiction over public schools located in communities within the City of Los Angeles and the unincorporated community of East Los Angeles. Public schools in the City of Montebello are administered by the Montebello Unified School District. The El Rancho Unified School District administers public schools in the City of Pico Rivera. The South Whittier School District administers public schools in the City of Whittier. Public schools in the unincorporated Southwest Whittier Community are under the jurisdiction of the Los Nietos School District.

Hospitals

There are three privately owned hospitals (Table 4-55) near the proposed alternative alignments including Beverly Hospital in the City of Montebello, Lincoln Hospital and White Memorial Medical Center in the Boyle Heights Community. In addition, there are two convalescent hospitals in the City of Montebello near the proposed alternative alignments.

Public Facilities

A total of sixteen public facilities (Table 4-56) were identified within close proximity of the proposed alternatives. This includes several libraries, police and fire stations as well as the Montebello and East Los Angeles Civic Centers.

TABLE 4-54
SCHOOLS
WITHIN 600 FEET OF EASTSIDE TRANSIT CORRIDOR ALTERNATIVES

No.[1]	Facility	Location	City/Community
18	North Ranchito School	Rosemead & Olympic Boulevards	Pico Rivera
19	Pio Pico School	Paramount Boulevard & Tilmont Avenue	Pico Rivera
20	Montebello Intermediate School	Whittier Boulevard & Vail Avenue	Montebello
21	Cantwell-Sacred Heart of Mary High School	Garfield Avenue & Hay Street	Montebello
22	Eastmont Intermediate School	Repetto & Bradshaw Streets	Montebello
23	Griffith Junior High School	3rd Street & Arizona Avenue	East Los Angeles
24	Our Lady Lourdes School	3rd Street & Rowan Avenue	East Los Angeles
25	Belvedere School	1st Street & Rowan Avenue	East Los Angeles
26	Romona High School	3rd & Indiana Streets	East Los Angeles
27	Our Lady of Talpa School	4th Street & Evergreen Avenue	Boyle Heights
28	Roosevelt High School	4th & Mott Streets	Boyle Heights
29	Breed Street School	4th & Breed Streets	Boyle Heights
30	First Street School	1st & Savannah Streets	Boyle Heights
31	Utah Street School	Clarence Street & Via Las Vegas	Boyle Heights
32	Sheridan Street School	Sheridan & Breed Streets	Boyle Heights
33	Seventh Day Adventist School	Cesar E. Chavez Avenue & Enchandia Street	Boyle Heights
34	Bridge Street School	Bridge & Enchandia Streets	Boyle Heights
35	San Antonio De Padua School	Cesar E. Chavez Avenue & Bridge Street	Boyle Heights
36	Maryknoll School	Hewitt & 2nd Streets	Central City North

[1]No. corresponds to numbers shown in Figures 4 -52 through 4 -54.

TABLE 4-55 HOSPITALS WITHIN 600 FEET OF EASTSIDE TRANSIT CORRIDOR ALTERNATIVES			
No.[1]	**Facility**	**Location**	**City/Community**
37	Rio Hondo Convalescent Hospital	Beverly Boulevard & Bradley Avenue	Montebello
38	Beverly Hospital	Beverly Boulevard & 4th Street	Montebello
39	Convalescent Hospital	Beverly Boulevard & Howard Avenue	Montebello
40	Lincoln Hospital	Soto Street (South of 4th Street)	Boyle Heights
41	White Memorial Medical Center	Cesar E. Chavez & Boyle Avenues	Boyle Heights
[1]No. corresponds to numbers shown in Figures 4 -52 through 4 –54.			

TABLE 4-56 PUBLIC FACILITIES WITHIN 600 FEET OF EASTSIDE TRANSIT CORRIDOR ALTERNATIVES			
No.[1]	**Facility**	**Location**	**City/Community**
42	Montebello City Hall	Beverly Boulevard & Vail Avenue	Montebello
43	Montebello Library	Beverly Boulevard & Vail Avenue	Montebello
44	Montebello Police Station	Beverly Boulevard & Vail Avenue	Montebello
45	Fire Station	Via Acosta & Via San Clemente	Montebello
46	Department of Social Services	Whittier Boulevard & Belden Avenue	East Los Angeles
47	ELA Sheriff's Station	3rd Street & LaVerne Avenue	East Los Angeles
48	Roybal Health Center	3rd Street & Fetterly Avenue	East Los Angeles
49	ELA Library	3rd Street & Fetterly Avenue	East Los Angeles
50	ELA Municipal Courts	3rd Street & Fetterly Avenue	East Los Angeles
51	Probation Department	3rd Street & Fetterly Avenue	East Los Angeles
52	Benjamin Franklin Library	1st & Chicago Streets	Boyle Heights
53	Hollenbeck Police Station	1st & St. Louis Streets	Boyle Heights
54	Social Security Administration	Breed Street (South of Chavez Avenue)	Boyle Heights
55	Fire Station	Cesar E. Chavez Avenue & Cummings Street	Boyle Heights
56	Parker Center Police Station	1st & Los Angeles Streets	Central City
57	Veterans Clinic	Alameda & Temple Streets	Central City
58	Roybal Federal Building	Alameda & Temple Streets	Central City
59	Mariachi Plaza	1st & Boyle Avenue	Boyle Heights
[1]No. corresponds to numbers shown in Figures 4 -52 through 4 –54.			

Community Facilities

A total of 39 community serving facilities (Table 4-57) were identified along the proposed alternative alignments. Many of these facilities are existing churches. Other types of community facilities included the Montebello YMCA, Legal Aid Foundation, Hollenbeck Youth Center, the Japanese American National Museum, and the Geffen Contemporary Museum.

4.14.2 Evaluation Methodology

The criterion being evaluated is the numbers of parks and recreation facilities along the alignments. The locations of park and recreation facilities in the study area were determined through a review of available mapping and supplemented by a field survey of each facility. Two types of impacts were considered: direct and constructive use. Direct impacts are those requiring acquisition of portions or all of a recreational facility to accommodate the right-of-way of an alternative. Constructive use may occur when impacts due to the proximity of the project

TABLE 4-57
COMMUNITY FACILITIES
WITHIN 600 FEET OF EASTSIDE TRANSIT CORRIDOR ALTERNATIVES

No.[1]	Facility	Location	City/Community
59	St. Mary Church	Whittier Boulevard & Rockne Avenue	Whittier
60	Friends Quaker Church	Paramount Boulevard & Beverly Road	Pico Rivera
61	Lord De Lo Vales Church	Whittier Boulevard & Murtle Street	Pico Rivera
62	Church	Whittier Boulevard & Ivy Street	Pico Rivera
63	Church	Whittier Boulevard & 2nd Street	Montebello
64	Christian Fellowship Church	Whittier Boulevard & 6th Street	Montebello
65	Praise Church	Whittier Boulevard & 10th Street	Montebello
66	Methodist Church	Whittier Boulevard & Taylor Avenue	Montebello
67	Park Avenue Christian Church	Whittier Boulevard & Park Avenue	Montebello
68	St. John Church	Beverly Boulevard & 18th Street	Montebello
69	Beverly Four Square Church	Beverly Boulevard & 19th Street	Montebello
70	Montebello YMCA	Beverly Boulevard & 20th Street	Montebello
71	Grace & Truth Church	Beverly Boulevard & Via Val Verde Road	Montebello
72	Church	North Concourse Avenue & Via Acosta	Montebello
73	Religious Science Church	Beverly boulevard (West of Hay Avenue)	Montebello
74	Church	Via Acosta & Via San Clemente	Montebello
75	Iglesia Cristiana Ejercito de Salvacion	Beverly Boulevard & Hillview Avenue	East Los Angeles
76	Central Arivamento Cristiano	Whittier Boulevard (West of Mobile Avenue)	East Los Angeles
77	Casa de Oracion	Whittier Boulevard & Hay Avenue	East Los Angeles
78	Iglesia Biblica	Whittier Boulevard & Westside Drive	East Los Angeles
79	Iglesia Misionera	Whittier Boulevard & Leonard Avenue	East Los Angeles
80	Asegures Del Cielo	Whittier Boulevard & Keenan Avenue	East Los Angeles
81	Legal Aid Foundation	Whittier Boulevard & Amalia Avenue	East Los Angeles
82	Iglesia El Siloe	3rd Street (east of Arizona Avenue)	East Los Angeles
83	Sala Evangelica	3rd Street & Arizona Avenue	East Los Angeles
84	Guadalupe Church	3rd Street (east of Sunol Drive)	East Los Angeles
85	Iglesia Evangelica	Gleason Avenue & Velasco Street	Boyle Heights
86	Evergreen Baptist Church	1st Street (east of Rivera Street)	Boyle Heights
87	Konko Church of Los Angeles	1st & Mott Streets	Boyle Heights
88	Hollenbeck Youth Center	1st Street (west of St. Louis Street)	Boyle Heights
89	Aliso-Pico Multipurpose Center	1st & Clarence Streets	Boyle Heights
90	St. Elizabeth Day Nursery	Mission Road (north of 1st Street)	Boyle Heights
91	Seventh Day Adventist Church	Cesar E. Chavez Avenue & State Street	Boyle Heights
92	Spanish Seventh Day Adventist Church	Bridge Street (east of Boyle Street)	Boyle Heights
93	CYO Brownstone House Teen Club	Cesar E. Chavez & Pennsylvania Avenues	Boyle Heights
94	Hompa Hongwanji Buddhist Temple	1st & Vignes Streets	Central City North
95	Zenshuji Soto Mission	Hewitt Street (South of 1st Street)	Central City North
96	Japanese American National Museum	1st & Alameda Streets	Little Tokyo
97	Geffen Contemporary Museum	Alameda Street (north of 1st Street)	Little Tokyo

[1]No. corresponds to numbers shown in Figures 4 -52 through 4 -54.

substantially impair the activities, features, or attributes of the resource. Constructive use impacts from transit projects generally include those that could result from adverse noise and vibration or visual impacts. For this conceptual level of analysis, it was assumed that any facility located within 300 feet of an alignment could potentially be affected by constructive use. The results of the evaluation are contained in section 4.14.3. A more detailed analysis will be conducted during the SEIS/SEIR to determine the extent of actual impacts and mitigation measures that will be implemented, if needed, to minimize impacts.

4.14.3 Environmental Issues

The criterion being evaluated is the number of parks and recreation areas along the alignments.

Comparative Evaluation

The evaluation of potential impacts on parks and recreation facilities considered two types of impacts: direct and constructive use. Direct impacts are those requiring acquisition of portions or all of a recreational facility to accommodate the right-of-way of an alternative. Constructive use impacts generally include those that could result from adverse noise and vibration or visual impacts. For this conceptual level of analysis, it was assumed that any facility located within 300 feet of an alignment could potentially be affected by constructive use. A more detailed analysis will be conducted during the SEIS/SEIR to determine the extent of actual impacts and mitigation measures that will be implemented, if needed, to minimize impacts. Sections 4.4 and 4.7 describe conceptual mitigation options for adverse visual and noise impacts on sensitive uses.

At this conceptual level of design, it has been determined that no partial or full takes of parks or recreation facilities will be necessary to accommodate the rights-of-way of any of the alternatives being considered. Therefore, the project will have no direct impacts on these resources. The park and recreation facilities displayed in Table 4-58 are located within 300 feet of one or more of the build alternatives. These are the facilities where constructive use impacts are possible. Additional evaluation will be conducted during the SEIS/SEIR phase to determine the actual extent of impacts, if any, and mitigation measures will be proposed to minimize adverse impacts.

All of the build alternatives pass within 300 feet of at least seven of these resources. Alternatives 4 and 5 would pass by the most facilities (Alternative 4 would pass by ten, and Alternative 5 would pass by ten or 11, if the Alameda option to Union Station is selected). Alternative 6 would pass by the fewest (seven) unless the Alameda option to Union Station is selected, and then it would pass by eight recreational resources. Alternatives 2 and 3 would also pass by eight such resources. However, if the Alameda option were selected for Alternative 3, then it would pass by one more resource for a total of nine. Note also that Alternatives 6 and 7 would be in subway segment in the vicinity of LANI Park, and Alternatives 7 and 8 would be in subway segment in the vicinity of Pecan Park. Therefore, it is unlikely that these alternatives would adversely affect those two parks.

Two of the areas listed in Table 4-58 are not officially designated as parks: LANI Park and Whittier Greenspace. LANI Park is within 300 feet of Alternatives 2 through 7; however, Alternatives 6 and 7 are in a subway segment in the vicinity of this facility. Whittier Greenspace is within 300 feet of all of the alternatives near the eastern terminus at Norwalk Boulevard.

TABLE 4-58
PARKS AND RECREATION AREAS WITHIN 300 FEET OF THE ALTERNATIVES

Alt.	No.	Facility	Location
No-Build	0		
TSM	0		
1	9	El Pueblo de Los Angeles State Historic Park Evergreen Park Belvedere Park Ashiya Park Grant Rea Park Rio Hondo River Trail Pio Pico State Historic Park San Gabriel River Trail Whittier Greenspace	Alameda St./Chavez Ave. 4th St./Evergreen Ave. 3rd St./Laverne Ave. Beverly Blvd./Via Altanira Beverly Blvd./Rea Dr. Rio Hondo River Whittier Blvd./Pioneer Blvd. San Gabriel River Whittier Blvd. (Norwalk to Carley)
2	8	Pecan Park LANI Park Evergreen Park Montebello Park Rio Hondo River Trail Pio Pico State Historic Park San Gabriel River Trail Whittier Greenspace	1st St./Pecan St. 1st St./Chicago St. 4th St./Evergreen Ave. Whittier Blvd./Park Ave. Rio Hondo River Whittier Blvd./Pioneer Blvd. San Gabriel River Whittier Blvd. (Norwalk to Carley)
3	8 or 9[1]	El Pueblo de Los Angeles State Historic Park-Alameda Option only Pecan Park LANI Park Evergreen Park Montebello Park Rio Hondo River Trail Pio Pico State Historic Park San Gabriel River Trail Whittier Greenspace	Alameda St./Chavez Ave. 1st St./Pecan St. 1st St./Chicago St. 4th St./Evergreen Ave. Whittier Blvd./Park Ave. Rio Hondo River Whittier Blvd./Pioneer Blvd. San Gabriel River Whittier Blvd. (Norwalk to Carley)
4	10	Pecan Park LANI Park Evergreen Park Belvedere Park Ashiya Park Grant Rea Park Rio Hondo River Trail Pio Pico State Historic Park San Gabriel River Trail Whittier Greenspace	1st St./Pecan St. 1st St./Chicago St. 4th St./Evergreen Ave. 3rd St./Laverne Ave. Beverly Blvd./Via Altanira Beverly Blvd./Rea Dr. Rio Hondo River Whittier Blvd./Pioneer Blvd. San Gabriel River Whittier Blvd. (Norwalk to Carley)
5	10 or 11[1]	El Pueblo de Los Angeles State Historic Park-Alameda Option only Pecan Park LANI Park Evergreen Park Belvedere Park Ashiya Park Grant Rea Park Rio Hondo River Trail Pio Pico State Historic Park San Gabriel River Trail Whittier Greenspace	Alameda St./Chavez Ave. 1st St./Pecan St. 1st St./Chicago St. 4th St./Evergreen Ave. 3rd St./Laverne Ave. Beverly Blvd./Via Altanira Beverly Blvd./Rea Dr. Rio Hondo River Whittier Blvd./Pioneer Blvd. San Gabriel River Whittier Blvd. (Norwalk to Carley)
6	7 or 8[1]	El Pueblo de Los Angeles State Historic Park-Alameda Option only Pecan Park LANI Park (subway segment)[2] Montebello Park Rio Hondo River Trail Pio Pico State Historic Park San Gabriel River Trail Whittier Greenspace	Alameda St./Chavez Ave. 1st St./Pecan St. 1st St./Chicago St. Whittier Blvd./Park Ave. Rio Hondo River Whittier Blvd./Pioneer Blvd. San Gabriel River Whittier Blvd. (Norwalk to Carley)

[1]The higher number applies if the Alameda Option to connect to Union Station is selected.
[2]The subway segment of this alternative passes underneath or in close proximity to the recreational resource. Adverse impacts are unlikely.

TABLE 4-58 PARKS AND RECREATION AREAS WITHIN 300 FEET OF THE ALTERNATIVES			
Alt.	No.	Facility	Location
7	9	Pecan Park (subway segment)[2] LANI Park (subway segment)[2] Belvedere Park Ashiya Park Grant Rea Park Rio Hondo River Trail Pio Pico State Historic Park San Gabriel River Trail Whittier Greenspace	1st St./Pecan St. 1st St./Chicago St. 3rd St./Laverne Ave. Beverly Blvd./Via Altanira Beverly Blvd./Rea Dr. Rio Hondo River Whittier Blvd/Pioneer Blvd. San Gabriel River Whittier Blvd. (Norwalk to Carley)
8	9	Pecan Park (subway segment)[2] Evergreen Park Belvedere Park Ashiya Park Grant Rea Park Rio Hondo River Trail Pio Pico State Historic Park San Gabriel River Trail Whittier Greenspace	1st St./Pecan St. 4th St./Evergreen Ave. 3rd St./Laverne Ave. Beverly Blvd./Via Altanira Beverly Blvd./Rea Dr. Rio Hondo River Whittier Blvd./Pioneer Blvd. San Gabriel River Whittier Blvd. (Norwalk to Carley)

[1]The higher number applies if the Alameda Option to connect to Union Station is selected.
[2]The subway segment of this alternative passes underneath or in close proximity to the recreational resource. Adverse impacts are unlikely.

Although referred to as a "park", LANI Park was actually created under the City of Los Angeles' Local Area Neighborhood Initiative program that targets improvements to certain streets with use of Federal funds. It is under the jurisdiction of the Public Works Department and not the Los Angeles City Recreation and Parks Department. It is a triangular-shaped property that was converted from a traffic island to a pedestrian way with green space and is located at the northeast corner of 1st Street and Chicago Street. The so-called "Whittier Greenspace" is located in an area that previously contained buildings that were not well-maintained and have since been demolished by the City of Whittier and is now an area of open space with no recreation facilities. It is not designated as a park in the city's general plan.

Applicability of Section 4(f)

Federal funds will be used to help finance this transit project. Section 4(f) of the Department of Transportation Act of 1966 requires that federal funds cannot be used for any "program or project which requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, or any land from an historic site of national, State, or local significance as determined by such officials unless (1) there is no feasible and prudent alternative to the use of such lands, and (2) such program includes all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site resulting from such use." The word "use" refers to either a direct or a constructive use of the property. Upon selection of a locally preferred alternative, a determination will be made as to whether a feasible or prudent alternative to using parks and/or recreational facilities is available (if it is determined during more detailed analysis that a "use" will occur), and whether the project includes all possible planning to minimize harm to the identified resources. At that time, for each property, the following will be described: (1) the potentially affected property and its current use, (2) the relevant alternative affecting the property, (3) the potential impact on the property from the project, (4) alternatives to avoid the Section 4(f) involvement and its potential effects, and (5) possible measures to mitigate the project-related impact.

4.15 MAJOR UTILITIES

4.15.1 Affected Environment

During the construction phase of this project, it is expected that underground utility lines may be affected by excavation activities. Utility lines are generally located underneath or immediately adjacent and parallel to roadways. Utility providers throughout the project area include municipal agencies, special utility districts, and private companies providing electricity, water, wastewater and stormwater collection, natural gas, steam, and telecommunications services. A summary of some of the major utility providers by municipality is presented in Table 4-59.

Electric power for the rail alternatives and the maintenance and storage facilities has generally been provided by the Los Angeles Department of Water and Power (LADWP) within the City of Los Angeles and by Southern California Edison (SCE) for the remainder of the study area. SCE owns and maintains approximately 88,000 circuit miles of 115-kilovolt (kV) and 230 kV transmission lines that carry power from its generating facilities to 800 substations. The deregulation of the industry in the California market has increased competition in the marketplace, which would benefit large utility users like the MTA in the negotiation of favorable utility rates for new rail starts. The negotiation of favorable rates for the supply of electric power is significant to the MTA on what is typically a large component of Operation and Maintenance budgets.

Pacific Bell and GTE provide telephone service throughout the entire Eastside project area. Telephone lines in urban areas are typically located within street rights-of-way, above ground on utility poles in most areas and underground in newer areas. Other smaller utilities often share these underground trenches or duct banks. Several private companies maintain fiber optic cables and/or provide long distance and other telecommunications services in Los Angeles County.

4.15.2 Evaluation Methodology

The criterion being evaluated is the potential impact on existing utilities. The major utility providers in the study area were identified. Based on typical engineering and construction practices, it was determined that all at-grade alternatives would have similar impacts since all alternatives are similar in length and would run in existing public right-of-way where most utilities are located. Impacts of the subway segments of the three hybrid alternatives were considered to be less than for similar segments of other alternatives that are at-grade since the tunneling would occur underneath most utilities. The exception would be in the vicinity of the subway station excavation areas. The analysis presented in section 4.15.3 is qualitative in nature due to the conceptual level of design available at this time. A detailed investigation of utility locations and impacts will be performed after an alternative is selected, and the design becomes more refined.

TABLE 4-59 MAJOR UTILITY PROVIDERS	
Municipality	**Providers**
City of Los Angeles	Los Angeles Department of Water and Power Pacific Bell Southern California Gas Company Los Angeles City Sanitation District Los Angeles County Flood Control
Pico Rivera	GTE Southern California Edison Southern California Gas Company Pico Water District Los Angeles County Sanitation Los Angeles County Flood Control
Whittier	Southern California Gas Company Southern California Edison California Domestic Water Company San Gabriel Valley Water Company GTE Pacific Bell Los Angeles County Sanitation Los Angeles County Flood Control
Montebello	Southern California Gas Company Southern California Edison Pacific Bell Water Department Los Angeles County Sanitation Los Angeles County Flood Control
Los Angeles County	Southern California Gas Company Southern California Edison Pacific Bell California Water Service Los Angeles County Sanitation Los Angeles County Flood Control

4.15.3 Environmental Issues

The criterion being considered in this discussion is the potential impacts on existing utilities.

Comparative Evaluation

The Eastside Transit Corridor project is proposed to be constructed almost entirely within the public right-of-way. Relocation of both public and private utility lines buried within the street or on overhead poles above the street is expected to some degree. During the construction phase of this project, it is expected that underground utility lines will be affected by excavation activities.

Utility lines are generally located underneath, or immediately adjacent and parallel to, roadways. Utility providers throughout the project area include municipal agencies, special utility districts, and private companies providing electricity, water, wastewater and stormwater collection, natural gas, steam, and telecommunications services. The major utility providers in the study area are identified in section 4.15.1.

Eight build alternatives are being evaluated including four BRT alternatives, two LRT alternatives, one hybrid Heavy Rail/BRT alternative, and one hybrid Heavy Rail/LRT alternative. The at-grade alternatives are considered to have the greatest impact on utilities other than the subway stations, which will require extensive utility relocation within the vicinity of the station excavation area. Use of tunneling methods, in lieu of cut and cover construction, for the subway tunnels should minimize interference with underground utilities. Table 4-60 provides a qualitative analysis of the potential impacts of the alternatives. A detailed investigation of utility locations and impacts will be performed after an alternative is selected and the design becomes more refined.

Mitigation

The project will be planned to avoid or minimize inconvenience to utility users. The locations of excavations and construction equipment movement in relation to subsurface and surface utility lines will be identified during later phases of the project after a preferred alternative has been selected and the design becomes more refined. If a subway alternative is selected, appropriate investigation will also be conducted to identify all known utilities.

The following steps should be considered to address the utility relocation/maintenance required for the Eastside Transit Corridor project:

- The approximate location of subsurface and overhead utility lines will be identified as part of preliminary engineering. Utilities include facilities for the provision of sewer, water, storm drain, gas, electrical, telephone, telegraph, cable television, street lighting, pipelines, alarm systems, and parking meters.
- The relationship between any rail project and utility lines will be identified.
- Discussions will be held with affected utility operators during the planning, design, and construction phases in order to identify how best to relocate affected utilities or maintain them in place during construction. Relocation methods and timing will take into account the need to minimize disruption in utility service. Temporary service will be provided as necessary to avoid lengthy disruption in utilities.
- Design and construction of public utility rearrangements may be either done by the utility owners in accordance with their own standard criteria and specifications or the MTA may elect to undertake the relocation of any affected public utilities working in close coordination with the public utility operators. The costs paid by the MTA are subject to negotiation and execution of cooperative agreements.
- Users will be notified well in advance of any anticipated service disruption, and attempts will be made to coordinate convenient times for necessary service outages with the utility owners.

- The project's contractors will be monitored as part of construction management/oversight, and construction contracts will include damages/penalties that encourage contractors to actively seek to avoid accidental disruption of services.
- The schedules of multiple utility rearrangements will be coordinated in order to minimize negative impacts on users.
- A contingency plan will be developed for emergency repair of any utilities unexpectedly found or that disintegrate because of age during excavations.

TABLE 4-60
IMPACTS ON UTILITIES

Alternative	Potential Impacts
No-Build	None
TSM	None or minimal.
1	Alternative is at-grade. Will have the most impact on utilities.
2	Alternative is at-grade. Will have the most impact on utilities.
3	Alternative is at-grade. Will have the most impact on utilities.
4	Alternative is at-grade. Will have the most impact on utilities.
5	Alternative is at-grade. Will have the most impact on utilities.
6	For the at-grade segments, the impacts will be similar to the other at-grade alternatives. Fewer impacts are expected in Boyle Heights in the vicinity of the subway segment from about 1st/Boyle to 1st/Lorena. However, impacts are likely in the excavation areas for the subway stations at 1st/Boyle and 1st/Lorena.
7	For the at-grade segments, the impacts will be similar to the other at-grade alternatives. Fewer impacts are expected in the Central City and Boyle Heights areas in the vicinity of the subway segment from Union Station to 1st/Lorena. However, impacts are likely in the excavation areas for the subway stations at 1st/Boyle and 1st/Lorena.
8	For the at-grade segments, the impacts will be similar to the other at-grade alternatives. Fewer impacts are expected in the Central City and Boyle Heights areas in the vicinity of the subway segment from Union Station to Chavez/Soto. However, impacts are likely in the excavation areas for the subway stations at 1st/Boyle and Chavez/Soto.

4.16 SAFETY

During the scoping and community outreach meetings a major issue of pedestrian, transit patron, and vehicular safety was brought forward by the community related to at-grade bus rapid transit and light rail transit operations. The major concern was the number of buses and light rail trains operating during the weekday peak hours (6 to 9 a.m. and 3 to 7 p.m.) as well as during the other hours of the day and on weekends. It was recommended that an estimate be made of the number of annual accidents that might occur along the Bus Rapid Transit alignments and the Light Rail Transit alignments where they are operating in an at-grade or street level environment.

4.16.1 Evaluation Methodology

In order to estimate the number of possible bus and light rail transit accidents that might occur in similar operating conditions proposed for the Eastside Corridor, data was obtained from the MTA's Operations Safety department.

For estimating bus accidents, the Lines by Accident Frequency Rate data for Calendar Year 1998 was provide by the MTA for all MTA operating lines. The average annual accident frequency rate for calendar year 1998 was 3.09 per 100,000 miles of operation. The average rate for the two major transit lines in the Eastside Corridor (routes 30/31 and 68) in 1998 was 4.04 per 100,000 of operation. These rates were used to provide a range of annual accidents possible for the at-grade Bus Rapid Transit alternatives.

For estimating light rail transit accidents, the MTA report Summary of Metro Blue Line Train/Vehicle and Train/Pedestrian Accidents (7/90-09/99) dated October 29, 1999 was used. The proposed at-grate light rail transit operations for the Eastside alternatives would not have a top speed over 35 mph and would be similar to the Metro Blue Line areas of slow operations in the City of Los Angeles (Flower St, Washington Blvd.) and the City of Long Beach downtown area. Speed is limited to a maximum of 35 mph in these sections. These sections account for about 10 miles of the 22 miles of the Metro Blue Line. Based on the data presented in the above report, average number of accidents per year per mile for fiscal years 1993 to 1999 is approximated 4. For fiscal year 1999 only, the accident rate is approximately 5.1 per mile. The operations for the proposed Eastside at-grade light rail alternatives is similar to the Metro Blue Line and therefore the above average rates (applied to the miles proposed) were used to provide a range of annual accidents possible for the at-grade Light Rail Transit alternatives. The above data also demonstrated that only about 5 percent of the accidents involved pedestrians. By far the majority of the accidents related to private vehicle conflicts with the LRT vehicle.

It was also decided to estimate the possible number of automobile accidents that might occur along these alignments of the Eastside Corridor alternatives. Data was obtained from Caltrans and the Federal Highway Administration related to accidents rates per 100 million vehicles miles operated. The number of annual miles operated by automobiles was estimated for each of the alignments and the accident rate applied to it. The overall accident rate for these types of arterial streets is approximated 530 accidents per 100 million vehicle miles traveled. About 300 involve property only, and the others involve some type of personal injuries.

4.16.2 Environmental Issues

The criteria being evaluated, as described above, is the number of possible bus accidents, light rail accidents, and automobile accidents for each alternative. No estimates were made for the no build condition and the TSM alternative. Table 4-61 presents the results. The results are for the full length of each alternative. It is expected that because of population densities, household make-up (more children), higher transit usage, and other factors that the areas west of Lorena would have a higher probability of accidents occurring versus the lower density, less transit dependent areas to the east.

TABLE 4-61 ESTIMATED ACCIDENTS			
Alternative	**Potential Annual Bus Accidents**	**Potential Annual Light Rail Accidents**	**Potential Annual Automobile Accidents**
No-Build	N.A.	N.A.	N.A.
TSM	N.A.	N.A.	N.A.
1	170 to 225	N.A.	385
2	170 to 225	N.A.	430
3	N.A.	50 to 65	430
4	170 to 220	N.A.	380
5	N.A.	50 to 65	380
6	N.A.	45 to 60	430
7	N.A.	35 to 50	380
8	165 to 215	N.A.	380

As shown in the table, the at-grade portions of the alternatives involving bus rapid transit are anticipated to have higher numbers of accidents than those alternatives employing at-grade LRT. However, the number of automobile accidents is related more to the segment that is traversed than the mode of transit being offered under each alternative. As previously discussed, accidents are not an issue associated with the segments of Alternatives 6 through 8 that operate in a subway.

In addition the MTA Operations Safety department recommended that the following Light Rail Transit safety features be considered in the next phase of analysis if a light rail transit alternative is considered:

- Explore all possibilities of grade separation – lessons learned with the Metro Blue Line and Metro Green Line says it will be much safer and cost effective in the long run to have a grade separation
- If grade separation is not possible, then consider designs to avoid and minimize left turns as much as possible
- Design adequate storage for cars waiting to make a left turn
- Consider installing left turn gates for cars in the left turn pocket lanes
- Consider protected left turn phases where possible
- Consider programmed visibility train signals that are not visible to cars making left turns and are visible only to train operators
- Consider photo enforcement camera equipment
- Consider train preemption or train priority signal system
- Consider having no vehicular crossing of the tracks between major intersections (right in – right out turns only)
- Consider alignment, grade, horizontal, and vertical curves to minimize or eliminate any visibility and/or operational problems.

- Consider pedestrian gates, crosswalks, stand behind the line markings, etc. Provide for an entire safe path from stations to sidewalks for pedestrians and patrons.
- Consider active warning devices for pedestrians
- Consider providing a full SCADA/TRACS system to document incidents and help early restoration of service
- Consider front fenders on the LRT vehicle
- Consider side fenders on the LRT vehicle

4.17 SUMMARY OF ENVIRONMENTAL ISSUES

4.17.1 Introduction

This section begins by summarizing the major environmental issues associated with each alternative according to the evaluation criteria that was considered. The major observations of the comparative evaluation of the build alternatives are next presented. Table 4-62, found at the conclusion of this section, consists of a matrix that compares the criteria considered for each alternative throughout the total length of each alignment (Union Station to Norwalk Boulevard). In the event that it is decided to construct the project in phases, a comparison of two smaller segments of each alignment is presented in Tables 4-63 and 4-64. Table 4-63 compares the criteria for each alternative for the portion of the study area between Union Station and Lorena Street, and Table 4-64 presents this information for the section of the study area between Union Station and Atlantic Boulevard.

4.17.2 No-Build Alternative

The No-Build Alternative assumes that no project would be constructed and would result in no impacts with regard to the following: acquisition of additional property to accommodate park-and-ride facilities; increases of impacts on the visual environment, noise/vibration, wetlands, floodplains, cultural and paleontological resources, parks and recreation facilities, and utilities; potential for liquefaction or inundation from possible dam failures during an earthquake; and potential to encounter pre-existing contaminated sites during construction.

The No-Build Alternative also would not create opportunities, beyond those currently projected for the region, for additional short-term jobs during construction and permanent jobs once the transit system becomes operational. It also has no effect on the plans and policies of the local communities and would maintain the status quo in this regard. Opportunities for enhanced mobility and access to low-income and minority areas as well as to some of the existing redevelopment and special revitalization zones in the study area also would be foregone. The air quality impacts of the No-Build Alternative would be greater than any of the build alternatives with respect to anticipated criteria pollutant/precursor emissions from volatile organic compounds (VOC), carbon monoxide (CO), and particulate matter (PM_{10}). However, there would be some decreases in nitrogen oxides (NO_x) emissions as compared to three of the eight build alternatives. This alternative ranks mid-range with respect to carbon dioxide (CO_2, a greenhouse gas) emissions.

4.17.3 TSM Alternative

This alternative involves an increase in the frequency of bus service only and the addition of bus routes in the study area. Construction of additional facilities would be minimal. Therefore, the TSM Alternative would also result in no additional impacts in most of the same categories cited for the No-Build Alternative. There may be slight increases in noise levels in locations where bus service is substantially increased.

Some short-term jobs would be created due to construction of the minimal facilities associated with this alternative. However, it is estimated that more than four times as many short-term jobs would be created with implementation of the lowest cost build alternative and more than fourteen times as many such jobs would be created with the highest cost build alternative. Some permanent jobs would also be created to support the additional bus service, but the number of such jobs would be 2.5 to 3.5 times less depending on the build alternative selected for comparison. Also, the TSM Alternative would have little effect on the plans and policies of the local communities and would maintain the status quo in this regard. Enhanced mobility and access to low-income areas, minority areas, and existing redevelopment and special revitalization zones would likely be provided in the vicinity of some of the increased bus service; however, not to the extent offered under any of the build alternatives. With regard to air quality, the TSM Alternative results in the highest criteria pollutant/precursor emissions and also in CO_2 emissions of any of the alternatives under consideration.

4.17.4 Commonality of the Build Alternatives

Some of the environmental issues evaluated would be the same for all of the build alternatives. All are generally compatible with the local plans and policies of the surrounding communities. The only potential conflict noted would be in the vicinity of the Whittier/Norwalk Station at the eastern terminus. The City of Whittier General Plan's land use designation near the proposed transit station is for single-family residential, greenspace, and general commercial along Whittier Boulevard. Future amendments or revisions to the general plan could consider modifications to the land use designations to allow intensification of land use in the area. The unincorporated Southwest Whittier Community has no adopted community plan at this time. However, the zoning in the vicinity of the station is for low-density residential uses. To promote compatibility with the proposed transit station, the County of Los Angeles could modify zoning patterns, as appropriate, when a community plan is prepared.

At this time, it appears that none of the build alternatives would require the displacement of any residences or businesses for the alignments or stations. There is a possibility that additional land may be needed to accommodate the cut-and-cover process of constructing the heavy rail station box area at 1st/Boyle (Alternatives 7 and 8) and at 1st/Lorena (Alternative 7). This will be further investigated if one of these alternatives is selected and when its design is further refined. No additional land will be needed in the subway station areas of LRT Alternative 6. All build alternatives will require additional land for park-and-ride facilities. This is discussed in more detail below. With regard to transportation-related energy consumption, there are no substantial differences between any of the build alternatives. However, all will have somewhat lower energy requirements than the TSM Alternative ranging from 32,424 (Alternative 8) to 243,321

(Alternative 6) fewer BTUs per year. In terms of barrels of oil saved annually as compared to the TSM Alternative, the build alternatives range from 243,321 barrels saved (Alternative 6) to 32,423 barrels saved (Alternative 8).

All of the build alternatives will serve several (from seven to ten depending on alternative) existing redevelopment or special revitalization zones. This is discussed in more detail below. An improved transit system could assist in the revitalization of these projects by providing improved access and mobility. All build alternatives will also serve minority and low-income populations and will result in an increase in numbers of transit trips in the corridor, but to somewhat varying degrees. All alternatives would also result in creation of additional jobs; visual and noise impacts unless mitigation is provided; and utility impacts. Again, there are differences in the extent of impacts anticipated depending on the alternative selected.

Although about 35 to 43 percent of all the alignments is designated as having a potential for liquefaction based on generalized liquefaction hazard maps discussed in Section 4.8, results of prior site-specific investigations indicate that the potential for liquefaction along all the alternative alignments is low to very low. Because prior investigations did not address subsurface conditions at the Rio Hondo area, the liquefaction potential of this area will require evaluation. However, because all the alignments are at grade and have similar segment lengths across the Rio Hondo area, comparative analyses to select a preferred alternative will likely not be influenced by the liquefaction potential of the Rio Hondo area. Accordingly, liquefaction has not been included as a criterion for the selection of the preferred alternative.

In addition, all alignments would be in proximity of pre-existing contaminated sites, cultural resources, and parks and recreation facilities, but to varying degrees. Three of the alternatives (Alternatives 1, 7, and 8) would cross the Coyote Pass Escarpment, an area of surface deformation believed to be a result of fault movement along the Elysian Park Thrust Fault. The remaining discussion in this section focuses on the differences between the build alternatives. Discussion of possible mitigation options for adverse impacts was presented in the previous sections of this chapter.

4.17.5 Alternative 1

This BRT alternative would require an additional 28 acres of land for park-and-ride facilities based on preliminary estimates of parking needs. This is one of the alternatives with the lowest requirements for additional property. At this conceptual level of design, only general locations of park-and-ride facilities (i.e., vicinity of some of the station areas east of I-710) are known. Specific site locations will be determined as the design advances to later stages of project development. The possibility of constructing parking structures (instead of surface lots) at some locations will also be determined later for the selected alternative. If structures were built, the additional land requirements would be reduced.

The numbers of accidents that may potentially occur were estimated based on historical statistics for similar bus operations and on similar arterial streets. An estimated 170 to 225 bus accidents and 385 automobile accidents are projected to occur annually. Alternative 1, as well as all of the other BRT alternatives, is forecasted to result in higher numbers of accidents involving a transit vehicle than those alternatives employing at-grade LRT. All of the BRT alternatives are projected to result in similar numbers of bus accidents. However, Alternative 8 would result in the least accidents of the BRT alternatives (165 to 215 bus accidents) because of the subway segment. This alternative is estimated to result in the next to least number of automobile accidents of all of the build alternatives. Alternatives 4, 5, 7, and 8 are estimated to result in the fewest auto accidents (380 annual accidents).

Alternative 1 ties with Alternatives 4 and 5 in directly serving the highest number of existing redevelopment or special revitalization zones (they each serve ten). However, this alternative ranks next to lowest in numbers of short-term jobs created (25,222 direct and indirect jobs). Only Alternative 2 ranks lower (24,857 such jobs). Although Alternative 1 ranks lowest of the build alternatives in numbers of permanent jobs created (3,748 direct and indirect jobs), it would still create 2.5 times as many permanent jobs as the TSM Alternative.In terms of highest numbers of low-income families served within 1/2 mile of the transit stations, Alternative 1 ranks third (31,583 families). The alternative is second in terms of minority populations served within the same distance of the stations (127,817 persons). All of the station areas for all of the build alternatives serve high concentrations of minority populations (refer to Section 4.3 for more information). Like Alternatives 4, 5, 7, and 8, this alternative also serves high concentrations of low-income families within 1/2 mile of all of the stations, with the exception of those at Beverly/Wilcox, Beverly/Montebello, Beverly/4th, and Whittier/Norwalk. Alternative 1 also ranks second in numbers of zero-car households (8,587 households) and in workers using public transportation to get to work (7,585 persons) within 1/2 mile of the stations. Alternative 1 ties with Alternative 2 in providing the fewest corridor daily transit trips (174,500) of the build alternatives. However, both alternatives would still provide more transit trips than either the No-Build or TSM Alternative (25,400 and 9,200 more trips each day, respectively).

With regard to potential visual impacts, this alternative would potentially affect the highest number of sensitive receptors of all alternatives (541 residences, schools, parks, bicycle trails, and/or cemeteries). However, this alternative includes a bus guideway. Overall impacts of this mode are expected to be less than a light rail mode because light rail would necessitate removal of median landscaping (where it already exists) and installation of an overhead catenary system. The BRT mode does not have these requirements. Alternative 1 would have the highest numbers of noise-impacted buildings and parks (554) of the alternatives. Because this mode involves buses, vibration would not be an issue.

This alternative ranks mid-range with regard to estimated pollutant criteria/precursor emissions. It ranks fourth best with regard to CO_2 emissions.

Alternative 1 crosses about 300 feet of the Coyote Pass Escarpment However, it is anticipated that this at-grade alternative would be affected less severely than the subway alternatives crossing the escarpment (Alternatives 7 and 8) in the event of future seismic activity along the escarpment.

This alternative has the lowest potential for concern with regard to possibly encountering pre-existing hazardous substance sites during construction. The BRT mode would involve only limited subsurface construction activity. In general, the major areas of concern for encountering contaminated sites under any of the build alternatives exist in the western portion of the study area between Union Station and Indiana Street.

Of the totally at-grade alternatives, the lowest numbers of potential cultural resources and sites listed on the State and National Registers (124) were identified in proximity of Alternative 1. However, all of the alternatives involving subway (Alternatives 6, 7, and 8) have fewer (75, 48, and 109, respectively). In general, the area between about Boyle Avenue and Indiana Street has the highest concentrations of such resources for all of the alternatives considered. Fewer potential resources were identified further east within the study area. Because of the limited subsurface construction activity associated with Alternative 1, there is no potential for encountering fossil sites and remains during construction.

A total of nine park and recreation facilities were identified within 300 feet of the alignment. This is the distance considered in the evaluation as the area where potential impacts are possible. All of the build alternatives are in proximity of between eight and 11 such resources; therefore, this alternative falls in the middle-range in the ranking of this criterion.

The final criterion evaluated is the potential impacts on utilities during construction. Alternative 1, as well as all of the other totally at-grade alternatives, would have the highest impacts because relocation of utilities buried within the street or on overhead poles above the street is expected to some degree.

4.17.6 Alternative 2

This BRT alternative, along with Alternatives 3 and 6, has the highest requirements for additional land (35 acres) to accommodate park-and-ride facilities according to preliminary estimates of parking needs. An estimated 170 to 225 bus accidents and 430 automobile accidents are projected to occur annually. Alternative 2, as well as all of the other BRT alternatives, is forecasted to result in higher numbers of accidents involving a transit vehicle than those alternatives employing at-grade LRT. All of the BRT alternatives are projected to result in similar numbers of bus accidents. This alternative is also tied with Alternatives 3 and 6 for the highest number of estimated automobile accidents of all of the build alternatives. The total accidents (both bus and auto) are estimated to be the highest of all of the build alternatives.

Alternative 2 also serves nine existing redevelopment or special revitalization zones tying with Alternatives 3 and 6 for second highest number of such zones served. Alternative 2 ranks lowest in numbers of short-term jobs created (24,857 direct and indirect jobs) as a result of construction of the project. It ranks second to lowest in numbers of permanent jobs created (3,770 direct and indirect jobs). Only Alternative 1 ranks lower (3,748 such jobs).

Alternative 2 ties with Alternative 3 for having the highest numbers of both low-income families (36,967 families) and minority populations (141,353 persons) served within 1/2 mile of the stations. As previously mentioned, all of the station areas for all of the build alternatives serve high concentrations of minority populations. Like Alternatives 3 and 6, this alternative also serves high concentrations of low-income families within 1/2 mile of all of the stations, with the exception of the one at Whittier/Norwalk. Alternative 2 also ties with Alternative 3 in having the

highest numbers of zero-car households (9,553 households) and workers using public transportation to get to work (8,521 persons) within 1/2 mile of the stations. This alternative ties with Alternative 1 in providing the fewest corridor daily transit trips (174,500) of the build alternatives. However, both alternatives would still provide more transit trips than either the No-Build or TSM Alternative (25,400 and 9,200 more trips each day, respectively).
With regard to potential visual impacts, this alternative ranks about middle range in terms of numbers of sensitive receptors potentially affected (427 residences, schools, parks, bicycle trails, and/or cemeteries). This alternative again ties with Alternative 3 with regard to numbers of receptors. However, overall impacts are expected to be less than the light rail mode proposed for Alternative 3 because it does not require removal of median landscaping or installation of an overhead catenary system. This alternative (like Alternative 3) again ranks in about the middle with regard to potential noise impacts (483 noise-impacted buildings and parks). Because this mode involves buses, vibration would not be an issue.

Alternative 2 ranks third best with regard to reductions in estimated pollutant criteria/precursor emissions. It ranks third best with regard to CO_2 emissions.

This alternative (like Alternatives 3 through 6) does not cross the Coyote Pass Escarpment. Therefore, potential ground deformation hazards are not a concern of this alternative. Alternative 2 is ranked second with regard to lowest potential concern for possibly encountering pre-existing hazardous substance sites during construction. The BRT mode would involve only limited subsurface construction activity.

Alternative 2 also ties with Alternative 3 in highest numbers of potential cultural resources and listed sites in proximity of the alignment (158). However, there is no potential for encountering fossil sites and remains during construction of this alternative. The fewest park and recreation facilities (8) of all the build alternatives are located close to the alignment of Alternative 2. Like the other at-grade alternatives, this alternative would have the highest impacts on utilities during construction.

4.17.7 Alternative 3

This LRT alternative follows the same alignment as Alternative 2 and shares many of the same impacts. Impacts on land requirements for the park-and-ride facilities, redevelopment/revitalization areas served, cultural resources, and utilities would be the same. The numbers of low-income and minority populations, zero-car households, and workers using public transportation to get to work that would potentially be served are also similar.

However, some differences are evident due to the different mode. The number of corridor daily transit trips is projected to be higher with this alternative (178,700) than with Alternative 2 (174,500), ranking it fourth highest in terms of ridership. The same numbers of sensitive receptors would be affected by noise as Alternative 2, but the LRT mode also introduces the potential for vibration impacts on those receptors. Also, similar numbers of sensitive receptors would possibly be affected by visual impacts as Alternative 2. However, the overall impact would be greater since the LRT mode will require removal of existing landscaping in medians and installation of an overhead catenary system.

Alternative 3 ranks second best with regard to reductions in estimated pollutant criteria/precursor emissions and with regard to CO_2 emissions.

An estimated 50 to 65 light rail vehicle accidents and 430 automobile accidents are projected to occur annually. Alternative 3 ties with Alternative 5 in highest projected numbers of light rail vehicle accidents. However, all of the LRT alternatives would result in fewer accidents involving a transit vehicle than those alternatives employing at-grade BRT. This alternative is tied with Alternatives 2 and 6 for the highest number of estimated automobile accidents of all of the build alternatives.

Alternative 3 nearly ties with Alternative 5 in estimated short-term jobs created (43,378 for Alternative 3 and 43,362 for Alternative 5). Both rank mid-range in numbers of such jobs. Alternative 3 also ranks mid-range in numbers of permanent jobs created (4,202 direct and indirect jobs).

The potential for concern with regard to possibly encountering pre-existing contaminated sites is somewhat higher than Alternative 2 because this mode will require some additional subsurface construction activity as compared to BRT. Construction of aerial structures associated with the Baseline and Evergreen Options for connecting to Union Station may require mitigative actions in contaminated areas. Also, one additional park (for a total of 9 facilities) would be in close proximity of this alternative if the Alameda Option for connection to Union Station were selected. If the Baseline or Evergreen Options were selected to connect to Union Station, then there would be potential for encountering fossil sites and remains during construction of the elevated segments. There is no such potential if the Alameda (at-grade) Option were selected.

4.17.8 Alternative 4

This BRT alternative would require an additional 28 acres of land for park-and-ride facilities according to preliminary estimates. This is one of the alternatives with the lowest requirements for additional property. An estimated 170 to 220 bus accidents and 380 automobile accidents are projected to occur annually. Alternative 4, as well as all of the other BRT alternatives, is forecasted to result in higher numbers of accidents involving a transit vehicle than those alternatives employing at-grade LRT. All of the BRT alternatives are projected to result in similar numbers of bus accidents. However, this alternative ties with Alternatives 5, 7, and 8 for the fewest projected auto accidents.

In terms of highest numbers of low-income families served within 1/2 mile of the stations, Alternative 4 ranks second (31,586 families) tying with Alternative 5. It ranks fourth highest, along with Alternative 5, in numbers of minorities served within the same distance of the stations (124,194 persons). Alternative 4 ranks third highest and fourth highest, respectively, in numbers of zero-car households (8,530 households) and in numbers of workers using public transportation (7,347 persons) within 1/2 mile of the stations. Again, this alternative is tied with Alternative 5 for these two criteria. However, Alternative 4 ranks second to last with regard to number of corridor daily transit trips (174,900).

Alternative 4, along with Alternatives 1 and 5, directly serve the highest number of existing redevelopment or special revitalization zones (ten). An improved transit system could assist in the revitalization of these projects by providing improved access and mobility. However, Alternative 4 ranks third from the bottom in numbers of short-term jobs created (25,520 direct and indirect jobs) and in numbers of permanent jobs created (4,003 direct and indirect jobs). With regard to potential visual impacts, this alternative would potentially affect the second highest number of sensitive receptors (490 residences, schools, parks, bicycle trails, and/or cemeteries). This is the same number potentially affected by Alternative 5. As mentioned before, the overall impacts are expected to be less, however, than a light rail mode (as in Alternative 5) because no landscaping would need to be removed in the medians, and no overhead catenary system would need to be installed. A total of 504 buildings and parks would be affected by noise, which is also similar to Alternative 5. However, vibration would not be an issue for this BRT mode.

Alternative 4 achieves some of the fewest pollutant criteria/precursor emission reductions compared to the No-Build Alternative of any of the build alternatives (ranking from sixth to eighth depending on the type of emissions considered). It ranks one of the lowest of the build alternatives with regard to CO_2 emissions and also results in higher such emissions than the No-Build Alternative.

This alternative (like Alternatives 2, 3, 5, and 6) does not cross the Coyote Pass Escarpment. Therefore, potential ground deformation hazards are not a concern of this alternative. Alternative 4 has the third lowest potential for concern with regard to possibly encountering pre-existing hazardous substance sites during construction. The BRT mode would involve only limited subsurface construction activity.

This alternative also ties with Alternative 5 for second highest number of potential cultural resources and listed sites identified in proximity of the alignment (132). Because of the limited subsurface construction activity associated with Alternative 4, there is no potential for encountering fossil sites and remains during construction.

A total of ten park and recreation facilities were identified within 300 feet of the alignment, ranking it second highest in terms of numbers of such facilities within close proximity. Like the other at-grade alternatives, Alternative 4 would have the greatest impact on utilities during construction.

4.17.9 Alternative 5

LRT Alternative 5 follows the same alignment as Alternative 4 and shares many of the same impacts. Impacts on land requirements for the park-and-ride facilities, redevelopment/revitalization areas served, cultural resources, and utilities would be the same. The numbers of low-income and minority populations, zero-car households, and workers using public transportation to get to work that would potentially be served are also similar.

However, some differences are evident due to the different mode. The number of corridor daily transit trips is projected to be higher with this alternative (180,350) than with Alternative 4

(174,900), ranking it second highest in terms of ridership. The same numbers of sensitive receptors would be affected by noise as Alternative 4, but the LRT mode also introduces the potential for vibration impacts on those receptors. Also, similar numbers of sensitive receptors would possibly be affected by visual impacts as Alternative 4. However, the overall impact would be greater since the LRT mode will require removal of existing landscaping in medians and installation of an overhead catenary system.

Alternative 5 achieves some of the fewest pollutant criteria/precursor emission reductions compared to the No-Build Alternative of any of the build alternatives (ranking from seventh to eighth depending on the type of emissions considered). It ranks worst of the build alternatives with regard to CO_2 emissions, but it still has fewer such emissions than the TSM Alternative.

An estimated 50 to 65 light rail vehicle accidents and 380 automobile accidents are projected to occur annually. Alternative 5 ties with Alternative 3 in highest projected numbers of light rail vehicle accidents. However, all of the LRT alternatives would result in fewer accidents involving a transit vehicle than those alternatives employing at-grade BRT. This alternative is tied with Alternatives 4, 7, and 8 for the least number of estimated automobile accidents of all of the build alternatives.

Alternative 5 nearly ties with Alternative 3 in estimated short-term jobs created (43,378 for Alternative 3 and 43,362 for Alternative 5). Both rank mid-range in numbers of such jobs. Alternative 5 provides the third highest number of permanent jobs (4,568 direct and indirect jobs).

The potential for concern with regard to possibly encountering pre-existing contaminated sites is somewhat higher than Alternative 4 because this mode will require some additional subsurface construction activity as compared to BRT. Construction of aerial structures associated with the Baseline and Evergreen Options for connecting to Union Station may require mitigative actions in contaminated areas. Also, one additional park (for a total of 11 facilities) would be in close proximity of this alternative if the Alameda Option for connection to Union Station were selected. If the Baseline or Evergreen Options were selected to connect to Union Station, then there would be a potential for encountering fossil sites and remains during construction of the elevated segments. There is no such potential if the Alameda (at-grade) Option were selected.

4.17.10 Alternative 6

This LRT alternative includes a subway segment from about US 101 (east of the Los Angeles River) to 1st/Lorena. It is tied with Alternatives 2 and 3 for the highest requirements for additional land (35 acres) to accommodate park-and-ride facilities, according to preliminary estimates of parking needs. An estimated 45 to 60 light rail vehicle accidents and 430 automobile accidents are projected to occur annually. This alternative is estimated to result in slightly fewer light rail accidents than the totally at-grade LRT alternatives because of the subway segment. However, as noted previously, all of the LRT alternatives would result in fewer accidents involving a transit vehicle than those alternatives employing at-grade BRT. This alternative is tied with Alternatives 2 and 3 for the highest number of estimated automobile accidents of all of the build alternatives.

Alternative 6 serves nine existing redevelopment or special revitalization zones tying with Alternatives 2 and 3 for second highest number of such zones served. This alternative creates the third highest number of short-term jobs (55,379 direct and indirect jobs). With regard to permanent jobs, Alternative 6 ranks fifth in numbers of jobs created (4,084 direct and indirect jobs). Only the BRT alternatives would create fewer such jobs.

In terms of numbers of low-income families served within 1/2 mile of the stations, Alternative 6 ranks fourth lowest (31,523 families). The alternative is the next to the lowest in terms of minority populations served within the same distance of the stations (122,522 persons). It ranks fourth lowest in numbers of zero-car households (8,120 households) and also ranks the next to the lowest in numbers of workers using public transportation to get to work (6,733 persons) within 1/2 mile of the stations. However, Alternative 6 ranks third highest with regard to daily transit trips within the corridor (179,550).

Alternative 6 would potentially visually affect the lowest number of sensitive receptors (296 residences, schools, parks, bicycle trails, and/or cemeteries). However, overall impacts would be greater in the areas affected than a BRT mode because of the need to remove landscaping in the medians and install an overhead catenary system. This alternative also would have the least number of noise-impacted buildings and parks of all the build alternatives (358 affected by wayside noise for the at-grade segments and 50 affected by ground-borne noise for the subway segment). However, the LRT mode would introduce the potential for vibration impacts on those receptors. The possible vibration impacts of the at-grade portion of the alternative would, however, be less than the subway portion because of the lower operating speed required along the at-grade segment.

Alternative 6 achieves the best reduction in pollutant criteria/precursor emissions of any of the alternatives under consideration. This also holds true with regard to CO_2 emissions.

This alternative (like Alternatives 2 through 5) does not cross the Coyote Pass Escarpment. Therefore, potential ground deformation hazards are not a concern of this alternative. Alternative 6 has the third highest potential for concern with regard to encountering pre-existing contaminated sites since the major areas of concern are not in the tunnel segment. It is likely that the proposed subway segment, and possibly the elevated segment of the Baseline and Evergreen Options for connecting with Union Station (proposed in this alternative as well as LRT Alternatives 3 and 5), would encounter some subsurface contamination related to historical industrial activities.

The second fewest potential cultural resources and listed sites were identified in the vicinity of this alternative (75). Both the subway segment of this alternative and the elevated segment of the Baseline and Evergreen Options for connecting with Union Station have a potential for encountering fossil sites and remains during construction. The at-grade segments have no potential since limited subsurface construction activity would occur.

A total of eight park and recreation facilities were identified within 300 feet of the alignment assuming the Alameda Option is selected for connection to Union Station. Only seven such facilities are in close proximity of this alternative if the other two options are selected. Note that the alternative is located within a subway segment near one of the facilities (LANI Park). No impacts on that park would be expected as a result of this alternative. Potential impacts on parks would be among the lowest of all the alternatives depending on which alternative is selected for connecting to Union Station. Like Alternatives 7 and 8, Alternative 6 would have the least impacts on utilities because of the subway segment. However, impacts are still likely in the vicinity of the subway station excavation areas.

4.17.11 Alternative 7

This hybrid alternative consists of a heavy rail subway segment from Union Station to 1st/Lorena and a LRT at-grade segment from 1st/Lorena east to Whittier/Norwalk. It is tied with Alternatives 1, 4, 5, and 8 for the lowest requirements for additional land (28 acres) to accommodate park-and-ride facilities, according to preliminary estimates of parking needs. An estimated 35 to 50 light rail vehicle accidents and 380 automobile accidents are projected to occur annually. This alternative is estimated to result in fewer light rail accidents than all of the LRT alternatives because it contains the longest length of subway segment where accidents would not be an issue. This alternative is also tied with Alternatives 4, 5, and 8 for the lowest number of estimated automobile accidents of all of the build alternatives. Overall, Alternative 7 ranks best in terms of fewest anticipated total accidents (light rail vehicle and auto).

In terms of numbers of low-income families, minority populations, zero-car households, and workers using public transportation to get to work within 1/2 mile of the stations, Alternative 7 ranks the lowest with 23,312 families, 100,294 persons, 6,024 households, and 5,100 workers, respectively. It also would directly serve the fewest redevelopment or special revitalization zones (seven) of any of the build alternatives. However, it would provide the highest number of corridor daily transit trips (180,750) and would create the most short-term jobs (79,141 direct and indirect jobs). It is estimated that this alternative would create more than 20,000 additional such jobs than Alternative 8 which ranks second highest in this category. Alternative 7 would also create the most permanent jobs (5,108 direct and indirect jobs).

Alternative 7 would potentially visually affect the second lowest number of sensitive receptors (300 residences, schools, parks, bicycle trails, and/or cemeteries). This is only four more than affected under Alternative 6. However, overall impacts would be greater in the areas affected than a BRT mode because of the need to remove landscaping in the medians and to install an overhead catenary system. The noise impacts would affect the second lowest number of buildings and parks (378 affected by wayside noise for the LRT at-grade segments and 68 affected by the ground-borne noise for the heavy rail subway segment). There would also be a potential for vibration impacts on those receptors due to both modes. However, such impacts would be less for the at-grade portions than the underground portion because of the lower speeds required for the street-running operation.

This alternative ranks about mid-range with regard to pollutant criteria/precursor emission reductions compared to the No-Build Alternative of any of the build alternatives (ranking from fourth to fifth depending on the type of emissions considered). It also ranks mid-range with regard to CO_2 emissions.

Approximately 800 feet of proposed tunnel segment of Alternative 7 crosses the Coyote Pass Escarpment. Alternative 7 also has the highest potential for concern with regard to encountering pre-existing contaminated sites west of the Los Angeles River. Alternatives 7 and 8 will involve extensive subsurface excavation in the vicinity of contaminated sites. Both of these subway alternatives are located through industrially developed property that has historically contained oil and gas production wells. High levels of methane gas and hydrogen sulfide are potential concerns associated with the tunneling. Previous studies in the vicinity of Union Station, conducted as a part of the previous Red Line study effort, have found groundwater to be contaminated with hydrocarbons, hydrogen sulfide gas, and various volatile organic compounds, and semi-volatile organic compounds. Two former coal-gasification sites are also located in the study area. Another major source of concern is the former site of six large gasoline above ground storage tanks (currently under demolition and being taken off-site) located near the Friedman Bag Company at the northwest corner of Ducommun and Vignes Streets. The reader is referred to section 4.9 for additional information about contaminated sites in the vicinity of the alignments and potential mitigation options.

The lowest number of potential cultural resources and listed sites were identified in the vicinity of this alignment (48). There is a potential to encounter fossil sites and remains during construction of the subway segment. A total of 9 park and recreation facilities are located in close proximity of the alignment. Note that the total parks nearby included two (Pecan Park and LANI Park) within the subway segment. No impacts on those parks would be expected as a result of this alternative. Like Alternatives 6 and 8, Alternative 7 would have the least impacts on utilities because of the subway segment. However, impacts are still likely in the vicinity of the subway station excavation areas.

4.17.12 <u>Alternative 8</u>

This hybrid alternative consists of a heavy rail subway segment from Union Station to Chavez/Soto and a BRT at-grade segment from Chavez/Soto east to Whittier/Norwalk. It is tied with Alternatives 1, 4, 5, and 7 for the lowest requirements for additional land (28 acres) to accommodate park-and-ride facilities, according to preliminary estimates of parking needs. An estimated 165 to 215 bus accidents and 380 automobile accidents are projected to occur annually. Alternative 8, as well as all of the other BRT alternatives, is forecasted to result in higher numbers of accidents involving a transit vehicle than those alternatives employing at-grade LRT. All of the BRT alternatives are projected to result in similar numbers of bus accidents except that Alternative 8 would have slightly fewer such accidents (approximately five less each year). This alternative ties with Alternatives 4, 5, and 7 for the fewest projected auto accidents.

Alternative 8 serves some of the fewest existing redevelopment or special revitalization zones (eight). Only Alternative 7 serves fewer such zones (seven served). It would create the second highest number of short-term jobs (58,611 direct and indirect jobs) and also the second highest number of permanent jobs (4,718 direct and indirect jobs).

In terms of numbers of low-income families served within 1/2 mile of the stations, this alternative ranks next to last (30,919 families) for fewest numbers served. It ranks third highest in numbers of minorities served within the same distance of the stations (126,496 persons). Alternative 8 again is next to last for fewest zero-car households served (7,918 households) and third highest in numbers of workers using public transportation to get to work (7,430 persons) within 1/2 mile of the stations. With regard to corridor daily transit trips, this alternative ranks fifth (177,150).

With regard to potential visual impacts, this alternative would potentially affect the third highest number of sensitive receptors (482 residences, schools, parks, bicycle trails, and/or cemeteries). However, the visual impacts are confined to the area where the BRT mode would operate. Overall impacts of this mode are expected to be less than a light rail mode due to reasons previously stated. Alternative 8 has the second highest numbers of noise-impacted buildings and parks of all of the build alternatives (538 affected by wayside noise for the BRT at-grade segments and 45 affected by the ground-borne noise for the heavy rail subway segment). There would also be a potential for vibration impacts on the receptors located in the vicinity of the heavy rail subway segment. The bus mode would result in no vibration impacts.

Alternative 8 achieves some of the fewest pollutant criteria/precursor emission reductions compared to the No-Build Alternative of any of the build alternatives (ranking from sixth to seventh depending on the type of emissions considered). It ranks worst with regard to CO_2 emissions of the build alternatives, but it still results in fewer such emissions than the TSM Alternative.

Alternative 8 has the longest length of crossing of the Coyote Pass Escarpment (800 feet of proposed tunnel segment and 300 feet of proposed at-grade busway). This alternative has the second highest potential for concern with regard to encountering pre-existing contaminated sites. The discussion of Alternative 7 identifies the major areas of concern. Refer to section 4.9 for additional information.

The third lowest number of potential cultural resources and listed sites were identified in the vicinity of this alignment (109). However, this alternative has the highest number of such resources of the alternatives involving a subway segment. There is a potential to encounter fossil sites and remains during construction of the subway segment. A total of 9 park and recreation facilities are located within 300 feet of the alignment. Note that the total parks nearby included one (Pecan Park) within the subway segment. No impacts on this park would be expected as a result of this alternative. Like Alternatives 6 and 7, Alternative 8 would have the least impacts on utilities because of the subway segment. However, impacts are still likely in the vicinity of the subway excavation areas.

4.17.13 Conclusions

Selection of an alternative for implementation will require consideration of tradeoffs. Some of the major observations of the comparative evaluation are discussed in this section.

The numbers of accidents anticipated to occur each year were estimated for each of the build alternatives based on historical data for similar bus, light rail, and automobile operations. With regard to accidents involving a transit vehicle, all of the at-grade BRT alternatives are estimated to result in substantially more accidents (more than three times) than the at-grade LRT alternatives. However, the number of estimated automobile accidents is related more to the segment that is traversed than the mode of transit being offered under each alternative. Alternatives 2, 3, and 6 would likely result in the highest number of auto accidents (an estimated 430 per year), while the other build alternatives would result in a projected 380 to 385 auto accidents each year. Based on historical statistics provided by MTA's Operations Safety Department for similar types of operating segments of the Metro Blue Line for light rail and by FHWA and Caltrans for automobile accidents on similar types of arterial streets, the following observations were noted. Only about five percent of the light rail accidents involved pedestrians. The majority of the accidents related to private vehicle conflicts with the LRT vehicle. Most of the automobile accidents involved property damage only; however, the remainder involved some type of personal injuries.

Because the portion of the study area west of Lorena Street has generally higher population densities, families with higher numbers of children, and higher transit usage than the eastern portion of the study area, the probability of accidents occurring in the western area is higher for the totally at-grade alternatives. The subway segments associated with Alternatives 6 through 8 would substantially reduce the probability of accidents in the Boyle Heights area where the tunneled sections would be located.

BRT Alternative 2 and LRT Alternative 3 would both serve the highest numbers of low-income (36,967 families) and minority populations (141,353 persons) within 1/2 mile of the stations. They also would serve the highest numbers of zero-car households (9,553 households) and workers using public transportation (8,521 workers) within 1/2 mile of the stations. These two alternatives follow the same alignment. Alternative 7 would serve the fewest of these populations (23,312 low-income families, 100,294 minorities, 6,024 households, and 5,100 workers, respectively). However, with regard to numbers of corridor daily transit trips, Alternative 7 would provide the highest number (180,750), followed closely by Alternative 5 (180,350). Alternatives 1 and 2 would result in the lowest number of such trips of the build alternatives (174,500 each). It is important to note that higher numbers of transit trips are anticipated for all of the build alternatives as compared to the No-Build and TSM Alternatives. The increase in corridor daily transit trips for the build alternatives range between 31,650 (Alternative 7) and 25,400 (Alternatives 1 and 2) as compared to the No-Build Alternative. A comparison to the TSM Alternative shows that projected increases for the build alternatives range from 15,400 additional trips (Alternative 7) to 9,200 additional trips (Alternatives 1 and 2).

Alternative 7 would result in creation of the highest number of short-term and permanent jobs (79,141 and 5,108 jobs, respectively). Alternative 2 would result in creation of the fewest short-term jobs (24,857), and Alternative 1 would result in creation of the fewest permanent jobs (3,748). Note that the alternatives employing heavy rail or LRT all would result in creation of more short-term and permanent jobs than any of the alternatives employing only the BRT mode.

Research of transit systems in other cities indicates that rail transit investment (similar to that associated with Alternatives 3, 5, 6, 7, and a portion of Alternative 8) offers greater possibility to support community development and revitalization efforts than implementing BRT (similar to that associated with Alternatives 1, 2, 4, and a portion of Alternative 8). However, it appears that the location, type, and success of development is often contingent on other factors as well such as market forces, public policy initiatives, and financing scenarios, particularly in less affluent communities.

With regard to air quality impacts, all of the build alternatives would result in criteria pollutant/precursor emissions reductions as compared to the TSM Alternative and would also result in reductions as compared to the No-Build Alternative except in the case of NO_x where three of the alternatives (Alternatives 4, 5, and 8) would produce higher emissions. Alternative 6 would achieve the greatest reductions among the build alternatives while Alternative 5 would generally result in the fewest reductions. Greenhouse gas emissions (measured in terms of tons of CO_2), from all of the build alternatives would be less than the TSM Alternative. Five of the build alternatives (Alternatives 1, 2, 3, 6 and 7) would also achieve reductions of greenhouse gas emissions as compared to the No-Build Alternative. Alternative 6 would again achieve the greatest reductions.

A comparison of potentially noise-impacted buildings shows that BRT Alternative 1 would have the greatest impact while LRT at grade/subway Alternative 6 would have the least impact. Buses, in general, are noisier than light rail vehicles because they result in wayside noise impacts at greater distances from an alignment than light rail vehicles. However, it is expected that both at-grade modes would still have an adverse impact on the first row of buildings because of the close proximity of the buildings to the streets. The extent of impact on the first row buildings would generally be more severe with buses than with a light rail vehicle. Sound walls are considered the most effective noise control measure for at-grade systems. However, to be effective, they must block the direct view of the noise source and must be solid with minimal openings. Installation of sound walls is not feasible for any of the at-grade LRT or BRT alternatives being considered because they would interfere with normal traffic movements and would restrict emergency vehicle access.

Noise levels from underground operations of either LRT or heavy rail (ground-borne noise) are normally heard as a low level rumbling sound on the inside of buildings and is not perceptible on the outside of a building. In general, even with closed windows, noise levels from underground operations (as with the subway segments of Alternatives 6, 7, and 8) would result in lower interior noise levels than BRT or LRT at-grade operations. Also, the outside at-grade rail noise levels would be significantly higher than ground-borne noise from underground operations which are generally not perceptible outdoors. With regard to vibration, no impacts would be expected from buses because they are rubber tired vehicles. However, such impacts are possible with both LRT and heavy rail. The potential vibration impacts from at-grade LRT operations would be less than from underground operations because of the lower speeds required for the street-running operation. However, mitigation techniques are available to minimize both potential ground-borne noise and vibration impacts.

With regard to potential visual impacts, both the number of sensitive receptors near an alignment and the mode itself should be considered. The mode, however, is probably a more important factor than the number of receptors located near an alignment when considering overall impact. An at-grade LRT would have the greatest impact because it would necessitate the removal of landscaping in the street medians and the installation of an overhead catenary system. A BRT mode has no such requirements. Although BRT Alternative 1 would be in close proximity of the highest number of sensitive receptors (541), LRT Alternative 5 would likely have the highest overall impact. It would affect the greatest number of receptors (490) of the LRT alternatives. Alternatives 6 and 7 (both involving subway segments) would affect the fewest such receptors (296 and 300, respectively). However, both of these alternatives incorporate LRT in the at-grade segments. Alternative 2 would affect the fewest receptors (427) of the alternatives employing BRT. It fares better than Alternative 8, which involves both a heavy rail subway segment and a BRT at-grade segment. The at-grade portion of Alternative 8 passes by more residences than Alternative 2.

Any alternative involving subway would have the least overall visual impact on the surrounding community because most of the facilities would be located underground. Therefore, Alternatives 6, 7, and 8 would have the least impact on the Boyle Heights community where the subway segments are located. As noted in Table 4-63, Alternatives 6 and 7 would potentially affect only 33 and 14 receptors, respectively, in the portion of the study area between Union Station and Lorena Street because these two alternatives operate mostly underground. These numbers compare with more than 200 receptors for each of the other at-grade alternatives in the same study area. Although Alternative 8 includes a subway segment, this alternative potentially affects 199 receptors in this portion of Boyle Heights due to the at-grade BRT portion that operates from Chavez/Soto to 4th Street/Lorena.

Regarding proximity to cultural resources, all of the alternatives will need to deal with both historic structures and subsurface remains in the Union Station/Alameda area. Note that, overall, the subway alternatives generally fare best of the build alternatives because they pass underground beneath the highest concentration of resources in Boyle Heights. Alternatives 6, 7, and 8 pass by 75, 48, and 109 such resources, respectively. Of the at-grade alternatives, BRT Alternative 1 passes by the fewest resources (124). The other at-grade Alternatives 2 through 5 each pass by the highest number of such resources (between 132 and 158, depending on the alternative). On the other hand, the at-grade alternatives have the least potential for encountering fossil sites and remains during construction since no major subsurface excavation activity is required. The subway segments of Alternatives 6 through 8 and the elevated segments (associated with the Baseline and Evergreen Options for connection with Union Station) of LRT Alternatives 3, 5, and 6 have the highest potential for encountering these resources.

The extensive subsurface excavation associated with Alternatives 7 and 8 also rank these subway alternatives the highest in terms of potential for concern for encountering existing contaminated sites during construction. Alternative 6 ranks the third highest in terms of potential concern since it has a shorter subway segment than Alternatives 7 or 8 and because the subway segment is east of the Los Angeles River where there is less of a concern for encountering hydrogen sulfide and other contaminants. Although there is still a concern for encountering hazardous substances along Alternative 6, most of the contaminated areas identified are located in the western portion of the study area between Union Station and Indiana Street and are, therefore, in the vicinity of the subway segments of Alternatives 7 and 8. Mitigation measures to address construction and operation of subway segments through contaminated ground, specifically the western portion of the study area, had been developed and incorporated into the design of the suspended Metro Red Line Eastside Extension project. Tunneling impacts and the mitigation measures previously developed to address them are discussed in section 4.8. The BRT alternatives have the lowest potential for concern for encountering contaminated sites followed by the at-grade LRT alternatives. Both types of alternatives would involve only limited subsurface construction activity.

Three of the build alternatives (Alternatives 1, 7, and 8) cross the Coyote Pass Escarpment that is associated with the Elysian Park Thrust, a buried thrust fault that underlies portions of the western study area. It is anticipated that the at-grade alternatives would be affected less severely than the subway alternatives in the event of future seismic activity along the escarpment. Alternative 8 has the longest length of crossing of the escarpment (about 800 feet of tunnel segment and 300 feet of at-grade segment). Special steel tunnel liners to mitigate the effects of deformation with added ductility had been incorporated into the design of the tunnel segments crossing the escarpment for the suspended Metro Red Line Eastside Extension project.

The impacts on utilities during construction would likely be greater for the totally at-grade alternatives than those alternatives involving subway segments (Alternatives 6 through 8) since relocation of some utilities buried within the street or on overhead poles above the street will be required. The depth of the tunneling will mostly avoid utilities. However, impacts are still likely in the subway station excavation areas.

TABLE 4 -62
COMPARISON OF ALTERNATIVES
(Union Station to Whittier/Norwalk)

Criteria	Alternative									
			1	2	3	4	5	6	7	8
	No-Build	TSM	BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Compatibility with local plans and policies	Maintains status quo.		Generally compatible except in vicinity of Whittier/Norwalk Station. An amendment to Whittier General Plan and revisions to Southwest Whittier Zoning may be needed.							
Redevelop-ment/ Revitalization areas served	Current trends and market conditions would prevail.		10	9	9	10	10	9	7	8
Potential for Economic Development[1]	Baseline Condition	Low	Low	Low	Good	Low	Good	Good	Good	Heavy Rail – Good BRT – Low
Short-term/ permanent jobs created	0/0	5,453/1,464	25,222/3,748	24,857/3,770	43,378/4,202	25,520/4,003	43,362/4,568	55,379/4,084	79,141/5,108	58,611/4,718
Potential residences and businesses displaced for alignment and stations[2]	0	0	0	0	0	0	0	0	0	0
Estimated acres needed for park-and-ride facilities[3]	0	0	28	35	35	28	28	35	28	28
Low-income families within 1/2 mi. of stations No./% of total	N/A	N/A	31,583/24%	36,967/26%	36,967/26%	31,586/25%	31,586/25%	31,523/25%	23,312/23%	30,919/24%
Minority populations within 1/2 mi. of stations No./% of total	N/A	N/A	127,817/93%	141,353/94%	141,353/94%	124,194/92%	124,194/92%	122,522/93%	100,294/91%	126,496/93%
Zero-car households within 1/2 mi. of stations No./% of total	N/A	N/A	8,587/24%	9,553/25%	9,553/25%	8,530/24%	8,530/24%	8,120/24%	6,024/21%	7,918/23%

TABLE 4-62
COMPARISON OF ALTERNATIVES
(Union Station to Whittier/Norwalk)

Criteria	No-Build	TSM	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
			BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Workers using public transportation within 1/2 mi. of stations No./% of total	N/A	N/A	7,585/15%	8,521/16%	8,521/16%	7,347/15%	7,347/15%	6,733/15%	5,100/13%	7,430/15%
Corridor daily person trips	3,532,600	3,540,900	3,542,600	3,542,900	3,546,100	3,542,800	3,546,500	3,546,700	3,546,000	3,544,400
Corridor daily transit trips	149,100	165,300	174,500	174,500	178,700	174,900	180,350	179,550	180,750	177,150
Corridor daily transit mode share	4.2%	4.7%	4.9%	4.9%	5.0%	4.9%	5.1%	5.1%	5.1%	5.0%
Increased daily transit trips as compared to: -No-Build -TSM		16,200 N/A	25,400 9,200	25,400 9,200	29,600 13,400	25,800 9,600	31,250 15,050	30,450 14,250	31,650 15,450	28,050 11,850
Potential visually affected receptors[3]	0	0	541	427	427	490	490	296	300	482
Change in regional emissions (tons per year) compared to No-Build -VOC -CO -NO_x -PM_{10} -CO_2	Baseline	+9 +150 +38 +1 +42,363	-14.08 -329.83 -25.51 -2.69 -3,319	-23.36 -509.82 -52.59 -4.20 -24,339	-27.60 -571.77 -70.59 -4.75 -36,261	-3.62 -131.48 +6.31 -1.02 -22,363	-2.08 -83.48 +5.82 -0.64 -24,505	-40.84 -825.65 -110.04 -6.88 -67,613	-13.87 -309.71 -29.30 -2.54 -944	-3.71 -130.03 +5.15 -1.01 +23,512
EPA regional air quality designation -O_3 -CO -PM_{10} -NO_x	Extreme Serious Serious Attainment	Extreme Serious Serious Attainment	Extreme Serious Serious Attainment	Extreme Serious Serious Attainment	Extreme Serious Serious Attainment	Extreme Serious Serious Attainment	Extreme Serious Serious Attainment	Extreme Serious Serious Attainment	Extreme Serious Serious Attainment	Extreme Serious Serious Attainment

TABLE 4 -62
COMPARISON OF ALTERNATIVES
(Union Station to Whittier/Norwalk)

Criteria	Alternative									
	No-Build	TSM	1	2	3	4	5	6	7	8
			BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Potential sensitive receptors affected by noise and vibration[5] (xx) applies to ground-borne noise in subway segment.	Baseline	Added bus service could result in slight increases in noise levels at some locations.	554	483	483	504	504	358/(50)	378/(68)	538/(45)
Portion of alignment that crosses Coyote Pass Escarpment (feet) -at grade -subway	N/A	N/A	300 0	0 0	0 0	0 0	0 0	0 0	0 800	300 800
No. contaminated sites nearby Potential for concern[6]: High Moderate Low	N/A	N/A	1 9 5	1 11 3	1 15 6	1 14 4	4 11 8	9 10 40	17 8 44	15 4 8
No. water crossings	N/A	N/A	3	3	3	3	3	3	2	2
Acres of floodplain affected[7]	0	0	0	0	0	0	0	0	0	0
Acres of wetland affected[7]	0	0	0	0	0	0	0	0	0	0
Energy consumption (Change in annual BTUs) compared to: No-Build TSM		110,877 N/A	17,331 -93,545	-29,301 -140,178	-61,649 -172,525	76,194 -34,682	75,963 -34,914	-132,445 -243,321	19,352 -91,525	78,453 -32,424

Criteria	No-Build	TSM	Alternative 1	2	3	4	5	6	7	8
			BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Potential cultural resources Nearby	0	0	109	137	137	116	116	54	34	98
National/State Register cultural resource sites[8]	0	0	14	21	21	14	14	20	14	9
Potential for fossil sites and remains being encountered during construction[8]	None	None	None	None	Potential in elevated segment (Baseline and Evergreen Options)	None	Potential in elevated segment (Baseline and Evergreen Options)	Potential in elevated segment (Baseline and Evergreen Options) and in subway segment	Potential in heavy rail (subway segment)	Potential in heavy rail (subway segment)
Parks and recreation facilities nearby[8,9]	0	0	9	8	9	10	11	8	9	9
Utility impacts	None	None or minimal	Alternative is at-grade. Will have the highest impact on utilities.					Fewer impacts expected for the subway segment than the at-grade segments. However, impacts still likely in subway station excavation areas.		
Expected Annual Bus Accidents on the BRT Alignment[10]	N.A.	N.A.	170 to 225	170 to 225	N.A.	170 to 220	N.A.	N.A.	N.A.	165 to 215
Expected Annual LRT Accidents on the LRT Alignment[10]	N.A.	N.A.	N.A.	N.A.	50 to 65	N.A.	50 to 65	45 to 60	35 to 50	N.A.
Expected Annual Automobile Accidents along the Fixed Guideway Alignments[10]	N.A.	N.A.	385	430	430	380	380	430	380	380

Notes to Table 4-62

[1]The success of any economic development depends also on other factors in addition to the provision of a transit system. Examples of other fctors include: implementation of appropriate public policies to encourage development; local market forces; subsidies; innovative financing scenarios; and land use and zoning changes to encourage transit-oriented development.

[2]Additional land may be needed to accommodate the cut-and-cover process of constructing the heavy rail station box area at 1st/Boyle (Alternatives 7 and 8) and at 1st/Lorena (Alternative 7). This possibility will be further investigated if one of these alternatives is selected, and the design is further refined.

[3]Only general locations of park-and-ride facilities are known at this conceptual level of analysis. Therefore, numbers of residences and businesses that could potentially be displaced cannot be determined. The land requirements are, therefore, reported in acres and are based on preliminary estimates of parking needs.

[4]This quantitative analysis does not take into account the differences in visual impacts due to the various transit modes. For example, LRT has an overhead catenary system associated with that mode, while BRT does not. Totals for each alternative may increase once specific park-and-ride facility locations and height (i.e., if a parking structure rather than a surface lot is constructed) information becomes available.

[5]Vibration is not an issue for the BRT alternatives.

[6]The assignment of a low to high potential for concern is based on the presumed construction activity for completion of the alternative when compared to historical, regulatory, and field reconnaissance information. Refer to Section 4.9 for additional information about the ratings.

[7]At the current conceptual level of design, the existing crossings of the Los Angeles, Rio Hondo, and San Gabriel Rivers would not need to be widened nor would new support piers be required. If it is determined at an advanced design stage that bridge widening or additional piers may be required, then impacts are possible.

[8]Slight differences in total numbers expected for LRT Alternatives 3, 5, and 6 depending on which option is selected for connecting to Union Station.

[9]For Alternatives 6 and 8, the subway segment passes underneath or in close proximity to one recreational resource. For Alternative 7, the subway segment passes underneath or in close proximity to two recreational resources. Adverse impacts are unlikely.

[10]Based on historical data provided by MTA's Operations Safety Department for similar bus and light rail operations and by Caltrans and FHWA for similar arterial streets.

TABLE 4 - 63
COMPARISON OF ALTERNATIVES
(Union Station to Lorena Street)

Criteria	Alternative									
			1	2	3	4	5	6	7	8
	No-Build	TSM	BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Compatibility with local plans and policies	Maintains status quo.		Generally compatible.							
Redevelopment/ Revitalization areas served	Current trends and market conditions would prevail.		6	6	6	6	6	6	4	4
Short-term/permanent jobs created	0/0	N.A./N.A.	11,486/886	11,814/868	19,449/889	11,561/906	19,762/981	31,271/829	42,765/855	43,025/951
Potential residences and businesses displaced for alignment and stations[1]	0	0	0	0	0	0	0	0	0	0
Estimated acres needed for park-and-ride facilities[2]	0	0	0	0	0	0	0	0	0	0
Low-income families within 1/2 mi. of stations No./% of total	N/A	N/A	16,959/31%	16,959/33%	16,959/33%	16,963/33%	16,963/33%	11,606/36%	8,635/33%	16,295/31%
Minority populations within 1/2 mi. of stations No./% of total	N/A	N/A	58,306/96%	54,672/96%	54,672/96%	54,690/96%	54,690/96%	36,073/94%	30,599/95%	56,985/97%
Zero-car households within 1/2 mi. of stations No./% of total	N/A	N/A	5,038/35%	4,980/37%	4,980/37%	4,981/37%	4,981/37%	3,568/30%	2,478/36%	4,369/33%

TABLE 4 - 63
COMPARISON OF ALTERNATIVES
(Union Station to Lorena Street)

Criteria	No-Build	TSM	Alternative 1	2	3	4	5	6	7	8
			BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Workers using public transportation within 1/2 mi. of stations No./% of total	N/A	N/A	4,809/24%	4,570/25%	4,570/25%	4,572/25%	4,572/25%	2,823/26%	2,339/25%	4,654/24%
Potential visually affected receptors[3]	0	0	260	212	212	212	212	33	14	199
Potential sensitive receptors affected by noise and vibration[4] (xx) applies to ground-borne noise in subway segment.	Baseline	Added bus service could result in slight increases in noise levels at some locations.	230	180	180	180	180	19(51)	0(69)	169(45)
Portion of alignment that crosses Coyote Pass Escarpment (feet)	N/A	N/A								
-at grade			300	0	0	0	0	0	0	300
-subway			0	0	0	0	0	0	800	800
No. contaminated sites nearby Potential for concern[5]:	N/A	N/A								
High			1	1	1	1	2	6	9	9
Moderate			6	5	8	7	8	7	5	2
No. water crossings	N/A	N/A	1	1	1	1	1	1	0	0
Acres of floodplain affected[6]	0	0	0	0	0	0	0	0	0	0
Acres of wetland affected[6]	0	0	0	0	0	0	0	0	0	0

TABLE 4 - 63
COMPARISON OF ALTERNATIVES
(Union Station to Lorena Street)

Criteria	Alternative									
			1	2	3	4	5	6	7	8
	No-Build	TSM	BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Potential cultural resources Nearby	0	0	94	107	107	101	101	5	6	84
National/State Register cultural resource sites[7]	0	0	3	6	6	6	6	5	5	2
Potential for fossil sites and remains being encountered during construction[7]	None	None	None	None	Potential in elevated segment (Baseline and Evergreen Options)	None	Potential in elevated segment (Baseline and Evergreen Options)	Potential in elevated segment (Baseline and Evergreen Options) and in subway segment	Potential in heavy rail (subway segment)	Potential in heavy rail (subway segment)
Parks and recreation facilities nearby[7,8]	0	0	2	3	4	3	4	3	2	2
Utility impacts	None	None or minimal	Alternative is at-grade. Will have the highest impact on utilities.					Fewer impacts expected for the subway segment than the at-grade segments. However, impacts still likely in subway station excavation areas.		

Notes to Table 4-63:

[1]Additional land may be needed to accommodate the cut-and-cover process of constructing the heavy rail station box area at 1st/Boyle (Alternatives 7 and 8) and at 1st/Lorena (Alternative 7). This possibility will be further investigated if one of these alternatives is selected, and the design is further refined.

[2]Only general locations of park-and-ride facilities are known at this conceptual level of analysis. Therefore, numbers of residences and businesses that could potentially be displaced cannot be determined. The land requirements are, therefore, reported in acres and are based on preliminary estimates of parking needs.

[3]This quantitative analysis does not take into account the differences in visual impacts due to the various transit modes. For example, LRT has an overhead catenary system associated with that mode, while BRT does not. Totals for each alternative may increase once specific park-and-ride facility locations and height (i.e., if a parking structure rather than a surface lot is constructed) information becomes available.

[4]Vibration is not an issue for the BRT alternatives.

[5]The assignment of a low to high potential for concern is based on the presumed construction activity for completion of the alternative when compared to historical, regulatory, and field reconnaissance information. Refer to Section 4.9 for additional information about the ratings.

[6]At the current conceptual level of design, the existing crossings of the Los Angeles, Rio Hondo, and San Gabriel Rivers would not need to be widened nor would new support piers be required. If it is determined at an advanced design stage that bridge widening or additional piers may be required, then impacts are possible.

[7]Slight differences in total numbers expected for LRT Alternatives 3, 5, and 6 depending on which option is selected for connecting to Union Station.

[8]For Alternatives 6 and 8, the subway segment passes underneath or in close proximity to one recreational resource. For Alternative 7, the subway segment passes underneath or in close proximity to two recreational resources. Adverse impacts are unlikely.

TABLE 4 - 64
COMPARISON OF ALTERNATIVES
(Union Station to Atlantic Boulevard)

Criteria	No-Build	TSM	Alternative 1 BRT	2 BRT	3 LRT	4 BRT	5 LRT	6 LRT (subway)/ LRT	7 Heavy rail (subway)/ LRT	8 Heavy rail (subway)/ BRT
Compatibility with local plans and policies	Maintains status quo.		Generally compatible.							
Redevelop-ment/ Revitalization areas served	Current trends and market conditions would prevail.		7	7	7	7	7	7	5	5
Short-term/permanent jobs created	0/0	N.A/N.A.	15,248/1,441	16,954/1,604	31,196//1,755	15,509/1,502	28,731/1,714	43,748/1,706	58,713/1,746	47,435/1,693
Potential residences and businesses displaced for alignment and stations[1]	0	0	0	0	0	0	0	0	0	0
Estimated acres needed for park-and-ride facilities[2]	0	0	3.75	10	10	3.75	3.75	10	3.75	3.75
Low-income families within 1/2 mi. of stations No./% of total	N/A	N/A	24,508/30%	28,516/30%	28,516/30%	24,511/31%	24,511/31%	23,081/31%	16,143/30%	23,750/30%
Minority populations within 1/2 mi. of stations No./% of total	N/A	N/A	86,746/97%	97,475/97%	97,475/97%	83,123/97%	83,123/97%	78,688/96%	58,908/97%	85,110/97%
Zero-car households within 1/2 mi. of stations No./% of total	N/A	N/A	6,615/31%	7,415/31%	7,415/31%	6,558/32%	6,558/32%	5,983/32%	4,046/30%	5,940/30%

TABLE 4 - 64
COMPARISON OF ALTERNATIVES
(Union Station to Atlantic Boulevard)

Criteria	Alternative									
	No-Build	TSM	1	2	3	4	5	6	7	8
			BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Workers using public transportation within 1/2 mi. of stations No./% of total	N/A	N/A	6,304/21%	6,896/21%	6,896/21%	6,066/21%	6,066/21%	5,110/20%	3,799/20%	6,129/21%
Potential visually affected receptors[3]	0	0	334	404	404	286	286	225	88	273
Potential sensitive receptors affected by noise and vibration[4] (xx) applies to ground-borne noise in subway segment.	Baseline	Added bus service could result in slight increases in noise levels at some locations.	331	396	396	281	281	221(51)	88(69)	270(45)
Portion of alignment that crosses Coyote Pass Escarpment (feet) -at grade -subway	N/A	N/A	 300 0	 0 0	 0 0	 0 0	 0 0	 0 0	 0 800	 300 800
No. contaminated sites nearby Potential for concern[5]: High Moderate	N/A	N/A	 1 7	 1 7	 1 10	 1 8	 3 9	 8 9	 12 6	 10 3
No. water crossings	N/A	N/A	1	1	1	1	1	1	0	0
Acres of floodplain affected[6]	0	0	0	0	0	0	0	0	0	0
Acres of wetland affected[6]	0	0	0	0	0	0	0	0	0	0

TABLE 4 - 64
COMPARISON OF ALTERNATIVES
(Union Station to Atlantic Boulevard)

Criteria	No-Build	TSM	Alternative 1 BRT	2 BRT	3 LRT	4 BRT	5 LRT	6 LRT (subway)/ LRT	7 Heavy rail (subway)/ LRT	8 Heavy rail (subway)/ BRT
Potential cultural resources Nearby	0	0	105	126	126	112	112	55	29	93
National/State Register cultural resource sites[7]	0	0	7	10	10	8	8	9	7	4
Potential for fossil sites and remains being encountered during construction[7]	None	None	None	None	Potential in elevated segment (Baseline and Evergreen Options)	None	Potential in elevated segment (Baseline and Evergreen Options)	Potential in elevated segment (Baseline and Evergreen Options) and in subway segment	Potential in heavy rail (subway segment)	Potential in heavy rail (subway segment)
Parks and recreation facilities nearby[7,8]	0	0	3	3	4	4	5	3	3	3
Utility impacts	None	None or minimal	Alternative is at-grade. Will have the highest impact on utilities.					Fewer impacts expected for the subway segment than the at-grade segments. However, impacts still likely in subway station excavation areas.		

Notes to Table 4-64:

[1]Additional land may be needed to accommodate the cut-and-cover process of constructing the heavy rail station box area at 1[st]/Boyle (Alternatives 7 and 8) and at 1[st]/Lorena (Alternative 7). This possibility will be further investigated if one of these alternatives is selected, and the design is further refined.

[2]Only general locations of park-and-ride facilities are known at this conceptual level of analysis. Therefore, numbers of residences and businesses that could potentially be displaced cannot be determined. The land requirements are, therefore, reported in acres and are based on preliminary estimates of parking needs.

[3]This quantitative analysis does not take into account the differences in visual impacts due to the various transit modes. For example, LRT has an overhead catenary system associated with that mode, while BRT does not. Totals for each alternative may increase once specific park-and-ride facility locations and height (i.e., if a parking structure rather than a surface lot is constructed) information becomes available.

[4]Vibration is not an issue for the BRT alternatives.

[5]The assignment of a low to high potential for concern is based on the presumed construction activity for completion of the alternative when compared to historical, regulatory, and field reconnaissance information. Refer to Section 4.9 for additional information about the ratings.

[6]At the current conceptual level of design, the existing crossings of the Los Angeles, Rio Hondo, and San Gabriel Rivers would not need to be widened nor would new support piers be required. If it is determined at an advanced design stage that bridge widening or additional piers may be required, then impacts are possible.

[7]Slight differences in total numbers expected for LRT Alternatives 3, 5, and 6 depending on which option is selected for connecting to Union Station.

[8]For Alternatives 6 and 8, the subway segment passes underneath or in close proximity to one recreational resource. For Alternative 7, the subway segment passes underneath or in close proximity to two recreational resources. Adverse impacts are unlikely.

5 FINANCIAL ANALYSIS

This chapter summarizes the capital and operating and maintenance (O&M) costs related to each of the Eastside alternatives and their respective elements.

5.1 CAPITAL COSTS

5.1.1 Capital Cost Estimating Approach

Capital cost for each alternative and its components was based on the definition of each alternative, its initial operating plans, and the necessary capital support facilities. The details of the estimates and the approach are included in the Eastside Transit Corridor Study, Capital Cost Estimate Report dated December 27, 1999.

Capital cost estimates were prepared for each of the eight alternatives with all costs expressed in 1999 dollars. Cost estimates are developed by identifying quantities on conceptual drawings and applying standardized rates. For guideways and/or alignment lengths, typical cross sections provide a basis for identifying costs on a linear foot basis. The alignment plans, typical cross sections and station concepts are included in the Engineering Report. In other cases, unit costs were developed and applied on a per item basis to account for non-linear cost elements such as parking spaces, stations, vehicles, etc.

The total capital cost for each complete alternative includes allowances for Owner Controlled Insurance Program (OCIP), professional services (preliminary engineering, final design, design services during construction, agency costs, construction management, specialty subconsultants), at-grade yard leads, bridge retrofit, testing and pre-revenue operations, environmental mitigation, urban design allowance, and artwork. Additionally, contingency has been included for construction, vehicles, and Right-of-Way (ROW) & program implementation.

For purposes of this study, the capital cost estimates were categorized to specific cost elements. The total capital costs for each alternative represents the aggregate of these categories. Many of the elements are common among each of the eight alternatives, providing a common basis for cost comparison; however, in some cases certain categories are only relevant to certain alternatives. Each cost element is further defined below. The proposed costing methods and unit costs are based on previously implemented transit projects and accepted industry standards for conceptual estimating.

Guideway

For rail alternatives, the guideway costs are developed based on unit costs for double track sections according to each construction type proposed. These construction types include at-grade, aerial, long-span aerial, tunnel, and cut & cover. Bus Rapid Transit (BRT) guideway costs are developed based on two dedicated busway lanes. Included in the guideway category are ductbanks for supervisory control and data acquisiton (SCADA) and other communications and safety needs for the length of the alignment.

At-Grade Guideway: Each of the BRT alternatives will be at-grade. Construction will be within existing street configurations. At-grade construction applies only to relevant sections of each Light Rail Transit (LRT) rail alternative. The at-grade LRT guideway will generally cover the preparation of the trackbed with the embedded track construction covered under trackwork.

Elevated Guideway: This construction technique applies to the LRT alternatives; the technique is proposed for that portion of each LRT alternative that crosses over the 101 Freeway. The guideway costs include site work, structural excavation and backfill, concrete footings, columns, pier caps and deck slab, steel reinforcement, and guardrail.

Aerial – Long Span: This construction technique applies to LRT Alternatives 3, 5, and 6. The design is intended to allow for crossing over the 101 Freeway.

Tunnel – Wet: This construction technique applies to LRT Alternative 6, the hybrid Heavy Rail Transit (HRT)/LRT Alternative 7, and the hybrid HRT/BRT Alternative 8. Heavy rail is the technology used in MTA's existing Red Line operations. Where appropriate, the estimates have allowed for localized ground stabilization by grouting.
Cut and Cover: This construction technique applies only to Alternative 6, 7 and 8

U-Wall Retaining: This construction technique applies only to Alternative 6, 7 and 8.

Bridge Reconstruction and Retrofit: The estimates for Alternatives 2, 3, 5 and 6 include an allowance for reconstruction of the Rio Hondo Bridge. The remaining at-grade alternatives include an allowance for simple bridge retrofitting.

Trackwork

This category applies only to the LRT and HRT alternatives. The trackwork unit costs include materials and installation per route foot. Several types of trackwork apply:

Trackwork – Open (LRT only): This construction involves ballasted trackwork and applies to at-grade portions (short in length) that are not aligned within an existing street. The unit cost includes rail, concrete ties, ballast, rail welding, tie plates, rail fasteners, and rail anchors.

Trackwork – Embedded (LRT only): This construction involves trackwork embedded into the street surface. The unit cost includes girder rail, fasteners, clips and parts, electrical isolation membrane, rubber inserts, track slab, reinforcing steel and concrete infill/pavement

Direct Fixation (LRT and HRT): This construction involves direct fixation of rails to a bridge deck aerial structure, long span structure or tunnel invert. The unit rate includes direct fixation fasteners, rail, anchors and any second pour concrete plinth pad and reinforcing steel.

Site Modifications

Site modifications are included in the estimates to address traffic signal installation and modification. At locations where the alignment crosses roadway intersections, the existing traffic signals must be modified in terms of placement and operation; other new signaling may also be required. This new construction and modification is based on preliminary field survey information developed over the course of the estimate.

Utilities Relocation

Placement of guideways will require the relocation of existing underground utilities that are in areas impacted by the construction. Aerial or at-grade configurations may also impact overhead utilities. The cost of utility relocation is calculated on a route foot basis and varies depending on the likelihood of light, moderate, or heavy relocation work. The BRT and LRT alternatives generally will be moderately to heavily impacted in some areas; the HRT alternative will be heavily impacted notably in station areas.

Stations

Stations cost estimates were prepared utilizing "typical" station prototypes. For Bus Rapid Transit (BRT), at-grade sidewalk platforms are assumed, on either side of the alignment. For Light Rail Transit (LRT), three station types are assumed, as applicable according to the conceptual drawings. For Heavy Rail Transit (HRT) one subway station type is assumed:

At-Grade: This station is a 3-car center platform configuration with canopy. Unit costs include platform, canopy, site work, excavation and grading, access, lighting, and general landscaping. This construction applies to all alternatives.

Below Grade: This station is a 3-car light rail or 6-car heavy rail below-grade configuration utilizing cut & cover construction. The LRT station platform is 270 feet long versus the HRT station platform of 450 feet. Unit costs include platform, sitework, cut and cover excavation and backfill, access, and lighting. This construction applies to Alternatives 6, 7 and 8.

Partially Depressed. This station (for Light Rail Transit) is a 3-car platform configuration, which is slightly below grade at one end and at-grade on the opposite end. This construction applies to Alternative 6 only.

Parking: Each alternative will provide for park-and-ride lots toward the Eastern ends of the full length alignments. Unit rates are developed on a "per space" basis. The real estate costs associated with the parking is included in the Right-of-Way element.

Union Station Modification: LRT and BRT alternatives will require modifications to platforms at the existing Union Station. Therefore, the estimates assume no cost to construction Union Station, but provide for an amount to modify the existing structure to accommodate either BRT or LRT vehicles, as appropriate.

Support Facilities and Equipment

The Maintenance Facility includes buildings and equipment needed for inspection, repair, cleaning, and storage of rolling stock. This includes, service pits, lighting, car washers and cleaning platforms, signaling, communications, and utilities. The estimate assumes a Maintenance Facility will be required for the BRT and LRT alternatives, with equipment. For HRT, no additional facilities or equipment will be required.

Systems and Other Costs

Operations Control Center: Each of the BRT alternatives will require an Operations Control Center. No additional Operations centers are required for the LRT or HRT alternatives, assuming existing facilities will be sufficient to accommodate each of these options.

Communications & Signage: This element includes radio communications, emergency telephones, and variable message signs (VMS) and applies to BRT alternatives. These functions are in direct contact with an Operations Control Center.

Ticket Vending Machines (TVMs): This element includes all fare collection equipment at each station and applies to all alternatives. Unit costs assume a barrier-free system and are applied as an average cost per station.

Lighting: Lighting will be required for the entire alignment length in the LRT alternatives. (Station lighting is included in the Station element.)

Traction Power: Traction power electrification unit costs include substations and an overhead catenary system using 750 VDC (volts, direct current) for LRT, and a third rail system for heavy rail. Unit costs are based on a double track system.
Train Control & Communications: Separate unit costs are applied per length of rail guideway to account for signals and communications. The costs include allowances for wayside, on-board and central control software and hardware for the overall signaling system. The costs also include communications and security facilities such as emergency phones, closed circuit television, public address systems, wayside facilities, and radio facilities. These functions are in direct contact with an Operations Control Center.

Environmental Mitigation

Environmental mitigation is associated with disposition of environmental issues, particularly as required in the approved environmental documents. These issues also relate to environmental justice.

Urban Design Allowance: A factor has been applied to address the potential for scope, configuration, schedule, or other changes resulting from community and other input. For purposes of this estimate, this factor is 75% of the environmental mitigation cost or 1.5% of the new facility and systems construction costs.

Environmental Mitigation: A factor of 2% of the new facility and systems construction costs has been applied to construction related elements to allow for environmental mitigation efforts.

Vehicles

The fixed guideway LRT vehicle cost estimate for this study is based on a conventional low floor light rail transit vehicle. The rate for the vehicle would apply to a standard vehicle length of approximately 90 feet. The vehicles are assumed to include the propulsion system, power collection devices, ventilation and air conditioning system, in addition to meeting the Americans With Disabilities Act (ADA) provisions. The number of vehicles is based on criteria provided for purposes of this estimate either articulated or married. HRT vehicles are assumed to be compatible with and similar to existing vehicles. Spare parts are indicated as a percentage (10%) of the vehicle cost.

The buses include two types: (1) The BRT type bus which would be a newly designed low floor, articulated bus with clean fuel and (2) the standard buses are the current MTA low-floor, CNG vehicles. Spare parts are indicated as a percentage (10%) of the vehicle cost.

Right-of-Way

Real Estate acquisition costs are included for each Alternative and include all parcels associated with the park-n-ride lots (all alternatives), displaced street parking, traction power substations (LRT alternatives only), and the maintenance yard (BRT and LRT alternatives).

Professional Services

Professional Services, which total approximately 24% of the construction cost, have been included in the estimate. This effort includes preliminary engineering, final design, design services during construction, agency costs, construction management, and specialty subconsultants. These elements are calculated as follows and does not include vehicles and real estate costs:

Preliminary Engineering: Preliminary Engineering (PE) will evaluate the "short-list" of alternatives, bringing the design completion to a level where a Locally Preferred Alternative (LPA) can be selected and final design can commence. Although the deliverables associated with completion of PE will be defined prior to commencement of the work, typically this effort will bring the engineering to approximately 35% completion. For purposes of this estimate, 3% of the construction cost has been used.

Final Design: Final design will develop the engineering to 100% completion and result in the preparation of construction and procurement documents for all facilities and systems contracts. This will include geotechnical investigations, land surveying and mapping, engineering, architecture, landscape architecture, traffic engineering, right-of-way engineering, preparation of plans and specifications in all necessary technical disciplines, and various other technical studies and support of the final design process. For purposes of this estimate, 7% of the construction cost has been used.

Design Services During Construction: Design Services During Construction (DSDC) includes responding to Requests For Information (RFIs), submittal review and process, processing of Design Change Notices (DCNs), processing of Non-Conformance Reports (NCRs), engineering field support, and other functions. For purposes of this estimate, 3% of the construction cost has been used.

Agency Costs: These costs include MTA costs associated with the project through project completion. These costs as assumed to cover real estate administration costs. For purposes of this estimate, 5% of the construction cost has been used.

Construction Management: Construction Management costs are related to the administration of the construction effort on behalf of the owner. Typically, these costs include the consultants' management and administration team, field staff including resident engineers, and others administering and overseeing the day-to-day activities of the construction contractors. For purposes of this estimate, 5% of the construction cost has been used.

Specialty Subconsultants: Specialty Subconsultant costs are typically associated with legal support, hazardous material support, and other specialty services not available in-house or through consultant staff. For purposes of this estimate, 1% of the construction cost has been used.

Artwork: The estimate includes a standard 0.5% of the construction cost for station artwork, if required.

Testing and Pre-Revenue Operations: The costs of pre-revenue testing, acceptance testing, safety certification, and training related to start-up of the system for revenue service. For purposes of this estimate, 2% of the construction cost has been used.

Contingency

A contingency is added as a percentage of certain cost categories based on past experience for projects in similarly early stages of engineering. Contingency is an allowance provided for in the estimate to address project risk. Contingency provided in the estimate is as follows:

Construction Contingency: Construction Contingency is intended to cover the cost of changes after construction begins. Typically, these changes would relate to scope or changed conditions that occur. This calculation is based on 10% of the facility and systems costs, and does not apply to vehicles or real estate.

Vehicle Contingency: Vehicle Contingency is intended to cover vehicle cost increases, which typically are related to scope and schedule changes. Historically, this contingency equates to 15% of the vehicle costs, but varies depending on the vehicle manufacturer, the type of procurement, the selected technology, and other issues. Additionally, a 5% vehicle implementation factor has been utilized.

Right-of-Way Contingency and Implementation: Right-of-Way contingency and implementation has been applied at 25% of the property cost.

Unit Costs

The unit costs detailed in the Capital Cost Estimate Report dated December 27, 1999 reflect a concensus between the three study teams and the MTA staff and consultants. Special consideration was given to the subway portions and tunnel impacts of Alternatives 6, 7, and 8 related to the newest and latest information available to MTA and the consultants. The unit cost estimates have included considerations of the tunneling impacts discussed below.

Tunneling conditions and alternative tunneling technologies were explored extensively during the design of the suspended Metro Red Line Eastside Extension alignment. This alignment, referred to as the suspended project, would have extended the Red Line from Union Station to First and Lorena Streets, via Little Tokyo. Specifically, mitigation measures for tunneling impacts were developed to address ground surface settlement, tunneling through contaminated ground, and tunneling through the Coyote Pass Escarpment. These measures were incorporated into an essentially complete final design prior to project suspension, and would be directly applicable for alternatives 6, 7, and 8. It should be noted that Alternative 6 would require significantly less mitigation for contaminated ground conditions as the alignment is at grade in the area west of the Los Angeles River, where most of the ground contamination exists. Tunneling conditions and the appropriate mitigation measures for the new proposed alternatives with tunnel sections are expected to be similar to those of the suspended project.

Ground Surface Settlement: Geologic conditions for most of the alignment are sands, clays and gravels, which in tunneling terms are described as "soft ground." During tunneling, some ground loss will occur, producing surface settlement. The amount of settlement measured at the surface will be a function of the tunnel depth, size, tunneling techniques, and geology. To reduce surface settlement, pressure-face Tunnel Boring Machines (TBM) and pre-cast, bolted, gasketed lining systems were proposed for the suspended project. The pressure-face technology maintains positive fluid or soil pressure on the tunnel face which decreases the potential for ground loss and soil instability (sloughing, caving) at the tunnel face, which in turn reduces soil movement and surface settlement. In combination with the face pressure, grout is installed immediately behind the TBM to fill the annular space between the installed precast concrete liners (tunnel rings) and the ground. This technology provides an additional measure to reduce surface settlement. An additional benefit of the pressure-face TBM is the ability to tunnel below the groundwater table without requiring dewatering or lowering of the groundwater table.

Coyote Pass Escarpment: Approximately 800 feet of the proposed tunneled segments of Alternatives 7 and 8 cross the Coyote Pass escarpment. This potentially active buried thrust fault has been documented extensively during investigations by the MTA for the suspended project. As opposed to surface fault offset occurring during an earthquake, the buried (blind) thrust fault produces an escarpment or hill feature. A relatively flexible steel tunnel liner in the portion crossing the Coyote pass was developed to accommodate bending at the crossings. A similar design could be used for Alternatives 7 and 8.

Ground Contamination: The proposed tunnel segments will traverse two inactive oil fields and contaminated ground. These conditions are most prevalent in the area between Union Station and the Los Angeles River, where previous industrial activity has occurred. As for existing Metro Red Line tunnels, there is documented subsurface methane gas. Between Union Station and the Los Angeles river, hydrogen sulfide exists in the groundwater as well as free oil and tar. To address the environmental issues discussed above, a closed-system of transporting cuttings and special tunnel liners (providing a secondary gasket) were proposed for the suspended project. Using the pressure-face TBM (in combination with the gasketed lining system), excavated soil can be transported through a closed system to a separation plant at the surface where special ventilation and mitigation measures can be implemented to contend with contaminated soil. Treatment methods for neutralizing the hydrogen sulfide within the spoil disposal system have also been developed. These or similar measures would be required for Alternatives 7 and 8. Alternative 6 is less likely to encounter hazardous gas and may not require such mitigation measures for contaminated ground.

More detailed discussions of the tunneling and subsurface conditions can be found in sections 4.8 and 4.9 of this report.

5.1.2 Capital Cost Results

A summary of total capital costs for each alternative is shown in Table 5-1. This summary compares each of the alternatives according to each of the major cost categories. Detail sheets for each of the alternatives are included in Appendix B of this report.

Due to the less-complex construction and technological approaches associated with BRT alternatives, these options result in a cost-per-mile ranging from approximately $30.0M to $31.6M with a moderately higher cost of $34.1M per mile for the BRT component of Alternative 8. LRT alternatives range from $59.2M to $74.1M per mile for Alternative 6, which includes an underground section to the alignment. Hybrids, which incorporate an HRT, section range from $69.0M to $98.2M per mile. The heavy rail components in the hybrid alternatives range from $205.3M to $247.1M per mile. Importantly, each of the alternatives include provisions for 40' buses, which must be considered when measuring these alternatives on a cost-per-mile basis with historical information.

Comparison of Alternatives

The BRT alternatives range from $394.4M to $415.1M for the three full length alternatives. In general, these estimates reflect a lower level of technology, construction complexity, and overall cost than the LRT and HRT alternatives. Therefore, the cost-per-mile is less than the other modes.

The LRT alternatives range from $748.7M to $936.2M for the three full length LRT alternatives. The highest estimate is associated with utilization of tunneling technology and both a subway station and a partially depressed station. On a cost-per-mile basis, these estimates are consistent with historical light rail project experience.

The two hybrid alternatives, which include a heavy rail technology, range from $848.8M for the HRT/BRT full length alternative to $1,178.0M for the HRT/LRT full length alternative. These alternatives reflect the cost associated with tunnel work, below-grade stations, and additional vehicle and systems costs for heavy rail.

The following recaps the estimate comparisons for each of the alternatives.

Alternative 1 – BRT: $394.4 million
Alternative 2 – BRT: $415.1 million
Alternative 3 – LRT: $764.6 million
Alternative 4 – BRT: $405.3 million
Alternative 5 – LRT: $748.7 million
Alternative 6 – LRT: $936.2 million
Alternative 7 – HRT/LRT: $1,178.0 million
Alternative 8 – HRT/BRT: $848.8 million

Comparisons of each alternative by major cost category are shown on Table 5-1.

Phasing

For purposes of this analysis, consideration was given to the potential for a "phased" construction approach. A phased approach, which might result from cash flow, funding, or other reasons, would result in the construction of an abbreviated alignment (with the potential of future extension to the full alignment length).

Table 5-2 indicates how costs would be impacted for each alternative if the alignments extend only from (A) Union Station to Lorena St. and (B) Union Station to Atlantic Blvd. These potential costs are compared to the full alignment cost for each alternative. Table 5-2 has been provided for an order-of-magnitude comparison of these costs; no provision has been made for possible economies-of-scale adjustments, construction inefficiencies, or other considerations in this regard.

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Table 5-1 Capital Cost Estimate Summary for each Alternative

Dollars in Millions

ELEMENT	BRT/ALT-1	BRT/ALT-2	LRT/ALT-3	BRT/ALT-4	LRT/ALT-5	LRT/ALT-6	HR-LR/ALT-7	HR-BR/ALT-8
Miles	13.1	13.1	12.8	13.0	12.6	12.6	12.0	12.3
Stations	18	19	19	19	19	16	15	18
1. GUIDEWAY	$ 33.8	$ 36.0	$ 40.0	$ 33.4	$ 39.7	$ 136.1	$ 193.9	$ 150.7
2. TRACKWORK	$ -	$ -	$ 103.7	$ -	$ 103.0	$ 95.9	$ 93.0	$ 12.8
3. SITE MODIFICATION	$ 8.8	$ 8.8	$ 9.1	$ 9.7	$ 5.0	$ 8.2	$ 5.9	$ 6.9
4. UTILITIES RELOCATION	$ 20.8	$ 20.8	$ 21.6	$ 20.5	$ 21.4	$ 21.3	$ 24.0	$ 22.3
5. STATIONS	$ 14.8	$ 16.5	$ 27.3	$ 15.3	$ 26.1	$ 67.4	$ 158.1	$ 152.4
6. SUPP FACILITIES/EQUIPMENT	$ 32.5	$ 32.5	$ 32.5	$ 32.5	$ 32.5	$ 32.5	$ 32.5	$ 32.5
7. SYSTEMS/OTHER	$ 13.5	$ 13.8	$ 67.4	$ 13.7	$ 66.7	$ 65.8	$ 85.1	$ 34.7
8. ENVIRONMENTAL MITIGATION	$ 3.7	$ 3.8	$ 9.6	$ 3.7	$ 9.4	$ 14.0	$ 19.1	$ 13.3
9. VEHICLES	$ 119.7	$ 123.7	$ 199.0	$ 127.7	$ 202.5	$ 190.4	$ 200.8	$ 147.5
10. RIGHT-OF-WAY	$ 55.8	$ 63.7	$ 68.4	$ 55.9	$ 60.7	$ 66.7	$ 57.3	$ 55.6
TOTAL CONSTR/PROCURE	**$ 303.4**	**$ 319.6**	**$ 578.6**	**$ 312.4**	**$ 567.0**	**$ 698.3**	**$ 869.7**	**$ 628.7**
11. PROF SERVICES/OTHER	$ 40.3	$ 41.6	$ 98.0	$ 40.6	$ 95.7	$ 139.0	$ 192.6	$ 134.1
12. PROJECT CONTINGENCY	$ 50.7	$ 53.9	$ 88.0	$ 52.3	$ 86.0	$ 98.9	$ 115.7	$ 86.0
GRAND TOTAL	**$ 394.4**	**$ 415.1**	**$ 764.6**	**$ 405.3**	**$ 748.7**	**$ 936.2**	**$ 1,178.0**	**$ 848.8**
COST PER MILE	**$ 30.0**	**$ 31.6**	**$ 59.8**	**$ 31.3**	**$ 59.2**	**$ 74.1**	**$ 98.2**	**$ 69.1**
						HRT	**$ 205.3**	**$ 247.1**
						LRT/BRT	**$ 64.9**	**34.1**

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Table 5-2 Phasing Comparison of Alternatives

Dollars in Millions

ELEMENT		BRT/ALT-1	BRT/ALT-2	LRT/ALT-3	BRT/ALT-4	LRT/ALT-5	LRT/ALT-6	HR-LR/ALT-7	HR-BR/ALT-8
	Miles	13.1	13.1	12.8	13.0	12.6	12.6	12.0	12.3
	Stations	18	19	19	19	19	16	15	18
FULL ALIGNMENT		$ 394.4	$ 415.1	$ 764.6	$ 405.3	$ 748.7	$ 936.2	$ 1,178.0	$ 848.8
	Miles	4.0	3.9	3.5	3.8	3.5	3.3	2.6	3.2
	Stations	7	8	8	8	8	5	4	7
UNION STATION TO LORENA		$ 179.6	$ 187.4	$ 286.8	$ 180.0	$ 288.7	$ 452.0	$ 603.5	$ 516.1
	Miles	6.5	7.2	6.9	6.3	6.1	6.8	5.3	5.7
	Stations	10	12	12	11	11	9	7	10
UNION STATION TO ATLANTIC		$ 238.5	$ 268.9	$ 460.0	$ 241.5	$ 419.7	$ 632.4	$ 828.5	$ 681.6

MTA Historical Costs

A comparison was also made with historical MTA costs. The main difference in costs is attributed to "soft" costs notably in the percentage add-ons covering the owner's controlled insurance and professional services. Consultant costs are used as a baseline in this report. They reflect what costs MTA will incur if its' soft costs are reduced as suggested in the RTAA report. The majority of the MTA unit costs are comparable to the consultant's unit costs. A comparison between the total cost of each alternative is shown below:

Full Length Alternative	Consultant Cost (Millions)	MTA Historical Cost (Millions)
Alternative 1 – BRT	$394.4	$415.2
Alternative 2 – BRT	$415.1	$436.6
Alternative 3 –LRT	$764.6	$821.9
Alternative 4 – BRT	$405.3	$425.4
Alternative 5 – LRT	$748.7	$804.6
Alternative 6 – LRT	$936.2	$1,015.1
Alternative 7 – HRT/LRT	$1,178.0	$1,319.3
Alternative 8 – HRT/BRT	$848.8	$966.2

5.2 OPERATING AND MAINTENANCE COSTS

5.2.1 Operating and Maintenance Cost Estimating Approach

The MTA operating and maintenance (O&M) costs for each alternative were developed in a consistent manner for each of the corridor studies. Manuel Padron & Associates prepared the O&M costs based on the current MTA cost model and the current guidelines of the MTA.

5.2.2 Operating and Maintenance Cost Results

Based on the estimating approach discussed above the transit annual operating and maintenance (O&M) costs were estimated for each alternative.

Table 5-3 presents the annual operating and maintenance costs in millions of 1999 dollars for each of the alternatives and compares the incremental cost of each alternative to the No Build and Transportation System Management (TSM) Alternatives for the full length alternatives from Union Station to Whittier/Norwalk Boulevards. Tables 5-4 and 5-5 presents the annual operating and maintenance cost estimates for the Phase I segment (Union Station to Atlantic Boulevard) and a shorter segment from Union Station to Lorena Street, respectively.

Table 5-3 Operating and Maintenance Cost Estimate Summary Full Length Alternatives (Union Station to Whittier/Norwalk)			
Alternative, Full Length	**Annual Operating and Maintenance Cost (millions, 1999 $)***	**Annual O&M Costs Compared to the No Build (millions, 1999 $)**	**Annual O&M Costs Compared to the TSM (millions, 1999 $)**
No Build	$848.4	N.A.	N.A.
TSM	$863.7	$15.3	N.A.
1 – BRT	$887.4	$39.0	$23.7
2 – BRT	$887.7	$39.3	$24.0
3 – LRT	$892.2	$43.8	$28.5
4 – BRT	$890.1	$41.7	$26.4
5 – LRT	$896.0	$47.6	$32.3
6 – LRT	$890.9	$42.5	$27.2
7 – HRT/LRT	$901.6	$53.2	$37.9
8 – HRT/BRT	$897.5	$49.1	$33.8

* Cost for full operation of the MTA system, not just the alternatives

Table 5-4 Operating and Maintenance Cost Estimate Summary Union Station to Atlantic (Phase I)			
Alternative, Union Station to Atlantic	**Annual Operating and Maintenance Cost (millions, 1999 $)***	**Annual O&M Costs Compared to the No Build (millions, 1999 $)**	**Annual O&M Costs Compared to the TSM (millions, 1999 $)**
No Build	$848.4	N.A.	N.A.
TSM	$863.7	$15.3	N.A.
1 – BRT	$877.3	$28.8	$13.6
2 – BRT	$877.4	$29.0	$13.8
3 – LRT	$879.0	$30.6	$15.4
4 – BRT	$878.6	$30.1	$14.9
5 – LRT	$881.1	$32.7	$17.4
6 – LRT	$878.4	$29.9	$14.7
7 – HRT/LRT	$885.3	$36.8	$21.6
8 – HRT/BRT	$886.1	$37.7	$22.5

* Cost for full operation of the MTA system, not just the alternatives

Table 5-5 Operating and Maintenance Cost Estimate Summary Union Station to Lorena			
Alternative, Union Station to Lorena	**Annual Operating and Maintenance Cost (millions, 1999 $)***	**Annual O&M Costs Compared to the No Build (millions, 1999 $)**	**Annual O&M Costs Compared to the TSM (millions, 1999 $)**
No Build	$848.4	N.A.	N.A.
TSM	$863.7	$15.3	N.A.
1 – BRT	$873.2	$24.7	$9.5
2 – BRT	$873.2	$24.8	$9.5
3 – LRT	$873.6	$25.2	$9.9
4 – BRT	$873.8	$25.4	$10.1
5 – LRT	$874.9	$26.5	$11.3
6 – LRT	$873.2	$24.7	$9.5
7 – HRT/LRT	$878.3	$29.9	$14.7
8 – HRT/BRT	$880.5	$32.0	$16.8

* Cost for full operation of the MTA system, not just the alternatives

6 COMPARATIVE ANALYSIS OF ALTERNATIVES

This chapter compares the eight build alternatives using various evaluation criteria discussed in Chapter 2, the analyses presented in Chapters 3, 4, and 5, and identifies the significant tradeoffs between the alternatives under study.

6.1 COSTS

The initial capital and annual operating and maintenance costs are summarized in Table 6-1 for the full-length alternatives. Also shown in Table 6-1 is the estimated capital costs for the Phase I segments to Atlantic Boulevard. All costs are in 1999 dollars. The capital costs include all engineering, design, construction, facilities, rolling stock, and contingency costs required to implement the alternative. The annual operating and maintenance costs include all the costs related to the fixed guideway component and the support bus service component of each alternative. The annual operating and maintenance costs are those over and above the cost to operate and maintain the No Build alternative.

Table 6-1
Summary of Capital and Operating and Maintenance Costs

Alternative	Capital Cost, millions $, full length alternative	Annual Operating and Maintenance Cost (above the No Build), millions $, full length alternative	Capital Cost, millions $, Phase I segment, Union Station to Atlantic
No Build	N.A.	N.A.	N.A.
Transportation Systems Management (TSM)	$53	$15.3	$53
1 – BRT	$394	$39.0	$238
2 – BRT	$415	$39.3	$269
3 – LRT	$765	$43.8	$460
4 – BRT	$405	$41.7	$242
5 – LRT	$749	$47.6	$420
6 – LRT	$936	$42.5	$632
7 – HRT/LRT	$1,178	$53.2	$828
8 – HRT/BRT	$849	$49.1	$681

6.2 EFFECTIVENESS IN IMPROVING MOBILITY

This section is a summary of the benefits of the alternatives on improving mobility for the residents and businesses in the Eastside Corridor. Chapters 3 and 4 discusses the impacts in detail and this section highlights four basic criteria related to improving mobility. These include (1) daily new transit trips compared to the No Build Alternative, (2) daily new transit trips compared to the TSM Alternative, (3) daily fixed guideway boardings, and (4) annual vehicle miles saved compared to the TSM Alternative. Table 6-2 presents the data for the four criteria discussed above.

Table 6-2
Summary of Effectiveness Criteria

Alternative	Daily New 2020 Transit Trips Compared to the No Build Alternative	Daily New 2020 Transit Trips Compared to the TSM Alternative	Daily Fixed Guideway Transit Boardings	Annual Vehicle Miles Saved Compared to the TSM Alternative
No Build	N.A.	N.A.	N.A.	N.A.
Transportation Systems Management (TSM)	19,900	N.A.	N.A.	N.A.
1 – BRT	28,700	8,700	11,500	1,276,000
2 – BRT	27,200	7,300	12,400	1,769,000
3 – LRT	31,700	11,800	17,000	1,977,000
4 – BRT	29,100	9,200	11,300	725,000
5 – LRT	33,800	13,900	18,000	629,000
6 – LRT	32,300	12,400	17,800	2,677,000
7 – HRT/LRT	34,300	14,400	18,700	1,252,000
8 – HRT/BRT	30,000	10,100	14,000	727,000

6.3 EFFICIENCY (COST-EFFECTIVENESS)

The efficiency or cost-effectiveness analysis provides a means of comparing the benefits of the alternatives being considered relative to the costs of the alternatives. Two measures or criteria are used: (1) operating cost per passenger mile; and (2) the incremental cost per new transit trip in the forecast year of 2020.

One measure of efficiency is the change or improvement in the operating cost per passenger mile in the forecast year of 2020 compared to the TSM alternative. The other measure of efficiency or cost-effectiveness is the incremental cost per new transit trip in the forecast year of 2020. This measure, expressed in 1999 dollar values, is based on the annualized total capital investment and annual operating costs divided by the forecast change in annual transit trips, compared to the TSM Alternative. This cost-effectiveness index measures the cost per new transit trip attracted to transit as a result of the alternative's improvements. This reflects benefits to existing transit users (making more trips), attraction of new transit trips, and the cost-efficiency of the improvements proposed. It can be interpreted as the ratio between the necessary capital and operating investment, and the return on that investment in terms of new transit trips being made. The TSM Alternative is used as the comparison baseline, since it incorporates a modest expansion in MTA bus services for the Eastside Corridor, and represents a low-cost approach to addressing the transportation needs in the corridor, without the construction of major new facilities. The TSM Alternative therefore provides a baseline against which to isolate the added costs and added benefits resulting from a major investment, such as the fixed guideway alternatives proposed for the Eastside Corridor. The incremental cost per new trip may also be measured against the No Build Alternative.

Table 6-3 presents the operating cost per passenger mile for each alternative compared to the TSM Alternative. The lower the incremental cost per passenger mile the more attractive the alternative is. The LRT alternatives have the lowest incremental operating cost per passenger.

Table 6-3
Operating Cost per Passenger Mile Compared to the TSM Alternative

Alternative	Incremental Annual Operating and Maintenance Cost (1999 dollars, millions)	Incremental Annual Transit Passenger Miles, millions	Incremental Operating Cost/Passenger Mile
Transportation Systems Management (TSM)	N.A.	N.A.	N.A.
1 – BRT	$23.77	24.99	$0.95
2 – BRT	$23.99	15.46	$1.55
3 – LRT	$28.49	33.18	$0.86
4 – BRT	$26.42	22.20	$1.19
5 – LRT	$32.29	40.79	$0.79
6 – LRT	$27.26	37.37	$0.73
7 – HRT/LRT	$37.91	36.10	$1.05
8 – HRT/BRT	$33.86	24.54	$1.38

Table 6-4 presents the annualized capital costs of each alternative. The annualization is based on the Federal Transit Administration's (FTA) recommended discount rate of seven percent, and the FTA suggested useful economic lives of capital components.

Table 6-4
Annualization of Capital Costs

Alternative	Total Capital Costs, millions $	Annualized Cost, millions $	Incremental Annual Cost Compared to TSM Alternative, millions $
No Build	N.A.	N.A.	N.A.
Transportation Systems Management (TSM)	$53	$6.1	N.A.
1 – BRT	$394	$39.4	$33.3
2 – BRT	$415	$41.2	$35.1
3 – LRT	$765	$65.7	$59.6
4 – BRT	$405	$40.7	$34.6
5 – LRT	$749	$64.4	$58.3
6 – LRT	$936	$79.4	$73.3
7 – HRT/LRT	$1,178	$99.3	$93.2
8 – HRT/BRT	$849	$75.6	$69.5

Table 6-5 presents the year 2020 annualized cost and benefit values and resulting cost-effectiveness for the eight build alternatives compared to the TSM Alternative. Alternative 1 and Alternative 5 are the most cost-effective related to this measure. The hybrid alternatives (Alternatives 7 and 8) are the least cost-effective related to this measure.

Table 6-5
Cost-Effectiveness: Incremental Cost per Incremental Transit Trip Compared to the TSM Alternative

Alternative	Incremental Annualized Capital Cost (1999 dollars, millions)	Incremental Annual Operating and Maintenance Cost (1999 dollars, millions)	Incremental Total Annualized Cost (1999 dollars, millions)	Incremental Annual Transit Trips in 2020, millions	Cost-Effectiveness (Incremental Cost per New Transit Trip)
1 – BRT	$33.27	$23.77	$57.04	2.75	$20.74
2 – BRT	$35.09	$23.99	$59.08	2.33	$25.36
3 – LRT	$59.62	$28.49	$88.11	3.74	$23.56
4 – BRT	$34.60	$26.42	$61.02	2.90	$21.04
5 – LRT	$58.34	$32.29	$90.63	4.38	$20.69
6 – LRT	$73.29	$27.26	$100.55	3.90	$25.78
7 – HRT/LRT	$93.22	$37.91	$131.13	4.56	$28.76
8 – HRT/BRT	$69.46	$33.86	$103.32	3.20	$32.29

Table 6-6 also presents the year 2020 annualized cost and benefit values and resulting cost-effectiveness for the eight build alternatives compared to the No Build Alternative.

Table 6-6
Cost-Effectiveness: Incremental Cost per Incremental Transit Trip Compared to the No Build Alternative

Alternative	Incremental Annualized Capital Cost (1999 dollars, millions)	Incremental Annual Operating and Maintenance Cost (1999 dollars, millions)	Incremental Total Annualized Cost (1999 dollars, millions)	Incremental Annual Transit Trips in 2020, millions	Cost-Effectiveness (Incremental Cost per New Transit Trip)
TSM	$6.10	$15.24	$21.34	6.26	$3.41
1 – BRT	$39.38	$39.00	$78.38	9.00	$8.71
2 – BRT	$41.20	$39.23	$80.43	8.58	$9.37
3 – LRT	$65.72	$43.72	$109.44	10.00	$10.94
4 – BRT	$40.71	$41.65	$82.36	9.15	$9.00
5 – LRT	$64.45	$47.53	$111.98	10.64	$10.52
6 – LRT	$79.39	$42.50	$121.89	10.16	$12.00
7 – HRT/LRT	$99.32	$53.15	$152.47	10.81	$14.10
8 – HRT/BRT	$75.56	$49.10	$124.66	9.46	$13.18

6.4 ENVIRONMENTAL

This section summarizes the significant environmental concerns and differences between the alternatives. Chapters 3 and 4 of this report presents more details along with methodology used for evaluating each of the environmental criteria. The most significant environmental issues and concerns related to the following criteria: (1) traffic impacts; (2) number of on-street parking spaces lost; (3) number of potential visually affected receptors; (4) number of potentially sensitive receptors affected by noise and vibration; (5) number of potential cultural resources nearby; (6) number of National/State Register cultural resources nearby; (7) compatibility with local plans and policies; (8) number of redevelopment/revitalization areas served; and (9) safety issues as measured by number of possible fixed guideway modes and automobile accidents. These nine issue areas point out differences between the alternatives and represent the most significant areas of concern to the public. Table 6-7 presents the information for each alternative for the nine critical concern areas listed above.

TABLE 6-7
Environmental Issues/Concerns

Criteria	No-Build	TSM	1 BRT	2 BRT	3 LRT	4 BRT	5 LRT	6 LRT (subway)/ LRT	7 Heavy rail (subway)/ LRT	8 Heavy rail (subway)/ BRT
Traffic Impacts	lowest	lowest	highest	highest	highest	highest	highest	moderate	lowest	moderate
Parking spaces lost	0	0	339	365	402	352	396	236	172	320
Potential visually affected receptors[1]	0	0	541	427	427	490	490	296	300	482
Potential sensitive receptors affected by noise and vibration[2] (xx) applies to ground-borne noise in subway segment.	Baseline	Added bus service could result in slight increases in noise levels at some locations.	554	483	483	504	504	358/(50)	378/(68)	538/(45)
Potential cultural resources Nearby	0	0	109	137	137	116	116	54	34	98
National/State Register cultural resource sites[3]	0	0	14	21	21	14	14	20	14	9
Compatibility with local plans and policies	Maintains status quo.		Generally compatible except in vicinity of Whittier/Norwalk Station. An amendment to Whittier General Plan and revisions to Southwest Whittier Zoning may be needed.							
Redevelop-ment/ Revitalization areas served	Current trends and market conditions would prevail.		10	9	9	10	10	9	7	8

TABLE 6-7
Environmental Issues/Concerns

Criteria	No-Build	TSM	Alternative 1	2	3	4	5	6	7	8
			BRT	BRT	LRT	BRT	LRT	LRT (subway)/ LRT	Heavy rail (subway)/ LRT	Heavy rail (subway)/ BRT
Expected Annual Bus Accidents on the BRT Alignment	N.A.	N.A.	170 to 225	170 to 225	N.A.	170 to 220	N.A.	N.A.	N.A.	165 to 215
Expected Annual LRT Accidents on the LRT Alignment	N.A.	N.A.	N.A.	N.A.	50 to 65	N.A.	50 to 65	45 to 60	35 to 50	N.A.
Expected Annual Automobile Accidents along the Fixed Guideway Alignments	N.A.	N.A.	385	430	430	380	380	430	380	380

[1]This quantitative analysis does not take into account the differences in visual impacts due to the various transit modes. For example, LRT has an overhead catenary system associated with that mode, while BRT does not. Totals for each alternative may increase once specific park-and-ride facility locations and height (i.e., if a parking structure rather than a surface lot is constructed) information becomes available.
[2]Vibration is not an issue for the BRT alternatives.
[3]Slight differences in total numbers expected for LRT Alternatives 3, 5, and 6 depending on which option is selected for connecting to Union Station.

6.5 EQUITY

Equity relates to the impacts and benefits to the transit reliant system users and related specials needs groups such as low income and minority populations. Section 4.3 of Chapter 4 (Environmental Justice) presents a very detailed description of the characteristics of the Eastside Corridor residents. A summary of the primary demographics (within one-half mile of the proposed stations) by each alternative is shown in Table 6-8. Based on the demographics Alternatives 2 and 3 would serve the most transit dependent within walking distance of the fixed guideway stations. Alternatives 1, 4, 5, 6, and 8 are very similar to Alternatives 2 and 3. Alternative 7 would serve the lowest number of transit dependent.

TABLE 6-8
DEMOGRAPHICS SUMMARY BY ALTERNATIVE[1]

Alternative/ Station	Minority Population		Low-Income Families		Workers 16 and Older Using Public Transportation		Zero-Car Households	
	No.	% of Total Pop.	No.	% of Total Families	No.	% of Workers 16 and Older	No.	% of Total Residential Units
Los Angeles County	5,228,442	59.0	1,308,255	15.1	267,210	6.5	333,562	11.2
Study Area	406,865	86.6	89,205	19.7	18,203	10.1	19,414	15.5
No-Build	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TSM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alternative 1	127,817	92.5	31,583	24.2	7,585	15.1	8,587	23.8
Alternative 2	141,353	93.8	36,967	25.8	8,521	16.2	9,553	25.1
Alternative 3	141,353	93.8	36,967	25.8	8,521	16.2	9,553	25.1
Alternative 4	124,194	92.3	31,586	24.8	7,347	15.2	8,530	24.3
Alternative 5	124,194	92.3	31,586	24.8	7,347	15.2	8,530	24.3
Alternative 6	122,522	93.2	31,523	25.4	6,733	14.9	8,120	24.3
Alternative 7	100,294	91.4	23,312	22.7	5,100	13.0	6,024	21.1
Alternative 8	126,496	92.8	30,919	24.0	7,430	15.0	7,918	22.6

[1]Includes the total served within one-half mile of all of the stations included in each alternative.
Source: 1990 U.S. Census Data.

6.6 COMMUNITY INVOLVEMENT RESPONSE

A rigorous public involvement was conducted throughout the study. Listed below are the summary of activities undertaken. The public involvement documentation is summarized in three documents: (1) Scoping Meetings Summary Report, September 24, 1999; (2) Second Round of Community Meetings Summary Report, October 30, 1999; and (3) Third Round of Community Meetings Summary Report, February 2000.

Major activities conducted included the following items:

- Ten major community meetings in August (Scoping) and October 1999 and January 2000 throughout the Eastside Corridor and attended by more than 585 community stakeholders.
- Federal and State community and agency scoping process (August 1999) and published the Notice of Intent in the Federal Register and the Notice of Preparation with the State Clearinghouse.
- Conducted more than 34 meetings with community based organizations.
- Conducted 33 briefings with Eastside elected officials and staff members.
- Combined mailings and flyers distribution to more than 67,500 households, businesses, and community organizations.
- Published meeting notices in the Los Angeles Time, La Opinion, Eastside Sun, Our Times, and Rafu Shimpo.

The community expressed many concerns, especially within the Boyle Heights area related possible community impacts of at-grade fixed guideway investments. The following is a succinct summary of what the community consensus appeared to be based on the inputs received and actions taken by community groups:

- The Boyle Heights and East Los Angeles communities prefer the previously adopted Locally Preferred Alternative and the Suspended Project due to less environmental impacts and superior quality of service.
- Due to MTA's financial constraints the Boyle Heights community and areas of East Los Angeles would consider Alternative 6 as a viable alternative to consider in the next phase.
- The communities east of Atlantic Boulevard (Montebello, Pico Rivera, and Whittier) are undecided about the fixed guideway transit mode and the specific alignment.

6.7 TRADE-OFFS BETWEEN ALTERNATIVES

This section highlights key differences and tradeoffs between the alternatives relative to costs, performance, mobility, impacts, and community response to the alternatives. The significant areas of tradeoffs between the alternatives are listed below:

- The full-length alternatives capital costs. From an initial capital cost standpoint the pure BRT alternatives (1, 2, and 4) are by far the lowest initial cost ($400 million). The LRT at-grade alternatives (3 and 5) are the next lowest cost ($750 million). The LRT Alternative 6 with a 1.8 mile tunnel section under Boyle Heights increases the at-grade alternative costs by about $200 million in order to mitigate the adverse impacts and community opposition to an at-grade alternative (either BRT or LRT) through the narrow streets of the Boyle Heights community. Alternatives 7 and 8 are two-station extensions of the Metro Red Line subway to 1st/Lorena or to Chavez/Soto. Alternative 7 connects to an LRT system to the end of the corridor and is by far the most expensive at almost $1.2 billion. Alternative 8 uses BRT to the end of the corridor and has a total capital cost of almost $850 million.

- Proposed Phase I segment capital costs. From an initial capital cost standpoint the pure BRT alternatives (1, 2, and 4) are by far the lowest initial cost ($238 to 269 million). The LRT at-grade alternatives (3 and 5) are the next lowest cost ($420 to 460 million). The LRT Alternative 6 with a 1.8 mile tunnel section under Boyle Heights increases the at-grade alternative costs by about $200 million in order to mitigate the adverse impacts and community opposition to an at-grade alternative (either BRT or LRT) through the narrow streets of the Boyle Heights community. Alternatives 7 and 8 are two-station extensions of the Metro Red Line subway to 1st/Lorena or to Chavez/Soto. Alternative 7 connects to an LRT system as far as Atlantic and is by far the most expensive at $828 million. Alternative 8 uses BRT as far as Atlantic and has a total capital cost of $681 million.
- From the standpoint of annual operating and maintenance costs, Alternatives 1, 2, and 4 (all BRT) perform the best (least cost). Alternative 6 is the lowest cost rail oriented alternative and is only slightly higher than the BRT alternatives. Alternative 7 (HRT/LRT) is the most expensive alternative.
- From a performance and mobility standpoint the BRT alternatives (1, 2, 4, and 8) perform less than the rail-oriented alternatives (3, 5, 6, and 7). Alternatives 5 (LRT) and 7 (HRT/LRT) perform the best.
- The most cost efficient alternatives based on annual operating costs per passenger mile compared to the TSM Alternative are Alternatives 5 and 6.
- The incremental cost per new transit trip compared to the TSM Alternative is the highest for Alternatives 7 and 8. Alternatives 1 and 5 are the most cost-effective alternative followed by Alternatives 4, 3, 2, and 6.
- From an environmental issues and concerns standpoint, the pure at-grade BRT and LRT alternatives (1, 2, 3, 4, and 5) and Alternative 8 (mostly at-grade) have the most potential for adverse environmental impacts, especially in Boyle Heights and sections of East Los Angeles with the older narrow streets and dense residential and business areas. Alternatives 6 and 7 are by far the best from an environmental impact standpoint.
- From an equity and environmental justice aspect, all the alternatives serve the Eastside communities but the alternatives that provide the most transit service with the least amount of community impacts are the alternatives that would have the best rating in this category. Even though Alternatives 2 and 3 would serve the most persons within ½ mile of the stations, it would have considerable impacts to the community. There is a distinct tradeoff between the service provided and the possible adverse impacts depending on the community and the policy makers.
- From the standpoint of the community and the three rounds of community meetings the following is a synopsis of the collective input received:
  - The Boyle Heights and East Los Angeles communities prefer the previously adopted Local Preferred Alternative (6.8 miles and 7 stations) and Suspended Project (3.7 miles and 4 stations) due to less environmental impacts and superior quality of service but many are willing to accept Alternative 6 in situations of MTA financial hardship
  - The communities east of Atlantic Boulevard are undecided about transit mode and specific alignment

- The Boyle Heights community and Whittier Boulevard merchants are opposed to the at-grade options regardless of mode

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PHASE I – LIST OF TECHNICAL REPORTS

Prepared by the Eastside Corridor Transit Consultants

- Scoping Meetings Summary Report, September 24, 1999
- Second Round of Community Meetings Summary Report, October 30, 1999
- Third Round of Community Meetings Summary Report, February 2000
- Final Purpose and Need Statement, September 1999
- Preliminary Systems Planning for Modal Extensions, December 28, 1999
- Baseline Set of Alternatives Working Paper, September 1999
- Conceptual Engineering and Design Drawings, December 1999
- Report of Geologic-Seismic Hazards Evaluation, December 22, 1999
- Proposed Urban Design Guidelines, December 1999
- Urban Design Concept Report, December 1999
- Capital Cost Estimates, December 27, 1999
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