

4.13 Economic and Fiscal Impacts

This section describes the potential for economic and fiscal impacts that could arise from the construction and long-term operation of the proposed transit improvements in the Crenshaw Transit Corridor study area. Topics discussed include the regulatory framework for this analysis, the regional economy, employment and unemployment trends, government revenues, and local business districts.

Information used to conduct this analysis comes from a wide variety of sources. Statistics include those published by the U.S. Census Bureau, U.S. Department of Labor – Bureau of Labor Statistics, California Employment Development Department, and the SCAG. Local government web pages for the Cities of Los Angeles, Hawthorne, Inglewood, and El Segundo, as well as Los Angeles County were consulted to obtain general economic information and copies of current 2007-2008 adopted budgets. Tax assessment information was obtained from the Los Angeles County Office of the Assessor. The number of direct, indirect, and induced jobs generated by the proposed alternatives as a result of both capital and operation and maintenance (O&M) expenditures was estimated using employment multipliers provided by the SCAG Input-Output Model (2004). This model also estimates economic output and household income impacts.

4.13.1 Regulatory Framework

Both federal and State regulations and guidance were used in the preparation of this analysis on economic and fiscal impacts.

4.13.1.1 Federal

The primary federal guidance is provided by the FHWA's Technical Advisory T-6640.8A, "Guidance for Preparing and Processing Environmental and Section 4(f) Documents" dated October 30, 1987. Section V of this document addresses economic impacts. The guidance directs preparers of EIS documents to discuss foreseeable economic impacts. Potential impacts to be considered include the following topics:

- (1) The economic impacts on the regional and/or local economy such as the effects of the proposed alternatives on development, tax revenues and public expenditures, employment opportunities, accessibility, and retail sales;
- (2) The impacts on the economic vitality of existing highway-related businesses and resultant impacts on the local economy; and
- (3) Impacts of the proposed action on established business districts.

4.13.1.2 State

Pursuant to the CEQA guidelines, economic or social effects of a project that are not related to physical changes in the environment shall not be treated as significant effects on the environment, but may be used to determine the significance of physical changes caused by the project (Section 15131(b)).

**4.13.2 Existing Conditions/Affected Environment****4.13.2.1 Regional Economy
Geographic Context**

The Crenshaw Transit Corridor study area is located in one of the country's largest metropolitan areas, Los Angeles. The corridor encompasses portions of the cities of Los Angeles, Hawthorne, and El Segundo as well as portions of unincorporated Los Angeles County. The City of Inglewood lies entirely within the study area.

Specifically, the study area extends approximately ten miles between Wilshire Boulevard and El Segundo Boulevard. Three major highways cross the study area, as well as three railroads. It is a relatively dense mixed-use urban environment with little undeveloped land remaining. However, there are many properties that are underused based on existing comprehensive plan and zoning designations. These properties provide opportunities for redevelopment to higher densities and/or different land uses. At the north end, the study area is about two miles in width that is approximately centered on Crenshaw Boulevard. At the southern end, the study area is about 5 miles wide and is approximately centered on La Brea Avenue and Hawthorne Boulevard.

Major Economic Activity

The study area lies within two planning regions of the Los Angeles Economic Corporation, South Bay and Greater Westside. The portion of the study area north of the Interstate 10 (I-10) Freeway is located in the Greater Westside region and the area to the south lies within the South Bay region.

South Bay Region

The South Bay region encompasses both LAX (located immediately west of the study area) and the Ports of Los Angeles and Long Beach (located to the south of the study area). It is a major center for international business associated with imports, exports, warehousing, and freight distribution in Southern California. The lack of vacant land poses a constraint to the growth and expansion of these logistical businesses and operations, though many properties are available that could be redeveloped.

The region's employment was recently estimated to be 486,000. Manufacturing has historically been strong in the region, and the region has the second largest concentration of manufacturing jobs in the county. However, the region has seen a long slow decline of high paying jobs associated with manufacturing, including those associated with large automotive operations, such as Honda and Toyota. A significant current economic asset is the Los Angeles Air Force Base, located in El Segundo. It is the center for advanced space research activity for the U.S. Government and supports a vital defense and high tech sector in the region. Research and development work is conducted for satellites and communications equipment, and commercial and military satellites are assembled in the area. Located on the coast, the South Bay region also has strong recreation and tourism sectors, with local beaches and major sports venues providing major attractions. The region has a small biomedical sector, and several Fortune 500 companies are headquartered in El Segundo.

Compared to other regions of Los Angeles County, South Bay has a substantial number of high paying jobs. Average annual wages in 2006 were \$51,689, the third highest in the county. The highest average annual wages were in the Greater Westside region, which reported \$66,531.

Greater Westside

The Greater Westside region is north of the South Bay region. It extends along the coast to include Malibu and extends inland to include the Cities of Beverly Hills, Santa Monica, Culver City, and West Hollywood, as well as portions of the City of Los Angeles. It also includes the communities of Bel Air, Brentwood, Century City, Koreatown, Miracle Mile, Pacific Palisades, Westchester, Westwood, and Venice.

Total employment for the region was recently estimated to be 653,591 (Los Angeles Economic Development Corporation, 2005). The region's economy is quite different than that of South Bay. It has a number of institutions of higher learning and research. There are unique cultural institutions, as well as many leisure, entertainment, and recreational attractions, including three major movie studios. The largest employment sector is professional and business services followed by leisure and hospitality services. In contrast to the South Bay region, manufacturing in the Greater Westside region comprises only a very small component of the region's economic base. The region hosts a number of corporate headquarters including Northrop Grumman, Occidental Petroleum, KB Home, and Hilton Hotels. Like the South Bay region, the Greater Westside region is essentially built out.

4.13.2.2 Employment and Unemployment Trends

Recent Employment Trends

Table 4-68 shows recent average annual employment in Los Angeles County and the four cities partially or entirely encompassed in the study area. Total employment for the county, as well as the four cities increased only modestly between 2000 and 2006. Employment increased in 2001, but declined during the following two years before rising to exceed employment in 2001. Average annual employment growth was nearly uniform at approximately 0.8 percent.

Unemployment trends for these jurisdictions show more variability. The 2000 unemployment rates ranged between four percent in El Segundo and 7.1 percent in Hawthorne. Unemployment rates increased by about 1.5 to 2.0 percent by 2003 before job growth resumed and unemployment rates declined again. In 2006, the Bureau of Labor Statistics unemployment rates for the cities of Hawthorne, Inglewood, and Los Angeles were all at 5.2 percent – more than the county's overall rate of 4.7 percent. (Note, 2006 unemployment statistics from the Bureau of Labor Statistics are not published for the City of El Segundo as the City's population is less than 25,000.)

This disparity in unemployment rates is due to a number of factors. As mentioned above, the area has seen a slow, but steady decline in the number of high paying manufacturing jobs. There was substantial property damage in the area due to the 1992 civil unrest and 1994 Northridge earthquake. Though both of these events occurred many years ago, the effects are still seen in the community and have continued to depress economic growth. In addition, many in the communities near LAX lost jobs due to the



Table 4-68. Local Government Employment and Unemployment Trends

Jurisdiction	2000 Employment (Unempl %)	2001 Employment (Unempl %)	2002 Employment (Unempl %)	2003 Employment (Unempl %)	2004 Employment (Unempl %)	2005 Employment (Unempl %)	2006 Employment (Unempl %)	2000-2006 Average. Annual Employment Growth
Los Angeles	1,710,743 (6.0%)	1,733,345 (6.3%)	1,719,334 (7.5%)	1,716,895 (7.7%)	1,731,251 (7.2%)	1,771,146 (5.9%)	1,790,669 (5.2%)	0.8%
Inglewood	47,575 (6.9%)	48,203 (7.2%)	47,814 (8.6%)	47,746 (8.8%)	48,145 (8.2%)	49,255 (6.7%)	49,797 (6.0%)	0.8%
Hawthorne	36,951 (7.1%)	37,440 (7.5%)	37,137 (8.9%)	37,084 (9.2%)	37,394 (8.6%)	38,256 (7.0%)	38,678 (6.3%)	0.8%
El Segundo*	9,625 (4.0%)	10,400 (2.6%)	10,400 (3.1%)	10,300 (3.2%)	10,400 (2.9%)	10,700 (2.4%)	10,800 (2.1%)	2.0%
Los Angeles County	4,424,894 (5.4%)	4,483,355 (5.7%)	4,447,115 (6.8%)	4,440,806 (7.0%)	4,477,937 (6.5%)	4,581,129 (5.3%)	4,631,626 (4.7%)	0.8%

Source: U.S. Department of Labor, Bureau of Labor Statistics, 2008; U.S. Census Bureau, 2000; and California Employment Development Department, 2006.

Note: * Statistics are not available from the U.S. Department of Labor, Bureau of Labor Statistics for El Segundo as the total population of this city does not exceed 25,000 – the threshold for data publication by this federal agency. The employment statistics for El Segundo for 2001-2006 are those published by the California Employment Development Department, Labor Market Information Division; and these statistics are estimates based on proportional county share based on the 2000 census. El Segundo statistics for 2000 are those published by the U.S. Census Bureau.

effects on air travel following the September 11th events. For comparison, the airport served 67.3 million passengers in 2000, but fell to 56.2 million for 2002. Services at the airport are now nearly at pre-2001 statistics with over 60 million passengers flying through LAX in 2006. The area is also one of the more affordable regions for housing, which also means it has been affected by the recent slump in the housing industry and the foreclosures arising from the sub-prime mortgage crisis. All together, these effects have resulted in increasing unemployment, reduced household income, and decline of a number of study area neighborhoods.

Forecast Employment

Employment growth in the study area is expected to continue. Small area forecasts have been prepared by SCAG. In 2006, the agency estimated total employment in the study area to be approximately 164,400 and projected employment to reach 197,100 by 2030 (Table 4-69). This represents an increase of approximately 20 percent, which is comparable to Los Angeles County's projected 22 percent employment growth during the same time period. The Lennox, Crenshaw, and South Mid-Wilshire Districts are projected to have the greatest increases in employment from 2006 to 2030 at 29 percent, 24 percent, and 23 percent, respectively.

Economic Revitalization Efforts

To support and encourage employment growth, local governments have developed specific plans to revitalize the economic base of communities located in the study area. A majority of the study area encompasses redevelopment areas designated by the Cities of Los Angeles, Inglewood, and Hawthorne. The purpose of designating redevelopment areas is to attract new private investment into economically depressed areas and to eliminate slums, blight, and abandoned or unsafe properties. This can happen by development of vacant properties or redevelopment of underused properties to different land uses or higher densities.

Research has shown that there is a strong connection between redevelopment and revitalization associated with transportation system improvements. Increased accessibility, mobility, and links to transit provide opportunity for new development. Some improvements and strategies being implemented focus on increasing pedestrian amenities and reducing or eliminating vehicular traffic, which increases demand on transit access and on the level of transit service, to help support existing and future land use development.

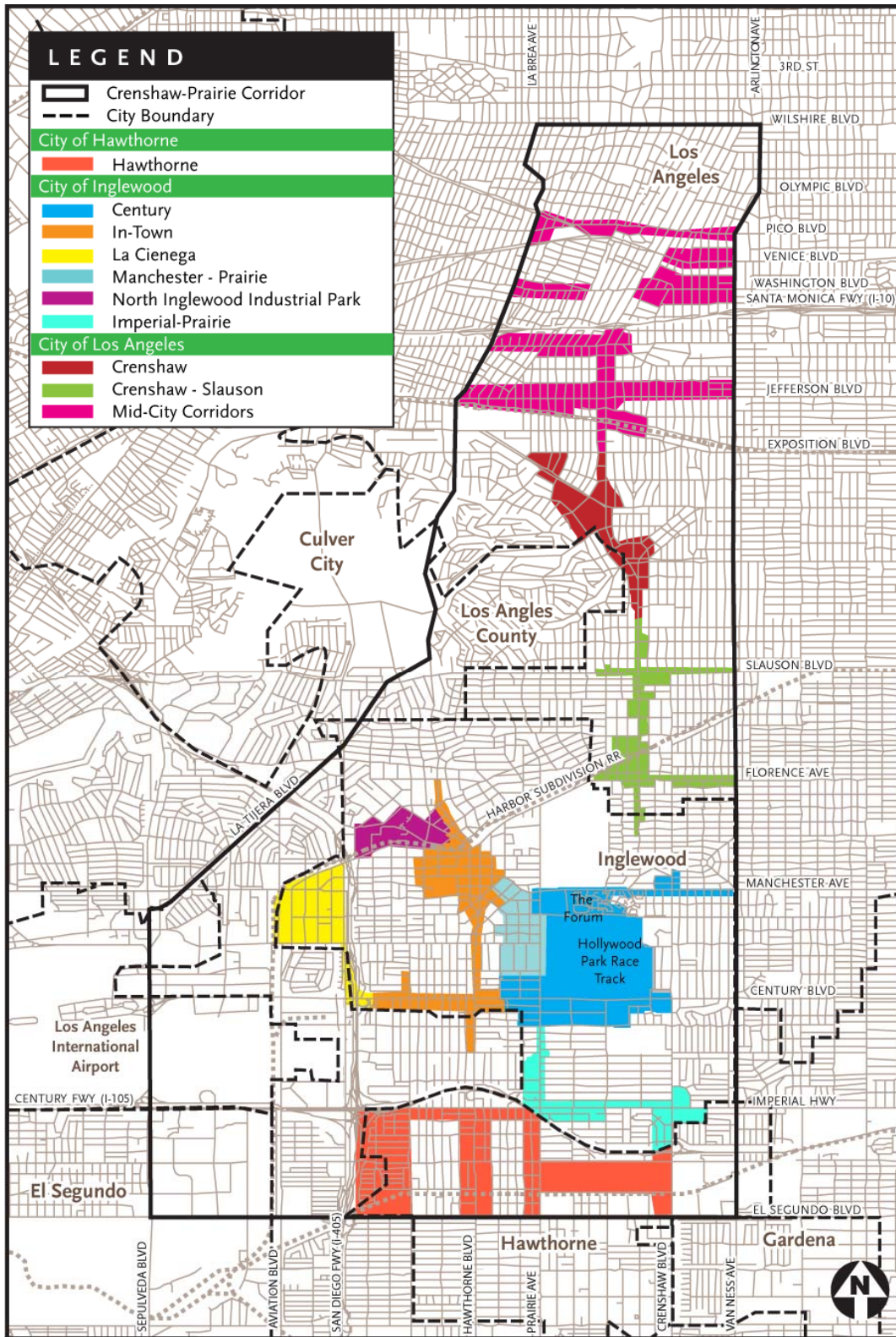
All or portions of nine redevelopment plan areas are located within the study area (Figure 4-49). These include the following:

- City of Los Angeles – Mid-City, Crenshaw, and Crenshaw-Slauson
- City of Inglewood – Century, Manchester-Prairie, In-Town, North Inglewood Industrial Park, and La Cienega
- City of Hawthorne – Hawthorne

In addition, the study area includes a portion of the Los Angeles State Enterprise Zone and is directly adjacent to a U.S. Department of Housing and Urban Development (HUD) Empowerment Zone and Renewal Community. Within these areas, businesses



Figure 4-49. Redevelopment Areas in the Study Area



Source: Parsons Brinckerhoff, 2008

Table 4-69. Forecast Employment, 2030

District Name	2006 Employment	2006 Employment Density	2030 Employment	2030 Employment Density	Percent Change	Average Annual Increase
Crenshaw	15,408	2,748	19,120	3,410	24%	1.0%
Hawthorne	15,859	4,561	19,272	5,543	22%	0.9%
Inglewood	53,360	5,888	63,032	6,956	18%	0.8%
LAX	55,489	6,866	65,528	8,108	18%	0.8%
Lennox	4,456	3,692	5,761	4,773	29%	1.2%
South Mid-Wilshire	18,179	3,773	22,349	4,639	23%	1.0%
View Park	1,672	899	2,030	1,092	21%	0.9%
Study Area Total	164,423	4,820	197,092	5,778	20%	0.8%

Source: SCAG, 2007.

Notes:

- 1 The Crenshaw District is the City of Los Angeles jurisdiction and extends slightly west of the study area boundary.
- 2 The Hawthorne District encompasses the portion of Hawthorne in the study area and the remainder of the City's jurisdictional lands to the south.
- 3 The Inglewood District boundaries are the same as those of the city, and are entirely within the study area.
- 4 The LAX District encompasses the airport, the El Segundo light industrial park and corporate offices area south of the airport, as well as the portion of the City of Los Angeles north of the airport. A substantial portion of this district extends west of the study area boundary (the airport runways), but almost all of the jobs are located within the study area.
- 5 The Lennox District is in the unincorporated County of Los Angeles.
- 6 The South Mid-Wilshire District extends both east and west of the study area boundary.
- 7 The View Park District is the portion of the unincorporated County of Los Angeles and extends slightly west of the study area boundary.

can take advantage of State and/or federal tax credits and deductions not available to businesses elsewhere. The goal of these incentives is to stimulate business attraction, encourage growth, and increase employment opportunities within economically challenged areas.

The revenue supporting local government operations and programs in the study area comes from many sources typical to local governments. These sources include business licenses, recreation facility user fees, sales tax, hotel room tax, and property taxes. Some revenues can only be spent on certain projects or types of programs. For example, revenues raised via property taxes for a special tax district such as the Metropolitan Water District or the Los Angeles Unified Schools District can only be used for those purposes and cannot be used to support other local government activities. Other local government revenue can be spent on a broad range of government activities. For example, revenues collected by sales tax support a local government's General Fund.

Typically, a substantial share of government revenue for the General Fund is from property taxes. For the four cities and Los Angeles County, property taxes comprise approximately 9 to 33 percent of these jurisdictions' General Funds (Table 4-70).



Table 4-70. Local Government Revenues, 2007-2008 Budgets

Jurisdiction	Property Tax Revenues	%	General Fund Revenues	%	Total Adopted Budget
Los Angeles	\$1,406,684,000	33.6%	\$4,185,714,000	61.4%	\$6,817,682,797
Inglewood	\$14,546,000	17.1%	\$84,866,567	28.0%	\$302,952,733
Hawthorne	\$4,775,000	9.2%	\$51,893,104	38.4%	\$135,103,030
El Segundo	\$5,773,900	10.5%	\$55,195,150	58.0%	\$95,048,800
Los Angeles Co.	\$3,695,541,000	22.5%	\$16,425,687,000	66.0%	\$24,892,780,000

Source: City of El Segundo, 2007; City of Hawthorne, 2007; City of Inglewood, 2007; City of Los Angeles, 2007; and County of Los Angeles, 2007.

Review of recently adopted budgets for the local governments in the study area reveals several major budgeting issues. As mentioned above, several local governments have established redevelopment areas within their jurisdictional boundaries. Within these areas, increases in property tax revenues from the base year in which the redevelopment/enterprise area is established are set-aside for special uses. The incremental tax revenue is used to make public investments, leverage public resources through bonding and revolving funds, attract private investment, and partner with members of the community. The purpose is to bring housing, jobs, and economic development to the designated project areas. Because property tax revenues allocated for the general fund are essentially frozen in time, properties within the project area contribute less and less of their “share” of total jurisdictional property tax revenues. To make up the difference, the unmet share of the property tax burden is spread across the entire city’s tax base.

Past years of economic expansion has also led several local governments to adopt budgets where expenditures have exceeded revenues. In part, this has been possible because rapidly increasing property values resulted in revenues exceeding conservative revenue forecasts. But, more recently the expenditures have exceeded incoming revenues. In response to this deficit spending, several of the study area local governments have established “rainy-day” funds to save local government revenues during boom times for those times when revenues may fluctuate downward and may not meet local government expenditure needs. These funds permit the local governments to balance expected expenditures with revenues.

As a matter of course, local government revenues always experience some fluctuations due to the ups and downs of the regional and national economy, which presents a challenge in forecasting local government revenues. After several years of substantial increases in local housing prices in Southern California, housing prices are now leveling off and even falling in some communities. This is occurring as the national economy appears to be entering a recessionary period. A lack-luster national economy tends to hamper regional economic growth, both employment and wages, which, then tends to generally reduce the overall demand for housing and commercial real estate and potentially reduce property values. This, in turn, affects the assessed value of housing and property tax revenues to governments.

Currently, local governments in Southern California are facing an even more serious downturn in property tax revenues. The region has seen increasing numbers of foreclosures on homeowners due to the sub-prime mortgage crisis. Prior to actual foreclosure, there may be a period during which property owners fall behind in paying their property taxes and overdue payments become a lien on the property and interest is accrued. The taxes are defaulted after six months and subject to sale after five years of non-payment. (Some property owners may qualify for the State's Property Tax Postponement Program.) Ultimately, the back taxes will be paid on properties when the property sells. In the meantime, local government property tax revenues may fall substantially below past collection rates and may potentially affect overall local government operations.

In the long term, however, local government fiscal restraint, efforts to keep government expenditures balanced with anticipated revenues including property taxes, and access to "rainy-day" reserve funds will support ongoing local government operations.

4.13.2.3 Study Area Commercial Districts

The study area contains a number of employment destinations, regional and community shopping districts, and active retail businesses. The following sections describe these local economic activity centers in the project area.

There are a number of commercial district corridors as well as several major shopping districts in the southern portion of the study area (Figure 4-50). The commercial district corridors line most of the major arterials. The north-south commercial corridors include La Brea Avenue and Hawthorne Boulevard, as well as portions of Crenshaw Boulevard and Prairie Avenue. East-west commercial corridors extend along portions of Florence Avenue, Century Boulevard (especially at the southeast corner of Hollywood Park Race Track and Casino), and Imperial Highway. Major commercial activity occurs in downtown Inglewood (Market Street) near Manchester Avenue and Hawthorne Boulevard and in downtown Hawthorne on Hawthorne Boulevard south of the I-105 Freeway.

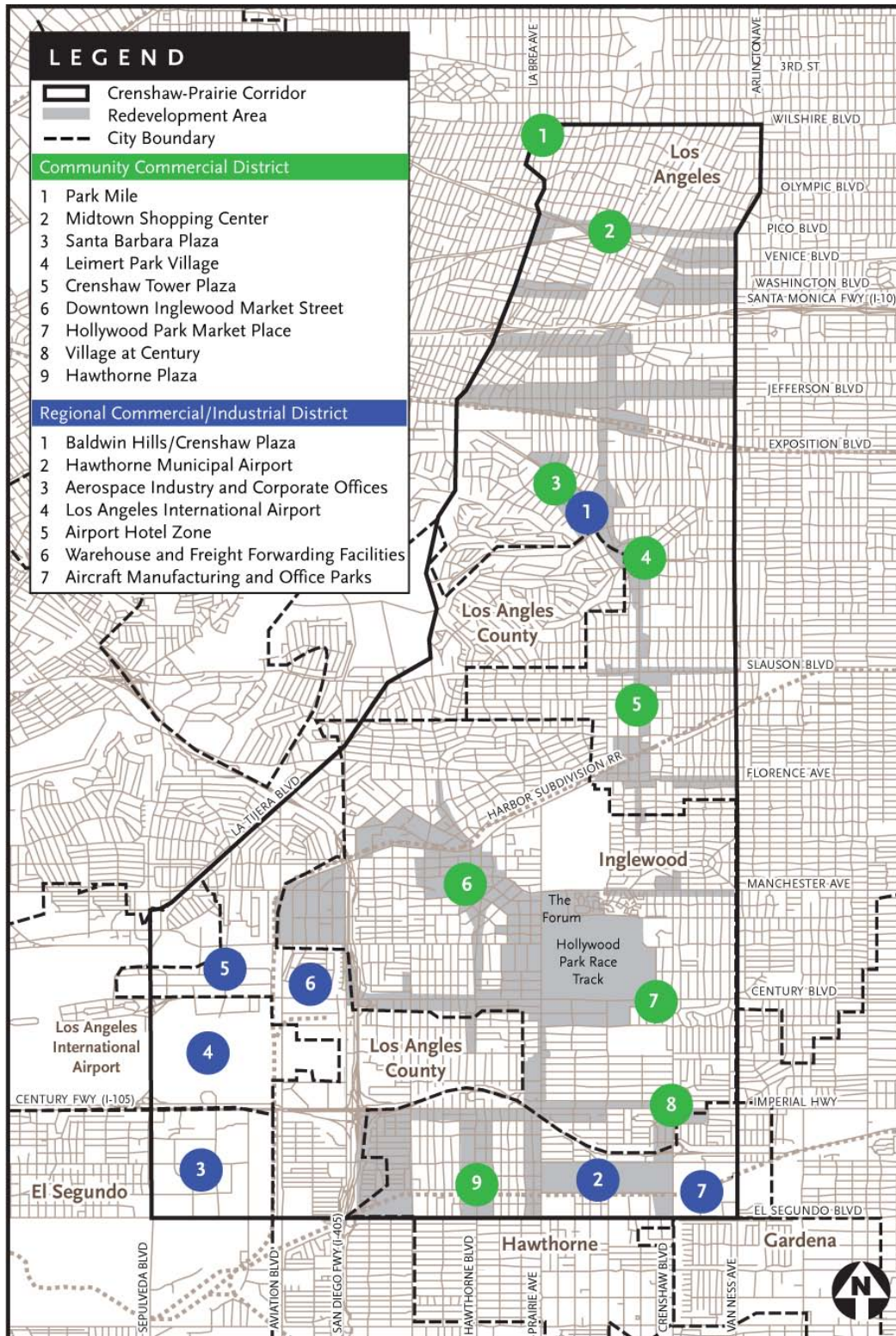
In addition, there are several industrial areas. There is a mix of commercial and industrial development south and east of the Hawthorne Airport, west of the I-405 Freeway, as well as north and south of LAX. Light industrial, mixed use, and corporate office developments are located in El Segundo south of LAX.

Further to the north, commercial business activities are focused on Crenshaw Boulevard. The Baldwin Hills-Crenshaw Plaza regional shopping district is located at the Crenshaw Boulevard/Martin Luther King Jr. Boulevard intersection. The Santa Barbara Plaza community commercial district is immediately to the north and commercial businesses extend to the south to Leimert Park Village, several commercial blocks north of historic Leimert Park. These commercial districts are located in "the heart of Los Angeles' finest African-American community." Commercial businesses also line the minor east-west arterials west of Crenshaw Boulevard and the entire length of Slauson Avenue. This business district also includes the Crenshaw Tower Plaza community shopping district.

In the northernmost portion of the project area, commercial business districts stretch along the major east-west arterials including Wilshire Boulevard, the eastern portion of Olympic Boulevard, Pico Boulevard, the very eastern portion of Venice Boulevard,



Figure 4-50. Economic Activity Centers in the Study Area



Source: Parsons Brinckerhoff, 2008

Washington Boulevard, the western half of Adams Boulevard, and the eastern half of Jefferson Boulevard. Commercial properties also are scattered among other land uses on Crenshaw Boulevard. Community shopping districts in this area include Park Mile and Midtown Shopping Center.

4.13.3 Environmental Impact/Environmental Consequences

4.13.3.1 Regional Economy

The total economic impacts of the proposed project O&M costs are estimated using regional multipliers from SCAG (SCAG 2004). In the past, regional economic impacts of operation have used methodology from APTA. That methodology, however, has not been used in this analysis as the model is based on 1983 data and focused on national impacts. The SCAG Input-Output model is a regional model specifically for Los Angeles County and is based on 2004 data. As such, the SCAG model provides a much improved methodology over the APTA model.

The SCAG Input-Output Model is used to translate the direct O&M cost expenditures into total direct, indirect, and induced economic impacts on the region. As such, the annual O&M expenditures would lead to additional labor and materials input purchases by firms in the production of their outputs, and consumer spending of additional earnings by households across all economic sectors. To assess the differences between the project alternatives, the net difference between total estimated O&M cost estimates (March 26, 2009) through 2030 was calculated for each major element of the Los Angeles County Metropolitan Transportation Authority (Metro)'s transit system – heavy rail transit (HRT), LRT and buses including BRT (Table 4-71). It is assumed that all operations and maintenance services would be procured from firms and suppliers within the region. The SCAG input-output economic multipliers for potentially two industrial sectors apply to the project. They are Sector 392

Table 4-71. O&M Estimated Costs (\$2008 millions)

	No Build	TSM	BRT	Base LRT
Total System Cost Estimate				
HRT	\$114.2M	\$114.2M	\$114.2M	\$114.2M
LRT	\$242.7M	\$242.7M	\$242.7M	\$284.9M
Bus, incl. BRT	\$1,227.2M	\$1,238.3M	\$1,246.8M	\$1,228.7M
Total	\$1,584.1M	\$1,595.1M	\$1,603.6M	\$1,627.8M
Changed Services to System Cost Estimate				
HRT	\$0	\$0	\$0	\$0
LRT	\$0	\$0	\$0	\$42.2M
Bus, incl. BRT	\$0	\$11.1M	\$19.6M	\$1.5M
Total	\$0	\$11.0M	\$19.5M	\$43.7M

Source: March 26, 2009 project O&M cost estimates; SCAG 2004.

Note: Figures may not sum due to rounding.



(rail transportation) and Sector 395 (transit and ground passenger transportation). Review of recent detailed average annual employment data by sector for the county revealed that the rail transportation sector only includes long- and short-haul rail transportation, and does not include LRT. Rather, the transit and ground passenger transportation sector includes urban transit systems, mixed-mode transit systems, commuter rail, and bus systems. As a result, it is necessary to apply the same multipliers to the O&M expenditures for both bus and LRT services.

However, considering much of the operating and maintenance costs are anticipated to be funded by local or regional sources, the net total impacts arising from the increase in O&M expenditures of the project alternatives would generally not be expected to substantially affect the regional economy.

No Build Alternative

The No Build Alternative is the base case scenario and O&M costs for this alternative are estimated to be about \$1,584.1 million (\$2008) through 2030. The overall gross economic impact from these O&M expenditures on the region would be about \$2,907.9 million per year. The average annual direct, indirect, and induced jobs would total an estimated 26,500, 3,300, and 5,000, respectively. The total number of jobs would be about 34,800. The total average annual household income earnings from these jobs would be about \$1,684.7 million. As this does not include any increases in transit services other than those already planned, there would be no additional economic impacts to the region from the implementation of this alternative.

TSM Alternative

The TSM Alternative would have increased O&M costs of about \$11.0 million above the estimated costs for the No Build Alternative (Table 4-72). Total economic output would be \$20.9 million (\$2008) greater than the No Build Alternative. Total average annual employment would be about 250 jobs above the forecast 34,800 jobs. Household earnings income would be about \$12.1 million greater than the No Build Alternative. These changes would be less than 1 percent greater than the No Build Alternative, and as such, they would not be substantial.

Table 4-72. Additional O&M Estimated Economic Impacts (\$2008 millions)

	No Build	TSM	BRT	Base LRT
Additional O&M	\$0	\$11.0M	\$19.5M	\$43.7M
Output	\$0	\$20.9M	\$20.3M	\$73.2M
Employment	0	250	240	880
Income	\$0	\$12.1M	\$11.7M	\$42.4M

Source: SCAG 2004.

BRT Alternative

The economic impacts of the BRT Alternative would be more than the TSM Alternative considering an additional \$19.5 million (\$2008) would be required for O&M expenditures. The economic output would be \$20.3 million, employment would be about

240, and household earnings income would be about \$11.7 million. These effects would be less than 1 percent, and would not be a substantial change.

Base LRT Alternative

In contrast, the economic impacts of the Base LRT Alternative would be substantially greater than the BRT and TSM Alternatives. Total economic output would be about 73.2 million for the Base LRT Alternative. Additional direct, indirect, and induced employment would be about 880. The total estimated household earnings would be about \$42.4 million. These effects, however, would be less than 3 percent greater than the No Build Alternative and would not be a substantial change.

LRT Alternative Design Options

The LRT Alternative may include the following six design options:

- LRT Alternative Design Option 1: An aerial station at Century Boulevard instead of an at-grade station at LAX.
- LRT Alternative Design Option 2: An aerial crossing instead of an at-grade crossing at Manchester Avenue.
- LRT Alternative Design Option 3: A cut and cover crossing instead of an at-grade crossing at Centinela Avenue.
- LRT Alternative Design Option 4: A cut and cover alignment instead of an aerial alignment between Victoria Avenue and 60th Street.
- LRT Alternative Design Option 5: A below-grade station at Vernon Avenue near Leimert Park.
- LRT Alternative Design Option 6: A below-grade alignment between 39th Street and Exposition with a below-grade station instead of an at-grade alignment north of 39th Street with connection to Exposition and an at-grade station.

The six design options would likely add costs compared to the Base LRT Alternative. However, similar to the Base LRT Alternative, these effects would not be adverse.

4.13.3.2 Employment

This section discusses the anticipated long-term annual increase in employment associated with operation of the project alternatives. These estimates are presented for operations, vehicle and other maintenance, and general administration jobs. They are broken out for HRT, light rail, and bus sectors of the transit agency's services. The estimates are based on estimated labor hours for each of the alternatives and assume one Full Time Equivalent (FTE) is equal to 2080 hours per year (Metro, 2007).

No Build Alternative

Table 4-73 provides a complete breakdown of planned employment by category for each sector of Metro's transit services for the No Build Alternative. Based on the specific O&M plan estimated labor hours for this alternative, a total of 13,069 workers would be employed by Metro. Approximately 68 percent are with the operations sector, an estimated 24 percent are maintenance, and an additional 8 percent are general administration. The average wage for all jobs is estimated to be approximately \$85,300 (\$2008).



Table 4-73. New Transit Operations Employment (FTE)

Employment	Planned Employment	No Build Alternative	TSM Alternative	BRT Alternative	Base LRT Alternative
Operations					
HRT	245	0	0	0	0
LRT	655	0	0	0	+132
Bus	7,961	0	+82	+68	+19
Vehicle Maintenance					
HRT	187	0	0	0	0
LRT	369	0	0	0	+57
Bus	1,944	0	+18	+21	-3
Non-Vehicle Maintenance					
HRT	148	0	0	0	0
LRT	241	0	0	0	+29
Bus	295	0	+1	+2	0
General Administration					
HRT	81	0	0	0	0
LRT	211	0	0	0	+36
Bus	730	0	+7	+7	+2
TOTAL	13,069	0	+108	+98	+272
Percent Increase		0%	<1%	<1%	2%

Source: Engineering Plan Sets, Preliminary Operation and Maintenance Cost Estimates and Metro Adopted Budget, 2008.

Note: Total may not sum due to rounding.

As this is the planned employment, no additional employees would be required under the No Build Alternative.

TSM Alternative

The TSM Alternative would maximize bus services and represents the least-cost alternative. Approximately 108 additional workers would be needed to operate and maintain the increased bus transit services. This is 108 jobs in addition to the planned 13,069 jobs, and therefore, would be a very small change in Metro’s total transit employment. Considering this is a small increase in total bus operators for the transit agency and it is a small proportion of total regional employment for operators of large vehicles (buses or large trucks), it is anticipated that the regional work force would be able to meet this increased demand.

BRT Alternative

The operations of the BRT Alternative would be very similar to conditions described for the TSM Alternative. The alternative would increase transit services by providing BRT services. Basically, the way the buses would be operated would be changed. An additional estimated 98 workers would be needed to operate transit services under this alternative. This would be a very small change in Metro’s total transit employment and it is anticipated that the regional work force would be able to meet this increased demand.

Base LRT Alternative

The long-term operations of the Base LRT Alternative would require more than double the number of additional workers needed under either the TSM or BRT Alternatives. The Base LRT Alternative would require an additional 274 workers to operate the expanded LRT system. Considering there would be a total of 1,477 jobs under the No Build Alternative associated with light rail services, this increase of more than 20 percent or 274 vehicle operators under the Base LRT Alternative would be substantial. Considering this is a substantial increase in light rail vehicle operators for the transit agency and there is a small workforce available in the region that has either light rail or heavy rail operator experience, it is possible the regional work force would not be able to meet this increased employment demand. Workers from other large metropolitan regions across the country may be attracted to move to the Los Angeles area for this employment opportunity. The total number of additional workers required for the Base LRT Alternative, however, would remain very small compared to the total regional employment. The effects could be lessened if Metro would cross-train local workers, e.g., bus maintenance workers and light rail maintenance workers.

LRT Alternative Design Options

As discussed previously, the LRT Alternative may include six design options. These design options would not require substantial numbers of additional workers compared to the number of additional workers under the Base LRT Alternative. Similar to the Base LRT Alternative, these design options would not have an adverse impact on employment.

4.13.3.3 Government Revenues

The acquisition of private property for construction of the project alternatives would result in a long-term reduction in the tax base for taxing districts in the project area. The loss of tax base means the revenue previously paid by acquired properties would need to be re-distributed across the tax base. The reduction in property tax revenue to local tax districts was estimated using the conceptual engineering plans and 2007-2008 Los Angeles County Tax Assessor records.

No Build Alternative

The No Build Alternative includes all existing highway and transit services, as well as committed highway and transit projects. These projects may or may not include acquisition of properties and the majority are not located within or near the Crenshaw Transit Corridor. As there would be minimal required acquisition of property within or near the corridor under the No Build Alternative, there would be no effects on local government property tax revenues.

TSM Alternative

Similarly, no property would be acquired for the minor transportation improvements proposed under the TSM Alternative. As such, there would be no effects on local government property tax revenues.

BRT Alternative

Under the BRT Alternative, all or a portion of a number of properties would be acquired. Acquisition would change the property ownership from private ownership to government (tax-exempt) ownership.



Table 4-74 shows the anticipated reduction in annual property tax revenues for the BRT Alternative exclusive of either of the maintenance and operations facility sites. The reduction to the six local government tax districts (exclusive of local government debt service) totals an estimated \$34,800. This reduction in property tax revenues would not be substantial, especially considering the several million dollars in property tax revenues that annually are collected by project area local governments and the more than \$3.6 billion collected by Los Angeles County (see Section 4.13.2.3).

Table 4-74. Property Tax Losses for Alternatives¹

Tax Districts	No Build Alternative	TSM Alternative	BRT Alternative ²	Base LRT Alternative ²
City of Inglewood	\$0	\$0	\$2,600	\$1,200
City of Los Angeles	\$0	\$0	\$500	\$1,100
LA Unified Schools	\$0	\$0	\$2,500	\$3,800
Community College	\$0	\$0	\$400	\$400
Metro Water District	\$0	\$0	\$200	\$200
General Tax Levy	\$0	\$0	\$28,600	\$34,700
Total³	\$0	\$0	\$34,800	\$41,400

Source: Engineering Plan Sets and Property Acquisition Table in Appendix A, Los Angeles County Tax Assessor Web Page May & June 2008.

Notes:

1. The data primarily used to calculate property tax revenue losses is based on the Property Acquisition Table dated September 15, 2008. This data is preliminary and some parcel data was incomplete. The incomplete data, however, would not substantially change the magnitude of the effects.
2. The BRT and LRT Alternatives tax revenue information does not include either of the proposed sites for the maintenance and operations facility. See table below.
3. Totals may not sum due to rounding. In addition, the totals exclude loss of property tax revenue for local government debt service. As such, the totals are slightly less than the actual amount that would be affected.

Additional properties would be acquired for a maintenance and operations facility site. Two sites are under consideration. Site B is about 16.2 acres in size and is comprised of 18 parcels. Site D is about 29.3 acres and is comprised of 12 parcels. Largely due to the number of parcels, existing land uses, and property improvements, the anticipated property tax revenue losses to local governments differ between these two sites (Table 4-75) shows that the total anticipated reduction in property tax revenues (exclusive of local government debt service). For Site B, revenue reductions would conservatively total about \$113,500 and about \$72,100 for Site D. So, despite the fact that Site D is substantially larger in size than Site B, the total anticipated loss of property tax revenues would be substantially less due to lower assessed values. In addition, note that the total amount of property tax revenue losses for the maintenance and operations facility sites would be nearly double the amounts required for property associated with the linear portions of the alternative.

Table 4-75. Property Tax Losses for Optional Maintenance and Operations Facility Sites¹

Tax Districts	Site B ²	Site D ²
City of Inglewood	\$100	\$0
City of Los Angeles	\$3,700	\$0
LA Unified Schools	\$11,900	\$0
El Segundo Elementary Schools	\$0	\$4,200
El Segundo High School	\$0	\$2,000
Community College	\$900	\$1,100
Metro Water District	\$500	\$300
General Tax Levy	\$96,400	\$64,500
Total ³	\$113,500	\$72,100

Source: Engineering Plan Sets and Property Acquisition Table in Appendix A; Los Angeles County Tax Assessor Web Page May & June 2008.

Notes:

1. The data primarily used to calculate property tax revenue losses is based on the Property Acquisition Table dated September 15, 2008. This data is preliminary and some parcel data was incomplete. The incomplete data, however, would not substantially change the magnitude of the effects.
2. The two maintenance and operations facility sites, Site B and Site D, can be paired with either the BRT or Base LRT Alternatives.
3. Totals may not sum due to rounding.

As such, the total reduction in property tax revenues under the BRT Alternative would include the losses from one of the maintenance and operations facility sites. The grand total loss in property tax revenues for the alternative would range from about \$106,900 (including Site D) to \$148,300 (including Site B). This loss of property tax revenues, however, would be insignificant considering the very sizable total revenue local governments receive in property tax revenues.

Base LRT Alternative

The effects on property tax revenues under the Base LRT Alternative are similar to those described for the BRT Alternative, but greater. The acquisition of property for the construction of the corridor improvements would result in a total loss of local government property tax revenues of an estimated \$41,400 (Table 4-74). This amount is somewhat larger than the amount under the BRT Alternative. The operation of the Base LRT Alternative would also require the additional acquisition of property for a maintenance and operations facility – the same two sites considered for the BRT Alternative (Table 4-75). As such, the grand total loss in property tax revenues for the Base LRT Alternative would conservatively range from about \$113,500 (including Site D) to \$154,900 (including Site B). These reductions are slightly greater than the effects under the BRT Alternative, but still insignificant considering the very sizable total revenue local governments receive in property tax revenues.

LRT Alternative Design Options

As discussed previously, the LRT Alternative may include six design options. Design Options 1, 2 and 6 would not require the acquisition of properties or removal of buildings in addition to those required under the Base LRT Alternative. In addition, Design Option



6 would reduce the number of property acquisitions compared to the at-grade alignment proposed under the Base LRT Alternative.

Design Option 3 would require the partial acquisition of one property, in addition to those required under the Base LRT Alternative. This partial acquisition would require 6,374 square feet of Edward Vincent Jr. Park, which would displace numerous palm trees. No buildings would be removed under this design option.

Design Option 4 would require the partial acquisition of three properties and the full acquisition of two properties, in addition to those required under the Base LRT Alternative. These properties are located in a deteriorating commercial/industrial portion of the corridor.

Design Option 5 would require the partial acquisition of only one property, in addition to those required under the Base LRT Alternative.

Therefore, similar to the Base LRT Alternative, these design options would not have an adverse impact on the loss of government revenue from property taxes.

4.13.3.4 Study Area Commercial Districts and Economic Revitalization

This section discusses the long-term effects of property acquisition on neighborhood business districts as well as potential economic revitalization as a result of the several project alternatives.

No Build Alternative

Under the No Build Alternative, there would be no improvements to transit services other than those already planned for the study area, including improved transit bus services in the project corridor. Construction and property acquisition may or may not be required. Over time, however, congestion on study area roadways would increase, thus reducing the level of service on roadways for all vehicles. Travel times would increase for all modes of travel. Access to project corridor businesses would adversely be affected. But increased traffic would also mean a potential increase in customers for existing and future businesses in the project corridor.

TSM Alternative

Transit bus services would be improved under the TSM Alternative compared to the No Build Alternative. There would be no construction of transit infrastructure and no required acquisition of property. Congestion and travel time would increase for all modes of travel, though not to the same extent as under the No Build Alternative. Adverse effects on access to project corridor businesses would be less than under the No Build Alternative.

The route for improved transit services would be similar to the other build alternative. Bus services in the corridor in particular would improve along Aviation Boulevard and Hawthorne Boulevard between Hawthorne and Inglewood, and Crenshaw Boulevard from Hawthorne to as far north as Wilshire Boulevard in Los Angeles. The transit-improved corridors travel adjacent or through eight of the nine designated redevelopment areas in the study area. The improved transit services would not specifically benefit

residents and businesses in the Manchester-Prairie redevelopment area, though the transit improvements would be only several blocks west of this redevelopment area. The lack of substantial additional new transit infrastructure may or may not facilitate future economic revitalization along the project corridor. Similar to the No Build Alternative, the increase in people traveling through the project corridor could increase customers for existing and future businesses.

BRT Alternative

Transit services under the BRT Alternative would be further improved in comparison to the TSM Alternative. Minor reconstruction of roadways would be required to establish the new BRT stations. A total of 29 parcels would be affected by either full or partial acquisition in the corridor. An estimated 22 light industrial/warehouse and three retail building structures could be potentially affected on these properties. It is not expected that these effects would be substantial for nearby business districts or local employment. If paired with the maintenance and operations facility Site B, an additional 17 light manufacturing structures could be affected. No additional buildings would be affected for maintenance and operations facility Site D.

Construction activities would be focused between the proposed station to serve LAX north to the West Boulevard BRT Station. This comprises approximately one-third of the corridor and is where the busway would be constructed. This substantial transportation infrastructure improvement would benefit adjacent businesses and business districts as this permanent improvement would be expected to attract new development. In particular, it could attract future development in the La Cienega, North Inglewood Industrial Park, and In-Town redevelopment areas. (For more detailed information about transit-oriented development, please see Section 4.1 Land Use and Development)

North of the Harbor Subdivision, transit services would be in restricted curb lanes to Exposition Boulevard and in mixed traffic north to Wilshire Boulevard. The improved transit services along these portions of the project corridor would result in minimal displacement of existing corridor businesses. The effects from the increased number of people traveling through the corridor would mean more customers for existing and future businesses. The effect would likely be similar to those described for the TSM Alternative for this portion of the project corridor. Despite the lack of permanent transit infrastructure, the permanent transit services may indirectly attract new development or redevelopment near the project corridor.

Base LRT Alternative

Under the Base LRT Alternative, substantial new transit infrastructure would be constructed that would potentially attract either new development or redevelopment of existing properties along most of the project corridor. Properties would be acquired for roadway widening, construction of LRT stations, as well as associated park-and-ride lots. Few parcels, however, would be fully acquired. The acquisition of this property would be expected to displace a total of about seven commercial or industrial building structures. No additional businesses would be displaced by the maintenance and operations facility Site D, though about 17 additional industrial/commercial structures would be displaced with the maintenance and operations facility Site B. It is not expected that the acquisition of property or the displacement of these buildings and business occupants would be a



substantial adverse effect in the eight-mile project corridor considering these acquisitions and displacements would be dispersed along the corridor.

Construction of substantial new transit infrastructure would occur along the entire eight miles of the proposed LRT line. These improvements may potentially attract new development or redevelopment along this portion of the project corridor. In particular, the transit improvements may stimulate development in the following five redevelopment areas: La Cienega, In-Town, North Inglewood Industrial Park, Crenshaw-Slauson, and Crenshaw.

LRT Alternative Design Options

As discussed previously, the LRT Alternative may include six design options. Design Option 1 may attract either new development or redevelopment of existing properties along Century and Aviation Boulevards primarily due to the proximity of LAX. In addition, the potential joint development of this area, including Metro's Crenshaw Transit Corridor and the LAX PeopleMover, would have a beneficial impact on the economic revitalization of the area. Under this design option, no properties would be acquired and no businesses displaced.

Design Options 2, 3, and 4 are not anticipated to attract either new development or redevelopment of existing properties in the corridor because the design options do not include a station. Under Design Options 2 and 3, no properties would be acquired and no businesses displaced. However, numerous palm trees that line the Harbor Subdivision right-of-way located in Edward Vincent Jr. Park would be removed with under Design Option 3. The removal of these palm trees is not anticipated to impact the commercial businesses or economic development of the area. Under Design Option 4, two commercial/industrial properties would be displaced. The removal of these properties would not impact the economic development of the area.

Design Option 5 may contribute to the attraction of either new development or redevelopment of existing properties in the community of Leimert Park, which is a significant cultural center along the corridor. Under this design option, one neighborhood commercial business would be displaced. The removal of this business would not impact the economic development of the area.

Design Option 6 may contribute to the attraction of either new development or redevelopment of existing properties near the intersection of Crenshaw and Exposition Boulevard. No properties or businesses would be displaced under this design option.

Therefore, similar to the Base LRT Alternative, these design options would not have an adverse impact on commercial districts and economic revitalization.

4.13.4 Mitigation Measures

As none of the anticipated long-term operational economic and fiscal impacts of the project alternatives would be substantial adverse effects, no mitigation would be required.

4.13.4.1 CEQA Determination

According to CEQA, economic effects of a project shall not be treated as significant effects on the environment; however, an environmental analysis may use economic effects to determine that a physical change is significant. The economic and fiscal effects discussed above address regional economic activity, long-term operations employment, government revenues, and likely long-term effects on adjacent businesses and business districts. Only the later effect would result from physical changes in the environment – primarily the acquisition of property, displacement of building structures, and potentially the construction of the rail tracks for the LRT line. As discussed above, these effects are anticipated to be less-than-significant for each of the build alternatives. More analysis is also presented in Section 4.2 Displacement and Relocation of Existing Uses, which discusses land use and displacement effects.

4.13.4.2 Impact Remaining After Mitigation

The effects of the LRT Alternative design options discussed above also address regional economic activity, long-term operations employment, government revenues, and the potential contribution of the design options to the long-term effects on adjacent businesses and business districts. None of the design options would displace a substantial number of properties or businesses. As discussed above, these effects are anticipated to be less-than-significant for each design option.

As anticipated economic and fiscal effects for each of the build alternative would not be expected to be adverse effects, no mitigation measures would be required and no effects would remain.



4.14 Safety and Security

This section presents the information about existing safety and security within the study area, especially as it pertains to pedestrians, motorists, and communities that may be impacted by the proposed project alignments.

The safety issues include station accidents, boarding and disembarking accidents, and right-of-way accidents and visibility obstructions for operators, motorists and pedestrians due to landscaping. Another aspect of safety is security, particularly the evaluation of station location, layout, and parking design, which must be evaluated to determine if the safety of transit passengers, or the safety of surrounding communities, is compromised and made more susceptible to criminal activity.

4.14.1 Regulatory Framework

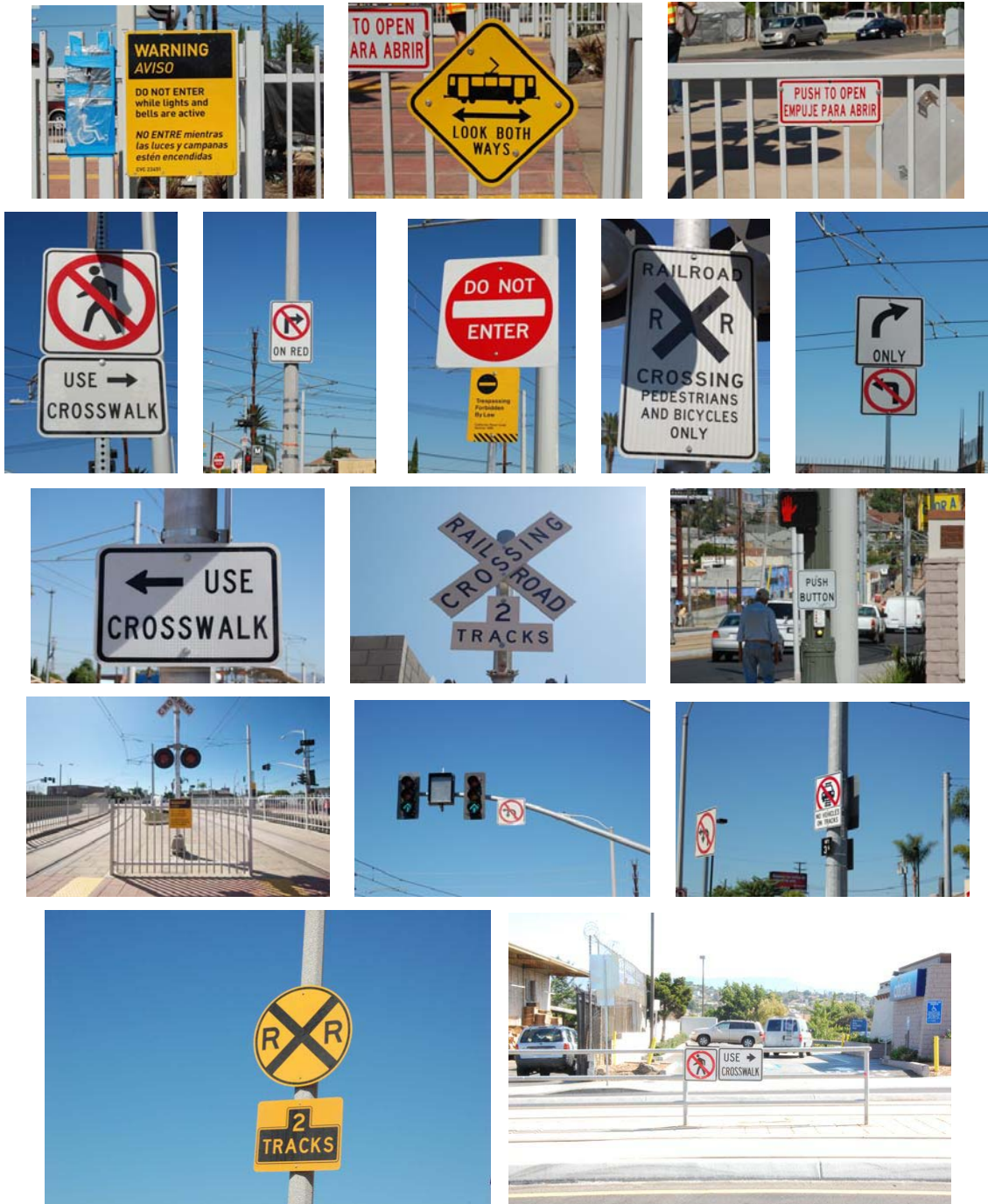
There are both federal and State regulatory requirements that dictate the safety aspects of various facilities and systems. Federal requirements include those published by the Federal Railroad Administration (FRA) and FTA. State requirements include those contained in State laws administered by the California Public Utilities Commission (CPUC). Metro has developed safety criteria and Board adopted policies that will be utilized in designing the elements for the project. Industry guidelines will also be used in developing the system design features. Local fire and police jurisdictions, general plan policies and ordinances are additional regulatory frameworks related to transit safety and security.

The study area encompasses a number of jurisdictions and agencies that have safety and security responsibilities, including the Metro, County of Los Angeles (Lennox) and the Cities of Los Angeles, Inglewood, Hawthorne, and El Segundo. The following provides a general description of the safety programs and police services that are provided in the study area.

4.14.1.1 Safety

Metro oversees the operation of bus and rail transit services throughout Los Angeles County. Metro is also responsible for implementing its own System Safety Program Plan (SSPP) and System Security Plan (SSP) during the operational phases of projects, which help to maintain and improve the safety and security of commuter operations, mitigate accidents, and comply with State regulations. These safety measures have been established to provide employee and passenger safety, crime prevention, adequate emergency response, and emergency procedures. Metro also uses numerous pedestrian and motorist safety devices, signs, and warning lights to alert pedestrians, passengers, employees, and the surrounding community. Figure 4-51 illustrates several of these warning devices. Metro has also implemented several programs and/or projects to enhance the safety of passengers, employees, and the community. A brief description of these programs and/or projects is provided below.

Figure 4-51. Pedestrian and Motorist Safety Devices



**Bus Safety and Security Measures**

- Photo equipment has been installed on Metro buses, permitting live video to be observed;
- Direct communication services have been established to connect Metro buses with the Los Angeles Police Department or the Los Angeles County Sheriff's Department Transit Dispatch/Emergency Response Center.

Rail Safety and Security Measures

- Four quadrant gates have been installed at various high-risk highway light rail transit (LRT) grade crossings to deter motorists from driving around the lowered gates;
- Pedestrian swing gates and pedestrian automatic gates have been installed at various pedestrians paths that cross LRT tracks, to deter unsafe pedestrian movement; and
- Photo enforcement of grade crossing violations has been installed at various crossings along the Metro Blue Line to discourage motorists from driving around lowered gate arms and to discourage motorists from making illegal left turns.

General Safety and Education Programs

- Metro's comprehensive and award-winning rail safety outreach program communicates safety information to motorists and pedestrians offering behavior modification around transportation projects. Safety information is communicated through one-on-one presentations to schools, senior and recreation centers, business and community groups, medical and religious centers to ensure the total saturation of safety materials in the community. Safety information is communicated through site-specific presentations, safety orientation tours, and participation in community events;
- Rail Safety Education and Outreach are offered in a classroom setting using site-specific photos and safety videos for communities along the Metro Blue, Gold, and Orange Lines;
- Rail Safety Orientation Tours are offered to K-12 students and include safety and system information;
- The Metro Experience, a mobile theatre, is available for community events, and may be used as a theatre or a movable classroom; and

Metro personnel are offered Community Emergency Response Training (CERT) in collaboration with the Los Angeles City Fire Department. Employees are trained in earthquake awareness, disaster medical procedures, and rescue operations.

4.14.1.2 Security

Security and policing services are provided at Metro facilities by the LACSD. Metro currently provides (via contracts with the LACSD) police surveillance, non-uniformed police inspectors on transit and at major transit nodes, a closed-circuit television, and an emergency radio system, which all facilitate a quick response in emergency situations.

While LACSD enforces Metro security procedures along the alignment and station areas, there are policing authorities whose jurisdictions apply to the surrounding areas adjacent to the alignment. The geographic coverage of policing authorities is shown in Figure 4-52 and Figure 4-53, and includes the LAPD, LACSD, Inglewood Police Department, Hawthorne Police Department and the El Segundo Police Department. The LAPD has

Figure 4-52. Police Services for BRT Alternative



Source: Parsons Brinckerhoff, 2008



Figure 4-53. Polices Services for Base LRT Alternative and Design Options



Source: Parsons Brinckerhoff, 2008



responsibilities for communities extending from the northern portion of the corridor in the Wilshire area to the Inglewood City limit near Florence Avenue and Crenshaw Boulevard. LAPD along with the Los Angeles

Department of Airports Police also have policing responsibilities for the south western portion of the corridor southwest of Manchester (Westchester Community) and in the vicinity of the LAX. LACSD provides services to two unincorporated areas within the corridor, including the View Park/Windsor Hills area west of Crenshaw Boulevard, and the Lennox area located south of the City of Inglewood. The Inglewood, Hawthorne and El Segundo Police Departments provide services to portions of the corridor within their respective jurisdictions.

Crime within the Project Corridor

Table 4-76 identifies the crime within the corridor relative to Part I crimes in 2008. Part I crimes include violent crimes, such as homicide, rape, and robbery, and property crimes, such as burglary and grand theft auto. Data is shown for the various divisions of LAPD, patrol areas for the LACSD, and the other jurisdictions within the corridor. In general the data indicate that the crime rate (measured in offences per each 10,000 persons of population) for Part I crimes within the corridor is higher than the overall crime rate for LAPD and LACSD jurisdictions.

Table 4-76. Crime Statistics within Project Corridor

Jurisdiction / Area	Total Population	Part I Crime Rate per 10,000 Persons ¹
City of El Segundo (2008)	16,700	408.38
City of Hawthorne (2007)	90,057	365.44
City of Inglewood (2007)	129,900	294.77
City of Los Angeles (2008)		
77th St Area	184,637	80.59
Wilshire Area	272,903	38.18
Pacific Area	217,867	58.75
Southwest Area	189,723	89.66
LAPD Jurisdiction (Total) ²	4,003,694	66.29
Los Angeles County (2007)		
Lennox Station	94,522	293.16
Marina Del Rey	25,047	437.58
LACSD Jurisdiction (Total) ³	2,944,422	309.20

Source: Los Angeles Police Department; Los Angeles County Sheriff's Department; Inglewood Police Department, 2008.

¹ Part I crimes includes total violent and property crimes.

² City of Los Angeles population totals based on LAPD 2007 Statistical Digest.

³ Los Angeles County Sheriff's Department population total based on LASD total population within jurisdictional area as reported by LACSD, not total population for Los Angeles County.

**4.14.2 Environmental Impacts/Environmental Consequences****4.14.2.1 Methodology**

Pedestrian and motorist safety along the alternatives considered in this document are evaluated on a qualitative level based on the experience of BRT and LRT systems throughout North America with similar alignment types. Research conducted on pedestrian and motorist safety referenced in this section include Transit Cooperative Research Program (TCRP) Report 17 – Integration of LRT into City Streets and TCRP Report 69 – Light Rail Service: Vehicular and Pedestrian Safety. The assessment of security concerns addresses crime prevention and potential for crime against persons, property theft, and vandalism. This analysis reviews project design features in the context of Metro procedures and prior experience of other rail systems to assess impacts.

4.14.2.2 Safety

This section discusses impacts to pedestrian and motorist safety related to the alternatives considered in this document. Table 4-77 and Table 4-78 provide the results of a limited safety analysis prepared for this document for both pedestrian and motorist safety for the BRT and Base LRT Alternatives.

Pedestrian Safety**No Build Alternative**

The No Build Alternative would not result in any pedestrian safety impacts, since it will maintain transit service as it is at present. In addition it is not expected that increased traffic congestion within the corridor in future years would have a direct effect on pedestrian safety other than possible increases in cut through traffic in residential areas, where vehicles would attempt to bypass congested intersections and travel through neighborhood areas.

TSM Alternative

Under the TSM alternative, the additional Metro Rapid bus services operating in the Crenshaw Transit Corridor would not result in any pedestrian safety impacts.

BRT Alternative

The BRT Alternative provides for new transit services in the Crenshaw Transit Corridor operating low-floor transit vehicles.

The BRT Alternative would be operating in mixed flow traffic between Wilshire Boulevard and Western Avenue to Wilshire Boulevard and Crenshaw Boulevard and would not result in any pedestrian safety impacts. Along Crenshaw Boulevard to the Harbor Subdivision Busway, the BRT Alternative would be operating within a semi-exclusive lane (bus only and right turns by automobiles when permitted). Pedestrian crossings at signalized intersections would be the same as the existing conditions. Pedestrians crossing the street may experience limited sight distance due to near side BRT stations with the BRT vehicle stopped and right turn vehicles queuing. Pedestrian safety impacts along this section of the alignment are not anticipated. Along the Harbor Subdivision Busway there are 19 at grade crossings of the existing railroad. Busway crossings would occur at these at-grade railroad crossings. Traffic signals and active “Bus” signs will be added for both pedestrians and motorists to supplement the at-grade

Table 4-77. Crenshaw Transit Corridor BRT Safety Analysis

Pedestrian Activity Segment	Preliminary Evaluation Factor				
	Pedestrian Generators	Pedestrian Activity Level	Pedestrian Sight Distance	Motorist Sight Distance	Thru Traffic
Wilshire	Residences, schools, and community businesses	Limited; recommended school pedestrian routes cross Crenshaw	OK	OK	Low to moderate
I-10 Freeway	West Angeles Church of God in Christ	High on Sundays; moderate on weekdays	OK	OK	Consistent
Expo Line Crossing	Expo Line and the West Angeles Church of God in Christ	High	OK	OK	Consistent
Baldwin Hills / Leimert Park	Baldwin Hills Crenshaw Plaza and Leimert Park	High	OK	OK	Consistent
Slauson Ave.	Community shopping areas, multiple churches, local post office, and schools	Moderate to High	OK	Columns from elevated structure may cause concern; spacing to be considered during final design	Consistent
Hyde Park	Multiple motels and some residences; Hyde Park Elementary School	Moderate; recommended school pedestrian routes cross Crenshaw	OK	OK	Low to moderate
Harbor Subdivision	Centinela Park, residences, a church, and medical facilities	Limited	OK	OK with reconfiguration proposed by City of Inglewood; otherwise, limited sight distance at Redondo because of intersection geometry	Consistent
Inglewood	Faithful Central Bible Church	High on Sundays; moderate on weekdays	OK	Columns from elevated structure may cause concern; spacing to be considered during final design	Low to moderate
Manchester Area	Commercial and industrial uses	Limited	Limited	Limited sight distance at Manchester/ Florence because of intersection geometry	Moderate truck traffic
LAX	Schools and hotels; proposed station would provide access to planned LAX automated people mover system	Limited; Century/Florence is moderate	OK	OK	Moderate truck traffic

Source: Parsons Brinckerhoff, 2008.



Table 4-78. Crenshaw Transit Corridor LRT Safety Analysis

Pedestrian Activity Segment	Preliminary Evaluation Factor				
	Pedestrian Generators	Pedestrian Activity Level	Pedestrian Sight Distance	Motorist Sight Distance	Thru Traffic
Expo Line Crossing	Expo Line and the West Angeles Church of God in Christ	High	OK	OK	Consistent
Baldwin Hills / Leimert Park	Baldwin Hills Crenshaw Plaza and Leimert Park	High	OK	OK	Consistent
Slauson Ave.	Community shopping areas, multiple churches, local post office, and schools	Moderate to High	OK	Columns from elevated structure may cause concern; spacing to be considered during final design	Consistent
Hyde Park	Multiple motels and some residences; Hyde Park Elementary School	Moderate; recommended school pedestrian routes cross Crenshaw	OK	OK	Low to moderate
Harbor Subdivision	Centinela Park, residences, a church, and medical facilities	Limited	OK	OK with reconfiguration proposed by City of Inglewood; otherwise, limited sight distance at Redondo because of intersection geometry	Consistent
Inglewood	Faithful Central Bible Church	High on Sundays; moderate weekdays	OK	Columns from elevated structure may cause concern; spacing to be considered during final design	Low to moderate
Manchester Area	Commercial and industrial uses	Limited	Limited	Limited sight distance at Manchester/Florence because of intersection geometry	Moderate truck traffic
LAX	Schools and hotels; proposed station would provide access to planned LAX automated people mover system	Limited; Century/Florence is moderate	OK	OK	Moderate truck traffic

Source: Parsons Brinckerhoff, 2008.

railroad gates to allow for pedestrian and motorist crossings of the busway. Photo enforcement systems will also be designed as part of the project along with other safety elements that were designed on the Metro Orange Line. Where the BRT Alternative would operate in a dedicated right-of-way along the Harbor Subdivision Busway, pedestrian safety can be separated into three categories: (1) pedestrian safety near the busway; (2) pedestrian safety at the designated grade crossings; and (3) pedestrian safety at station locations.

Busway Crossings

In general, pedestrians cannot legally cross the Harbor Subdivision railroad right-of-way at any location other than a designated pedestrian crossing. Trespassing is a concern for busways because pedestrian warning devices are not provided between designated crossings. At locations where pedestrian crossings are not provided across the busway, pedestrian travel patterns must be identified to determine if pedestrians are likely to attempt to cross the busway at locations other than designated pedestrian crossings. The busway would include fencing and signage to deter trespassing, irrespective of vehicle speed. These additional features along the corridor would reduce the likelihood of pedestrians crossing the busway at locations other than designated pedestrian crossings.

Designated Grade Crossings

Pedestrian safety at designated grade crossings is a key factor to be considered in the design of Harbor Subdivision Busway alignment. The existing 19 at-grade railroad crossings will be shared with the Busway pedestrian crossings. All of these pedestrian crossings would be located at motorist crossings of the tracks and would be controlled by an adequate number of traffic signals, pedestrian signals and active “Bus” signs. Every pedestrian crossing would be equipped with such pedestrian treatments. Additional treatments and warning devices, such as in-pavement flashing lights at the grade crossings may be warranted based on the BRT alignment type, grade crossing geometry, BRT operating speed and pedestrian volumes. The BRT alignment does not contain bicycle lanes.

Each grade crossing would be evaluated for pedestrian safety during preliminary engineering based on a site visit and review of the preliminary engineering design. The evaluation would be conducted using industry guidelines and previous best practices utilized on the Metro Orange Line and would be part of an overall safety evaluation which includes pedestrian and motorist safety. The evaluation would result in a list of recommended design modifications as well as mitigation measures to improve the level of safety at the crossings, which would be subject to approval by the CPUC. The various pedestrian safety features that would be utilized for this alignment are described in Section 2.0 Alternatives Considered for this Draft EIS/EIR. The alignment was reviewed in segments of pedestrian activity areas to determine the impact on pedestrian safety. Areas of pedestrian activity near at-grade crossings are listed below:

Wilshire

- This pedestrian activity area begins the northern terminus at Wilshire Boulevard and extends to the I-10 Freeway along Crenshaw Boulevard. Pedestrian activity along this segment is generated by residences, schools, and community businesses. Pedestrians activity in this segment is considered limited.



- There are three elementary schools (Wilshire Park, Wilton Place, and Arlington Heights) and one middle school (Cochran) that have recommended pedestrian routes for street crossings at Crenshaw Boulevard.
- Since the BRT vehicles would operate in mixed-traffic along this segment, similar to how buses currently operate in this area, no impacts to pedestrian safety would be anticipated.

I-10 Freeway to Exposition Boulevard

- This pedestrian activity area extends from the I-10 Freeway to the Expo Line crossing. Pedestrian activity along this segment is generated by the presence of the West Angeles Church of God in Christ cathedral and related buildings, community services and parking structure. Pedestrians contribute a high level activity on Sundays and moderate levels during the rest of the week along this segment. Signal crossings would not change with mixed-flow BRT.
- Since the BRT vehicles would operate in mixed-traffic along this segment, similar to how buses currently operate in this area, no impacts to pedestrian safety would be anticipated.

Expo Line Crossing / West Angeles Church of God in Christ

- This pedestrian activity area begins the northern terminus at the Expo Line crossing and extends to West 39th Street along Crenshaw Boulevard. Pedestrian activity along this segment is generated by the presence of the connection to the Expo Line and the West Angeles Church of God in Christ cathedral and related buildings and parking structure to the north. Pedestrians contribute a high level activity on Sundays and moderate levels during the rest of the week along this segment.
- Adequate pedestrian refuge areas at the intersection corners as well as wide crosswalks should be provided to facilitate pedestrian mobility. The BRT Alternative would not alter the width of the sidewalks along this segment.

Baldwin Hills Crenshaw Plaza / Leimert Park

- This pedestrian activity segment is located from 39th Street to north of West 50th Street along Crenshaw Boulevard. Pedestrian activity is generated along this segment by the Baldwin Hills Crenshaw Plaza and Leimert Park. The Baldwin Hills Crenshaw Plaza experiences high levels of continuous pedestrian activity; whereas, Leimert Park experiences high levels of activity on the weekends. There is also an elementary school, and Today's Fresh Charter School, located on the east side of Crenshaw Boulevard, south of West Vernon Avenue.
- Adequate pedestrian refuge areas at the intersection corners, as well as wide crosswalks, should be provided to facilitate pedestrian mobility. The BRT Alternative would not alter the width of the sidewalks along this segment

Slauson Avenue

- This pedestrian activity segment is located from West 50th Street to 60th Street along Crenshaw Boulevard. Pedestrian activity is generated along this segment by community shopping areas, multiple churches, local post office, and schools, including the Crenshaw High School. Pedestrian activity along this segment is

consistent throughout the day. Although the City of Los Angeles recommended pedestrian route for Crenshaw High School does not include crossing Crenshaw Boulevard, the crossing at West 50th Street experiences heavy activity from area youth coming to and from the high school.

- Traffic signals and other signs/signals and pavement markings/delineations would be used to further assist in warning pedestrian and motorist traffic.

Hyde Park

- This pedestrian activity segment is located from the West 60th Street along Crenshaw Boulevard to the Florence Avenue intersection. Pedestrian activity is generated along this segment by multiple motels and some residences. Pedestrian activity along this segment is considered moderate.
- Hyde Park Elementary School recommended pedestrian routes for street crossings include three crossings at Crenshaw Boulevard at intersections with 63rd Street, Hyde Park Boulevard, and 67th Street. Harbor Subdivision (to La Brea)
- This pedestrian activity segment is located along the Harbor Subdivision right-of-way from the Crenshaw Boulevard to La Brea Avenue. Pedestrian activity is generated along this segment by Centinela Park, residences, St. John Chrysostom Church, and medical facilities/convalescent homes. There is a moderate amount of pedestrian activity along this segment.
- The pedestrian crossings along this segment would be located at motorist crossings and would be controlled by traffic signals. Every pedestrian crossing would be equipped with pedestrian grade crossing treatments.

Faithful Central Bible Church / Inglewood

- This pedestrian activity segment is located along the Harbor Subdivision right-of-way from La Brea Avenue to the I-405 Freeway. The Faithful Central Bible Church generates that majority of pedestrian activity along this segment as the church complex includes many buildings and parking centers throughout the blocks within this segment. Pedestrian activity is high on Sundays and moderate during the remainder of the week. The alignment divides the church and main administration buildings from the parking lot; therefore, there is a significant pedestrian safety concern at Eucalyptus. In addition, the sidewalk is quite narrow at this location and is not designed for significant concentrations of pedestrians.
- The pedestrian crossings along this segment would be located at motorist crossings of the tracks. The existing traffic signal is located at the Eucalyptus Avenue and Florence Avenue intersection; however, the tracks crossing is not signalized and only controlled by gates. The BRT alignment is elevated along this segment.

Manchester Area

- This pedestrian activity segment is located along the Harbor Subdivision right-of-way from the I-405 Freeway to West Hillcrest Boulevard. This segment is dominated by commercial and industrial uses; as a result, pedestrian activity is very limited.



- The pedestrian crossings along this segment would be located at motorist crossings and would be controlled by traffic signals. Every pedestrian crossing would be equipped with pedestrian grade crossing treatments.

LAX

- This pedestrian activity segment is located along the Harbor Subdivision from West Hillcrest Boulevard to the southern terminus at the Metro Green Line Aviation Station. Pedestrian activity is generated along this segment by nearby schools, including Amino Charter School and Redstone College, and hotels and is considered limited, with the exception of the intersection of Century Boulevard, which is considered moderate.
- The pedestrian crossings along this segment would be located at motorist crossings and would be controlled by traffic signals. Every pedestrian crossing would be equipped with pedestrian grade crossing treatments.

Station Locations

In addition to the pedestrian safety measures described above for pedestrian crossings of the busway, pedestrian safety would also be taken into account at pedestrian station locations due to the pedestrian traffic generated by stations. Adequate pedestrian queuing and refuge areas would be provided as well as wide crosswalks to facilitate pedestrian mobility. Parking and bus circulation within or around the station would also be considered to determine if any pedestrian conflicts arise.

Base LRT Alternative

The introduction of the Base LRT Alternative along the Crenshaw Transit Corridor would have various safety impacts. A review of data from prior research, safety oversight authorities and direct surveys of LRT system staff in the western United States conducted in recent years reveals that collisions between pedestrians and light rail vehicles (LRV) are divided into two general location types. The first location type is along the LRT right-of-way. This location type includes crossings at intersections where pedestrians cross over the light rail tracks, and intrude on the right-of-way (trespassing). Based on statistics from Metro's accident history, a high percentage of accidents occur at crossings. At station platforms, due to the inherent purpose of a station, large numbers of people converge near LRVs, and cross the trackway. The second train syndrome is at station platforms, where pedestrians see a train berthed at the station and run to catch it, violating all warning signals. In some cases, they get hit by another train coming in the opposite direction. These types of accidents are often referred to as "second train" accidents.

Although the low number and unique circumstances of historic pedestrian collisions do not allow a valid quantitative projection for the LRT alignment, some trends are present in the background data of collision causes. For example, collisions with pedestrians are more likely to occur near station areas where large numbers of persons cross the tracks. Inattention to pedestrian warning devices, whether due to distractions present in the environment or other causes, is a factor in many collisions. Achieving a low number of pedestrian involved collisions with LRVs is a result of several conditions, including safety orientated design, light rail operator training, and public education that warns pedestrians of potential hazards involved with LRT.



When the Base LRT Alternative is at grade, it would operate in a semi-exclusive right-of-way separated from automobile traffic by a raised curb and would not result in any pedestrian safety impacts. As discussed in Section 3.0 Transportation Impacts, the signal phasing at intersections would be changed to accommodate the LRT operations. When LRT vehicles are present, movements that would conflict with LRT vehicles are prohibited. Pedestrians are permitted to cross the street during phases in which the LRT vehicles are not present. Along the Harbor Subdivision Busway, there would be eight at grade crossings of the LRT trackway at existing railroad crossings. Pedestrian safety along the Harbor Subdivision right-of-way is evaluated in the same way as the BRT Alternative and is separated into three categories: (1) pedestrian safety near the trackway (2) pedestrian safety at the designated grade crossings; and (3) pedestrian safety at station locations.

LRT Crossings

At locations where pedestrian crossings are provided across the Harbor Subdivision alignment, there may be potential for motorist and pedestrian confusion when freight train and LRT vehicles come in sequence. At locations where pedestrian crossings are not provided across the Harbor Subdivision alignment, pedestrians are likely to attempt to cross the LRT trackway. Trespassing is a concern because pedestrian warning devices are not provided between designated crossings. In adherence to CPUC guidelines, the Harbor Subdivision will include fencing where the vehicles travel at speeds in excess of 35 mph. In addition, as design plans are completed to a higher degree of detail, it is anticipated that fencing would be provided at select locations along the Harbor Subdivision. This additional fencing along the corridor would reduce the likelihood of pedestrians crossing the trackway at locations other than designated pedestrian crossings.

Designated Grade Crossings

Pedestrian safety at designated grade crossings is a key factor to be considered in the design of Harbor Subdivision LRT trackwork. Eight of the existing 19 railroad at-grade crossings would be used for the LRT pedestrian crossings. Eleven pedestrian crossings would be removed, requiring pedestrians to walk longer distances to cross streets, but a greater degree of pedestrian safety would result at the designated crosswalks due to the installation of signals and pedestrian treatments. All of these pedestrian crossings would be located at motorist crossings of the tracks. The treatments vary from pedestrian signal heads at locations where the LRT would be controlled by traffic signals to pedestrian automatic gates where required. The type of treatments and warning devices provided at the grade crossings would vary based on the LRT alignment type, grade crossing geometry, LRV operating speed and pedestrian volumes. There are 29 schools within 0.25 mile of the project alignment, 17 of these are within 1 mile of the Harbor Subdivision alignment. At designated pedestrian crossings along the Harbor Subdivision where the LRT alignment is located within a school zone, pedestrian automatic gates could be utilized to increase student safety. The exact safety measures will be determined through consultation and approval by the CPUC. Figure 4-54 provides an example of an at-grade LRT crossing with safety features incorporated.

Each grade crossing would be evaluated for pedestrian safety based on a site visit and review of the preliminary engineering design. The evaluation would be conducted using the Metro Grade Crossing Policy for Light Rail Transit and would be part of an overall



Figure 4-54. At-Grade LRT Crossing with Safety Features



safety evaluation which includes pedestrian and motorist safety. The evaluation would result in a list of recommended design modifications as well as mitigation measures to improve the level of safety at the crossings. The various pedestrian safety features that would be utilized for this alignment are described in Section 2.0 Alternatives Considered for this Draft EIS/EIR. The specific warning devices would be determined by preparing a Hazard Analysis and conducting joint field diagnostic reviews with all affected parties as part of the Grade Crossing Analysis process mandated by the CPUC.

For the purposes of this report, the alignment was reviewed in segments of pedestrian activity areas to determine the impact on pedestrian safety. Areas of pedestrian activity near at grade crossings are listed below:

Expo Line Crossing/West Angeles Church of God in Christ

- This pedestrian activity area begins the northern terminus at the Expo Line crossing and extends to West 39th Street along Crenshaw Boulevard. Pedestrian activity along this segment is generated by the presence of the connection to the Expo Line and the West Angeles Church of God in Christ cathedral and related buildings and parking structure to the north. Pedestrians contribute a high level activity on Sundays and moderate levels during the rest of the week along this segment.
- At-grade crossings along this segment would occur along Crenshaw Boulevard at Rodeo Place and Coliseum Street. An at-grade station would be located at Exposition Boulevard and Crenshaw Boulevard connecting the two LRT services.
- Adequate pedestrian refuge areas at the intersection corners as well as wide crosswalks should be provided to facilitate pedestrian mobility.

Baldwin Hills Crenshaw Plaza / Leimert Park

- This pedestrian activity segment is located from 39th Street to north of West 50th Street along Crenshaw Boulevard. Pedestrian activity is generated along this segment by the Baldwin Hills Crenshaw Plaza and Leimert Park. The Baldwin Hills Crenshaw Plaza experiences high levels of continuous pedestrian activity; whereas, Leimert Park experiences high levels of activity on the weekends. There is also an elementary school, and Today's Fresh Charter School, located on the east side of Crenshaw Boulevard south of West Vernon Avenue.
- There would be one at grade crossing along this segment at West 48th Street.
- Adequate pedestrian queuing areas at the intersection corners as well as wide crosswalks should be provided to facilitate pedestrian mobility. Traffic and pedestrian signals and signage would be used to provide additional warning to control pedestrian and motorist traffic.

Slauson Avenue

- This pedestrian activity segment is located from West 50th Street to 60th Street along Crenshaw Boulevard. Pedestrian activity is generated along this segment by community shopping areas, multiple churches, local post office, and schools, including the Crenshaw High School. Pedestrian activity along this segment is consistent throughout the day. Although the City of Los Angeles recommended pedestrian route for Crenshaw High School does not include crossing Crenshaw Boulevard, the crossing at West 50th Street experiences heavy activity from area youth coming to and from the high school. Field observations were conducted on June 2, 2009 at 50th street and Crenshaw Boulevard during peak pedestrian activity which occurred over a twenty-five minute period after the close of school. Approximately 50 percent of the 90 students observed walking west along 50th Street crossed Crenshaw Boulevard and continued heading west. Many of these students (approximately 30 to 40 percent) were observed to cross Crenshaw Boulevard against the flow of oncoming



traffic. The majority of the remaining pedestrians boarded three local bus lines (Route 40, Route 210, and the DASH Crenshaw).

- There are five at grade crossings along this segment, located along Crenshaw Boulevard at the intersections of West 50th Street, West 52nd Street, West 57th Street, West Slauson Avenue, and West 59th Street. An at-grade station would be located at Crenshaw Boulevard and Slauson Avenue.
- Adequate pedestrian queuing areas would be provided at these locations. To enhance safety, appropriate signing should be installed at the grade crossings directing pedestrians to the designated intersection crossings. Pedestrian gates could be provided as determined to be necessary by the CPUC.

Hyde Park

- This pedestrian activity segment is located from the West 60th Street along Crenshaw Boulevard to the Crenshaw Boulevard and Florence Avenue intersection. Pedestrian activity is generated along this segment by multiple motels and some residences. Pedestrian activity along this segment is considered moderate.
- Hyde Park Elementary School's recommended pedestrian routes for street crossings include three crossings at Crenshaw Boulevard at intersections with 63rd Street, Hyde Park Boulevard, and 67th Street; however, the alignment is in aerial configuration at these crossings, so conflict with pedestrians is limited.
- There are no at-grade crossings along this segment, as the alignment is in an aerial configuration.

Harbor Subdivision (to La Brea Avenue)

- This pedestrian activity segment is located along the Harbor Subdivision right-of-way from Crenshaw Boulevard to La Brea Avenue. Pedestrian activity is generated along this segment by Centinela Park, residences, St. John Chrysostom Church, and medical facilities. There is a limited amount of pedestrian activity along this segment.
- There are five at-grade crossings along this segment of the Harbor Subdivision right-of-way, located at Victoria Avenue, Brynhurst Avenue, West Boulevard, East Redondo Boulevard (crossing to be closed), and Centinela Avenue.
- Pedestrian crossings along this segment would be located at motorist crossings. Every pedestrian crossing would be equipped with pedestrian grade crossing treatments, including automatic gates and warning devices, as appropriate.

Faithful Central Bible Church / Inglewood

- This pedestrian activity segment is located along the Harbor Subdivision right-of-way from La Brea Avenue to the I-405 Freeway. The Faithful Central Bible Church generates that majority of pedestrian activity along this segment as the church complex includes many buildings and parking centers throughout the blocks within this segment. Pedestrian activity is high on Sundays and moderate during the remainder of the week. The alignment divides the church and main buildings from the parking lot; therefore, there is a significant pedestrian safety concern.

- At-grade crossings along this segment of the Harbor Subdivision right-of-way are located at Inglewood Avenue, North Cedar Avenue, and North Oak Street.
- Pedestrian crossings along this segment would be located at motorist crossings. Every pedestrian crossing would be equipped with pedestrian grade crossing treatments, including automatic gates and warning devices, as appropriate. To discourage crossing the alignment at other locations near the Faithful Central Bible Church and to enhance safety, fencing along either side of the alignment, between the parking lot and church buildings, would be provided.

Manchester Area

- This pedestrian activity segment is located along the Harbor Subdivision right-of-way from the I-405 Freeway to West Hillcrest Boulevard. This segment is dominated by commercial and industrial uses, as result pedestrian activity is very limited.
- There are two at-grade crossings along this segment of the Harbor Subdivision right-of-way, located at Hindry Avenue and Manchester Avenue. There would be an at-grade station just west of Hindry Avenue, the Manchester Avenue station.
- Pedestrian crossings along this segment would be located at motorist crossings of the tracks. Every pedestrian crossing would be equipped with pedestrian grade crossing treatments, including automatic gates and warning devices, as appropriate.

LAX

- This pedestrian activity segment is located along the Harbor Subdivision right-of-way from West Hillcrest Boulevard to the southern terminus at the Metro Green Line Aviation Station. Pedestrian activity is generated along this segment by nearby schools, including Amino Charter School and Redstone College, and hotels and is considered limited, with the exception of the intersection at Century Boulevard, which is considered moderate.
- An at-grade crossing occurs at Arbor Vitae Street and an at-grade station would be located north of Century Boulevard near the 96th Street and Aviation Boulevard intersection. This station would provide for transfers to the planned LAX automated people mover system, so increased pedestrian activity would be expected to occur at this section of this pedestrian activity segment.
- Pedestrian crossings along this segment would be located at motorist crossings. Every pedestrian crossing would be equipped with pedestrian grade crossing treatments, including automatic gates and warning devices. Because of this station location, the final design would provide adequate queuing areas and crosswalk width for the anticipated pedestrian volumes.

Station Locations

In addition to the pedestrian safety measures described above for pedestrian crossings of the tracks, pedestrian safety would also be taken into account at pedestrian station locations due to the pedestrian traffic generated by stations. Adequate pedestrian queuing and refuge areas would be provided as well as wide crosswalks to facilitate pedestrian mobility. Parking and bus circulation within or around the station would also be considered to determine if any pedestrian conflicts arise. Stations would be designed to meet Metro's Fire/Life Safety Criteria.

**LRT Alternative Design Options**

The LRT Alternative may include the following six design options:

- LRT Alternative Design Option 1: An aerial station at Century Boulevard instead of an at-grade station at LAX.
- LRT Alternative Design Option 2: An aerial crossing instead of an at-grade crossing at Manchester Avenue.
- LRT Alternative Design Option 3: A cut and cover crossing instead of an at-grade crossing at Centinela Avenue.
- LRT Alternative Design Option 4: A cut and cover alignment instead of an aerial alignment between Victoria Avenue and 60th Street.
- LRT Alternative Design Option 5: A below-grade station at Vernon Avenue near Leimert Park.
- LRT Alternative Design Option 6: A below-grade alignment between 39th Street and Exposition with a below-grade station instead of an at-grade alignment north of 39th Street with connection to Exposition and an at-grade station.

Design Option 1 would not improve pedestrian safety for transit riders and would be similar to an at-grade station. Because the station is located along the Harbor Subdivision away from the Century Boulevard and Aviation Boulevard intersection, it would be unlikely to affect non transit pedestrians. Design Option 2 would enhance pedestrian safety because pedestrians would be able to cross underneath the aerial structure. Design Options 3, 4, 5 and 6 would travel below grade and eliminate any potential collisions from freight trains, automobiles or LRVs and pedestrians. These design options would be similar to the Base LRT Alternative in all other areas of the alignment, and no adverse effects are anticipated for pedestrian safety.

Motorist Safety**No Build Alternative**

The No Build Alternative would not result in any motorist safety impacts, since it would maintain present roadway conditions.

TSM Alternative

Under this alternative, the additional Metro Rapid bus services operating in the Crenshaw Transit Corridor would not result in any motorist safety impacts.

BRT Alternative

Where the BRT would be operating in mixed flow traffic between Wilshire Boulevard and Western Avenue to Wilshire Boulevard and Crenshaw Boulevard motorist safety impacts are not anticipated. Along Crenshaw Boulevard to the Harbor Subdivision Busway, the BRT would be operating within a semi-exclusive lane. Conflicts with right turn movements would occur along this alignment but would be similar to the conflicts with existing bus services operating along this alignment. Motorist crossings at signalized intersections would be the same as existing conditions.



Along the Harbor Subdivision Busway there are 19 at-grade crossings of the existing railroad right-of-way. Busway crossings would occur at these at-grade railroad crossings. There is potential for motorist confusion at the crossings along the Harbor Subdivision segment caused by multiple modes of transportation, including bus, freight rail, and other automobiles. The Redondo Boulevard and Florence Avenue intersection may be reconfigured according to plans at the City of Inglewood. If this plan is not implemented, this intersection should be examined for closure due to poor sight distances caused by intersection geometry. In addition, traffic going eastbound or westbound at the Centinela Avenue and Florence Avenue intersection must contend with limited sight distance caused by a hill just east of the railroad tracks. Although the Manchester Boulevard and Florence Avenue intersection has limited sight distance for westbound traffic and would present an unsafe situation for southbound trains, using traffic signals and motorist gates would alleviate this potential conflict. Traffic signals, lights, and signage would be added to all at-grade railroad gates to allow for motorist crossings of the busway. Due to the addition of the traffic signals, no impacts are anticipated from BRT operations at these locations.

Base LRT Alternative

Motorist safety along the LRT alignment has been evaluated using the methodology described in the Metro Grade Crossing Policy for Light Rail Transit. Motorist safety treatments are described in detail in Section 2.0 Alternatives Considered. From the Exposition/Crenshaw Station southward, the LRT would operate at-grade in a semi-exclusive right-of-way separated from automobile traffic by a raised curb until the alignment transitions to a below-grade section at Crenshaw Boulevard and 39th Street and would not travel above 35 mph. Pedestrians and motorists would cross the LRT tracks with standard signal phases. As discussed in Section 3.0 Transportation Impacts, the signal phasing at intersections would be changed to accommodate the LRT operations. When LRT vehicles are present, movements that would conflict with LRT vehicles are prohibited. Pedestrians are permitted to cross the street during phases in which the LRT vehicles are not present. Additional safety features, such as dedicated left-turn phases, photo enforcement cameras, and in-pavement lights will be considered, as appropriate, along this segment. Typically, gates are not required for street-running LRT operation.

The alignment would extend south along Crenshaw Boulevard at-grade at West 59th Street continuing at-grade to West 60th Street. From West 60th Street south toward the Harbor Subdivision, the alignment would be in an aerial configuration. The addition of an elevated structure along this segment of Crenshaw Boulevard may affect sight distance for motorists. The spacing of the columns relative to movement from left turn lanes shall be a consideration during final design in developed in close coordination with LADOT.

The alignment transitions back and forth from aerial to at-grade throughout the Harbor Subdivision alignment, with the exception of a segment in below-grade configuration between Century Boulevard and West 111th Street. As this segment of the alignment is contained in a dedicated right-of-way, the only interaction with motorists along the Harbor Subdivision would be at the existing 19 at-grade railroad crossings. At these railroad crossings, motorist gates would be required. There is potential for motorist



confusion at the crossings along the Harbor Subdivision segment caused by multiple modes of transportation, including bus, freight rail, LRVs, and other automobiles. The Redondo Boulevard and Florence Avenue intersection would be reconfigured to provide adequate motorist sight distance. In addition, traffic going eastbound or westbound at the Centinela Avenue and Florence intersection must contend with limited sight distance caused by a hill just east of the railroad tracks.

LRT Alternative Design Options

As discussed previously, the LRT Alternative may include six design options. Design Option 1 would not require additional crossings or alter motorist sight distance.

Design Option 2 would create a decrease in sight distance for vehicles traveling east on Manchester Avenue approaching Aviation Boulevard. However, because the aerial crossing occurs west of the Manchester Avenue and Aviation Boulevard/Florence Avenue intersection, motorist sight distance would be fully restored before vehicles begin entering the queuing lanes for the intersection. Vehicles traveling west on Manchester Avenue and on Aviation Boulevard/Florence Avenue are not anticipated to experience any decrease in sight distance.

Design Options 3 and 6 would eliminate any potential collisions from freight trains or light rail vehicles and motorists at this crossing. Design Options 4 and 5 would not result in any changes to the number of crossings. Design Option 4 may reduce potential obstructions to motorist sight distance.

These design options would be similar to the Base LRT Alternative in all other aspects of motorist safety and no adverse effects are anticipated.

4.14.2.3 Security**No Build Alternative**

The No Build Alternative would not result in any security impacts, since it would maintain present conditions.

TSM Alternative

Under this alternative, the additional Metro Rapid bus services operating in the Crenshaw Transit Corridor would not result in any security impacts. Any new Rapid Bus lines would have the same security coverage and station security as current Rapid Bus lines.

BRT Alternative

The design of BRT facilities (including vehicles, stations, parking lots, etc.) would provide a safe, secure, and comfortable transit system. BRT stations would be located approximately 1 mile apart. With the exception of La Brea station, the BRT stations would be at-grade and would be comprised of two separate platforms along the alignment, one for each direction of travel. Canopies would partially cover portions of the platforms, including the fare collection areas. Platforms would be well-lit and include amenities, such as seating, bike lockers, bike racks, trash receptacles, and artwork. They would also include signage, safety and security equipment, such as closed circuit televisions (CCTVs), public announcement (PA) systems, passenger assistance

telephones (PTEs), and variable message signs (VMSs), which would provide real-time information.

The Crenshaw BRT Alternative would pass through lower-density residential areas as well as industrial and commercial areas. During evening and nighttime hours, adjacent land uses may be less populated, creating an “isolated environment” at some of the stations. Discussions were held with local police departments to determine crime activity near proposed station locations. The following proposed stations were identified as having moderate to high crime activity in surrounding areas: Pico, Adams, and La Brea. Based on discussions with LAPD, the area surrounding the proposed station at Pico Boulevard contains a moderate intensity of crime activities, including theft, burglary, and robbery with violent force. The area surrounding the proposed station at Adams Boulevard was identified as having a moderate to high level of intensity of crime activities, including narcotics, automobile theft, and armed burglary. Although the crime activities around the proposed station at Martin Luther King Boulevard were identified as low intensity, the multi-family residential area to the west, which is within walking distance to the station, contains violent gang activity. According to the Inglewood Police Department, the area surrounding the proposed station at La Brea contains moderate activity of Part I crimes, including robbery, larceny, burglary, and automobile theft. These conditions along the alignment, combined with a higher existing crime rate than the Los Angeles region as a whole, as shown in Table 4-76, raise security concerns for both station areas and for proposed parking facilities. A large degree of due diligence would be required to ensure the safety and security of transit patrons. Implementation of the BRT Alternative would incorporate all crime preventative measures mentioned previously, in addition to Metro crime prevention policies, to deter criminal acts and protect passengers, employees, and the community from crime.

Base LRT Alternative

The design of rail facilities (including vehicles, stations, parking lots, etc.) would provide a safe, secure, and comfortable transit system. Transit patrons along the Crenshaw Transit Corridor Project would be provided with station and platform amenities such as covered waiting platforms and secure lighting. In addition, the Metro would include security related design features designed for the Project such as emergency telephones, PA systems, and closed circuit monitoring systems.

The elevated portion of the alignment along Crenshaw Boulevard south of West 60th Street to the Harbor Subdivision would have support columns spaced approximately 80 to 120 feet apart. These columns would create shadows and could create hiding places that may add to crime problems in this area. Discussions with the Los Angeles and Inglewood Police Departments indicated that the columns may be conducive to graffiti. The Base LRT Alternative would pass through lower-density residential areas as well as industrial and commercial areas. During evening and nighttime hours adjacent land uses may be less populated, creating an “isolated environment” at some of the stations. Discussions were held with local police departments to determine crime activity near proposed station locations. The La Brea proposed station was identified as having moderate to high crime activity in the surrounding area, including robbery, larceny, burglary, and automobile theft. Although the crime activities around the proposed station at Martin Luther King Boulevard were identified as low intensity, the residential



area to the west, which is within walking distance to the station, contains violent gang activity. These conditions, combined with a higher existing crime rate than the City of Los Angeles as a whole, as shown in Table 4-76, raise security concerns for both station areas and for proposed parking facilities. Mitigation would be necessary to address security concerns along the alignment. A large degree of due diligence would be required to ensure the safety and security of transit patrons. Implementation of the Base LRT Alternative would incorporate all crime preventative measures mentioned previously, in addition to Metro crime prevention policies, to deter criminal acts and protect passengers, employees, and the community from crime.

LRT Alternative Design Options

As discussed previously, the LRT Alternative may include six design options. Design Options 1 and 2 would have additional columns that would cast shadows and be vulnerable to graffiti as identified in the Base LRT Alternative analysis. The additional columns could result in an increased risk for crime activity, which would require additional resources for preventative efforts identified in the Base LRT and mitigation measures. Design Option 3 would include a trench, which may create potential hiding places for criminal activity or shelter for homeless activity. Persons could potentially enter the trench and not be visible from ground level. They could potentially engage in criminal misconduct, particularly if there is limited or no service in the late hours of the night. This would require additional resources for preventative efforts identified in the Base LRT and mitigation measures.

Design Options 4, 5, and 6 may create potential hiding places for criminal activity or shelter for homeless activity. Persons could potentially enter the below-grade sections or below-grade stations and not be visible from ground level. They could potentially engage in criminal misconduct, particularly if there is limited or no service in the late hours of the night and would require additional resources for patrol and preventative efforts identified in the Base LRT and mitigation measures.

4.14.3 Mitigation Measures

- SS1** All stations and parking facilities shall be equipped with monitoring equipment and/or be monitored by Metro security personnel on a regular basis.
- SS2** Metro shall implement a security plan for BRT and LRT operations. The plan shall include both in-car and station surveillance by Metro security or other local jurisdiction security personnel.
- SS3** All stations shall be lit to standards that minimize shadows and all pedestrian pathways leading to/from sidewalks and parking facilities shall be well illuminated.
- SS4** Metro shall coordinate and consult with the LAPD, the LA County Sheriff's Department, the Inglewood Police Department, and the LAX Police to develop safety and security plans for the alignment, parking facilities, and station areas.
- SS5** The station design shall not include design elements that obstruct visibility or observation nor provide discrete locations favorable to crime; pedestrian access to

at-grade, below-grade, and above-grade station entrances/exits shall be accessible at ground-level with clear sight lines.

- SS6** Metro shall monitor pedestrian crossing activity at all locations with adjacent schools and implement appropriate measures to ensure pedestrian crossing safety, as determined by the CPUC.
- SS7** Metro shall conduct a Hazard Analysis before the start of Final Design, using current safety analysis as a reference. The Hazard Analysis shall determine a design basis for warning devices as required by the California Public Utilities Commission.
- SS8** Traffic warning measures, such as signage, shall be provided along the length of the platforms of the BRT and LRT Stations. These markings will be provided to alert motorists to significant pedestrian activity in the area.
- SS9** To discourage crossing the alignment at other locations near the Faithful Central Bible Church and enhance safety, Metro shall provide fencing along either side of the alignment, between the parking lot and church buildings.

4.14.4 CEQA Determination

According to CEQA, project effects on safety and security would be considered significant if they:

- Cause or create the potential for substantial adverse safety conditions, including: station accidents, boarding and disembarking accidents, right-of-way accidents, collisions, and fires, and major structural failures; or substantially limit the delivery of community safety services, such as police, fire, or emergency services; and/or
- Cause or create the potential for substantial adverse security conditions, including: incidents, offenses, and crimes.

4.14.4.1 Safety

No Build Alternative

The No Build Alternative would not result in any safety impacts.

TSM Alternative

The TSM Alternative would not result in any safety impacts.

BRT Alternative

As described above in Section 4.14.3.2 Pedestrian Safety, the BRT operations part of the project would occur within existing mixed flow traffic. Pedestrian safety would be the same as the existing conditions. Operations along the Harbor Subdivision Busway would utilize the 19 existing at-grade railroad crossings. Traffic signals would be added to allow both pedestrian and motorist crossings at these locations. Vehicle speeds above 35 mph would require fencing to prevent pedestrian from crossing the busway between these crossing locations. Through safety-oriented Project design and mitigation measures SS1 through SS8, the BRT Alternative would not result in any significant safety impacts.

**Base LRT Alternative**

As described above in Section 4.14.3.2 Pedestrian Safety, around the trackway would be ensured through implementation of appropriate warning devices based on comprehensive hazard analysis and field diagnostic reviews with the affected parties as part of the legally required CPUC grade crossing application process. Either the speed of the train would not exceed 35 mph when it is running at-grade and crossing would occur with traffic signals, or the train speed would exceed 35 mph and barriers would impede access to the tracks. At designated crossings, pedestrian and motorist gates and visual and audible warning devices would be provided. Through safety-oriented Project design and Mitigation Measures **SS1** through **SS8**, the Base LRT Alternative would not result in any significant safety impacts.

LRT Alternative Design Options

As discussed previously, the LRT Alternative may include six design options. The safety conditions with Design Option 1 would be the same as the Base LRT Alternative and implementation of Mitigation Measures **SS1** through **SS8** would result in less-than-significant safety impacts.

Design Option 2 would include an aerial crossing instead of an at-grade crossing at Manchester Avenue. The decision to include this option would be based on the results of Metro's Grade Separation Analysis. This design option would enhance pedestrian safety because pedestrians would be able to cross underneath the aerial structure. The aerial crossing at Manchester Avenue would create a decrease in sight distance for vehicles traveling east on Manchester Avenue approaching Aviation Boulevard. However, because the aerial crossing occurs west of the Manchester Avenue and Aviation Boulevard/Florence Avenue intersection, motorist sight distance would be fully restored before vehicles begin entering the queuing lanes for the intersection. Vehicles traveling west on Manchester Avenue and on Aviation Boulevard/Florence Avenue are not anticipated to experience any decrease in sight distance. This design option would be similar to the Base LRT Alternative in all other areas of the alignment, and no significant impacts are anticipated for pedestrian and motorist safety.

Design Option 3 would travel beneath Centinela Avenue and eliminate any potential collisions from freight trains or light rail vehicles and pedestrians or motorists at this crossing. The decision to include this option would be based on the results of Metro's Grade Separation Analysis. This design option would result in improved pedestrian and motorist safety over the Base LRT Alternative and a less-than-significant impact is anticipated.

Design Options 4 and 5 would result in the same pedestrian and motorist safety impacts as the Base LRT Alternative, and a less-than-significant impact is anticipated.

Design Option 6 would eliminate any potential collisions from light rail vehicles and motorists at the crossings in between. This design option would result in improved motorist safety over the Base LRT Alternative and would result in less-than-significant safety impacts.

4.14.4.2 Security

No Build Alternative

The No Build Alternative would not result in any security impacts.

TSM Alternative

The TSM Alternative would not result in any security impacts.

BRT Alternative

To control security at Stations platforms would be well-lit and include amenities, such as seating, bike lockers, bike racks, trash receptacles, and artwork. They would also include signage, safety and security equipment such as CCTVs, PA systems, PTEs, and VMSs, which would provide real-time information. Through security-oriented Project design and Mitigation Measures **SS1** through **SS3**, the BRT Alternative would not result in any significant security impacts.

The BRT Alternative would pass through lower density residential areas as well as industrial and commercial areas which are less populated during evening and nighttime hours. These conditions, combined with the fact that traffic and pedestrian volumes are relatively low and the existing crime rate is somewhat higher than the City of Los Angeles as a whole, raise security concerns for both the station areas and the proposed park facilities. Without mitigation, security concerns along the alignment would be considered significant. A large degree of due diligence is required to ensure the safety and security of transit patrons. Through security-oriented Project design and Mitigation Measures **SS1** through **SS7**, BRT Alternative security impacts would be reduced to a less-than-significant level.

Base LRT Alternative

The design of existing bus and rail facilities (including vehicles, stations, parking facilities, etc.) would provide a safe, secure, and comfortable transit system. Transit patrons along the Base LRT Alternative would be provided with station and platform amenities, such as covered waiting platforms and secure lighting. In addition, Metro would include security related design features specifically for the Project such as emergency telephones, PA systems, and closed circuit monitoring systems.

The Base LRT Alternative would pass through lower-density residential areas as well as industrial and commercial areas which are less populated during evening and nighttime hours. Along the Harbor Subdivision right-of-way, these conditions, combined with the fact that traffic and pedestrian volumes are relatively low and the existing crime rate is somewhat higher than the City of Los Angeles as a whole, raise security concerns for both the four station areas and for the two proposed maintenance and operations facilities sites along the Harbor Subdivision. Without mitigation, security concerns along the alignment would be considered significant. A large degree of due diligence is required to ensure the safety and security of transit patrons. Through security-oriented Project design and Mitigation Measures **SS1** through **SS7**, Base LRT Alternative security impacts would be reduced to a less-than-significant level.

**LRT Alternative Design Options**

As discussed previously, the LRT Alternative may include six design options. Design Options 1 and 2 would have additional columns which would cast shadows and could be vulnerable to graffiti as identified in the Base LRT Alternative analysis. The additional columns could result in an increased risk for crime activity that would require additional resources for preventative efforts identified in the Base LRT and mitigation measures.

Design Option 3 would include a trench which may create potential hiding places for criminal activity or shelter for homeless activity. Persons could potentially enter the trench and not be visible from ground level. They could potentially engage in criminal misconduct, particularly if there is limited or no service in the late hours of the night. This would require additional resources for preventative efforts identified in the Base LRT and mitigation measures.

Design Options 4, 5, and 6 may create potential hiding places for criminal activity or shelter for homeless activity. Persons could potentially enter the below-grade sections or below-grade stations and not be visible from ground level. They could potentially engage in criminal misconduct, particularly if there is limited or no service in the late hours of the night and would require additional resources for patrol and preventative efforts identified in the Base LRT and mitigation measures.

Implementation of Mitigation Measures **SS1** through **SS8** would result in less-than-significant security impacts for all design options.

4.14.4.3 Impacts Remaining After Mitigation

Implementation of Mitigation Measures **SS1** through **SS8** would reduce safety and security impacts to less-than-significant levels.



4.15 Construction Impacts

4.15.1 Regulatory Framework

4.15.1.1 Federal

Under the USEPA, there are several areas of regulation that govern the assessment and consideration of construction. These areas of regulation include air quality, water quality, hazardous materials, biological resources and cultural preservation. To address the assessment of these areas, as well as others not pertaining specifically to construction, the USEPA created the NEPA (42 USC Section 4231), which puts regulatory responsibility on the federal government to “use all practicable means” to “assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.” The following federal regulations apply to the evaluation of construction effects for the proposed project.

Air Quality

The Federal Clean Air Act (CAA) regulates air quality in the United States. The USEPA is responsible for enforcing the federal CAA and establishing the NAAQS. NAAQS have been established for seven major air pollutants: CO, NO₂, O₃, PM_{2.5} microns or smaller in diameter, PM₁₀ microns or smaller in diameter, SO₂, and Pb. The CAA requires the USEPA to designate areas as attainment, nonattainment, or maintenance (previously nonattainment and currently attainment) for each criteria pollutant based on whether the NAAQS have been achieved. The USEPA has classified the SCAB as maintenance for CO and nonattainment for O₃, PM_{2.5}, and PM₁₀.

Water Quality

The NPDES regulates the issuance of storm water permits necessary for projects that will discharge pollutants from any point source into waters of the United States. The Clean Water Act (CWA) provides the statutory basis for the NPDES permit program. Section 402 of the CWA requires the USEPA to develop and implement the NPDES program. The CWA gives USEPA the authority to set effluent limits on an industry-wide and water-quality basis. The CWA allows the NPDES to be administered and enforced at the State level, but the USEPA retains oversight responsibilities. A plan must be submitted to obtain a NPDES permit, which lists potential sources of pollutants during construction, and identifies erosion prevention, sediment control, and storm water management measures to be implemented during construction of the proposed project.

Hazardous Materials

The RCRA under Title 40, Protection of the Environment of the CFR, regulates hazardous wastes that may be encountered during construction activities. This statute provides for proper handling and disposal of any encountered hazardous materials. The Toxics Substances Control Act regulates handling of polychlorinated biphenol wastes encountered during construction or demolition. In addition, the Comprehensive Environmental Response, Compensation, and Liability Act regulates the handling and removal of underground storage tanks that may be encountered during construction.

**Biological**

The Endangered Species Act (ESA) regulates the removal or disturbance of biological resources (sensitive species, riparian habitats, migratory fish or wildlife, or wetlands). Lists of endangered or sensitive species are maintained by the USFWS and National Marine Fisheries Service.

Cultural

The NHPA is a multi-faceted statute which includes, but is not limited to, programs for identifying significant historic resources. Section 106 of this statute requires federal agencies to account for the effects of their undertakings on historic properties and allow comment with regard to such undertakings.

In addition to the USEPA, the following federal agencies have regulatory policies that would apply to construction activities for the proposed project.

The FHWA and the FTA established Environmental Impact and Related Procedures (23 CFR 771) for the evaluation of urban mass transit projects and the compliance of these projects with 23 USC 109(h) and 303, as well as other USCs.

The USDOT Act, Section 4(f), which has been part of the federal transportation law since 1966, applies to agencies within the USDOT and is generally referred to as 49 USC 303. Section 4(f) focuses on the preservation of public parks and recreation lands, wildlife and waterfowl refuges, and historic sites, and includes the preservation of their aesthetic integrity.

4.15.1.2 State**Water Quality**

The State RWQCB is responsible for administering water quality at the State level.

Air Quality

In addition to being subject to the requirements of CAA, air quality in California is also governed by more stringent regulations under the CCAA. The CCAA, which is governed by the CARB, requires all air districts in the State to endeavor to achieve and maintain the CAAQS. The CAAQS are generally more stringent than the corresponding federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles.

4.15.1.3 Local**Air Quality**

The SCAQMD is the agency principally responsible for comprehensive air pollution control in the region. The SCAQMD has jurisdiction over an area of approximately 10,743 square miles, consisting of Orange County; the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties; and the Riverside County portion of the Salton Sea Air Basin and Mojave Desert Air Basin. The SCAQMD has developed regional and localized significance thresholds for air pollutants in order to determine potential project-specific impacts to regional air quality and local sensitive receptors.

Noise

The LAMC Section 112.05 provides noise ordinances that specify construction hours and construction equipment noise thresholds. The noise thresholds and applicable hours of construction are as follows:

- Construction activities lasting more than one day would exceed existing exterior noise levels by ten dBA or more at a sensitive use;
- Construction activities lasting more than ten days in a three-month period would exceed existing ambient exterior noise levels by five dBA or more at a noise sensitive use;
- Construction activities would exceed the ambient noise level by five dBA at a sensitive use between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at anytime on Sunday.

4.15.2 Affected Environment

This section examines the affected environment as it relates to construction activities for the proposed alternatives. The conditions described in this section would only occur during construction and would be temporary and short-term, as opposed to ongoing during the operational phase of the proposed alternatives.

4.15.2.1 General Construction Scenario

The construction of the proposed alternatives would employ conventional construction techniques and equipment typically used in the Southern California region. The proposed BRT Alternative would include such construction activities as street reconstruction, restriping of traffic lanes, street widening, bus lanes in the Harbor Subdivision right-of-way, elevated structures, at-grade stations, landscaping and possible traffic signal modifications. . Major construction elements for the proposed LRT Alternative would include at-grade guideway and trackwork, below-grade stations and tunnels, at-grade station platforms, elevated guideways and stations, utility relocations, possible traffic signal modifications and specialty system work such as traction power, communications, and signaling.

The equipment that would be used during construction may include rail-mounted equipment, earth moving equipment, cranes, concrete mixers, flatbed trucks, sand and gravel delivery trucks, dump trucks, and tunnel boring machines. These construction vehicles may temporarily impede traffic mobility in areas of construction. Traffic detours and truck routes would be required during construction. To minimize any disruptions to traffic, mitigation of potential traffic adverse effects and traffic management and traffic control measures would be implemented with the coordination and involvement of the various jurisdictions within the study area.

There would be no major construction activities under the No Build and TSM Alternatives, and no adverse construction effects are anticipated. Therefore, the focus of construction impacts will be limited to the BRT, LRT Alternatives, which include the construction of maintenance and operations facility sites.



Construction for the BRT Alternative would occur during an approximate two- to three-year period. Surface streets would be impacted due to lane reductions for a total of approximately 12 to 18 months. The 11.26-mile BRT alignment is divided into 10 segments containing four sections, busway aerial, mixed traffic, busway at-grade, and exclusive right-of-way.

Construction for the Base LRT Alternative would occur during an approximate four- to five-year period. Surface streets would be impacted through intermittent closures and lane reductions for a total of approximately 28 to 45 months. The 8.5-mile LRT alignment is divided into 14 segments which include seven bridges and two below-grade segments. It is anticipated that construction of each bridge would lag the previous bridge by approximately four months and that three to four bridges may be in construction simultaneously. The two below-grade segments would also occur at the same time and construction of systems and tracks would begin approximately 18 to 24 months after the start of construction. Simultaneous construction activity would accommodate activities requiring lengthy construction times such as tunnels, below ground stations, and aerial segments, as well as reduce the overall construction duration.

Construction would follow all applicable local, state and federal laws for building and safety. The Metro Fire Life Safety Committee, composed of members from the City and County of Los Angeles Fire Departments and Metro specialists, would approve all construction methods. Because segments of the proposed alternatives are also located within the City of Inglewood, the City of Inglewood would be required to approve all construction methods. Working hours would be varied to meet special circumstances. Standard construction methods would be used for traffic, noise, vibration and dust control, consistent with all applicable laws, and as described in the following paragraphs.

4.15.2.2 Surface, Below-Grade, and Aerial Construction

The subsections below describe in added detail the characteristics of three categories of construction: surface, below-grade, and aerial construction. Construction of the proposed alternatives would involve various combinations of these three types of construction. A summary of these types of construction is presented in Table 4-79.

4.15.2.3 Surface Construction

Utility Relocation and Street Closures

Prior to beginning construction it would be necessary to relocate, modify or protect in place all utilities and below-grade structures which would conflict with excavations for street level trackwork, cut-and-cover station and shallow tunnel sections, deeper tunnel sections with a tunnel boring machine (TBM), bridges, and station structures. Shallow utilities, such as maintenance manholes or pull boxes, which would interfere with guideway excavation work, would require relocation. The utilities would be modified and moved away from the proposed facilities. Temporary interruptions in services (several hours) may be experienced during relocation or rerouting of utilities. Depending on the extent of utility relocation work, estimated construction durations are four to six months for a 1-mile segment of work.

Table 4-79. Summary of Construction Activities

Activity	Mode (BRT/LRT)	Duration (months)	Description	Equipment Required
At-Grade				
Utility Relocation	BRT/LRT	12-18	Move utilities away from construction	Jackhammers, trenchers
Street Widening	BRT/LRT	5-12	Requires new curbs, sidewalks, and lane configuration in areas where existing right-of-way is inadequate	Pavers, pavement breakers, cement trucks
Surface Trackwork	LRT	28	Demolition, construction of slab, and laying rail	Trucks, storage for rail, and truck mounted welders
Trench, Retaining Wall, Fill Construction	LRT	2-15	Minimize rail grade	Bulldozers, tractor trailer rigs, loaders, earthmovers
Station Construction	LRT	12	Developed simultaneously with segments using standard building materials	Forklifts, generator sets, loaders, welders
Operating Systems Installation	LRT	8	Catenary overhead wire system and substations for power,	Highrail vehicles
Parking Facilities	BRT/LRT	1-3	Parking lot and landscaping	Pavement breakers, diamond saws, compressors, paving machines, loaders, haul trucks
Below-Grade				
Pre-Construction	LRT	12	Final design and geotechnical investigation	Trenchers, drill rigs
Tunnel Construction	LRT	14-30	Use of Cut-and-Cover or TBM or cut-and-cover	Bulldozers, loaders, TBM, haul trucks
Stations and Portals	LRT	15	Cut-and-cover, open cut, doorframe slab	Bulldozers, loaders
Underground Utilities	LRT	12	Relocate or temporarily reroute utilities	Trenchers, compactors, excavator, loaders
Station Excavation	LRT	12	Build foundations to support existing adjacent structures	Excavators, loaders, drill rigs,
Station Construction	LRT	24	Base slab, exterior walls and columns	Forklifts, generator sets, loaders, welders
Street/Site Restoration	LRT	2-4	Backfilling, and reinstallment of street and sidewalks	Pavers, rollers, cement trucks
Vent Shafts and Emergency Exits	LRT	1-2	Exits and vents at both ends of stations	Drill rigs, excavator, loaders
Aerial				
Station Construction	LRT	18		Forklifts, generator sets, loaders, welders
Elevated Guideway	BRT/LRT	6-20	Construction of foundation columns, and elevated sections	Cranes, compressors, concrete and haul trucks, loaders, rigs

Source: Parsons Brinckerhoff, 2008

**Street Widening**

Certain segments of the proposed alignments would require street work to widen the existing roadway widths in order to maintain the required number of through and turning traffic lanes. Work would initially be done at the curb line to construct new curb and gutter, sidewalks, and outside traffic lanes. The estimated construction duration is five months to a year depending on the extent of widening and utility relocation for a 1-mile segment. During this stage of work, property owners and businesses located immediately adjacent to the work areas may be affected.

Surface Trackwork

LRT tracks would be located in the street right-of-way and within the Harbor Subdivision right-of-way. Mountable curbs would be constructed to discourage vehicular traffic from driving on the tracks. After any required utility relocation, rough grading would be completed within the streets, followed by trackbed excavation, subdrainage installation, subgrade and base preparation and placement of ties for support of the rails. Duct banks would be installed at this time below the bottom of trackwork to carry communication and signaling conduits.

Trackwork construction involves work to demolish the roadway section being displaced by the LRT trackway, preparation of the track bed, construction of the supporting track structures, and laying of rail. Foundations for overhead wire poles may be installed with the track installation. At this stage of construction, center traffic lanes would be closed, which would effectively eliminate all mid-block turns and street parking. One-mile construction segments are likely to be recommended to minimize cost and schedule. Segments may be under construction both north and south of below-grade segments. Rail would be welded into strings at several locations along the proposed alignments, using diesel powered, trailer mounted machines. The machinery would clean, straighten, prepare, weld, and grind short sections of rail into approximately 0.25 mile strings or shorter dependent on site conditions such as length of street blocks. Rails would be brought to the site in 78 foot lengths by truck for welding. Local rail storage areas would be necessary for short-term storage and to facilitate placement of rail. Work durations are estimated to be four months to complete trackwork for each 1-mile segment. Periodic lane closures predominately on one side of the work zone or the other would be required for delivery of materials, as well as during concrete pours. The construction of station platform slabs would likely be included in line segment contracts and would be coordinated with trackwork installation within each 1-mile segment.

During trackwork construction, minor cross streets and alleyways may be temporarily closed, however access to adjacent properties would be maintained. Major cross streets would require partial closure (half of the lanes on a street at a time), while relocating utilities, if required, for surface stations and constructing the LRT trackbed. Depending on allowable working hours, full street blocks may require closure during excavation, preparation of subgrade, and track foundation placement. Closures would be in a staggered sequence to facilitate traffic control. Where streets are not fully closed, two-way traffic would be allowed on half of the street. After the trackbed is constructed across a local street and the roadway is restored to its permanent condition, vehicles would resume original traffic patterns. Equipment used for construction of the surface tracks (and surface stations) would be similar to equipment required for construction of the

utilities with the addition of track laying equipment, paving machines, concrete mixers, and concrete finishers.

Trench, Retaining Wall, and Fill Construction

Trenching and filling to lower or raise the existing grades may be required to meet the necessary rail gradients. Relatively small retaining walls (estimated to be less than 5 feet in height) would be necessary to retain these sections. The excess material would be excavated using bulldozers, earthmovers, front-end loaders, and tractor-trailer rigs. Excess material would be transported to Metro-approved disposal sites.

At-Grade Stations

All stations would be constructed simultaneously with the various segments of the proposed alternatives. However, the construction contractor may elect to construct them sequentially. The duration of construction for each station would be approximately 14 months. These stations would be constructed from standard building materials such as concrete, steel, aluminum, and heavy plastic, which are durable and resistant to vandalism.

Operating Systems Installation

Operating systems for the Base LRT Alternative include traction power, an overhead catenary system, communications, and train control. Catenary systems consist of poles connected to drilled shaft foundations with overhead wires to supply power to the trains. Traction power includes six substations to provide direct current power for the trains. These include grounding systems and prefabricated units which are placed on foundation slabs by crane and connected to the system. Where existing structures must be demolished to accommodate substations, demolition work would be completed prior to construction of the substations. Construction equipment would include highrail vehicles for installation of the overhead catenary wires in the guideway area. While wires are strung at cross streets, temporary nighttime or weekend street closures lasting a few hours are anticipated.

Systems installation contracts are generally bid as system-wide contracts and follow the completion of line segment construction. Finishing contracts for stations and landscaping would be planned to overlap with systems work and be completed prior to final testing and pre-revenue operations. The systems installation work is considered to be significantly less disruptive to communities compared to the line segment construction work and is estimated to be approximately five months in duration for a 1-mile segment.

Parking Facilities

Construction of parking lots would involve grade preparation of the parking area, paving, and striping. Concrete curbs, lighting, driveways, sidewalks, and landscaping would be reconstructed as necessary. Equipment used for construction of the parking facilities would include diamond saws, pavement breakers, jackhammers, compressors, concrete pumping equipment, paving machines, dump trucks, and front-end loaders.

**4.15.2.4 Below-Grade Construction
Preconstruction Activities**

Preconstruction activities would include building assessments (preconstruction evaluation of existing structures along the proposed alignments) and the preparation of worksite traffic control plans. During preliminary and final design of the proposed alternatives, subsurface (geotechnical) investigations would be undertaken to evaluate soil, groundwater, seismic, and environmental conditions along the proposed alignments. The geologic conditions would influence design and construction methods specified for stations and tunnels, as well as foundations.

Tunnel Construction***Cut-and-Cover***

The cut-and-cover construction technique involves the sequential excavation and support of a tunnel and surface. The cut and cover construction technique is common in areas where the alignment is located within a public right-of-way and excavation does not require the displacement or relocation of existing uses. These tunnels can be constructed conventionally, from the bottom-up, from the top-down, or by cast in place. The conventional cut and cover involves excavating a trench and backfilling and restoring the original roadway or ground with a support system to carry the load of the material used to cover over the tunnel, such as steel or shotcrete. The bottom-up method occurs where a drilling rig installs caisson walls down to the existing bedrock and the soil between the walls is excavated to a depth below the tunnel floor. The floor slab is then poured followed by the sidewalls from the bottom up and the roof and roadway are then constructed and restored, respectively. Methods used for construction and support include concrete, pre-cast concrete, pre-cast arches, or corrugated steel arches. The top-down method occurs when a trencher digs a trench and a temporary slurry wall is constructed, followed by the permanent wall structure. The roof of the tunnel is then constructed, followed by the restoration of the surface roadway. The tunnel is then excavated down to the tunnel floor and the tunnel slab is the last component constructed. The top-down method allows for an earlier reinstatement of roadways and services on the surface above. The cast-in-place method involves the trench being excavated with forms being built inside the trench. Concrete is then cast and upon curing the forms are removed and the trench is backfilled and roadway is restored. In order to evaluate the worst-case scenario, cut-and-cover construction methods are assumed for all below grade segments of the proposed project.

Tunnel Boring Machine

Tunnel driving operations consist of a series of activities. The tunnel boring machine (TBM) would be lowered into the excavation at the northern cut and cover portal shaft by a crane and would mine from the shaft through the Martin Luther King Station to the end of the below-grade alignment at Leimert Park. Staging areas would be required adjacent to the location for lowering or removal of the TBM. The TBM would be advanced a small distance (typically 4 to 6 feet) by means of hydraulic jacks, which react against the previously installed tunnel lining ring. Tunnel lining rings are typically pre-cast concrete segments bolted in place together. Elastomeric gaskets are placed at segment joints to prevent groundwater inflows during and after construction. The TBM is advanced and the process is repeated until the entire length of the tunnel has been excavated. The pre-cast concrete liners are fabricated off-site and delivered by truck to the

site. Segment loads are estimated to be 400 or 500 total truck loads. Several days' production of segments may be stored at the worksites to allow continuous tunneling.

Excavated material (muck) is taken to the rear of the TBM and deposited on a conveyor belt. The conveyor belt drops the excavated material into mine cars, which are then taken back to the shaft by a locomotive operating on temporary rail tracks laid or fastened to the bottom of the tunnel. At the shaft, the mine cars are lifted out by crane or hoist and the material is put into trucks for off-site disposal or temporarily stockpiled for later disposal. Alternatively, belt conveyor systems may be used to transport excavated material through the tunnel and/or from the shaft to the surface.

The pressure face tunnel boring machines to be used with the proposed project may require that soil is "conditioned" in the pressure chamber of the machine. Conditioners (which include surfactants, polymers, and bentonite) help to provide a more fluid material, which aids in adjusting the earth or fluid pressure on the tunnel face. In addition, the lubrication reduces the wear on the equipment. When the conditioned excavated soil reaches the ground surface, it is still wet, and transport to dump sites would require that dump trucks be lined to prevent water leaking onto the roadway.

If a slurry face tunneling machine is selected by the contractor for the proposed project, excavated material would be treated at the site in a slurry separation system. This tunneling system requires that enough bentonite (clay) slurry be added to the face to provide hydrostatic pressure to stabilize the tunnel face. Depending on the ground encountered, conditioners may also be added to the bentonite slurry. Excavated material mixes with the fluid and is pumped out through the tunnel. The soil is then separated from the slurry fluid at a separation plant constructed at the work site. After separation, the soil can be transported in trucks to a disposal site. These trucks may also require lining as previously mentioned. Although cut-and-cover construction methods are assumed for all below grade segments of the proposed project in order to evaluate the worst-case scenario, the use of a TBM for below grade segments that are deep enough to allow use of a TBM may be considered at a later date.

Stations and Portals

Stations and portals for the proposed Base LRT Alternative would be constructed by cut-and-cover and open cut methods. The depths of the stations would be as required to allow for utilities, access to the stations' center station platform, structure thickness, and cover over the tunnels extending from the stations. Conceptual design depths range from approximately 50 to 60 feet for the below-grade section along Crenshaw Boulevard. Station widths would be approximately 60 feet to include trackways and center platforms. Portals would be designed to accommodate twin tracks, station widths, traffic flow around the portals, and existing topography. Prior to below-grade construction, work sites would require clearing and possible building demolition in some areas. Demolition equipment typically includes bulldozers and loaders. Prior to demolition, contractors may salvage items such as fixtures, mechanical equipment, and lumber, unless the contract states otherwise. Where economical, materials such as concrete and steel may be recycled.

**Underground Utilities**

Subject to other constraints, the below-grade stations would be located to avoid, to the extent possible, conflicts with the space occupied by below-grade utilities. In certain instances, the positioning of a station or the location of station entrances and vent shafts would require that conflicting utilities be relocated to clear the way for the station structures. Utilities, such as water mains and gas lines, may represent potential hazards during cut-and-cover and open cut station construction. Utilities that are not to be permanently relocated away from the work site would be temporarily rerouted to prevent accidental damage to the utilities, to construction personnel, and to the adjoining community. Buried utilities are often protected in place and supported by hanging from deck beams at cut-and-cover sections.

Station Excavation – Initial Support

If the building assessments indicate the necessity to protect nearby structures, the first step in construction of a below-grade station would be to support the foundations of buildings adjacent to the station excavation. This would be done by underpinning (additional foundations placed under the building), or by other means such as soil grouting. In lieu of underpinning or grouting, or in combination with grouting, the support of adjacent structures is commonly accomplished by use of excavation support systems which in conjunction with proper excavation and bracing procedures serve as building protection.

The excavation's initial support systems may include reinforced concrete drilled-in-place piles; braced soldier piles and lagging, tangent pile walls; diaphragm walls; and tied-back excavations. Initial support allows support of the ground while soil is removed from the excavation and for the temporary duration of tunneling and other work in the shaft. Final support includes the concrete slabs, walls, and walkways for the stations and portals. Some lateral movement of the excavation walls would occur during removal of soil. The amount of movement would depend on the construction contractor's excavation methods, wall design, and the height of the wall. Project specifications would call for monitoring of walls and adjacent ground for lateral movements and surface settlement. Acceptable movements, such that adjacent buildings would be protected, would be determined during final design of the proposed project. Specifications would require the construction contractor to take appropriate actions if limiting movements are approached.

Prior to installation of the ground support system, dewatering is likely to be required at the underground station sites to temporarily lower the groundwater level below the station excavation depth or to an impermeable soil layer. This facilitates installation of the piles, improves soil stability, and allows excavation in dry conditions. Groundwater is pumped from wells installed around the perimeter of the excavation. If contaminated water is encountered, it is either treated at the site or hauled to a treatment facility. At the completion of the stations, pumping is discontinued and groundwater levels return to their natural level.

To install the soldier piles and lagging for the support of the excavation it would be necessary to bore out the holes for the placement of the piles. The pre-drilling of holes is necessary to eliminate pile driving and reduce project noise levels that would otherwise occur with pile driving. The contractor would occupy one side of the street to install one

line of soldier piles while the other side would remain open for traffic circulation. The equipment required for installation of the soldier piles includes drill rigs, concrete trucks, cranes, and dump trucks.

After installation of soldier piles on both sides of the street for the underground stations, the construction contractor would proceed with installation of the deck and deck beams, excavation, and bracing. Pre-cast concrete panels (decking) allow continued traffic and pedestrian circulation since they would be installed flush with the existing street or sidewalk levels. However, deck installation would require lane and nighttime street closures at the stations. The concrete decking would be installed in progressive stages. Portal construction would follow similar construction methods as for the station excavations and retaining walls. The portal would remain permanently open and, thus, no decking would be used during construction.

Excavation, Bracing, and Hauling of Soil

With the decking installed and the utilities supported, the major excavation activities can proceed. The method of removing the material for hauling away from the job site is a choice made by the contractor. A typical operation would be for the bulldozers and/or overhead loaders to move the material to a central pick-up point or several such points, where a large bucket from a crane or a vertical or diagonal conveyor belt can hoist the material and place it into waiting trucks or a loading hopper. Spoils from the station site would be moved sideways out from under the deck onto an off-street work site and loaded from there into hauling trucks. Spoils would not be loaded in the street, except during the initial drilling of the soldier piles and deck installation.

Construction of Station and Portal Final Structures

The construction sequence for the final station structure would include installation of the station floor, also known as the base slab, followed by the installation of exterior walls and any interior column elements. Slabs are poured as the columns and intermediate floor and roof wall pours progress. Portal structures would use similar construction methods involving placement of concrete inverts, walls, and walkways. Station entrance locations are generally used as access points to the underground station during the construction process. Exterior entrances would be constructed after the station structure has been completed.

Street Restoration/Site Restoration

After the below-grade structure has been completed and the roof slab allowed to cure for a specified period, the backfilling operation would begin. During the backfilling operations, the utilities would be restored to their permanent locations. Where sidewalks have been demolished because of the cut-and-cover construction, they would be restored. After backfilling, the permanent street would be installed and the sidewalks and pavement restored to city standards.

Ventilation Shafts and Emergency Exits

The below-grade or tunnel segments of the alignment include a number of ventilation and emergency exit areas for the below-grade segment in the vicinity of the below-grade stations. The stations would house emergency ventilation fan shafts, as well as separate emergency exit shafts at both ends of the stations. Ventilation fans are used for



extracting smoke from the tunnels and stairs for evacuation in the event of an emergency – such as a fire in the below-grade areas. The exact location of these facilities would be determined during final design. These shafts are constructed as extensions of the station excavation, using cut-and-cover construction methods.

The two level vent structure is a 45-foot wide, approximately 70-foot deep, concrete box at two ends of the station joining openings in the top of the tunnels to a vertical shaft penetrating the ground in a convenient location. Ventilation fans and their control equipment, as well as the emergency exit stairs, would be housed in this horizontal concrete box. The area of the shaft would be dependent on the height of the box. Where shafts vent at ground level, the area is typically approximately 400 square feet reducing to about half this area where towers are provided. Minimum tower height would be approximately ten feet. In some cases, vent structures are incorporated with other structures and the height may be adjusted to match or compliment the structure. Since the fans are operated only for emergencies and for maintenance, noise is not considered to be a factor.

It is assumed that each below-grade station would have two exit hatches connected to emergency stairs at each end of the station. Each exit hatch is approximately six feet wide. Most of these hatches and gratings would be located at the station entrance plazas or right-of-way to be acquired for the construction staging areas. During the preliminary engineering design phase, further coordination with the City of Los Angeles would be required to determine if some or all of these hatches and gratings would be located within the public right-of-way. This may require variances from City codes.

4.15.2.5 Aerial Construction

Aerial structures (bridges and elevated approach sections) would be constructed using typical phases of work: foundation construction, installation of columns, and setting in place of concrete or steel girders or steel trusses. Lower elevation portions of the bridge approach structures may be constructed on retained fills. A 1,000-foot bridge may take as long as 24 months to complete. Construction of the column foundations may begin at the same time the utilities are relocated, providing the utilities do not directly impact the foundation locations. Once the foundations are in place, the columns would be constructed. It may be possible to conduct most of the column construction and girder placement during late night hours to minimize disruptions on the local streets. Traffic would not be allowed to pass under the structure during form and concrete placement, and temporary lane closures would be necessary during these periods.

Equipment used for construction of the aerial guideway segments would include drill rigs/augers, cranes, pile drivers, jackhammers, compressors, concrete trucks and pumping equipment, dump trucks, front-end loaders, paving machines, and large tractor-trailer rigs to carry girders and miscellaneous tools.

4.15.3 Environmental Impacts/Environmental Consequences

4.15.3.1 Methodology

The following section addresses the construction-related adverse effects of the BRT and LRT Alternatives, as well as the maintenance and operations facility sites, based on the implementation of the construction scenario described in the preceding section. Topics addressed in this section include:

- I. Traffic, Circulation, and Parking
- II. Land Use and Development
- III. Displacement and Relocation of Existing Uses
- IV. Community and Neighborhood
- V. Visual and Aesthetic
- VI. Air Quality
- VII. Noise and Vibration
- VIII. Ecosystems/Biological Resources
- IX. Geotechnical/Subsurface/Seismic/Hazardous Materials
- X. Water Resources
- XI. Energy
- XII. Historic, Archaeological and Paleontological
- XIII. Parklands and Community Facilities
- XIV. Economic and Fiscal
- XV. Safety and Security
- XVI. Growth Inducing
- XVII. Environmental Justice
- XVIII. Cumulative

4.15.3.2 Traffic, Circulation, and Parking

Refer to Section 3.0 Transportation Impacts.

4.15.3.3 Land Use and Development

BRT Alternative

Construction for the BRT Alternative may require temporary easements but would not affect zoning or surrounding land use compatibility. Therefore, no adverse effects are anticipated.

Base LRT Alternative

Construction for the Base LRT Alternative may require temporary easements but would not affect zoning or surrounding land use compatibility. The large amount of concrete necessary for construction of the alignment, particularly for the aerial structure and below-grade construction, may necessitate the placement of a batch plant, which would likely occur within the existing Harbor Subdivision right-of-way and would be compatible with the existing zoning. Therefore, no adverse effects are anticipated.

LRT Alternative Design Options

The complexity of construction activity for all of the design options would increase from the Base LRT Alternative as more construction equipment, such as cranes, excavators, or



trenchers would be necessary. The duration of construction would also be longer than the Base LRT Alternative and more dirt would have to be stockpiled or transferred off-site. The staging of equipment, and the stockpiling or hauling of dirt and materials would not affect the land use compatibility of the surrounding primarily industrial area. Therefore, no adverse effects to land use compatibility are anticipated for the design options.

Maintenance and Operations Facility Sites

Construction of the maintenance and operations site facility would be located adjacent to the industrial-zoned areas adjacent to the Harbor Subdivision right-of-way. While these activities may require temporary easements, zoning and land use compatibility would not be altered and no adverse effects are anticipated.

Mitigation Measures

None required.

4.15.3.4 Displacement and Relocation of Existing Uses

Displacement and relocation of existing uses would occur prior to any construction activity, and, therefore, no adverse construction effects are anticipated.

LRT Alternative Design Option 6 is not anticipated to require the full or partial acquisition of any parcels during construction except at station locations. However, in the event that a tunnel boring machine is used to construct the below-grade alignment, the acquisition of parcels may be required for staging and spoil areas, which may be situated in the vicinity of the station areas.

Mitigation Measures

None required.

**4.15.3.5 Community and Neighborhood
BRT, Base LRT, and LRT Alternative Design Options**

The noise from construction equipment and the timing of construction (potentially at nighttime), as well as street closures, would temporarily disrupt the communities and neighborhoods within the corridor. These temporary adverse effects would affect individuals or individual property owners, but would not divide a neighborhood, remove important amenities, or affect the integrity of the neighborhood. Access to some neighborhoods would be disrupted and detoured for short periods of time during construction, but access would continue to be available to neighborhoods for both residents and emergency response. Mitigation measures that are presented to reduce the construction effects on traffic and access (Section 3.0 Transportation Impacts), noise, and visual quality would reduce the adverse effects on communities and neighborhoods in the corridor. Therefore, no adverse environmental effects are anticipated.

Maintenance and Operations Facility Sites

Construction of the proposed maintenance and operations facility would occur at one of two potential sites, neither of which would alter or block access to any community assets, displace on- or off-street parking spaces, or impact economic development. Therefore, no adverse environmental effects are anticipated.

Mitigation Measures

None required.

4.15.3.6 Visual Quality

BRT Alternative

During construction of the BRT Alternative, the project area's visual quality may be altered from the start of the exclusive lane at the Exposition station to the Century station where the busway ends. Multi-family residences and motels are located along Crenshaw Boulevard, while single-family residences are located along La Colina Drive. The stockpiling of dirt and materials would be visible to these residential and other sensitive uses located adjacent to Crenshaw Boulevard and the Harbor Subdivision right-of-way. The placement of concrete barriers with fencing would be visible along the perimeter of construction areas. Mature vegetation, including trees, would be removed from some areas. Temporary lighting may be necessary for nighttime construction of certain project elements or in existing highway rights-of-way (to minimize disruption to daytime traffic). This temporary lighting may potentially affect residential areas by exposing residents to glare from unshielded light sources or by increasing ambient nighttime light levels. Therefore, potentially adverse effects are anticipated.

Base LRT Alternative

The Base LRT Alternative visual quality construction effects are the same as the BRT Alternative.

LRT Alternative Design Options

Design Option 1 visual quality construction effects are the same as the LRT and BRT Alternatives. Potential nighttime glare would impact a sensitive use (a motel) at the northeast corner of Century and Aviation Boulevards. The nighttime glare may be visible by motel patrons. Therefore, potentially adverse effects are anticipated.

Design Option 2 visual quality construction effects are the same as the LRT and BRT Alternatives. There are no sensitive uses located adjacent to the intersection of Manchester Avenue and the Harbor Subdivision right-of-way that would be impacted by nighttime construction lighting with this design option. Therefore, no adverse effects are anticipated.

Design Option 3 visual quality construction effects are the same as the LRT and BRT Alternatives. Potential nighttime glare would impact the single-family residences located along La Colina Drive located directly north of the Harbor Subdivision right-of-way. Therefore, potentially adverse effects are anticipated.

Design Option 4 visual quality construction effects are the same as the LRT and BRT Alternatives. Potential nighttime glare would impact the multi-family residences and motel uses located along Crenshaw Boulevard, south of 60th Street. West Angeles Villas, a senior living complex located at the southeast corner of Crenshaw Boulevard and 60th Street would also be affected by the potential nighttime glare. Therefore, potentially adverse effects are anticipated.



Design Option 5 visual quality construction effects are the same as the LRT and BRT Alternatives. Potential nighttime glare would impact the residential and other sensitive uses located east of the station construction site. Therefore, potentially adverse effects are anticipated.

Design Option 6 visual quality construction effects are the same as the LRT and BRT Alternatives. Potential nighttime glare would impact the multi-family residences and other sensitive uses located along Crenshaw Boulevard. Therefore, potentially adverse effects are anticipated.

Maintenance and Operations Facility Sites

Construction of a maintenance facility would result in construction-related signage, the stockpiling of dirt and materials, construction staging areas, and heavy equipment which would all be visible at, and in the vicinity of, construction sites. The placement of concrete barriers with fencing would be visible along the perimeter of the construction area which would degrade the physical character of the area.

Mitigation Measures

Mitigation measures are proposed for the BRT Alternative, Base LRT Alternative, and design options to avoid, minimize, and mitigate adverse effects related to conflicts between scale and visual character, effects on scenic resources, location of ancillary facilities, and introduction of new sources of light and glare.

- CON1** Visually obtrusive erosion control devices, such as silt fences, plastic ground cover, and straw bales should be removed as soon as the area is stabilized.
- CON2** Stockpile areas should be located in less visibly sensitive areas and, whenever possible, not be visible from the road or to residents and businesses.
- CON3** During nighttime construction activities, lighting shall be aimed at the downward and away from residential and other sensitive uses adjacent to the alignment and stations.

Impacts Remaining After Mitigation

With the implementation of Mitigation Measures **CON1** through **CON3**, the visual effects of construction activity would be reduced for all of the alternatives, and because of its short-term nature, no adverse effects are anticipated.

4.15.3.7 Air Quality

BRT Alternative

Construction of the BRT Alternative would generate pollutant emissions from the following activities: 1) demolition, 2) grading, 3) mobile emissions related to construction workers traveling to and from construction areas, 4) mobile emissions related to the delivery and hauling of construction supplies and debris to and from construction sites, and 5) stationary emissions related to fuel consumption by on-site construction equipment. Minimal construction information was available at the time this analysis was completed. As such, maximum daily emissions are presented for general construction activity utilizing conservative assumptions. It was assumed that maximum BRT

Alternative construction activities would include the operation of ten pieces of heavy-duty equipment per day, 25 heavy-duty truck roundtrips per day, and the disturbance of 500 cubic yards of soil per day.

The BRT Alternative would include the construction of a maintenance and operations facility. Construction activity would generate emissions from the same sources as described above. It was assumed that maximum maintenance and storage facility site construction activities would include the operation of seven pieces of heavy-duty equipment per day, 50 heavy-duty truck roundtrips per day, and the disturbance of 1,000 cubic yards of soil per day.

Table 4-80 shows regional construction emissions associated with the BRT Alternative and the maintenance and operations facility site. The effects of lane closures and intersection improvements during construction activity would also reduce traffic speeds and result in increased emissions, particularly CO emissions at major points of delay. Detour routes would ensure that traffic does not idle for extended periods of time thus reducing the potential for localized exceedances of the federal CO standards. Construction-related air quality impacts would be temporary. With the implementation of mitigation measures, no substantial adverse construction effects are anticipated.

Table 4-80. Regional Construction Emissions

Scenario	Pounds Per Day					
	VOC	NO _x	CO	SO _x	PM _{2.5}	PM ₁₀
BRT Alternative	18	130	67	<1	12	52
Base LRT Alternative	48	381	180	<1	36	168

Source: TAHA, 2008

Base LRT Alternative

Air pollutant emissions would result from similar activities as described for the BRT Alternative. The Base LRT Alternative would generate additional fugitive dust and equipment emissions from excavation activity and NO_x emissions associated with the transport of excavated material. It was assumed that maximum Base LRT Alternative construction activities would include the operation of 30 pieces of heavy-duty equipment per day, 150 heavy-duty truck roundtrips per day, and the disturbance of 3,000 cubic yards of soil per day.

The Base LRT Alternative would also include the construction of a maintenance and storage facility. It was assumed that maximum maintenance and operations facility site construction activities would be similar as described for the BRT Alternative.

Table 4-80 shows regional construction emissions associated with the Base LRT Alternative and the maintenance and operations facility. The effects of lane closures and intersection improvements during construction activity would also reduce traffic speeds and result in increased emissions, particularly CO emissions at major points of delay. Detour routes would ensure that traffic does not idle for extended periods of time thus reducing the potential for localized exceedances of the federal CO standards.



Construction-related air quality impacts would be temporary. With the implementation of mitigation measures, no substantial adverse construction effects are anticipated.

LRT Alternative Design Options

All six LRT Alternative design options would include additional excavation activity and soil hauling. These activities would generate additional emissions, especially regional NO_x from haul trucks and localized fugitive dust. Similar to the Base LRT Alternative, construction-related air quality impacts would be temporary. With the implementation of mitigation measures, no substantial adverse construction effects are anticipated.

Mitigation Measures

- CON4** Water or a stabilizing agent shall be applied to exposed surfaces in sufficient quantity to prevent generation of dust plumes.
- CON5** Track-out shall not extend 25 feet or more from an active operation and track-out shall be removed at the conclusion of each workday.
- CON6** Contractors shall be required to utilize at least one of the measures set forth in South Coast Air Quality Management District Rule 403 section (d)(5) to remove bulk material from tires and vehicle undercarriages before vehicles exit the project site.
- CON7** All haul trucks hauling soil, sand, and other loose materials shall maintain at least 6 inches of freeboard in accordance with California Vehicle Code Section 23114.
- CON8** All haul trucks hauling soil, sand, and other loose materials shall be covered (e.g., with tarps or other enclosures that would reduce fugitive dust emissions).
- CON9** Traffic speeds on unpaved roads shall be limited to 15 mph.
- CON10** Operations on unpaved surfaces shall be suspended when winds exceed 25 mph.
- CON11** Heavy equipment operations shall be suspended during first and second stage smog alerts.
- CON12** On-site stockpiles of debris, dirt, or rusty materials shall be covered or watered at least two times per day.
- CON13** Contractors shall maintain equipment and vehicle engines in good condition and in proper tune per manufacturers' specifications.
- CON14** Contractors shall utilize electricity from power poles rather than temporary diesel or gasoline generators, as feasible.
- CON15** Heavy-duty trucks shall be prohibited from idling in excess of five minutes, both on- and off-site.

- CON16 Construction parking shall be configured to minimize traffic interference.
- CON17 Construction activity that affects traffic flow on the arterial system shall be limited to off-peak hours, as feasible.

Impacts Remaining After Mitigation

Implementation of Mitigation Measures CON4 through CON17 would reduce the effects of construction on air quality; however, an unavoidable adverse effect would remain for the BRT Alternative, the Base LRT Alternatives, and the LRT Alternative design options.

**4.15.3.8 Noise and Vibration
 BRT Alternative**

North of the Harbor Subdivision right-of-way, construction of the BRT Alternative would be limited to placement of new bus stops in and changing the lane striping. Noise from removal of existing track and construction of the busway along the Harbor Subdivision Railroad between Crenshaw Boulevard and Century Boulevard, would be generated by heavy equipment and would occur as close as 50 feet from existing structures along the alignment. Table 4-81 shows the estimated maximum noise levels for the different stages of at-grade construction 100 feet from a receiver. Construction-generated noise levels may potentially result in adverse short-term noise effects.

Table 4-81. Estimated Peak-Hour Construction Noise Levels

Construction Phase	Loudest Equipment	Noise Level at 100 feet L _{max} (dBA)/a/
Clearing and grubbing	Bulldozers, backhoes, haul trucks	86
Earthwork	Scrapers, bulldozers	88
Foundation	Backhoes, loaders	85
Structures	Cranes, loaders, haul trucks	86
Base preparation	Trucks, bulldozers	88
Paving	Pavers, pumps, haul trucks	89

/a/L_{max} - Maximum Sound Level – The highest exponential-time-average sound level in decibels that occurs during a stated time period.

Source: Transit Noise and Vibration Impact Assessment, FTA, May 2006.

Common vibration-producing equipment used during at-grade construction activities include: jackhammers, pavement breakers, augur drills, bulldozers, and backhoes. Pavement breaking and soil compaction would produce the highest levels of vibration. Table 4-82 shows the type of construction equipment measured under a variety of construction activities and includes an average of source vibration levels reported in terms of velocity levels. Although the table lists one level for each piece of equipment, considerable variation exists in reported ground-vibration levels from construction activities. The data provides a reasonable estimate for a wide range of soil conditions. Potential effects of construction vibration would result in annoyance to nearby occupied buildings. The vibration levels expected from construction equipment associated with



Table 4-82. Vibration Source Levels for Construction Equipment

Equipment		Peak Particle Velocity at 25 feet(in/sec)	Approximate L _v at 25 feet(VdB)/a/
Pile driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile driver (sonic)	Upper range	0.734	105
	Typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	In soil	0.008	66
	In rock	0.017	75
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

/a/ L_v = RMS velocity in decibels (VdB) re 1 micro-inch/sec.

RMS = The square root of the mean-square value of an oscillation waveform.

Source: Transit Noise and Vibration Impact Assessment, FTA, May 2006.

this project are not anticipated to result in either architectural or structural damage to any nearby buildings.

Base LRT Alternative

Noise from construction of the Base LRT Alternative, would be generated by heavy equipment, haul trucks, and worker vehicles, and would occur as close as 50 feet from existing structures along the alignment. Table 4-81 showed the estimated maximum noise levels for the different stages of at-grade construction 100 feet from a receiver. Construction-generated noise levels may potentially result in adverse short-term effects.

As discussed under the BRT Alternative, potential effects of construction vibration would result in annoyance to nearby occupied buildings. The vibration levels expected from construction equipment associated with this project is not anticipated to result in either architectural or structural damage to any nearby buildings.

LRT Alternative Design Options

The construction generated noise levels associated with all six LRT Alternative design options would be similar to the Base LRT Alternative and construction-generated noise levels may potentially result in adverse short-term effects. Potential effects of construction vibration would result in annoyance to nearby occupied buildings. The vibration levels expected from construction equipment associated with this project is not anticipated to result in either architectural or structural damage to any nearby buildings.

Maintenance and Operations Facility Sites

Noise from construction of the maintenance and operations facility sites would be generated by heavy equipment and would occur as close as 50 feet from existing

structures along the alignment. There are no sensitive receptors near potential maintenance and operations facility Site D and, thus, no adverse effects are anticipated during construction.

Should maintenance facility site B be selected, noise-control measures during construction would be required to minimize adverse effects on existing single-family residences along 83rd Street. Mitigation Measures **CON18** through **CON21** shall be required to ensure construction noise is attenuated to the greatest extent feasible for those sensitive receptors. All construction activities would have to comply with local noise ordinances and noise regulations, as described in Section 4.6.2 Regulatory Framework.

The vibration levels expected from construction equipment associated with construction of maintenance and operations facility site is not anticipated to result in either architectural or structural damage to any nearby buildings.

Mitigation Measures

Noise-control measures during construction would be required to minimize adverse effects on existing noise-sensitive land uses. All construction activities would have to comply with local noise ordinances and noise regulations, as described in section 4.6.2 Regulatory Framework.

The measures listed in this section are examples of those that would be incorporated and should be re-evaluated in greater detail during preliminary design because adverse effects to residences cannot be accurately determined without detailed construction plans and schedules. General mitigation measures presented below are guidelines in developing measures to reduce construction noise. The measures shall be incorporated into site-specific construction plans to minimize adverse noise effects to sensitive receivers along the project corridor. Equipment noise emission limits also would be developed and/or adopted from existing sources. Construction hours would be set, and construction activity noise level emission criteria would be determined and compliance required during construction.

- CON18** During the early stages of construction plan development, natural and artificial barriers, such as ground elevation changes and existing buildings, shall be considered for use as shielding against construction noise.
- CON19** Noise barriers shall be constructed during the initial stages to reduce potential adverse construction noise effects along the right-of-way for traffic mitigation.
- CON20** The contractor shall comply with Standard Specifications and all local sound control and noise level rules, regulations, and ordinances that apply to any work performed pursuant to the contract. Each internal combustion engine used for any purpose on the job or related to the job shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated without a muffler.



- CON21** Noisier activities involving large machinery shall be limited to daytime hours when most people normally affected are either not present or engaged in less noise-sensitive activities. Nighttime construction shall require a variance.

Impacts Remaining After Mitigation Measures

Mitigation Measures **CON18** and **CON19** would reduce potential adverse construction noise effects at sensitive receivers. Compliance with local noise ordinances identified in Mitigation Measure **CON20** would also attenuate adverse effects associated with construction noise. Certain phases of transit construction work, such as pile driving may produce noise levels in excess of acceptable limits, even when feasible noise-reduction methods are used. Using alternate methods of construction would potentially reduce these adverse effects. In the case of pile driving, vibratory or hydraulic insertion may be used depending on many factors (e.g., vibratory pile driving is not always quieter). Drilling holes for cast-in-place piles is an alternative construction method that would produce significantly lower levels of noise. Community meetings would be held to explain the construction work, time involved, and the control measures to be taken. Implementation of the proposed mitigation measures would reduce the potential adverse effects of construction noise.

**4.15.3.9 Ecosystems/Biological Resources
BRT Alternative**

Construction of the BRT Alternative may require removal or disturbance (including trimming) of mature trees along the proposed alignment. Specifically, construction of the BRT Alternative adjacent to the Edward Vincent Jr. Park (within the Harbor Subdivision portion of the project) may require removal of mature palm trees that line the southern boundary of the park, adjacent to the railroad right-of-way, and the palms to the south of the railroad right-of-way (adjacent to Florence Avenue). These mature trees provide potential nesting and roosting habitat for select bird species, including raptors. Removal or disturbance of this vegetation during the nesting season may affect the habitat and any bird species that is present. Mitigation Measure **CON22** would be implemented to ensure no adverse effect would occur.

In addition, construction of the BRT Alternative may result in removal of native tree species (as defined in the Native Tree Protection Ordinance) located along Crenshaw Boulevard within the City of Los Angeles; however, compliance with the Native Tree Ordinance would ensure no adverse effect would occur. Although the ordinance does not require a permit for the pruning of protected trees, if the project requires pruning of native tree species, Mitigation Measure **CON23** would be implemented to ensure that the pruning would not damage or adversely affect the trees.

Base LRT Alternative

Construction of the Base LRT Alternative may require removal or disturbance of mature trees along Crenshaw Boulevard. If construction of the Base LRT Alternative results in removal of native tree species (as defined in the Native Tree Protection Ordinance) within the City of Los Angeles, compliance with the Native Tree Ordinance would ensure that no adverse effect would occur. Although the ordinance does not require a permit for the pruning of protected trees, if the project requires pruning of native tree species,

Mitigation Measure **CON23** would be implemented to ensure that the pruning would not damage or adversely affect the trees.

LRT Alternative Design Options

Design Options 1 and 2 do not have biological resources or habitat in the areas where they are located. It is unlikely that mature trees would be removed or disturbed.

Design Option 3 may result in the removal of non-native palm trees located along the Harbor Subdivision right-of-way adjacent to Edward Vincent Jr. Park in the City of Inglewood (similar to BRT Alternative). As these mature trees provide potential nesting and roosting habitat for select bird species, including raptors, removal during the nesting season may affect the habitat and any bird species that are present.

Design Options 4, 5 and 6 may result in the removal of mature trees located along Crenshaw Boulevard in the City of Los Angeles. These trees provide potential nesting and roosting habitat for select bird species, including raptors, and removal during the nesting season may affect the habitat and any bird species that are present. Design Option 5 would be located in the vicinity of Leimert Plaza Park, which supports a few mature trees, but not sensitive biological resources. The proposed below-grade station would be located on the opposite side of Crenshaw Boulevard from Leimert Plaza Park; therefore, the trees at the park would not be disturbed or impacted.

Mitigation Measure **CON22** and **CON23** would be implemented to ensure no adverse impact would occur for any of the design options. Similar to the Base LRT Alternative, with implementation of Mitigation Measures **CON22** and **CON23**, these design options would not be anticipated to have an adverse impact on biological resources.

Maintenance and Operations Facility Sites

Should Site D be chosen as maintenance and operations facility, the removal or disturbance of the mature trees may be required. Since removal or disturbance of trees during the nesting season may result in the loss of this habitat and individuals of select bird species, Mitigation Measure **CON22** would be implemented to ensure no adverse impact to biological resources would occur. Therefore, adverse effects to ecosystems and biological resources are not anticipated during the construction of maintenance and operations facility sites.

Mitigation Measures

To avoid violations of federal and State migratory bird protections and prevent adverse effects to bird species that may utilize trees located within the proposed alignments, stations, or maintenance facility sites, project construction will be timed to occur outside the breeding bird season, which occurs generally from March 1st to August 31st and as early as February 1st for raptors. However, if construction must occur during the nesting season, the following mitigation measure would be implemented:

- CON22** Two biological surveys shall be conducted, one fifteen days prior and a second 72 hours prior to construction that would remove or disturb suitable nesting habitat. The surveys shall be performed by a biologist with experience conducting breeding bird surveys. The biologist shall prepare survey reports documenting the presence or absence of any protected native bird in the



habitat to be removed and any other such habitat within 300 feet of the construction work area (within 500 feet for raptors). If a protected native bird is found, surveys will be continued in order to locate any nests. If an active nest is located, construction within 300 feet of the nest (500 feet for raptor nests) will be postponed until the nest is vacated and juveniles have fledged and when there is no evidence of a second attempt at nesting.

CON23 If construction of the project requires pruning of native tree species, the pruning shall be performed in a manner that does not cause permanent damage or adversely affect the health of the trees.

Impacts Remaining After Mitigation

Through compliance with existing ordinances and implementation of Mitigation Measures **CON22** and **CON23**, construction of the BRT Alternative, Base LRT Alternative, and LRT Alternative design options are not anticipated to adversely affect biological resources.

**4.15.3.10 Geotechnical/Subsurface/Seismic/Hazardous Materials
BRT Alternative**

The primary concern for the BRT Alternative would be the potential for encountering hazardous materials during grading and excavation within the Harbor Subdivision Railroad right-of-way. The construction work for the proposed project would generally be limited to the upper 5 feet of soil, which constrains the volume of unearthed potentially contaminated soil.

The Harbor Subdivision Busway alignment does include two aerial sections and the associated pile foundations would require much deeper earthwork, probably down to 60 feet below-grade, thereby increasing the possibility of encountering contaminated soil. In addition, it is possible that contaminated groundwater may be encountered when installing pile foundations. The Phase I ESA indicated that in, or adjacent to the right-of-way, there are instances of soil and/or groundwater contamination for leaking USTs, stained soil, small soil/asphalt stockpiles, and other facilities that may have released hazardous materials to the subsurface. In addition, it is possible that lead, arsenic, pesticides, and creosote have leached into the soil along the right-of-way and may occur at hazardous levels.

Additional soil testing would need to be completed in the areas where grading and/or excavation will occur, particularly in the areas of potential environmental concern identified in the Existing Conditions of Section 4.8 Geotechnical/Subsurface/Seismic/Hazardous Materials. The potential for an encounter with a hazardous material is an adverse impact. The mitigation measures below provide the recommended methods for safely approaching potential hazardous materials encountered during the course of the project.

Base LRT Alternative

Adverse effects would be similar for the Base LRT Alternative as described for the BRT Alternative with the exception of increased possibility of encountering contaminated soil and/or groundwater in the areas of the proposed at-grade, below-grade, and aerial alignments along the entire section.

The construction work for the at-grade alignments would generally be contained to the upper 5 feet of soil, thereby constraining the volume of unearthed contaminated soil and eliminating the possibility of encountering contaminated groundwater.

The below-grade areas would probably consist of cut-and-fill activities to approximately 70 feet below-grade, which would result in encountering large quantities of soil and increasing the possibility of encountering contaminated soil and possibly contaminated groundwater.

The aerial sections would consist of pile foundations that would require deep earthwork, down to 60 feet below-grade, to support the crossovers, thereby increasing the possibility of encountering contaminated soil and possibly contaminated groundwater.

The Phase I ESA indicated that in, or adjacent to the right-of-way, there are instances of soil and/or groundwater contamination for leaking USTs, stained soil, small soil/asphalt stockpiles, and other facilities that may have released hazardous materials to the subsurface. In addition, it is possible that lead, arsenic, pesticides, and creosote have leached into the soil along the right-of-way and may occur at hazardous levels.

Additional soil testing would need to be completed in the areas where grading and/or excavation will occur, particularly in the areas of potential environmental concern identified in the Existing Conditions Section. The potential for an encounter with a hazardous material is an adverse impact. The mitigation measures that follow provide the recommended methods for safely approaching potential hazardous materials encountered during the course of the project.

LRT Alternative Design Options

As discussed previously, the LRT Alternative may include six design options. Design Options 1 and 2 would include aerial structures that would have an increased possibility of encountering contaminated soil and/or groundwater than the Base LRT Alternative. The aerial stations would require pile foundations that would require deep earthwork, down to 60 feet below-grade, to support the crossovers, thereby increasing the possibility of encountering contaminated soil and possibly contaminated groundwater. Design Options 3 and 4 include cut and cover construction and Design Options 5 and 6 include below-grade construction. The cut and cover and below-grade construction would have an increased possibility of encountering contaminated soil and/or groundwater than the at-grade alignment in the Base LRT Alternative. The below-grade crossing would require excavation activities to approximately 70 feet below-grade, which would result in encountering large quantities of soil and increasing the possibility of encountering contaminated soil and possibly contaminated groundwater. Additional soil testing would need to be completed in the areas where grading and/or excavation will occur, particularly in the areas of potential environmental concern identified in the Existing Conditions Section. The potential for an encounter with a hazardous material is an adverse impact. The mitigation measures that follow provide the recommended methods for safely approaching potential hazardous materials encountered during the course of the project.

**Maintenance and Operation Facility Sites**

Adverse effects include the potential for encountering hazardous materials during grading activities in preparation for construction; however, a Phase I ESA has not been conducted to determine if hazardous materials have been used in these areas. A Phase I ESA would be required to assess the site for potential adverse effects, as well as completing any potential Phase II recommendations.

Mitigation Measures

A geotechnical study for proposed at-grade, aerial, and below-grade structures and improvements shall be required. This technical study shall identify design specifications for maintaining structural integrity under static and seismic loading and operational demands.

The geotechnical study shall include a soil-gas investigation at planned below-grade structures and where deep excavations are anticipated to develop mitigation measures to be implemented during construction and incorporated in the design. Mitigation measures typically include installation of soil gas barriers, monitoring, venting, and purging.

The study shall be performed before the commencement of Final Design.

The following mitigation measures are recommended per the conclusions of the Phase I ESA prepared for the proposed project.

CON24 Phase II ESA - Conduct a limited Phase II ESA prior to construction in areas where construction workers may be exposed to impacted soil. A base line soil sampling protocol should be established with special attention to those areas of potential environmental concern identified in this report. The soil should be assessed for constituents likely to be present in the subsurface including, but not limited to, TPH, VOCs, SVOCs, PCBs, PAHs, pesticides, lead arsenates, and Title 22 metals. The depth of the sampling should be based on the depth of grading or cut and fill activities. In addition, in areas where groundwater will be encountered, samples should also be analyzed for suspected contaminants prior to dewatering. This will ensure that NPDES discharge requirements are satisfied.

CON25 Soil Mitigation Plan – A soil mitigation plan should be prepared after final construction plans are prepared showing the lateral and vertical extent of soil excavation during construction. The soil mitigation plan should establish soil reuse criteria, establish a sampling plan for stockpiled materials, describe the disposition of materials that do not satisfy the reuse criteria, and specify guidelines for imported materials. The soil mitigation plan should include a provision that during grading or excavation activities, soil should be screened for contamination by visual observations and field screening for volatile organic compounds with a PID. Soil samples that are suspected of contamination based on field observations and PID readings shall be analyzed for suspected chemicals by a California certified laboratory. If hazardous soil is found, it shall be removed, transported to an approved disposal location, and remediated or disposed according to state and federal laws. Other contaminated but nonhazardous soil may be reused on site

applications such as bridge embankments or underneath paved areas provided the public is protected from coming into contact with the contaminated soils and the specific use is agreed to by the California Department of Toxic Substances Control (DTSC).

- CON26** Hazardous Material and Debris Removal - All hazardous materials, drums, trash, and debris shall be removed and disposed of in accordance with regulatory guidelines.
- CON27** Health and Safety Plan - A health and safety plan should be developed for persons with potential exposure to the constituents of concern identified in the limited Phase II ESA.
- CON28** Construction Observations - Historical and present site usage along the many areas of the proposed alignment included businesses that stored hazardous materials and/or waste and used USTs, from at least the 1920s to the present. It is possible that areas with soil and/or groundwater adverse effects may be present that were not identified in this report, or were considered a low potential to adversely impact the subject property. In general, observations should be made during any future development activities for features of concern or areas of possible contamination such as, but not limited to, the presence of underground facilities, buried debris, waste drums, tanks, soil staining or odorous soils. Further investigation and analysis may be necessary, should such materials be encountered.
- CON29** Upon selection of a maintenance and operations facility site, a Phase I ESA shall be prepared to identify potential soil contamination, and if necessary, a Phase II ESA shall follow to determine the extent of the soil contamination.

Impacts Remaining After Mitigation

Implementation of Mitigation Measures **CON25** through **CON29** would reduce the adverse effects related to geologic hazards and hazardous materials during the construction and operational phases of the proposed project to less than adverse for all of the alternatives.

4.15.3.11 Water Resources BRT Alternative

The BRT Alternatives would require excavation below the surface level. Los Angeles RWQCB records indicate a potential for a high groundwater table north of Exposition Boulevard. Uncontaminated groundwater that is collected during the construction dewatering operations can be treated with a small-scale treatment facility and pumped back into the groundwater table or pumped to the sewer or storm drain system or used onsite for dust control purposes. Permission from the Los Angeles RWQCB is required if groundwater is to be pumped back or discharged to the storm drain system. Contaminated groundwater is prohibited from being discharged to the storm drain system. Once construction is complete, no long-term adverse effects to groundwater are anticipated.



Along the proposed fixed guideway, there are several catch basins or storm drain structures that may require relocation or temporary closure. There are three catch basins located at the intersection of Leimert Boulevard and Crenshaw Boulevard. There are also two catch basins located along Florence Avenue at the North La Brea Avenue intersection and at the Centinela Avenue intersection. For the BRT Alternative, a station would be built at the La Brea Avenue/Florence Avenue intersection, where a catch basin may be impacted. Construction of a station at the Vernon Avenue/Crenshaw Boulevard intersection may potentially impact the catch basins in that area. The proposed project would relocate or resize drainage conveyance features appropriately so that flooding or ponding is not induced on the project site or on adjacent properties. With the implementation of a drainage control plan, no adverse effects to the local drainage basin would occur.

The BRT Alternative includes the construction of additional stations and an increased fleet size to improve service. Construction adverse effects would potentially include increased sediment and erosion in or near disturbed areas. Pollutants that may potentially enter the storm drain system include grease and oil from construction or personnel vehicles and equipment, paint, lubricants, and construction debris. For general construction activities, the proposed project is required to comply with the NPDES General Construction Permit to discharge stormwater associated with construction activity. To address and reduce water quality adverse effects, the project is required to prepare a SWPPP accordance with the General Construction Stormwater Permit. BMPs will be identified in the SWPPP to reduce or eliminate pollutants in stormwater discharges from the construction site. A SUSMP would also be prepared to address the quality and quantity of stormwater runoff generated onsite during project operation and the incorporation of permanent treatment BMPs into the project. Implementation of temporary and permanent treatment BMPs would minimize adverse effects to water quality due to the construction of the proposed project.

Base LRT Alternative

The Base LRT Alternative would require excavation below the surface level. Los Angeles RWQCB records indicate a potential for a high groundwater table north of Exposition Boulevard. The tunnel for the Base LRT Alternative, which is approximately 50 feet below the ground surface, also has a potential to be below the water table. If groundwater is encountered, a dewatering permit is required from the Los Angeles RWQCB prior to construction. Uncontaminated groundwater that is collected during the construction dewatering operations can be treated with a small-scale treatment facility and pumped back into the groundwater table or pumped to the sewer or storm drain system or used onsite for dust control purposes. Permission from the Los Angeles RWQCB is required if groundwater is to be pumped back or discharged to the storm drain system. Contaminated groundwater is prohibited from being discharged to the storm drain system. Once construction is complete, no long term adverse effects to groundwater are anticipated.

The Base LRT Alternative would require the installation of new facilities for the fixed guideway, new stations, and support facilities. There are several catch basins or storm drain structures that may require relocation or temporary closure. There are three catch basins located at the Leimert Boulevard/Crenshaw Boulevard intersection. There are also two catch basins located along Florence Avenue at the North La Brea Avenue intersection

and at the Centinela Avenue intersection. A station would be built at the La Brea Avenue/Florence Avenue intersection, where a catch basin may be impacted. Construction of a station at the Vernon Avenue/Crenshaw Boulevard intersection, may potentially impact the catch basins in that area. The proposed project would relocate or resize drainage conveyance features appropriately so that flooding or ponding is not induced on the project site or on adjacent properties. With the implementation of a drainage control plan, no adverse effects to the local drainage basin would occur.

The Base LRT Alternative would include construction of new stations and installation of a track for the fixed guideway. Construction adverse effects would potentially include increased sediment and erosion in or near disturbed areas. Pollutants that may potentially enter the storm drain system include grease and oil from construction or personnel vehicles and equipment, paint, lubricants, and construction debris. For general construction activities, the proposed project is required to comply with the NPDES General Construction Permit to discharge stormwater associated with construction activity. To address and reduce water quality adverse effects, the project is required to prepare a SWPPP accordance with the General Construction Stormwater Permit. BMPs will be identified in the SWPPP to reduce or eliminate pollutants in stormwater discharges from the construction site. A SUSMP would also be prepared to address the quality and quantity of stormwater runoff generated on-site during project operation and the incorporation of permanent treatment BMPs into the project. Implementation of temporary and permanent treatment BMPs would minimize adverse effects to water quality due to the construction of the proposed project.

LRT Alternative Design Options

All six LRT Alternative design options would include additional excavation activity and soil hauling which would increase the possibility of encountering groundwater and necessitating dewatering activity than would the Base LRT Alternative. If groundwater is encountered during tunneling and dewatering is necessary, a dewatering permit is required from the Los Angeles RWQCB prior to construction. With compliance with applicable regulations, no long-term or adverse impacts are anticipated related to groundwater resources. These design options would relocate or resize drainage conveyance features appropriately so that flooding or ponding is not induced on the project site or on adjacent properties. With the implementation of a drainage control plan, no adverse effects to the local drainage basin would occur.

These design options would comply with the NPDES General Construction Permit to discharge stormwater associated with construction activity which requires preparation of a SWPPP accordance with the General Construction Stormwater Permit. BMPs will be identified in the SWPPP to reduce or eliminate pollutants in stormwater discharges from the construction site. A SUSMP would also be prepared to address the quality and quantity of stormwater runoff generated on-site during project operation and the incorporation of permanent treatment BMPs into the project. Implementation of temporary and permanent treatment BMPs would minimize adverse effects to water quality due to the construction.

**Maintenance and Operations Facility Sites**

Similar to the construction of stations under the Base LRT Alternative, the construction of a maintenance and operations facility would potentially include increased sediment and erosion in or near disturbed areas. The proposed project is required to comply with the NPDES General Construction Permit to discharge stormwater associated with construction activity. To address and reduce water quality adverse effects, the project is required to prepare a SWPPP accordance with the General Construction Stormwater Permit. BMPs will be identified in the SWPPP to reduce or eliminate pollutants in stormwater discharges from the construction site. A SUSMP would also be prepared to address the quality and quantity of stormwater runoff generated on-site during project operation and the incorporation of permanent treatment BMPs into the project. Implementation of temporary and permanent treatment BMPs would minimize adverse effects to water quality due to the construction of a maintenance and operations facility.

Mitigation Measures

The proposed project would include preparation of a SWPPP that includes the identification and implementation of applicable BMPs to control erosion and to ensure that dirt, construction materials, pollutants or other human-associated materials are not discharged from the project area into surface waters or into areas that would eventually drain to storm drains. No substantial water quality or resource related adverse effects would result from the proposed project. In addition to the standard BMPs required for compliance with NPDES to be included as part of the proposed project, the following mitigation measures are recommended for incorporation into the project:

- CON30** During project construction, remediation should be required at maintenance facilities and vehicle storage areas, where a potential exists for grease and oil contamination to flow into storm drains. Various types of ditch structures, including grease traps, sediment traps, detention basins, and/or temporary dikes may be used to control possible pollutants. These facilities shall be constructed pursuant to guidance published in Section 402 of the CWA and shall follow the most current guidance within the NPDES program.
- CON31** A dewatering permit is required due to the high groundwater table. The proposed project is located in an urbanized area where potential groundwater contamination may exist. If contaminated groundwater is encountered during construction, the contractor shall stop work in the vicinity of the suspect find, cordon off the area, and contact the appropriate hazardous waste coordinator and maintenance hazardous spill coordinator at Metro and immediately notify the Certified Unified Program Agencies (LAFD, County of Los Angeles Fire Department, and Los Angeles RWQCB) responsible for hazardous materials or waste incidents. Coordination with the appropriate regulatory agencies will be initiated immediately to develop an investigation plan and remediation plan for expedited protection of public health and environment. Contaminated groundwater is prohibited from being discharge to the storm drain system. The contractor shall properly treat or dispose of any hazardous or toxic materials, according to local, state, and federal regulations (see Section 4.9 for details on potential groundwater contamination and remediation).

CON32 The project site currently drains indirectly to Ballona Creek and Dominguez Creek through the MS4. Treatment control BMPs shall be incorporated into the project design. The project shall consider placing the treatment BMPs in series or in a complimentary system to increase the control of pollutants to the maximum extent practicable. The systems shall be designed to efficiently and effectively handle and treat dry and wet weather flows to the maximum extent practicable. A SUSMP and appropriate drainage control plan shall be implemented to select and place appropriate permanent treatment BMPs.

Impacts Remaining After Mitigation

With the implementation of Mitigation Measures **CON30** through **CON32**, effects to water resources and water quality would not be adverse.

4.15.3.12 Energy

BRT Alternative

The highest indirect energy consumption would occur during demolition and then construction of on-site facilities, such as guideways, structures, stations, and support facilities. Construction-related energy consumption would result in the one-time, non-recoverable energy costs associated with the construction and manufacturing of BRT vehicles. Impacts on non-renewable energy resources would be temporary and not be considered adverse.

Base LRT Alternative

The impacts would be the same as the BRT Alternative.

LRT Alternative Design Options

All six LRT Alternative design options would be similar to the Base LRT Alternative, and construction-related energy consumption would result in the one-time, non-recoverable energy costs associated with the construction and manufacturing of light-rail vehicles. Impacts on non-renewable energy resources would be temporary and not be considered adverse.

Maintenance and Operations Facility Sites

Some of the highest indirect energy consumption would occur during the construction of a maintenance and operations facility site. Impacts on non-renewable energy resources would be considered potentially adverse. Impacts on non-renewable energy resources would be temporary and not be considered adverse.

Mitigation Measures

None required.

4.15.3.13 Historic, Archaeological, and Paleontological Resources

BRT Alternative

Where the BRT Alternative has construction components that require excavation, or where new land may be taken, the BRT alternative has the potential to affect archaeological resources, historic and architectural resources, or paleontological resources.

**Archaeological Resources**

Even with the majority of the project area developed, there is the potential for buried archaeological deposits beneath the developed land surface. Of the nineteen previous cultural resource studies conducted within the proposed project area, only nine were conducted within the past eight years and of those nine studies only three cover portions of the linear project route.

No known archaeological resources listed in or eligible for listing in the National Register would be affected by the BRT Alternative. However, discovery of archaeological resources is possible during construction, and if a National Register-eligible archaeological resource is damaged or destroyed, construction of the BRT Alternative would result in an adverse effect. Mitigation Measure **CON33** would be implemented to insure no adverse impact would occur to archaeological resources.

Historic and Architectural Resources

Construction of the BRT Alternative would introduce an elevated ramp and station that would run immediately adjacent to the existing elevated railroad ramp and bridge. Construction of the elevated ramp and station would require the potential demolition of the Century Lounge (formerly Carolina Lanes Bowling Center). The demolition would be an adverse effect under Section 106 Criteria of Adverse Effect *i*, “damage to all or part of a property”. It would “demolish or materially alter in an adverse manner those physical characteristics of a historical resource that convey its historical significance.” In addition, Mitigation Measures **CON34**, **CON35**, and **CON38** would be implemented to reduce potential impacts to historic properties and structures.

Paleontological Resources

Based upon the paleontological review, the majority of the project area has a high level of sensitivity for paleontological resources, especially at depths below 5 feet. The only component of the BRT Alternative where excavation during construction would possibly exceed 5 feet would be elevated guideways and station locations. If construction of the BRT Alternative destroys a significant paleontological resource, it would potentially result in an adverse effect.

Base LRT Alternative***Archaeological Resources***

The LRT Base Alternative has the same potential effects to archaeological resources as the BRT Alternative.

Historic and Architectural Resources

The Department of Water and Power district office, Maverick’s Flat, Angelus Funeral Home, May-Company Department store (now Macy’s), and Crenshaw Square are all located near where the proposed LRT tracks would be located in a cut-and-cover or deep bored tunnel within the center of the street right of way. Construction period effects may include restriction of access to the businesses and therefore negatively affect their economic viability. These buildings are all located in areas where cut and cover subway construction techniques may be employed. Cut and cover construction typically requires surface land area located within the public right of way to allow for excavation, equipment and adjacent lay down and spoil areas. Cut and cover construction sites may limit

pedestrian, vehicular and parking access to adjacent land uses and businesses. Each of the properties of concern have dedicated off-street parking accessible from both Crenshaw Boulevard as well as an adjacent side street or alley. As described in the Transportation section under Mitigation Measures **T8** and **T11**, Metro will maintain access as well as provide way finding signage to these parking areas during construction. Cut and cover disruption at a single location is likely to extend for one to two years. It is not anticipated that access to this adjacent property would be severely restricted, and as a result, it would be unlikely that all access to this adjacent property would be eliminated, to the extent that the economic viability of the historic property would be adversely affected and to the extent there would physical deterioration of property during the period of construction.

Under Section 106, “change of the character of the property’s use” and “neglect of a property which causes its deterioration” both would be considered an “adverse effect” if they were to occur during cut-and-cover construction (Criteria of Adverse Effect *iv*, and *vi*, respectively). With implementation of previously described Traffic Mitigation Measures **T8** and **T11** and Mitigation Measure **CON35**, these buildings would be unlikely to experience physical damage, a change of the character of the property’s use, or physical deterioration during construction. Therefore, no adverse effects are anticipated during construction related to historic and architectural resources.

The Broadway Department store (now WalMart) and Great Western Savings and Loan (now Chase Bank) Building are located where the proposed LRT tracks would be located within a cut-and-cover or deep bored tunnel within the center of the street right of way and where a subterranean station is proposed. While there would be no direct major change to the historic property or its setting, there is a risk of settlement and damage that may result from both tunnel and station construction.

In addition, construction period effects would include restriction of access to the businesses and therefore negatively affect their economic viability. These buildings are all located in areas where cut and cover subway construction techniques may be employed. Cut and cover construction typically requires surface land area located within the public right of way to allow for excavation, equipment and adjacent lay down and spoil areas. Cut and cover construction sites may limit pedestrian, vehicular and parking access to adjacent land uses and businesses. Each of the properties of concern have dedicated off-street parking accessible from both Crenshaw Boulevard as well as an adjacent side street or alley. As described in the Transportation section under Mitigation Measures **T8** and **T11**, Metro will maintain access as well as provide way finding signage to these parking areas during construction. Cut and cover disruption at a single location is likely to extend for one to two years. It is not anticipated that access to this adjacent property would be severely restricted, and as a result, it would be unlikely that all access to this adjacent property would be eliminated, to the extent that the economic viability of the historic property would be adversely affected and to the extent there would physical deterioration of property during the period of construction. Under Section 106, “damage to all or part of a property”, “change of the character of the property’s use” and “neglect of a property which causes its deterioration” all would be considered an “adverse effect” if they occur during cut-and-cover construction (Criteria of Adverse Effect *i*, *iv*, and *vi*, respectively). With implementation of previously described Traffic Mitigation Measures **T8**



and **T11** and Mitigation Measure **CON35**, these buildings would be unlikely to experience physical damage, a change of the character of the property's use, or physical deterioration during construction. Therefore, no adverse effects are anticipated during construction related to historic and architectural resources.

Leimert Park and the potential contributing commercial buildings may be affected by the cut-and-cover tunnel construction and the proposed subterranean station construction spanning the area along Crenshaw Boulevard between West Vernon Avenue and West 43rd Place. There is a risk of settlement and any damage that may result to any of the properties, for the properties on the west side of Crenshaw Boulevard, as well as the western edge of the park, and potentially some of the buildings along the north side of West 43rd Place.

In addition, construction period effects may include restriction of access to the businesses, and, therefore, negatively affect their economic viability. These buildings are all located in areas where cut and cover subway construction techniques may be employed. Cut and cover construction typically requires surface land area located within the public right of way to allow for excavation, equipment and adjacent lay down and spoil areas. Cut and cover construction sites may limit pedestrian, vehicular and parking access to adjacent land uses and businesses. Each of the properties of concern have dedicated off-street parking accessible from both Crenshaw Boulevard as well as an adjacent side street or alley. As described in the Transportation section under Mitigation Measures **T8** and **T11**, Metro will maintain access as well as provide way finding signage to these parking areas during construction. Cut and cover disruption at a single location is likely to extend for one to two years. It is not anticipated that access to this adjacent property would be severely restricted, and as a result, it would be unlikely that all access to this adjacent property would be eliminated, to the extent that the economic viability of the historic property would be adversely affected and to the extent there would physical deterioration of property during the period of construction.

Under Section 106, "damage to all or part of a property", "change of the character of the property's use" and "neglect of a property which causes its deterioration" all would be considered an "adverse effect" if they occur during cut-and-cover construction (Criteria of Adverse Effect *i*, *iv*, and *vi*, respectively). With implementation of previously described Traffic Mitigation Measures **T8** and **T11** and Mitigation Measure **CON35**, these buildings would be unlikely to experience physical damage, a change of the character of the property's use, or physical deterioration during construction. Therefore, no adverse effects are anticipated during construction related to historic and architectural resources.

Construction of the Base LRT Alternative would introduce an elevated station and approach that would run immediately adjacent to the existing elevated railroad right-of-way and bridge. Construction of the elevated structure would require a property take and from the Century Lounge (formerly Carolina Lanes Bowling Center). Although no demolition of the building is anticipated, acquisition would result in a direct use under Section 4(f).

In addition, Mitigation Measures **T8**, **T11**, **CON34**, **CON35**, **CON37**, and **CON38** would be implemented to reduce potential impacts to historic properties and structures.



Paleontological Resources

Based upon the paleontological review, the majority of the project area has a high level of sensitivity for paleontological resources, especially at depths below 5 feet. Under the Base LRT Alternative, excavation during construction would exceed 5 feet at the cut and cover and below grade portions of the alignment as well as possibly at the elevated guideways and station locations. While it is unlikely, if construction of the LRT Alternative destroys a significant paleontological resource, it would potentially result in an adverse effect on paleontological resources. Mitigation Measure **CON37** would be implemented as appropriate to ensure no adverse impact would occur.

LRT Alternative Design Options

Archaeological Resources

No known archaeological resources would be affected by the six LRT Alternative design options. However, discovery of archaeological resources is possible during excavation activities associated with the columns. Mitigation Measure **CON33** would be implemented to insure no adverse impact would occur to archaeological resources.

Historic and Architectural Resources

Construction of the Design Option 1 would introduce an elevated station and approach that would run immediately adjacent to the existing elevated railroad right-of-way and bridge. Construction of the elevated structure would require a property take (associated with the aerial stations columns). However, no demolition of the Century Lounge (formerly Carolina Lanes Bowling Center) would occur. Therefore, this option would result in a direct use under Section 4(f). An avoidance alternative would consist of design of the station and placement of the columns in an area furthest from the building. In addition, Mitigation Measures **CON34** and **CON38** would be implemented to reduce impacts to the Century Lounge (formerly Carolina Lanes).

While there may be minor indirect impacts to historic properties within the APE that are in the vicinity of Design Options 2 and 3, they are not expected to be adverse, would not require mitigation, and do not warrant further detailed analysis. Therefore, construction of this option is not anticipated to have an adverse impact on historic and architectural resources.

Unlike the Base LRT alignment, Design Option 4 would travel below grade in the vicinity of potentially historic structures (i.e., St John the Evangelist Catholic Church, St. John Catholic School, and Department of Water and Power Transformer Station #18); therefore, no visual change in the setting of the properties would occur. While there may be minor indirect impacts to historic properties within the APE that are in the vicinity of this option, they are not expected to be adverse, would not require mitigation, and do not warrant further detailed analysis. Therefore, this option is not anticipated to have an adverse impact on historic and architectural resources.

Design Option 5 proposes a below-grade station north of Vernon Avenue in the community of Leimert Park. This optional station would be located below Crenshaw Boulevard in the vicinity of Leimert Park, but immediately across Crenshaw Boulevard from the park and nearby historic structures (along 43rd Place and the Great Western Savings & Loan on Crenshaw Boulevard). Therefore, similar to the Base LRT Alternative,



this option would not affect historic properties. Therefore, this option would not result in any direct or indirect adverse effect on Section 4(f) resources. In addition, Mitigation Measures **T8**, **T11** and **CON35** would be implemented to reduce potential impacts to historic properties and structures.

Design Option 6 proposes a below-grade alignment between 39th and Exposition Boulevard with a below-grade station at Martin Luther King Jr. Boulevard. As with the Base LRT Alignment, while there would be no direct major change to the adjacent historic properties (i.e., former Broadway and May Company Department Stores, Department of Water and Power Building, Angelus Funeral Home, and Crenshaw Square) or their setting, there is a risk of settlement and damage that may result from both tunnel and station construction.

In addition, construction period effects would include restriction of access to the businesses, and therefore, negatively affect their economic viability. These buildings are all located in areas where cut and cover subway construction techniques may be employed. Cut and cover construction typically requires surface land area located within the public right of way to allow for excavation, equipment and adjacent lay down and spoil areas. Cut and cover construction sites may limit pedestrian, vehicular and parking access to adjacent land uses and businesses. Each of the properties of concern have dedicated off-street parking accessible from both Crenshaw Boulevard as well as an adjacent side street or alley. As described in the Transportation section under Mitigation Measures **T8** and **T11**, Metro will maintain access as well as provide way finding signage to these parking areas during construction. Cut and cover disruption at a single location is likely to extend for one to two years. It is not anticipated that access to this adjacent property would be severely restricted, and as a result, it would be unlikely that all access to this adjacent property would be eliminated, to the extent that the economic viability of the historic property would be adversely affected and to the extent there would physical deterioration of property during the period of construction.

Under Section 106, “damage to all or part of a property”, “change of the character of the property’s use” and “neglect of a property which causes its deterioration” all would be considered an “adverse effect” if they occur during cut-and-cover construction (Criteria of Adverse Effect (i), (iv), and (vi), respectively). Mitigation Measures **T8**, **T11**, **CON35**, and **CON37** would be implemented to reduce potential impacts to historic properties and structures.

Paleontological Resources

Potential impacts to paleontological resources for the six LRT Alternative design options are similar to the Base LRT Alternative. Mitigation Measure **CON37** would be implemented as appropriate to ensure no adverse impact would occur.

Maintenance and Operations Facility Sites

Archaeological Resources

No known archaeological resources listed in or eligible for listing in the National Register would be affected by the construction of a maintenance and operation facility site.

However, discovery of archaeological resources is possible during construction, and if a



National Register-eligible archaeological resource is damaged or destroyed, construction of a maintenance and operations facility site would result in an adverse effect.

Historic and Architectural Resources

A portion of the original Kaiser Homes production plant (proposed Site B) would be demolished for the BRT/LRT maintenance yard/shops. In the absence of avoidance or adaptive reuse and incorporation into the project, the demolition would be an adverse effect under Section 106 Criteria of Adverse Effect *i*, “damage to all or part of a property”.

Paleontological Resources

Excavation during construction of maintenance and operations facility sites is not anticipated to exceed 5 feet in depth. However, if construction of a maintenance and operations facility site destroys a significant paleontological resource, it would potentially result in an adverse effect.

Mitigation Measures

Impacts that would arise from construction of any of the alternatives were identified in Sections 4.11 Cultural and 4.15.3.13, above. Elimination or reduction of these construction period impacts would occur through two steps, as follows: (1) compliance with local, state or federal regulations or permits that have been developed by agencies to manage construction impacts, to meet legally established environmental impact criteria or thresholds, and/or to ensure that actions occurring under agency approvals or permits are in compliance with laws and policies, as described below; (2) implementation of the proposed alternatives with additional construction period mitigation measures. Section 4.15.3.13 identifies construction period impacts for which compliance with local, State, and federal regulations, permits, or similar types of requirements would eliminate or reduce such impacts. Grading and construction activities may expose prehistoric or historical archaeological sites or paleontological resources. The proposed project would be implemented with the following accidental find provisions, expressed as mitigation measures, as part of any construction documents.

- CON33** Archaeological monitoring by a qualified archaeologist shall be conducted during initial ground disturbance (a qualified archaeologist has at least a Bachelor’s degree in anthropology and experience, and is supervised by is a registered professional archaeologist). If buried cultural resources—such as flaked or ground stone, historic debris, building foundations, or non-human bone—are inadvertently discovered during ground-disturbing activities, work shall stop in that area and within 100 feet of the find until a qualified archaeologist can assess the significance of the find and, if necessary, develop appropriate treatment measures. Treatment measures typically include: development of avoidance strategies, capping with fill material, or mitigation of impacts through data recovery programs such as excavation or detailed documentation. If during cultural resources monitoring the qualified archaeologist determines that the sediments being excavated are previously disturbed or unlikely to contain significant cultural materials, the qualified archaeologist can specify that monitoring be reduced or eliminated. If cultural resources are discovered during construction activities, the



construction contractor shall verify that work is halted until appropriate site-specific treatment measures—such as those listed above—are implemented.

If human remains of Native American origin are discovered during ground-disturbing activities, it is necessary to comply with state laws relating to the disposition of Native American burials that fall within the jurisdiction of the California Native American Heritage Commission (PRC Section 5097). According to California Health and Safety Code, six or more human burials at one location constitute a cemetery (Section 8100), and disturbance of Native American cemeteries is a felony (Section 7052). Section 7050.5 requires that excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the California Native American Heritage Commission to determine the most likely living descendant(s). The most likely living descendant shall determine the most appropriate means of treating the human remains and any associated grave artifacts, and shall oversee disposition of the human remains and associated artifacts by the project archaeologists.

- CON34** Documentation of the Century Lounge (formerly Carolina Lanes Bowling Center at 5601 West Century Boulevard to HABS archival standards shall be prepared, submitted to SHPO for review and approval, and donated to a suitable repository, such as the Los Angeles Public Library. The documentation would not mitigate the demolition of the buildings to less than adverse.
- CON35** Although settlement adjacent to cut-and-cover construction is not anticipated, monitoring of soil settlement shall be conducted where historic buildings are in close proximity to cut-and-cover construction. If settlement is detected, steps shall be taken to stop the settlement before damage to historic buildings occurs. If historic buildings are damaged, they shall be repaired in accordance with the Secretary of the Interior’s Standards. Monitoring of potential settlement shall be undertaken at the following locations:
- Department of Water and Power – 4030 Crenshaw Boulevard
 - May Company Department Store (now Macy’s) – 4005 Crenshaw Boulevard
 - Broadway Department Store (now WalMart) – 4101 Crenshaw Boulevard
 - Maverick’s Flat - 4225 Crenshaw Boulevard
 - Great Western Savings and Loan (now Chase Bank) – 4401 Crenshaw Boulevard
 - Leimert Park-Commercial Buildings
- CON36** A qualified paleontological monitor shall monitor all excavation in areas identified as likely to contain paleontological resources below 5 feet. These areas are defined as all areas within the Crenshaw Transit Corridor where

excavation would exceed 5 feet in depth (*i.e.*, tunnel boring, cut-and-cover construction, deep footings.)

The qualified paleontological monitor shall retain the option to reduce monitoring if, in his or her professional opinion, the sediments being monitored were previously disturbed. Monitoring may also be reduced if the potentially fossiliferous units, previously described, are not present or, if present, are determined by qualified paleontological personnel to have a low potential to contain fossil resources. The monitor shall be equipped to salvage fossils and samples of sediments as they are unearthed to avoid construction delays and shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Recovered specimens shall be prepared to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Specimens shall be curated into a professional, accredited museum repository with permanent retrievable operation. A report of findings, with an appended itemized inventory of specimens, shall be prepared and will signify completion of the program to mitigate impacts on paleontological resources.

- CON37** The TPSS near the Angelus Funeral Home at 3886 Crenshaw Boulevard shall be designed and/or set back to minimize the visual effect on the historic building and its setting. Consultation with a qualified architectural historian or historic preservation architect shall be conducted and their comments implemented in the design or location of the TPSS site. SHPO will be given an opportunity for review, comment, and approval.
- CON38** The LRT and BRT station(s) at the Century Lounge (formerly Carolina Lanes Bowling Center) at 5601 West Century Boulevard shall be designed to minimize the permanent visual effect on the historic building and its setting. Consultation with a qualified architectural historian or historic preservation architect shall be conducted and their comments implemented. SHPO will be given an opportunity for review, comment, and approval.

Impacts Remaining After Mitigation

Implementation of Mitigation Measure **CON33** would reduce construction period impacts for both build alternatives to less than adverse levels. No further mitigation would be required and there would be no remaining adverse effects. Implementation of Mitigation Measure **CON34** would not mitigate the demolition of the Century Lounge (formerly Carolina Lanes Bowling Center, 5601 West Century Boulevard) to a level of less than adverse. Implementation of Traffic Mitigation Measures **T8** and **T11** and Mitigation Measure **CON35** would ensure that access to historical resources and is available and no damage to historical resources would occur. Therefore, no adverse effects are anticipated. Implementation of Mitigation Measure **CON36** would eliminate potential adverse effects to paleontological resources by complying with the local, state and/or federal regulatory requirements and/or permits for potential paleontological resources. Therefore, no adverse effects are anticipated.

**4.15.3.14 Parklands and Other Community Facilities
BRT Alternative**

Adverse effects related to construction associated with the BRT Alternative may potentially temporarily disrupt circulation patterns and result in temporary obstruction of pedestrian and vehicular access to the parklands and other recreational facilities along the alignment.

No roadway modifications would occur along Crenshaw Boulevard adjacent to Leimert Park. However, the roadway would be widened immediately to the south of the park which would temporarily disrupt circulation patterns in the vicinity. Vehicles and pedestrians accessing the park from the south would have to traverse the construction area to reach the park. However, the pedestrian and vehicular entrances to the park would be outside of the construction area and, therefore, be unobstructed and the park and its amenities would remain accessible. The disruption caused by construction along Crenshaw Boulevard to the south of the park would be temporary.

Construction of the BRT exclusive busway would occur adjacent to and within the southern edge of the Edward Vincent Jr. Park. Vehicular access to the park is provided from streets to the north and east of the park, which would not be directly affected during the construction period. Although there is no direct access into the park from the Harbor Subdivision, vehicular and pedestrian circulation in the park vicinity would be temporarily disrupted.

Pedestrian access into the park, at the Florence Avenue/Centinel Avenue intersection, would be closed during construction at this location. The path leading into the park at this location would be removed and relocated immediately to the north of the existing location. The removal and relocation would be a temporary disruption to pedestrians, however, remaining access points into the park would remain open - the nearest at the Centinela Avenue/Warren Lane intersection. Although the path to be relocated would be closed to park visitors during the construction and relocation period; another leg of the path immediately to the north would continue to remain open and would provide access to other park amenities.

The other recreational amenities in close proximity to the construction area are tennis courts and athletic fields. While use of the tennis courts and play fields may temporarily be impaired as a result of noise and air emissions associated with construction, the amenities would likely remain open for use during the construction period. Furthermore, construction would primarily occur during weekdays as opposed to weekends when use of the park amenities would be at the highest levels.

No construction would also occur immediately adjacent to the Museum of African American Art located on Crenshaw Boulevard near Martin Luther King Jr. Boulevard. However, construction would occur on Crenshaw Boulevard on the opposite side of the street across and to the south of the museum. This would temporarily disrupt vehicular and pedestrian circulation patterns in the vicinity. However, direct access into the museum site would remain open.

Construction would temporarily disrupt vehicular and pedestrian circulation in the vicinity of several recreation facilities, and disrupt use of a path in Edward Vincent Jr. Park. However, this impact would be temporary in that it would only occur only while construction is occurring along the BRT segment in the immediate vicinity. Further, direct vehicular and pedestrian access into all the recreational facility sites would remain open. Therefore, construction activity on parklands and other community facilities would not result in adverse effects.

Construction along the alignment would result in temporary lane closures and disruption in traffic. However, emergency ingress and egress would be maintained at all times. Construction work traffic control plans would be prepared for each construction site and submitted to Los Angeles Department of Transportation (LADOT) for review and approval prior to the start of any construction activities. As part of the work plan process, advance notice would be given to emergency service providers (the LAPD, IPD, LAFD, and Los Angeles County Fire Department) regarding the location and duration of any traffic delays and applicable detours to minimize the potential disruption to emergency services caused by limited access to and/or closure of lanes and streets within the public rights-of-way. Construction would not affect the provision of police and fire protection services.

Adverse construction effects related to roadway modifications and construction associated with the BRT Alternative may temporarily disrupt circulation patterns and result in temporary obstruction of pedestrian and vehicular access to community facilities located along the alignment. However, this impact would be temporary in that it would only occur only while construction is taking place along the BRT segment in the immediate vicinity of the facility. Those community facilities that would be affected to the greatest degree are those with ingress and egress located on roadway segments that are being modified. Five religious facilities and two educational facilities have ingress and egress on segments of Crenshaw Boulevard frontage roads where roadway modifications will occur with no alternative site access available. While access to these facilities would be impeded during construction, it would not be eliminated. Therefore the impact would not be adverse.

Base LRT Alternative

Construction adverse effects related to roadway modifications and construction of the Base LRT Alternative would be similar to those discussed for the BRT described above. As with the BRT Alternative, construction activity related to parklands and other community facilities would not result in adverse effects.

LRT Alternative Design Options

There are no parklands located within 0.5-mile of the Design Options 1, 2, 4, and 6. Therefore, these design options would not result in any construction impacts to parkland. Design Option 3 includes a cut and cover crossing instead of an at-grade crossing at Centinela Avenue. Potential construction impacts to Edward Vincent Jr. Park are similar to those discussed for the BRT Alternative described above. Design Option 5 includes a design option for a below-grade station at Vernon Avenue in Leimert Park. Potential construction impacts to Leimert Park are similar to those discussed for the BRT Alternative described above. These options are within the Base LRT Alternative alignment area. Similar to the Base LRT Alternative, these options are not anticipated to have an adverse effect from construction related to roadway modifications and construction.

**Maintenance and Operations Facility Sites**

Neither of the two proposed maintenance and operations facility locations are within 0.25 mile from parkland. Maintenance and operations facility Site B is within 0.25 mile of two community facilities. Site D does not have any community facilities within 0.25 mile. Construction of Site B would occur within the maintenance and operations site and therefore, construction at the maintenance and operations facility sites would have no adverse impact on parklands or community facilities.

Mitigation Measures

None required.

4.15.3.15 Economic and Fiscal Adverse effects**BRT Alternative**

The BRT Alternative preliminary capital cost is estimated to be \$562.0 million (\$2008). The estimated regional economic output, employment, and household income are larger by several magnitudes. Economic output would be about \$496.5 million (\$2008), average annual total employment would be about 3,500 employees, and household income would be about \$286.8 million (\$2008).

The construction activities, demand for construction workers, and four to five years of construction for the BRT Alternative would be greater than the TSM Alternative. Total direct, indirect, and induced jobs would create a demand for about 3,500 new workers. The 2,000 direct jobs would mostly be in the construction section, but is a very small proportion of the 2006 average annual employment in the regional construction sector. Again, the demand for workers would be expected to be met by the available work force. The construction for the road improvements and BRT stations would involve expenditures for labor as well as materials and supplies.

It is expected that the construction labor force would be from the region. The magnitude of the construction project is relatively small, the construction duration is several years, and the regional construction work force is very large. State and local governments would theoretically benefit from income taxes paid on the project construction force wages. However, the magnitude of the construction activities associated with the BRT Alternative is relatively small compared to all construction activities in the region and the available construction work force. As such, it is not expected that the labor expenditures would result in substantial net new expenditures for construction labor in the region. Therefore, it is unlikely that state and local governments would actually benefit from increased income tax revenues.

The purchase of materials and supplies associated with roadway modifications, the busway, BRT stations, and park-and-ride lots include routine roadway construction purchases. They would include gravel, asphalt, concrete, architectural materials for the station structures, and signage. Most of these materials and supplies would be expected to be purchased within the region, if not a substantial portion in Los Angeles County. The purchase of these materials and supplies would include the payment of sales tax, which would be revenue distributed to the state and local governments in the region. The amount of materials and supplies required for the proposed project, however, is relatively small compared to all construction projects that would be ongoing in the

region. As such, it is unlikely that the state or local governments would see a substantial increase in sales tax revenues.

Multiple construction crews would work simultaneously along the corridor, but would not remain in any one corridor segment for long periods, except slightly longer segment construction durations would be required for the busway in the Harbor Subdivision. These disruptions along the entire corridor would last from four to five years.

These construction activities would inconvenience and disturb area employees, business operations, and business customers. Temporary construction effects would include:

- Presence of construction workers, heavy construction equipment, and materials
- Use of short-term reduction in number of roadway travel lanes, road closures, traffic diversions, and modified access to properties
- Loss of parking, especially on-street parking
- Increase in airborne dust
- Increase in noise and vibration from construction equipment and vehicles
- Decreased visibility and change in customer access to businesses

Depending on construction activities, individual businesses may suffer little or no adverse effects, while others may experience a noticeable adverse change in sales or operating costs. Construction of the maintenance and operations facility at either Site B or Site D should not affect nearby businesses as these sites are in predominantly light industrial and warehousing areas. In contrast, other business along the corridor may see increased sales – particularly for restaurant meals, food and snacks, gasoline, and other minor purchases from the project construction work force.

Base LRT Alternative

The regional economic effect of the Base LRT Alternative would be more than twice the effects of the BRT Alternative. The preliminary capital costs for the LRT Base LRT Alternative is \$1,301.0 million (\$2008). Regional economic impacts for the Base LRT Alternative would be \$1,110.3 million (\$2008), average annual total employment would be about 7,800 employees, and household income would be \$642.7 million (\$2008). Together, the range of regional effects for the Base LRT Alternative is almost three times larger compared to the BRT Alternative.

Proposed construction associated with the Base LRT Alternative would require a workforce that would be substantially larger, more than double, than the size needed for the BRT Alternative. Total direct, indirect, and induced employment from new monies in the region for both the Base LRT Alternative would total about 7,800. About 4,400 construction workers would be needed. Similar to the BRT Alternative, it is fully expected that the regional labor force would meet the expected demand.

Compared to the capital expenditures for the BRT Alternative, the expenditures for the Base LRT Alternative would be substantially greater. The preliminary capital cost estimate for the BRT Alternative is \$562.0 million compared to \$1301.0 million for the



Base LRT Alternative. The construction for the road improvements and LRT stations, however, would involve expenditures for labor, materials and supplies. And, most would go to workers and businesses in the region.

Like the BRT Alternative, it is expected that the regional labor force would construct this alternative. State and local governments would benefit from income taxes paid on the project construction force wages. However, the magnitude of the construction activities for the Base LRT Alternative is relatively small and so it is not expected that the labor expenditures would result in net new expenditures for construction labor. Therefore, it is unlikely that state and local governments would see a substantial increase in income tax revenues.

The purchase of materials and supplies associated with roadway modifications, the rail tracks, LRT stations, and park-and-ride lots would include routine roadway and rail construction activities. Purchases would include gravel, asphalt, concrete, track rails, and architectural materials for the station structures, and signage. Most of these materials and supplies would be expected to be purchased within Southern California, if not a substantial portion in Los Angeles County. The purchase of these materials and supplies would include the payment of sales tax, which would be revenue distributed to the state and local governments. The amount of materials and supplies required for the proposed project, however, is relatively small compared to all construction projects that would be ongoing in the region. As such, it is unlikely that the state or local governments would see a substantial increase in sales tax revenues.

For business owners and commercial property owners, the disruption of construction activities would similarly involve multiple construction crews operating along the corridor simultaneously; however, the extent of construction activities under this alternative compared to the BRT Alternative would be substantially greater over a shorter transit corridor for a similar total duration of four to five years. As such, the duration of a particular construction crew would be working on a particular corridor segment in any one commercial district would generally be longer than under the BRT Alternative. Construction activities for at-grade segments would take the least amount of time followed by elevated portions and then below-grade segments. Construction activities associated with the LRT stations would be substantially more involved than the BRT stations, especially for those with park-and-ride lots. Construction activities associated with the maintenance and operations facility would be expected to last up to two years.

As the disruption from the construction activities would be more extensive, the duration of reduced number of roadway travel lanes, road closures, traffic diversion, and modified access to business properties, and loss of on-street parking would be greater. These effects would further decrease business visibility and access to businesses by suppliers and customers. As such, the total duration of adverse effects on corridor businesses and commercial property owners would be substantially greater compared to the BRT Alternative.

LRT Alternative Design Options

Design Option 1 includes an aerial station at Century Boulevard instead of an at-grade station at LAX. The preliminary capital cost estimate for this LRT design option is \$1,312,880 as compared to \$1,301,011 for the Base LRT Alternative.

Design Option 2 includes an aerial crossing instead of an at-grade crossing at Manchester Avenue. The preliminary capital cost estimate for this LRT design option is \$1,317,302 as compared to \$1,301,011 for the Base LRT Alternative.

Design Option 3 includes a cut and cover crossing instead of an at-grade crossing at Centinela Avenue. The preliminary capital cost estimate for this LRT design option is \$1,312,524 as compared to \$1,301,011 for the Base LRT Alternative.

Design Option 4 includes a cut and cover alignment instead of an aerial alignment between Victoria Avenue and 60th Street. The preliminary capital cost estimate for this LRT design option is \$1,332,684 as compared to \$1,301,011 for the Base LRT Alternative.

Design Option 5 includes a design option for a below-grade station at Vernon Avenue in Leimert Park. The preliminary capital cost estimate for this LRT design option is \$1,458,174 as compared to \$1,301,011 for the Base LRT Alternative.

Design Option 6 includes a below-grade alignment between 39th Street and Exposition with a below-grade station instead of an at-grade alignment north of 39th Street with connection to Exposition and an at-grade station. The preliminary capital cost estimate for this LRT design option is \$1,525, 888 as compared to \$1,301,011 for the Base LRT Alternative. Regional economic impacts for the LRT Alternative Design Options would increase marginally over the Base LRT Alternative. Average annual total employment would remain about 7,800 employees, and household income would be similar to the Base LRT Alternative.

Mitigation Measures

It is not expected that effects on the regional economy, employment, and government revenues would be adverse. However, construction planning and mitigation measures would be needed to reduce adverse effects from the inconvenience and/or disruption to the flow of customers, employees, and materials and supplies to and from corridor businesses. Some mitigation measures would be integrated into the project management plan, the business mitigation plan, and the project's contract specifications. Recommended mitigation measures to reduce these adverse effects on project area businesses should include the following:

- CON39** Nearby business owners and commercial property owners shall be notified of the schedule for specific planned construction activities, changes in traffic flow, and required short-term modifications to property access.
- CON40** General notice shall be provided to local government, transit agencies, major institutions, and other organizations of the schedule for planned construction activities.



- CON41** Methods shall be developed by which business owners can convey their concerns about construction activities and the effectiveness of mitigation measures during the construction period so activities can be modified to reduce adverse effects.
- CON42** Advance notice shall be provided to affected property owners if utilities would be disrupted for short periods of time and scheduled major utility shut-offs during low-use periods of the day.
- CON43** Construction activities shall be planned to minimize effects on community gatherings, special celebrations, or other similar events.
- CON44** Public information campaigns shall be conducted to encourage patronage of corridor businesses during the construction period.

Due to the more extensive construction disruptions under the Base LRT Alternative, the total package of mitigation measures would need to be more elaborate than those proposed for the BRT Alternative.

Impacts Remaining After Mitigation

Implementation of Mitigation Measures **CON41** through **CON44** would reduce economic and fiscal effects during construction to less than adverse.

4.15.3.16 Safety and Security

BRT Alternative

Under the BRT Alternative, construction of the busway would involve excavation, and on-site construction equipment which would pose a temporary safety threat to traffic and pedestrians. Typical of construction sites, concrete barriers with fencing would be placed around the perimeter of the site to restrict access and eliminate the threat to safety and security of anyone not directly involved in construction activity. Construction sites located near schools may pose an additional risk to students who pass by on their way to or from school. It is assumed that all additional related activity would be implemented in accordance with all federal and State requirements and permits during the construction process. Therefore, the BRT Alternative would have no adverse effects related to safety and security.

Base LRT Alternative

Construction of the Base LRT Alternative would result in similar threats to safety and security as the BRT Alternative. Concrete barriers with fencing would be placed around the perimeter of the site to restrict access and eliminate the threat to safety and security of anyone not directly involved in construction activity. Construction sites located near schools may pose an additional risk to students who pass by on their way to or from school. It is assumed that all additional related activity would be implemented in accordance with all federal and state requirements and permits during the construction process. Therefore, the Base LRT Alternative would have no adverse effects related to safety and security.

LRT Alternative Design Options

The six LRT Alternative design options would have the same safety and security construction effects as the Base LRT Alternative.

Maintenance and Operations Facility Sites

Construction of maintenance and operations facility sites would be similar to the BRT and Base LRT Alternatives. Therefore, no adverse effects related to safety and security are anticipated.

Mitigation Measures

CON45 An Educational safety awareness program shall be instituted at schools adjacent to construction activity along the project alignment, which provide information to students about the threat to safety from entering construction sites.

4.15.3.17 Growth Inducing

Any construction-related activity that would be growth inducing is addressed in Section 4.15.3.15 Economical and Fiscal Impacts.

Mitigation Measures

None required.

4.15.3.18 Environmental Justice

BRT Alternative

The construction activity associated with the BRT Alternative would be temporary and similar throughout the alignment. The only exception is the intense construction that would occur at the Florence Avenue/La Brea Avenue intersection due to the aerial structure and near Edward Vincent Jr. Park, where the large mature trees would be removed. Both of these areas are predominately minority, low-income, have a high percentage of elderly and Limited English Proficiency (LEP) populations. Nevertheless, mitigation measures have been identified for the construction of the aerial structure and the process of the removal of the mature trees that, upon implementation, would result in no substantial adverse effects. Therefore, no disproportionate adverse impacts associated with construction are anticipated.

Base LRT Alternative

The construction activity associated with the Base LRT Alternative would be temporary throughout the alignment. However, the intensity and type of construction activities would differ in several segments of the alignment. In particular, construction impacts would be more intense where the cut-and-cover tunnel construction occurs (Leimert Park and Crenshaw District) and where the aerial structures/station are to be built (Hyde Park, Inglewood, El Segundo). These areas are comprised predominately by minority populations, a combination of medium- and low-income populations, and have variable populations of elderly and LEP. Although mitigation measures have been identified for the construction of the grade separations, there remain impacts associated with the local businesses along Crenshaw Boulevard, many of which may be owned by minorities, and most of which serve the minority and low-income communities. Although the prolonged construction period that is typical of cut-and-cover tunnel construction and of aerial structures could affect the economic viability of the small businesses (by restricting access and removing on-street parking), the construction of the Base LRT Alternative would not temporarily



displace these businesses. Therefore, no disproportionate adverse impacts associated with construction are anticipated for businesses that serve minority and low-income communities.

LRT Alternative Design Options

All six LRT Alternative design options would have similar environmental justice construction impacts as the Base LRT Alternative.

Maintenance and Operations Facility Sites

Construction of maintenance and operations facility sites would not directly relate to environmental justice considerations of the proposed project corridor. Construction methods and equipment would not be different than that present at other construction sites in other neighborhoods, minority or non-minority, low- or high-income. As such, no disproportionate adverse effects associated with environmental justice considerations for construction of maintenance and operations facility sites are anticipated.

Mitigation Measures

CON46 Metro shall ensure that all businesses and service providers are provided with adequate access during construction. Where there is a significant LEP population, signage shall be provided in various languages (as appropriate).

CON47 Metro shall provide funding for temporary signage and advertising during construction to help businesses that are partially blocked or that have inconvenient access due to construction activity.

4.15.4 Cumulative

Construction impacts, by nature, would be temporary and intermittent over the construction period for the Crenshaw Transit Corridor Project. Over this time period, other developments in the vicinity may compound construction nuisances, such as air quality, noise, and traffic delays, for the community and motorists in isolated areas in and around the Crenshaw Transit Corridor. The project area is a growing area, and any major development occurring simultaneously adjacent to the project alignment may potentially have a short-term cumulatively considerable construction impact. Each alternative includes measures to minimize construction impacts and thereby, reduce the project's contribution to cumulative construction impacts. However, in the long-term, construction impacts would not be considered cumulatively adverse.

Mitigation Measures

None required.

4.15.5 CEQA Determination

The CEQA Guidelines implicitly acknowledge that construction-related changes may be the source of significant impacts to the physical environment even though these effects may be short-term in duration. The preceding discussion has addressed all topic areas of environmental effects as required by CEQA. Typically significant construction effects are identified in CEQA as changes to the physical environment that are particularly

disruptive or that have specific health and safety considerations. The construction effects identified above by in large require the development and implementation of a comprehensive array of construction management and abatement measures as described previously under the Mitigation Measures heading. Those environmental changes requiring mitigation would be considered significant for purposes of CEQA and include:

- Traffic, Circulation, and Parking
- Land Use and Development
- Visual Quality
- Air Quality
- Noise and Vibration
- Ecosystems/Biological Resources
- Geotechnical/Subsurface/Seismic/Hazardous Materials
- Water Resources
- Historic, Archaeological and Paleontological
- Economic and Fiscal
- Safety and Security



4.16 Growth-Inducing Impacts

4.16.1 Regulatory Framework

Federal

Guidance for the preparation of growth inducing impacts was obtained from both federal and State regulations. The regulations established by the Council on Environmental Quality (CEQ), regarding the implementation of the NEPA, require the evaluation of all potential environmental consequences of all proposed federal activities and programs. This provision includes a requirement to examine the indirect consequences, or secondary impacts, which may occur in areas beyond the immediate influence of a proposed action and at some time in the future (40 CFR 1508.8). Secondary impacts may include changes in land use, economic vitality, and population density. These are all elements of growth.

FTA guidelines require MPOs to create regional growth projections by assuming future year conditions. The SCAG states in the 2008 RTP Program Environmental Impact Report (PEIR) that lead agencies for individual projects may use the PEIR as the basis of their regional impacts analysis. The 2008 RTP examines current and future transportation plans, population and employment growth, and land use data for the SCAG region to develop projections through the year 2035. The 2008 RTP, adopted on May 8, 2008, updates the 2004 RTP, which contains projections through year 2030. Since the year for the analysis of this proposed project has been determined to be 2030, the 2004 RTP projections serve as the basis for this analysis of growth inducing impacts.

State

The CEQA also requires the analysis of a project's potential to induce growth. CEQA guidelines, Section 15126.2(d), require that environmental documents "discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." Growth inducing impacts also include removing obstacles to growth and can include changes in the amount and distribution of growth.

4.16.2 Existing Conditions/Affected Environment

4.16.2.1 Study Area

The study area crosses through two of the 14 subregions in SCAG's planning area: the City of Los Angeles and the South Bay Cities Council of Governments (SBCCOG) subregions. The Cities of Inglewood, Hawthorne, and El Segundo are located within the SBCCOG subregion.

The primary regional growth management plans are developed by SCAG. SCAG initiated a comprehensive growth visioning process called the Southern California Compass (Compass). The Compass process seeks to accommodate growth while maintaining mobility, livability, prosperity, and sustainability goals for residents in the SCAG region. SCAG also developed the RCPG, which is described in Section 4.1 Land Use and Development.

4.16.2.2 Population Growth

As illustrated in Table 4-83, the SCAG region had a 2007 population of roughly 18.4 million persons. For the 2000 through 2007 period, Los Angeles County contributed the largest share of total population change for the region, at nearly 40 percent, with the addition of 756,584 residents. However, in terms of the relative growth rate, Los Angeles County was the slowest growing county in the SCAG region, with an annual average growth rate of approximately 1.1 percent. Table 4-84 shows that Los Angeles County had the largest number of households (752,027 households), which comprises 40 percent of the total for the region.

Table 4-83. Regional Population Growth, 2000-2007

County	Year 2000 Population	Year 2007 Population	2000-2007 Change	2000-2007 Annual Average % Change
Imperial	142,361	171,576	29,215	2.9%
Los Angeles	9,519,330	10,275,914	756,584	1.1%
Orange	2,846,289	3,089,707	243,418	1.2%
Riverside	1,545,387	2,034,840	489,453	4.5%
San Bernardino	1,710,139	2,026,325	316,186	2.6%
Ventura	753,197	823,129	69,932	1.3%
SCAG Region	16,516,703	18,421,491	1,904,788	1.6%

Source: State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008.

Table 4-84. Households in the Region, 2000-2007

County	Year 2000 Households	Year 2007 Households	2000-2007 Change	2000-2007 Annual Average % Change
Imperial	131317	159,545	28,228	3.1%
Los Angeles	9344078	10,096,105	752,027	1.1%
Orange	2803924	3,045,714	241,790	1.2%
Riverside	1511034	1,997,866	486,832	4.6%
San Bernardino	1664402	1,973,415	309,013	2.7%
Ventura	739985	809,595	69,610	1.3%
SCAG Region	16,194,740	18,082,240	1,887,500	1.7%

Source: State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008.

Table 4-85 shows the near-term population growth for all of the cities in the study area. Between 2000 and 2007, the City of Los Angeles has the highest annual average growth rates, at 1.2 percent. The City of El Segundo, which had the smallest population in 2000 (16,033 people), had the same annual average growth rate (less than 1 percent) as the Cities of Hawthorne and Inglewood between 2000 and 2007.



Table 4-85. Population Growth for Study Area Cities, 2000-2007

City	Year 2000 Population	Year 2007 Population	2000-2007 Change	2000-2007 Annual Average % Change
El Segundo	16,033	16,981	948	0.8%
Hawthorne	84,112	88,583	4,471	0.8%
Inglewood	112,580	118,550	5,970	0.8%
Los Angeles	3,694,742	3,996,070	301,328	1.2%

Source: State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008.

Table 4-86 also shows that the City of Los Angeles experienced the largest amount of household growth from 2000 to 2007. By 2007, Los Angeles had the largest number of households at 3,910,799 households and the annual average percent change in number of households at 1.2 percent, compared to the other cities in the study area.

Table 4-86. Households for Study Area Cities, 2000-2007

City	Year 2000 Households	Year 2007 Households	2000-2007 Change	2000-2007 Annual Average % Change
El Segundo	16,010	16,958	948	0.8%
Hawthorne	83,612	88,083	4,471	0.8%
Inglewood	111,210	117,180	5,970	0.8%
Los Angeles	3,612,145	3,910,799	298,654	1.2%

Source: State of California, Department of Finance, E-4 Population Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008.

4.16.2.3 Employment Growth

As shown in Table 4-87, total employment in the SCAG region, including self-employment, increased by nearly 770,000 jobs between 2000 and 2007, an estimated 1.4 percent annual increase. Compared to the other counties in the SCAG region, Los Angeles County exhibited the lowest annual average change in employment at less than 1 percent change.

As shown in Table 4-88, out of the four study area cities, the City of Los Angeles had both the largest increase in employment numbers (96,800 new jobs); however, the annual average percent change in growth for the City of Los Angeles is roughly the same as the Cities of El Segundo, Hawthorne, and Inglewood.

4.16.2.4 Projections

The following projections are drawn from the 2004 RTP Growth Forecast. As shown in Table 4-89, the region is expected to have a population of nearly 23 million persons and 8.7 million persons employed by 2030. Along with the population and job growth, the region is expected to have a total of roughly 6 million households. The population of Los Angeles County and the employment in Los Angeles County are projected to increase by nearly 1.5

Table 4-87. Regional Employment Growth, 2000-2007

County	2001 Employment	2007 Employment	2000-2007 Employment Change	2000-2007 Annual Average % Change
Imperial	52,000	55,800	3,800	1.0%
Los Angeles	4,424,900	4,675,300	250,400	0.8%
Orange	1,428,400	1,568,800	140,400	1.4%
Riverside	643,900	853,800	209,900	4.7%
San Bernardino	703,600	835,100	131,500	2.7%
Ventura	374,700	408,300	33,600	1.3%
SCAG Region	7,627,500	8,397,100	769,600	1.4%

Sources:

1. State of California, Department of Finance, Labor Force Data for Sub-county areas, with 2006 Benchmark. Sacramento, California, 2000.
2. State of California, Department of Finance, Labor Force Data for Sub-county areas, with 2007 Benchmark. Sacramento, California, 2007.

Table 4-88. Employment Growth for Study Area Cities, 2000–2007

City	2001 Employment	2007 Employment	2000-2007 Employment Change	2000-2007 Annual Average % Change
El Segundo	10,300	10,900	600	0.8%
Hawthorne	37,000	39,000	2,000	0.8%
Inglewood	47,600	50,300	2,700	0.8%
Los Angeles	1,710,700	1,807,500	96,800	0.8%

Sources:

1. State of California, Department of Finance, 2000 Labor Force Data for Sub-county areas, with 2006 Benchmark. Sacramento, California, 2000.
2. State of California, Department of Finance, 2007 Labor Force Data for Sub-county areas, with 2007 Benchmark. Sacramento, California, 2007.

Table 4-89. Regional Population, Households, and Employment from 2010-2030

County	2010 Population	2030 Population	2010 Households	2030 Households	2010 Employment	2030 Employment
Imperial	189,025	269,874	54,626	83,735	76,724	111,072
Los Angeles	10,718,007	12,221,799	3,404,016	4,120,270	5,022,215	5,660,992
Orange	3,291,628	3,552,742	1,034,027	1,098,474	1,749,985	1,921,806
Riverside	2,085,432	3,143,468	685,775	1,127,780	727,711	1,188,976
San Bernardino	2,059,420	2,713,149	618,782	897,739	770,877	1,178,890
Ventura	865,149	989,765	275,352	332,109	381,680	465,466
SCAG Region	19,208,661	22,890,797	6,072,578	7,660,107	8,729,192	10,527,202

Source: Southern California Association of Governments, 2004 RTP Growth Forecast. April 2004.



million people and 640,000 jobs between 2010 and 2030. This represents an estimated average annual increase of approximately 75,100 persons (0.7 percent annual population growth) and 32,000 jobs (0.6 percent employment growth). For comparison, the annual average increase was 43,000 jobs, or 1.4 percent, during the 1972 to 2000 period.

For study area cities, forecast information, including population, number of households, and employment, was estimated based on the transportation analysis zones (TAZ) identified for each city, based on the SCAG 2030 Projections in the 2004 RTP. As demonstrated in Table 4-90, the City of Hawthorne is expected to have the most substantial change in population at 1.5 percent per year, nearly doubling its population from 2010 to 2030; however it exhibits the lowest growth per year of households (0.5 percent per year). The City of Los Angeles is anticipated to have the highest growth in households (1 percent per year), compared to the City of Inglewood and the City of El Segundo (both at 0.7 percent per year). The City of Los Angeles is expected to have the largest employment growth, with an anticipated growth rate of over 0.6 percent per year for the 20-year period while the City of Hawthorne and City of Inglewood are projected to have employment growth at 0.5 percent per year.

Table 4-90. Study Area Cities Population, Households, and Employment from 2010-2030

City	2010 Population	2030 Population	2010 Households	2030 Households	2010 Employment	2030 Employment
El Segundo	16,787	19,479	7,218	8,171	65,618	70,647
Hawthorne	90,395	116,725	29,217	32,153	37,915	41,897
Inglewood	119,023	133,072	39,358	44,812	56,859	62,046
Los Angeles	3,950,347	4,309,625	1,372,873	1,637,475	1,994,358	2,223,338

Source: Southern California Association of Governments, Draft 2035 Baseline Projections (2007).

4.16.3 Environmental Impacts/Environmental Consequences

Generally, growth-inducing projects are located in isolated, undeveloped, or underdeveloped areas, necessitating the extension of major infrastructure (e.g., sewer and water facilities, roadways, etc.) or are those that could encourage “premature” or unplanned growth (i.e., “leap-frog” development). Growth-inducing impacts would be considered significant if the proposed project has the potential to induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).

4.16.3.1 No Build Alternative

The No Build Alternative would include all existing highway and transit services and facilities, the committed highway and transit projects in Metro’s current LRTP, and the committed highway and transit projects in SCAG’s 2004 RTP. A substantial permanent change to the physical environment of the study area would not occur under the No Build Alternative. The No Build Alternative would not have the potential to induce growth. Therefore no adverse impacts are anticipated related to growth inducement.

4.16.3.2 TSM Alternative

The TSM Alternative would enhance the No Build Alternative by expanding the Metro Rapid bus services operating in the study area along Wilshire, Crenshaw, Martin Luther King Jr., and Aviation Boulevards, and the Harbor Subdivision right-of-way. A substantial permanent change to the physical environment of the study area would not occur under the TSM Alternative. The TSM enhancement would be located within a densely developed urban setting and would not extent into previously undeveloped areas that could induce changes in such areas. The TSM Alternative would not remove a barrier to growth or otherwise induce growth directly or indirectly. Therefore, no adverse impacts are anticipated related to growth inducement.

4.16.3.3 BRT Alternative

Within the Harbor Subdivision, the BRT Alternative would operate in an exclusive busway including both at-grade and aerial segments. Enhanced BRT stations within the Harbor Subdivision would be similar to those along the existing Metro Orange Line and would be more extensive than the BRT stops provided along Crenshaw Boulevard. On Crenshaw Boulevard, BRT stations would be similar to existing Metro Rapid Bus stops. Similar to the TSM Alternative, the BRT Alternative would be located within a densely developed urban setting and would not extend into previously undeveloped areas that may induce changes in such areas. Potential indirect growth inducing effects may result from the micro-scale growth or development near proposed stations due to the implementation of local and State land use policies or local planning objectives, which may encourage transit-oriented development, station area planning, or housing density bonuses adjacent to transit corridors. However, this potential indirect growth is speculative at this time. The BRT Alternative would not remove a barrier to growth or otherwise induce growth directly or indirectly. Therefore, no adverse impacts are anticipated related to growth inducement.

4.16.3.4 Base LRT Alternative

The Base LRT Alternative would operate in at-grade, below grade, and aerial segments along Crenshaw Boulevard and the Harbor Subdivision. As with the TSM and BRT Alternatives, the Base LRT Alternative would be located within a densely developed urban setting and would not extend into previously undeveloped areas that may induce changes in such areas. Potential indirect growth inducing effects may result from the micro-scale growth or development near proposed stations due to the implementation of local and State land use policies or local planning objectives, which may encourage transit-oriented development, station area planning, or housing density bonuses adjacent to transit corridors. The potential indirect growth would likely be more substantial with the Base LRT Alternative than the BRT Alternative. However, this potential indirect growth is speculative at this time. The Base LRT Alternative would not remove a barrier to growth or otherwise induce growth directly or indirectly. Therefore, no adverse impacts are anticipated related to growth inducement.

**4.16.3.5 LRT Alternative Design Options**

The LRT Alternative may include the following six design options:

- LRT Alternative Design Option 1: An aerial station at Century Boulevard instead of an at-grade station at LAX.
- LRT Alternative Design Option 2: An aerial crossing instead of an at-grade crossing at Manchester Avenue.
- LRT Alternative Design Option 3: A cut and cover crossing instead of an at-grade crossing at Centinela Avenue.
- LRT Alternative Design Option 4: A cut and cover alignment instead of an aerial alignment between Victoria Avenue and 60th Street.
- LRT Alternative Design Option 5: A below-grade station at Vernon Avenue near Leimert Park.
- LRT Alternative Design Option 6: A below-grade alignment between 39th Street and Exposition with a below-grade station instead of an at-grade alignment north of 39th Street with connection to Exposition and an at-grade station.

Design Option 1 is proposed for an area that primarily consists of commercial and LAX-associated uses and does not contain a large number of residences. It is less likely that transit-oriented development would occur at this location whether the station is aerial or at-grade.

Design Options 2, 3, and 4 would not remove a barrier to growth or otherwise induce growth directly or indirectly.

Design Options 5 and 6 have the potential for transit-oriented development at these locations with the addition of a below-grade station, however, any such conclusions would be speculative. The Leimert Park area has a mix of residential and commercial uses near the proposed station. In addition, a below-grade station in Design Option 6 would not alter the potential for growth from an at-grade station.

Similar to the Base LRT Alternative, these design options would not remove a barrier to growth or otherwise induce growth directly or indirectly. Therefore, no adverse impacts related to growth inducement are anticipated for these design options.

4.16.4 Mitigation Measures

No mitigation measures are required.

4.16.5 CEQA Determination

According to CEQA, growth inducing impacts would be considered significant if the proposed project has the potential to induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure). The proposed project intends to meet the existing and future transit needs of the study area. The proposed

project would be located within a densely developed urban setting and would not extent into previously undeveloped areas that may induce changes in such areas. As previously mentioned, for the BRT and Base LRT Alternative and the design options, potential indirect growth-inducing effects may result from the micro-scale growth or development near proposed stations due to the implementation of local and State land use policies or local planning objectives, which may encourage transit-oriented development, station area planning, or housing density bonuses adjacent to transit corridors. However, this potential indirect growth is speculative at this time. No direct or indirect growth-inducing impacts are anticipated.

4.16.6 Impacts Remaining After Mitigation

No significant impacts related to growth inducement are anticipated for the proposed project alternatives.