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REVISED DRAFT ENVIRONMENTAL IMPACT REPORT
PASADENA-LOS ANGELES RAIL TRANSIT PROJECT
STATE CLEARINGHOUSE NO. 88042713

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SECTION 1
INTRODUCTION

1.1 PURPOSE AND USE OF THE EIR

This environmental impact report (EIR) analyzes the potential environmental impacts that may result from the construction and operation of the Pasadena-Los Angeles Rail Transit Project. This EIR has been prepared for the Los Angeles County Transportation Commission (LACTC) in accordance with the California Environmental Quality Act (CEQA) and State CEQA Guidelines, as amended. The LACTC is the designated lead agency for this project.

The proposed light rail transit (LRT) facility is the "project" as defined by Section 15378 of the state CEQA guidelines and is not an exempt specified mass transit project as defined in Section 15275 of the same guidelines. The proposed LRT project is an individual project of a regional transportation improvement plan as defined in Section 15276.

The LACTC, acting as lead agency, has determined that the project may have a significant impact on the environment and, therefore, directed the preparation of this EIR. The LACTC prepared an Initial Study which indicated those issue areas that are to be analyzed in this EIR. Following the completion of the Initial Study, a notice of preparation (NOP) was submitted to all identified responsible agencies.

The LACTC prepared and circulated a draft EIR (DEIR) in December 1988 to evaluate the potential impacts on those issue areas identified in the Initial Study/NOP. Following this review and in response to a number of concerns raised by responsible agencies, elected officials, and members of the community, the scope of the project was expanded. As a result, the LACTC determined that the earlier DEIR should be revised to reflect the changes made to the project proposals and be recirculated. A revised Initial Study/NOP was also recirculated to notify all responsible agencies that the earlier DEIR was being revised and would be recirculated pursuant to state and LACTC guidelines.

The purpose of this EIR is to provide a full disclosure informational document that will inform the lead agency, responsible agencies, decision makers, and general public of the environmental effects of the proposed project. This report discusses the potential significant effects of the project on the aspects of the environment identified in the Initial Study, evaluates alternatives to the project, and identifies measures that would be effective in reducing or avoiding significant adverse impacts.

The implementation of this project will require a number of discretionary actions to be taken by the LACTC and other responsible agencies. The following responsible agencies may use the EIR in the issuance of permits, approvals, or cooperative agreements required to implement the project.

- California State Department of Transportation
- City of South Pasadena
- City of Pasadena
- City of Los Angeles
- County of Los Angeles
- Los Angeles County Flood Control District
- Interstate Commerce Commission
- Public Utilities Commission
- Federal Railroad Administration
- Southern California Rapid Transit District
- Los Angeles Department of Water and Power

1.2 EIR FOCUS AND EFFECTS FOUND NOT TO BE SIGNIFICANT

The Initial Study, included in Appendix A, indicates those issue areas that may be adversely affected by the construction and/or operation of the LRT project alternatives being considered. This EIR analyzes the project's potentially significant environmental effects for those issue areas identified in the Initial Study. A revised notice of preparation (NOP), which indicated the scope of the analysis, was recirculated to all identified responsible agencies. Based on the results of the preliminary environmental assessment prepared for the Initial Study and the NOP, LACTC determined that the analysis should focus on the issues indicated in Table 1-1. The issue areas identified in Table 1-1 and evaluated in this EIR are identical to those considered in the previous DEIR.

TABLE 1-1

FOCUS OF ENVIRONMENTAL ANALYSIS

Issue Area	Section of EIR
Land Use	4.1
Transportation and Circulation	4.2
Geology and Earth	4.3
Air Quality	4.4
Biological Resources	4.5
Noise and Vibration	4.6
Light and Glare	4.7
Risk of Upset	4.8
Population and Housing	4.9
Public Services	4.10
Public Utilities	4.11
Aesthetics	4.12
Recreation	4.13
Cultural Resources	4.14

The preliminary environmental analysis prepared as part of the Initial Study also identified a number of environmental effects found not to be significant. The assessment found that the project would not result in any significant impacts on water, natural resources, energy, and human health. As a result, these issues are not discussed in the EIR.

1.3 PUBLIC REVIEW PROCESS

The LACTC is committed to providing extensive public involvement in the environmental review process for the Pasadena-Los Angeles Rail Transit Project. Community workshops and public hearings were held in the communities in which the alignments are located to identify environmental and project issues of concern. These public meetings were held in Lincoln Heights, Highland Park, El Sereno, and South Pasadena, in February 1989 to obtain input concerning the adequacy of the DEIR initially circulated. The City of Pasadena co-sponsored route refineme. studies and administered an extensive public participation process for those portions of the Highland Park alignment that pass through Pasadena.

Following the completion of the revised DEIR, a series of additional public hearings will be held to obtain public and agency input concerning the adequacy of the analysis contained in the revised DEIR. During this review period, agencies, organizations, and citizens will have an opportunity to comment on the revised DEIR. As the LACTC has already received comments regarding the previously issued DEIR which will be addressed in the final EIR (FEIR), comments should focus on the new material contained in the revised DEIR.

The preparers of the DEIR will respond, in writing, to those comments received from both the initial DEIR and the revised DEIR. The comments and the responses to comments will be addressed in the FEIR prepared following the public review period for the DEIR.

1.4 FORMAT OF THIS EIR

The format of this revised EIR is similar to that of the previous DEIR prepared for the proposed Pasadena-Los Angeles Rail Transit project. This EIR consists of the following sections:

1. Introduction. The purpose and focus of the EIR and an overview of the public review process is provided in this section.

2. Summary. This section summarizes the proposed project and includes a summary table outlining the environmental setting, anticipated impacts, and those measures that will be effective in reducing or eliminating potential adverse impacts.

3. Project Description. The various alignment alternatives under consideration are described in this section. An overview summary of the alternative alignments is presented.

4. Environmental Impact Analysis. The existing environmental setting, potential environmental impacts anticipated to result from the construction and operation of the proposed rail transit project, and recommended mitigation measures are discussed in this section.

5. Cumulative Impacts. The cumulative impacts from related projects together with the proposed project are evaluated in this section.

6. Alternatives to the Proposed Project. A description of those alternative development scenarios previously considered in earlier route refinement studies are described in this section. In addition, the no-project alternative is discussed in this section.

7. Significant Unavoidable Environmental Effects. This section describes the potential significant adverse impacts resulting from the construction and/or operation of the proposed project.

8. Long-Term Implications of the Proposed Project. This section discusses the project's relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. In addition, the irreversible environmental changes which would be involved with the implementation of the proposed project are discussed.

9. Growth-Inducing Impacts. The manner in which the proposed project will generate growth-inducing impacts is discussed.

10. List of Preparers and References. Those persons and agencies responsible for the preparation of the EIR are identified as are the agencies and individuals contacted in the course of its preparation.

The EIR also includes a number of appendices that contain the Initial Study/NOP, and responses to the NOP. The traffic study, noise and vibration study, biological field survey report, and detailed engineering drawings are provided under a separate cover.

SECTION 2
SUMMARY

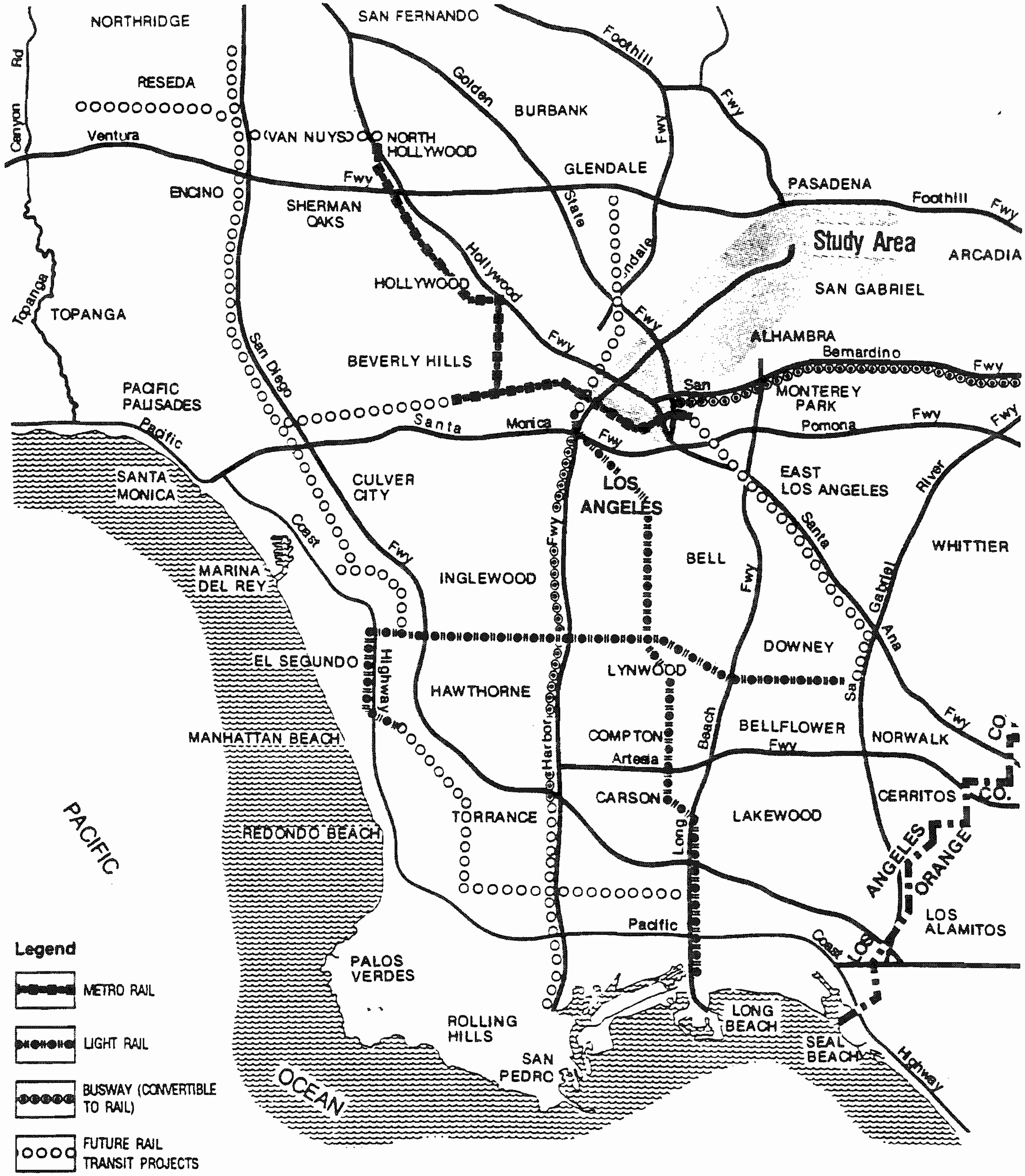
2.1 SUMMARY DESCRIPTION OF PROPOSED PROJECT

The proposed Pasadena-Los Angeles Rail Transit Project involves the extension of the Long Beach-Los Angeles Light Rail Transit (LRT) facility from downtown Los Angeles through Pasadena. The regional context of the proposed project is indicated in Exhibit 2-1. The proposed project considers two main alignment alternatives: the Highland Park alignment through Highland Park, South Pasadena, and Pasadena; and the North Main Street alignment through Lincoln Heights and El Sereno. In downtown Los Angeles, one of a number of downtown alignment options will connect the Highland Park or North Main Street alternative alignments with the Long Beach LRT or provide a Metro Rail connection with a station at Union Station. The downtown options for the Highland Park and North Main Street alignments are indicated in Exhibits 2-2. The Highland Park and North Main Street alignments are indicated in Exhibit 2-3. Yard sites and storage track locations are also indicated in Exhibit 2-3.

2.1.1 ALIGNMENT CHARACTERISTICS

Highland Park Alternative: From downtown Los Angeles, the Highland Park alignment alternative crosses under the Santa Ana Freeway (I-5) and continues in a subway configuration using one of the following three route options: Chinatown, Second Street, or Second Street-Union Station. Alternatively, this alignment can begin at Union Station using the Union Station "No Subway" option or a phased plan of the Second Street-Union Station option. The alignment then travels at-grade on an existing Santa Fe Railroad line through Mount Washington, Highland Park, and South Pasadena, continuing on into Pasadena. The line terminates in the vicinity of the Foothill Freeway (I-210) and Sierra Madre Villa in eastern Pasadena. The Highland Park alternative is illustrated in Exhibit 2-3.

North Main Street Alternative: The North Main Street alignment alternative traverses the downtown area by using either the Chinatown or Second Street options. It then surfaces to an elevated structure that follows the centerline of North Main Street crossing the Los Angeles River and I-5. It turns north on an elevated structure onto Mission Road near Lincoln Park, crosses the

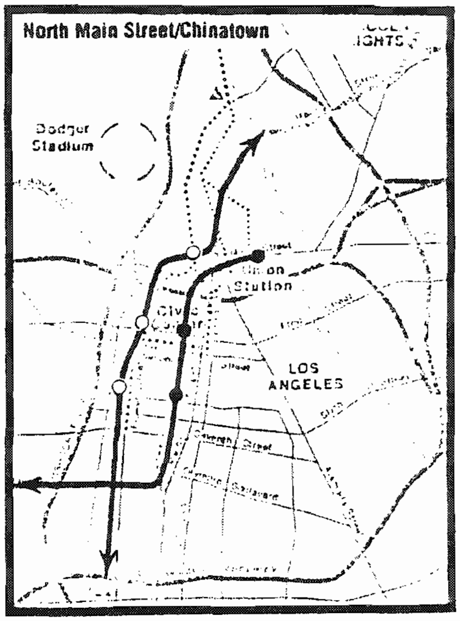


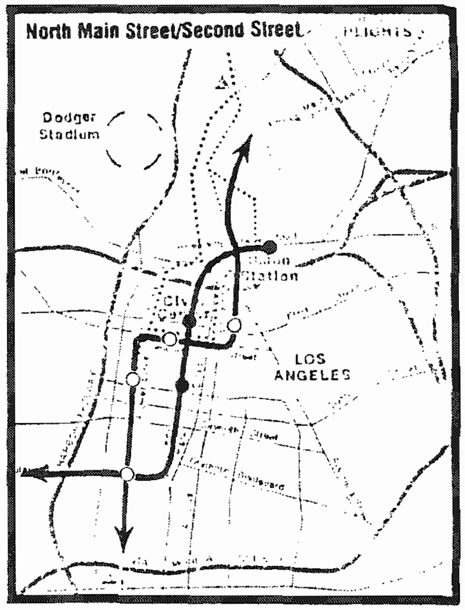
Regional Location
Pasadena-Los Angles Light Rail Transit Project

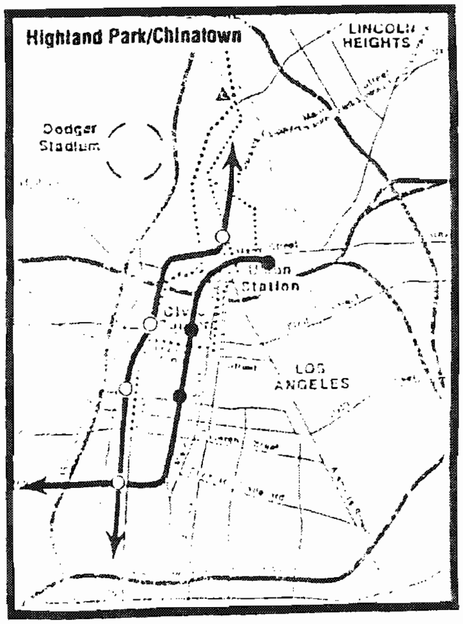
North

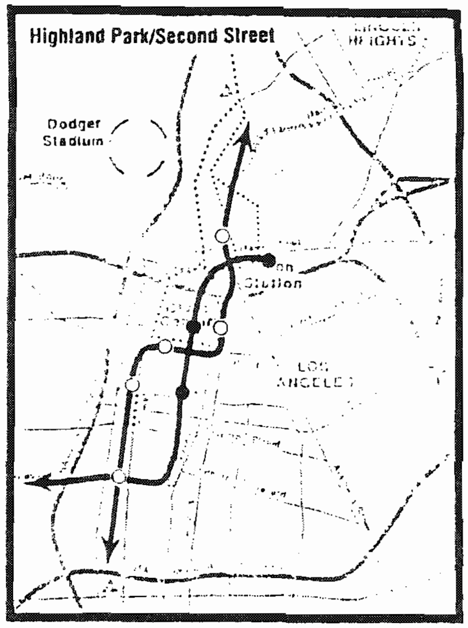
Michael Brandman Associates

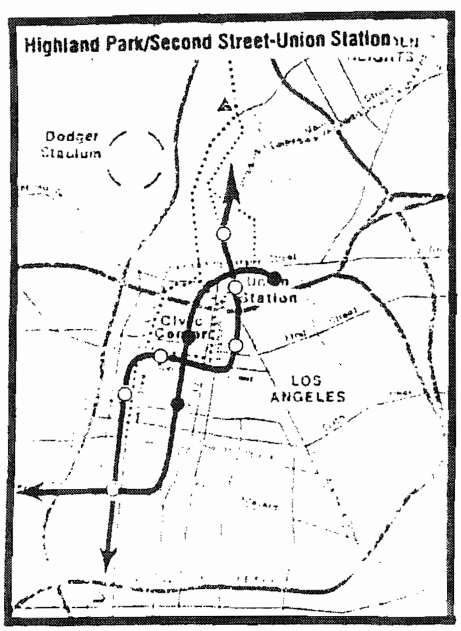
Exhibit 2-1

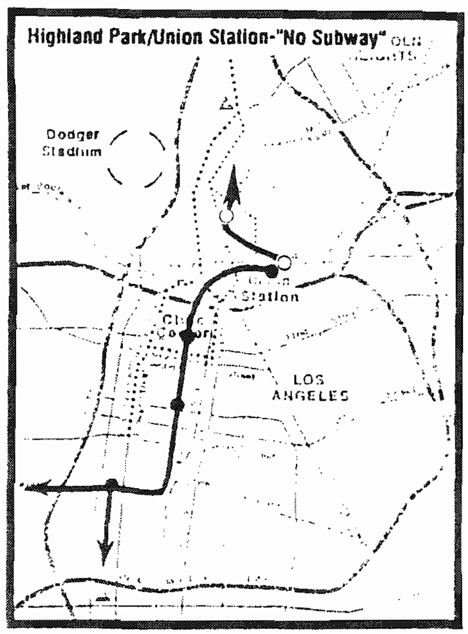












Summmary of Downtown Options
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 2-2

North Broadway/Mission intersection then descends to street level as it approaches Huntington Drive. The route aligns with Huntington Drive where it continues at-grade, terminating just before Poplar Boulevard in El Sereno. The North Main Street alternative is illustrated in Exhibit 2-2.

2.1.2 DOWNTOWN OPTIONS

Chinatown Option: The Chinatown option connects with the Long Beach line at the 7th/Flower Station and links with either the Highland Park or North Main Street alignments. The route runs in subway under Flower Street and Hope Street toward I-5 where it passes under the freeway and shifts eastward. For the Highland Park alignment, the route crosses under Sunset Boulevard and heads north to align with North Broadway, surfacing along the edge of the Southern Pacific rail yard north of Chinatown. The Chinatown option for the Highland Park alignment is shown in Exhibit 2-4. For the North Main Street alignment, the route crosses under Sunset Boulevard, aligning with Ord Street, crossing under North Broadway, and then surfacing to connect into the North Main Street elevated guideway structure. The Chinatown downtown option for the North Main Street alternative is indicated in Exhibit 2-5.

Second Street Option: This alignment option within downtown Los Angeles may connect with either the Highland Park or North Main Street alternative to the Long Beach line at 7th and Flower Streets. The alignment begins at the northern terminus of the Long Beach-Los Angeles LRT at the 7th/Flower Station and follows Flower north, turns east underneath Second Street, then turns again in a northerly direction beneath Los Angeles Street. The alignment continues northward beneath I-5 and then links to either North Broadway (for the Highland Park alignment) or North Main Street (for the North Main Street alignment). The Second Street option for the Highland Park and North Main Street alternatives are shown in Exhibits 2-3 and 2-4, respectively.

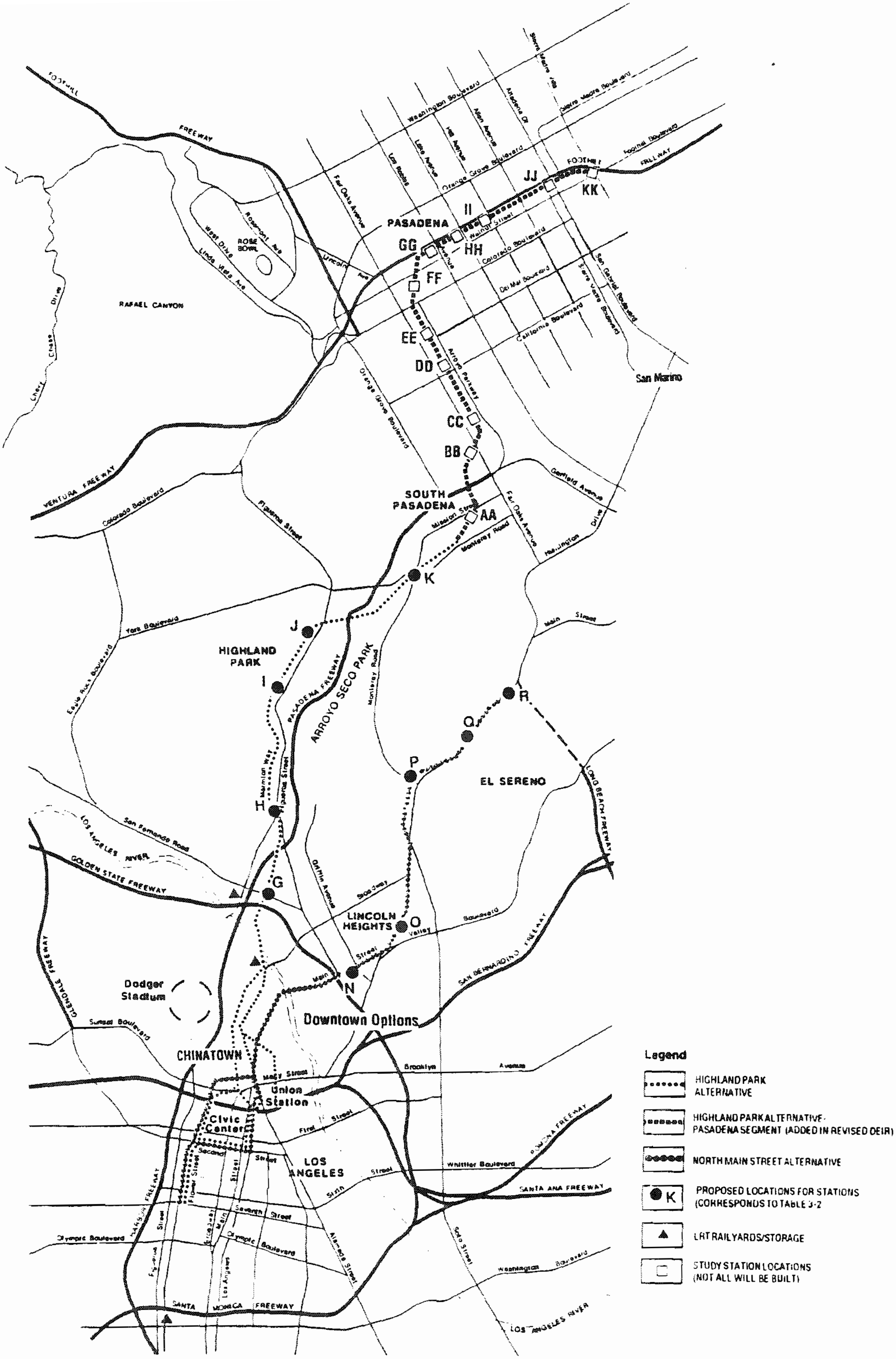
Originally, the Second Street option for the Highland Park alternative did not provide a direct connection with Union Station. As a result of the circulation of the original DEIR, an additional option was identified connecting the Second Street route to the Highland Park alternative via Union Station. To distinguish between the Second Street options linking with the Highland Park alignment, they have been identified separately as the Second Street option (original DEIR) and the Second Street-Union Station option as described below.

Second Street-Union Station Option: This downtown option would serve the Highland Park alignment only. It is similar to the Second Street option described above except that the alignment allows for a connection with Union Station. Under this scenario, the Second Street-Union Station subway follows the same general subway alignment proposed for the Second Street option (refer to Exhibit 2-4). However, instead of turning west under El Pueblo Park, the alignment meets Alameda Street and provides a stop at Union Station near Macy Street. After leaving Union Station, the subway continues northward under Alameda Street where the line surfaces near the SPTC main freight yard. Two variations of this option are being considered in the vicinity of the SPTC main freight yard, where the alignment can proceed on either the north side or the south side of the yard (refer to Exhibit 2-4). Unlike the two previously described options, this option can be phased to begin construction at Union Station, extending toward Pasadena.

Union Station "No Subway" Option. This additional downtown option also applies only to the Highland Park alignment. The alignment begins at Union Station and connects with the Highland Park alternative, primarily using existing rail rights-of-way. In the vicinity of the SPTC main freight yard, two variations using either boundary of this yard are also being considered. The selection of this option would mean that there would not be a direct connection between the proposed Pasadena-Los Angeles LRT line and the Long Beach-Los Angeles line which will terminate at the 7th Street and Flower Station in downtown Los Angeles. However, design of such a connection would not be precluded. The route of the proposed alignment is also shown in Exhibit 2-4.

2.1.3 RAIL STORAGE YARDS

Two alternative sites for rail storage yards are proposed for the Highland Park alignment depending on the downtown route option selected and are referred to as the Midway Yard and the Taylor Yard. The Midway Yard will involve placing the railyard north of the existing SPTC railyard along the west bank of the Los Angeles River north of Broadway. The Taylor yard proposal places the railyard north of the Pasadena Freeway along the east bank of the Los Angeles River. Finally, storage tracks are proposed for a location under the Santa Monica Freeway (I-10) which is unchanged from the previously issued DEIR.



NO SCALE

Highland Park and North Main Street Alternatives

Pasadena-Los Angeles Light Rail Transit Project

Exhibit 2-3

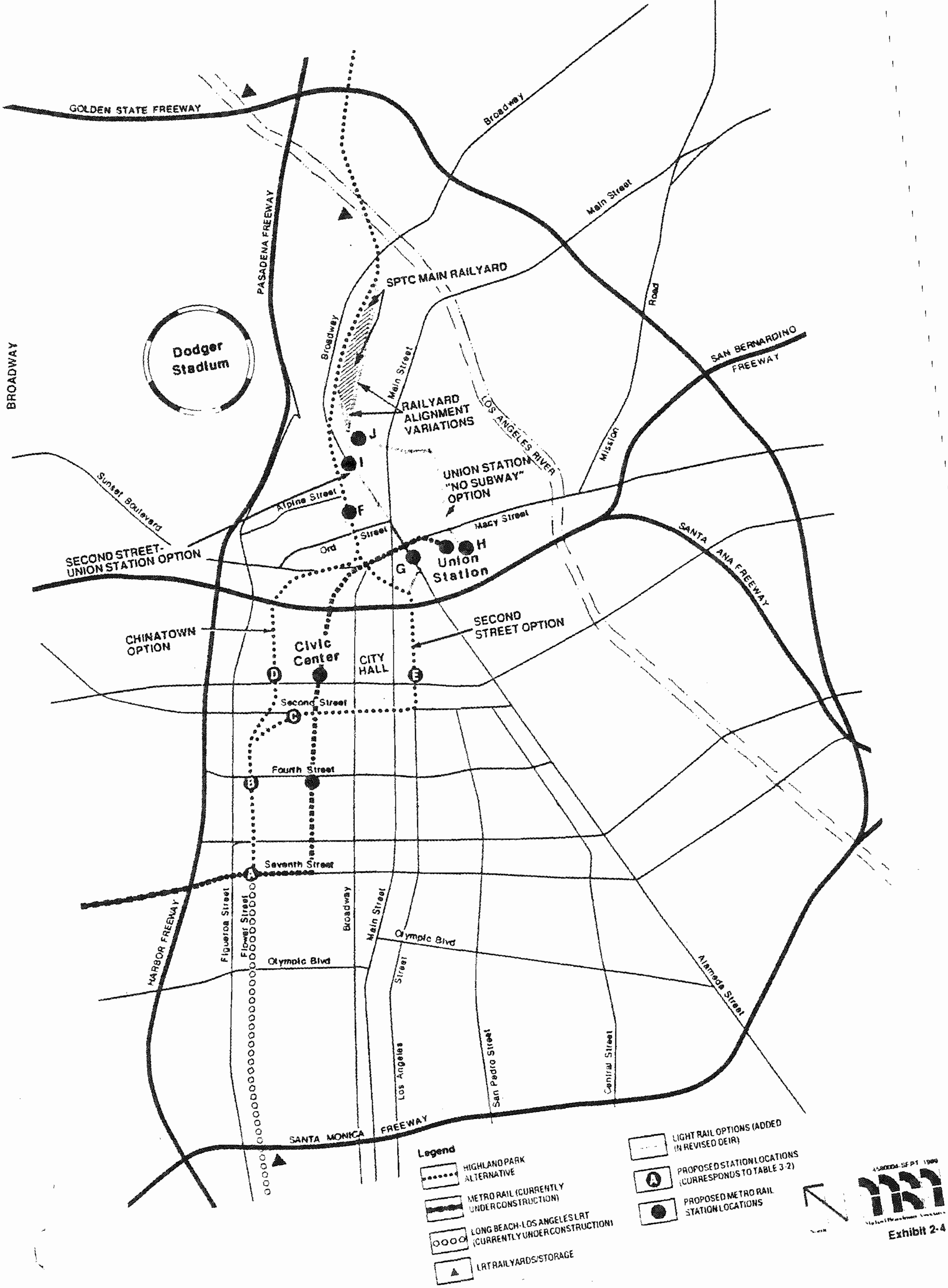
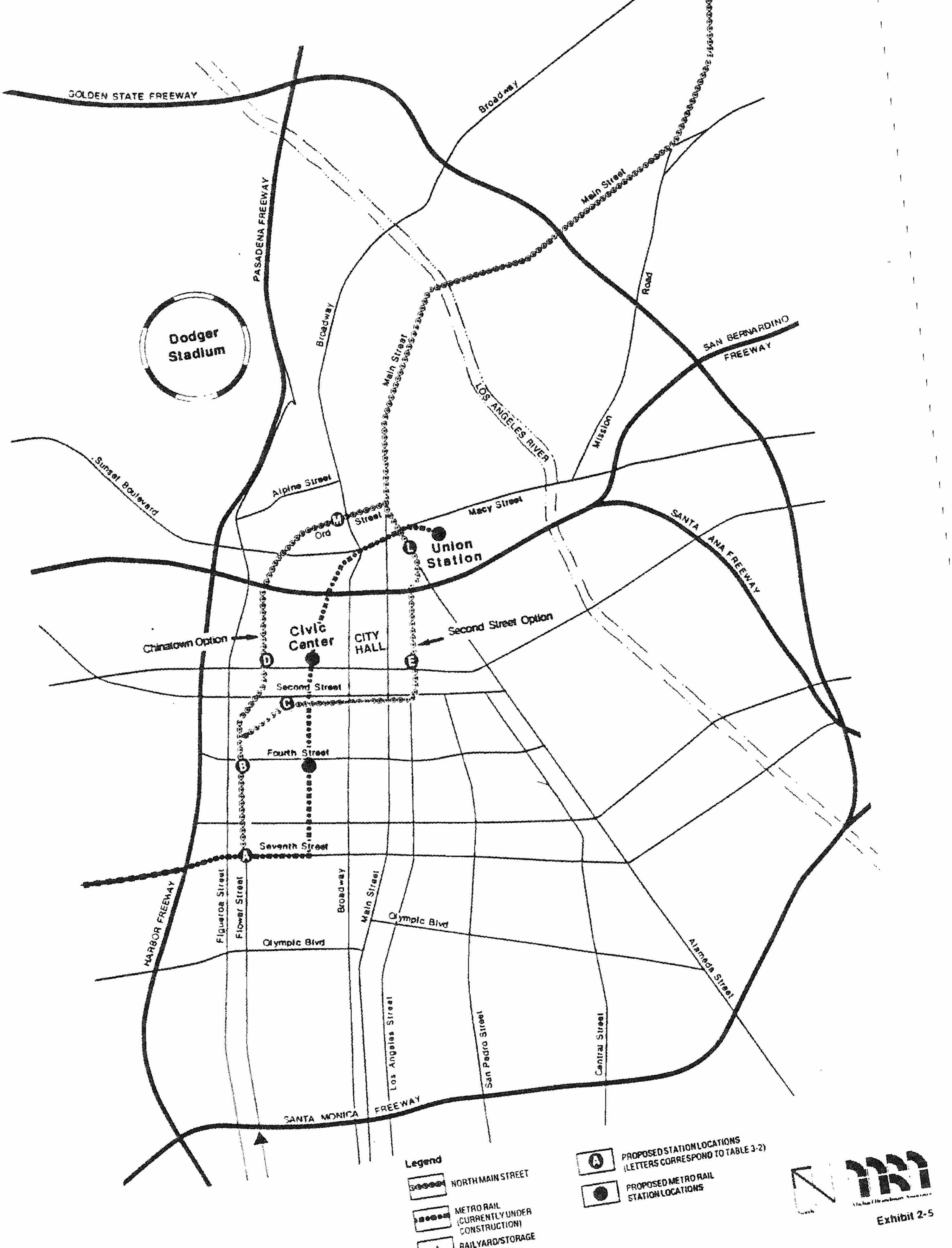


Exhibit 2-4

Downtown Options
Highland Park Alternative
Los Angeles Light Rail Transit Project



Downtown Options/
North Main Street Alternative
Pasadena-Los Angeles Light Rail Transit Project

The previous DEIR identified a rail storage yard adjacent to Chinatown for the North Main Street Alternative. Due to numerous concerns regarding the proposed yard site, it has been eliminated from consideration.

2.2 ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

Table 2-1, located at the end of Section 2, summarizes environmental impacts and mitigation measures for the alternative rail alignments. Impacts that remain after mitigation are noted in the summary as "unavoidable adverse impacts" if the project is approved as proposed (CEQA Section 21081).

Impacts of the project are rated in the table according to the following:

- Not significant. Adverse effects are not substantial according to CEQA, but should be mitigated to the extent feasible.
- Significant. Substantial adverse impacts or changes to the environment as defined by CEQA.
- Beneficial Impact. Beneficial impacts resulting from the implementation of the proposed project.

Mitigation measures are listed for each impact in Table 2-1; those that have been incorporated into the project design by the LACTC are noted with an asterisk (*). Others are recommended for incorporation into the project by the EIR prior to project approval.

The environmental analysis identified the three significant adverse environmental effects summarized below.

Parking Displacement: The loss of on-street parking is a significant effect which is unavoidable and cannot be mitigated. In this respect, the North Main Street alternative has a higher impact as all of the existing parking spaces along North Main Street, most of the parking spaces along Mission Road, and a large number along Huntington Drive South will have to be removed. In comparison, the Highland Park route results in less of a parking loss (approximately six blocks of on-street parking) since it is primarily located in the existing AT&SF railroad right-of-way.

Aesthetics: The implementation of the proposed North Main Street alignment would result in significant aesthetic impacts along certain segments of the alignment since a portion of this route is an aerial structure. The major aesthetic impacts will occur in the vicinity of Parque de Mexico and Lincoln Park. Both of these sites are very important to the surrounding communities. While mitigation measures are identified in Section 4.12 of this EIR, they will not be totally effective in reducing these visual impacts.

Cultural Resources: The AT&SF railroad bridge over the Arroyo Seco has been designated as a cultural monument by the City of Los Angeles. The surface decking of the bridge will need to be widened to accommodate the LRT's double tracks. While the Santa Fe Station located within an area proposed for the Del Mar LRT station is a city-designated historic structure, no modifications to the structure are proposed as part of this project.

2.3 CUMULATIVE IMPACTS

This EIR analyzes the cumulative impacts from three types of related projects: (1) other mass transit projects in the Los Angeles area; (2) development planned, approved, or under construction immediately adjacent to the alignments under consideration; and (3) other development planned, approved, or under construction within one-half mile of the alignments. Cumulative impacts are discussed in Section 5. Included in this section is a discussion of a future extension of this project.

The LRT is substantially different from the developments identified as related projects in that the rail line would not incrementally increase the level of impact anticipated to result from the related development projects. The rail transit line does potentially present a number of possible growth-inducing impacts by which other jurisdictions could permit additional development beyond that which may be possible if no public rail mass transit project were provided.

2.4 ALTERNATIVES TO THE PROPOSED PROJECT

Previous route refinement studies considered five main alignment alternatives plus downtown route variations (LACTC 1987, 1988). The alternatives analysis in this EIR summarizes the evaluation of those alignment alternatives which were not selected for future study.

- Downtown Alignment Options: Three downtown route options were developed: the 1st Street, I-5, and Stadium options.

- Mission Road Rail Transit Alignment Alternative: This alternative considered locating the LRT alignment above the El Monte busway beside the San Bernardino Freeway (I-10) and then turning north onto Mission Road and Huntington Drive.

- Soto Street Rail Transit Alignment Alternative: This alternative involved locating the LRT alignment in the El Monte busway to Soto Street where it turned north and followed Soto Street to Huntington Drive.

- North Broadway Alternative: Once north of Chinatown, the alignment followed North Broadway through Lincoln Heights and then turned north onto Mission Road continuing to Huntington Drive.

In addition, a route refinement study was undertaken in 1988 in cooperation with the City of Pasadena to examine alignments within Pasadena's city limits. The first study identified several conceptual alignments with each one consisting of a north/south option which then connects with one of a number of east/west options. The conceptual alignment options included the following:

- Proposed I-710 extension (north south option)
- Santa Fe right-of-way (north/south option)
- I-210 (east/west option)
- Walnut Street (east/west option)
- Union Street (east/west option)
- Colorado Boulevard (east/west option)
- Green Street (east/west option)

The second stage of the study reduced the number of potential alternatives to three alternatives from which the preferred I-210 alignment reflected in this document was selected.

The environmental effects related to these alternatives are discussed in Section 6. The alignment alternatives considered in the earlier route refinement phases were removed from further consideration due to a variety of reasons. For example, some alignments were identified as impractical due to difficulties in linking to downtown Los Angeles. In other cases, engineering and design constraints were the primary reasons for removing an alignment from further consideration. Finally, many alternatives were dropped because of expected adverse environmental impacts.

Two other scenarios are discussed as alternatives to the proposed project:

- Bus Alternative: Under this project scenario, existing bus service would be expanded along the Pasadena-Los Angeles Corridor. No LRT facilities would be constructed for this project alternative.

- No Project Alternative: The No Project Alternative would assume that no new transit facilities or improvements would be constructed in the Pasadena-Los Angeles Corridor.

Neither of the above two alternatives serve the Commission's voter mandate to provide rail transit service between Pasadena and downtown Los Angeles.

2.5 IDENTIFIED AREAS OF CONTROVERSY AND ISSUES TO BE RESOLVED

The primary issue to be resolved is the selection of the project alignment and downtown option. Identification of the stations to be constructed in South Pasadena and Pasadena from the list of study stations is required. Also, consideration of the extent of mitigation to be included in the project needs to be resolved through the public review process and FEIR preparation.

In addition, a number of important issues were raised in community workshops held prior to the preparation of the DEIR. These issues included potential noise, traffic, safety, and visual impacts of the project on residences and businesses located in the vicinity of the proposed rail line. These appear to be the main areas of public concern.

Table 2-1 summarizes environmental impacts and mitigation measures identified for the alternative rail alignments. Impacts that remain after mitigation are noted as "unavoidable adverse impacts." Mitigation measures that have been incorporated into the project design by LACTC are noted with an asterisk (*).

TABLE 2-1

SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Issue	Highland Park Alignment	North Main Street Alignment
LAND USE (SECTION 4.1)		
Environmental Impacts	The implementation of this proposed project would result in short-term parking and access impacts in the down-town in Los Angeles area. Displacement of railroad right-of-way, several structures, and the removal of about six blocks of parking in Highland Park. Other impacts detailed in Table 4-1 in Section 4.1 include: • Right-of-way and land acquisition at SPTC railyard. • Acquisition of AT&SF Railroad right-of-way from Los Angeles River bridge through South Pasadena. • Land acquisition of mostly vacant property at Avenue 26 and on both sides of Avenue 50. • Displacement of six residences next to AT&SF right-of-way near Avenue 61.	The implementation of this proposed project would result in short-term parking and access impacts in the downtown Los Angeles area. Displacement of several small residential and commercial structures at station locations for parking and minor dislocation in vicinity of traction powered substations. Removal of approximately 640 parking spaces. • Acquisition of Southern Pacific tracks near Alameda and Main. • Land acquisition for traction power substation (TPS) west of Los Angeles River. • Acquisition of additional right-of-way for bridge supports over the I-5. • Land acquisition for guideway supports at Gates Street.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
LAND USE (continued)		
Environmental Impacts (continued)	• Acquisition of land for traction power substations at Fair Oaks, Hill Avenue and Altadena. • Potential acquisition of land for parking at Glenarm, Del Mar, and Sierra Madre Villa stations; minor acquisition for potential stations at Mission, California, and Holly. • Easement conflict with Stancliff School. • Displacement of one house and one garage near Pasadena Avenue and Monterey. • Parking displacement on Marmion Way between Avenues 51 and 59. • Displacement of AT&SF freight service between Los Angeles and San Bernardino. • Displacement of Amtrak service between Los Angeles and San Bernardino (Pasadena Station).	• Displacement of vacant structure east of Lincoln Park Avenue for parking and station entrance. • Land acquisition for aerial guideway supports at Broadway. • Land acquisition north of Broadway. • Land acquisition for station and parking at Huntington and Monterey. Displacement of up to 25 residences and businesses. • Parking removal on both sides of North Main Street and Mission Road, and one side of Huntington Drive South.
	Chinatown Downtown Option	Chinatown Downtown Option
	• Land acquisition required near 5th Street for station entrance.	• Land acquisition required near 5th Street for station entrance.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
LAND USE (continued)		
Environmental Impacts (continued)	• Land acquisition for proposed entrance at Music Center and for entrance at DWP.	• Land acquisition for proposed entrance at Music Center and for entrance at DWP.
	• Underground easements under Evans Community Adult School and other properties in Chinatown.	• Underground easements under Evans Community Adult School and other properties in Chinatown.
	• Land acquisition for station entrance on Broadway near Alpine.	• Land acquisition for station entrance at Ord and Hill and for underground construction at Ord and Alameda.
	Second Street-Downtown Option	Second Street Downtown Option
	• Land acquisition required near 5th Street for station entrance.	• Land acquisition required near 5th Street for station entrance.
	• Subsurface easements between Hope and Olive and land acquisition for station entrance at Grand.	• Subsurface easements between Hope and Olive and land acquisition for station entrance at Grand.
	• Land acquisition for station entrances at 1st and Los Angeles Streets.	• Land acquisition for station entrances at southeast corner of 1st and Los Angeles Streets.
	• Subsurface easement under El Pueblo de Los Angeles Historic State Park and near Sunset and Broadway.	• Subsurface easement under El Pueblo de Los Angeles Historic State Park.
	• Land acquisition for staton entrance at Alpine and Broadway.	• Land acquisition for station entrance at Union Station.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
LAND USE (continued)		
Environmental Impacts (continued)	Second Street-Union Station • Land acquisition required near 5th Street for station entrance. • Subsurface easements between Hope and Olive and land acquisition for station entrance at Grand. • Land acquisition for station entrances at 1st and Los Angeles Streets. • Acquisition of land at Union Station for station site and portions of SPTC railyard for LRT right-of-way, traction powered sub-station, and yard acquisition. Union Station- "No Subway" • Acquisition of portion of Union Station, SPTC track and railyard site for LRT storage and maintenance yard. • Acquisition of parcels bounded by Alameda, Alpine, and North Main.	
Mitigation Measures	Property owners and tenants will be compensated for property acquired and to cover relocation costs as required by state law. *	Property owners and tenants will be compensated for property acquired and to cover relocation costs as required by state law. *

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
LAND USE (continued)		
Significance After Mitigation	The implementation of the project will not result in any significant adverse impact after mitigation.	The implementation of the project will not result in any significant adverse impact after mitigation.
CIRCULATION (SECTION 4.2)		
Environmental Impacts	The proposed project will have a beneficial impact on a regional scale through an overall reduction in vehicle miles traveled. Adverse traffic impacts may occur in the vicinity of rail stations. Traffic impacts include loss of on-street parking on Marmion Way between Avenues 51 and 57, traffic delays at crossings, and a reduction in level of service (LOS) at the intersection of Avenue 57 and Figueroa. Along the Pasadena route segment with at-grade crossings, the LRT would impact five study intersections; and that portion of the Pasadena route within I-210 would impact two intersections at Hill and Sierra Madre Villa.	The proposed project will have a beneficial impact on a regional scale through an overall reduction in vehicle miles traveled. Adverse traffic impacts may occur in the vicinity of rail stations.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
CIRCULATION (continued)		
Mitigation Measures	Roadway improvements, such as widening, restriping, and reconfiguration of turn lanes will lessen impacts on circulation in the vicinity of rail stations. Marmion Way would be converted to a one-way couplet between Avenues 51 and 57. Cross streets would be signalized. Peak hour parking would be prohibited at the intersection of Avenue 57 and Figueroa. * Mitigation measures that will be effective in reducing impacts along the Pasadena segment within I-210 during construction include limiting center lane closure to off-peak or late evening hours, closing one lane at a time, implementing a ramp metering program, and establishing an interim high-occupancy vehicle lane.	Use of straddle-bent columns instead of median columns, roadway widening, restriping, and reconfiguration of lanes and signalization. Potential redesign of Hunting Drive/Soto Street intersection to remove Soto Street bridge. Huntington Drive to Huntington Drive south would be converted to a one-way couplet between Soto and Eastern.
Significance After Mitigation	Some on-street parking loss remains. LOS impacts mitigated to not significant.	Parking spaces on North Main Street, Mission Road, and Huntington Drive South are a significant loss. LOS impacts mitigated.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
GEOLOGIC RESOURCES (SECTION 4.3)		
Environmental Impacts	Potential seismic effects of earth shaking may impact construction or operations of LRT. The alignment will cross the fault trace of the Raymond Hill fault. Construction will involve tunneling, cut and cover tunneling, and grading.	Potential seismic effects of earth shaking may impact construction or operations of LRT. Construction will involve tunneling, cut and cover tunneling, and grading.
Mitigation Measures	Mitigation will be designed to support tunnel during construction. Construction methods and design will anticipate withstanding a major earthquake and conform to City of Los Angeles Seismic Safety Plan and Los Angeles Municipal Building and Safety Code. A transit evacuation plan will be prepared.	Mitigation will be designed to support tunnel during construction. Construction methods and design will anticipate withstanding a major earthquake and conform to City of Los Angeles Seismic Safety Plan and Los Angeles Municipal Building and Safety Code. A transit evacuation plan will be prepared.
Significance After Mitigation	Potential for major earthquake remains significant though risk is no greater or no less than that for other areas considered as a candidate alignments. Some earthen fill materials may require disposal at Class I or III landfills in the county.	Potential for major earthquake remains significant though risk is no greater or no less than that for other areas considered as a candidate alignments. Some earthen fill materials may require disposal at Class I or III landfills in the county.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
AIR QUALITY (SECTION 4.4)		
Environmental Impacts	Short-term construction emissions of fugitive dust and equipment emissions; long-term mobile emissions from traffic traveling to and from the project, and long-term stationary emissions from off-site electrical power generation. The project will contribute to a reduction in vehicle emissions following implementation.	Short-term construction emissions of fugitive dust and equipment emissions; long-term mobile emissions from traffic traveling to and from the project, and long-term stationary emissions from off-site electrical power generation. The project will contribute to a reduction in vehicle emissions following implementation.
Mitigation Measures	Short-term dust emissions will be controlled in compliance with SCAQMD Rule 403; construction equipment will be maintained to reduce emissions; grading operations will be halted during first and second stage smog alerts. Long-term mobile emissions will be reduced by maintaining convenient access to transit stops and including transit improvements, such as bus shelters and pockets into the design of the project.	Short-term dust emissions will be controlled in compliance with SCAQMD Rule 403; construction equipment will be maintained to reduce emissions; grading operations will be halted during first and second stage smog alerts. Long-term mobile emissions will be reduced by maintaining convenient access to transit stops and including transit improvements, such as bus shelters and pockets into the design of the project.
Significance After Mitigation	Mobile and stationary emissions impacts will be offset by the overall reduction in vehicle miles travelled. There will be no significant adverse impacts on air quality.	Mobile and stationary emissions impacts will be offset by the overall reduction in vehicle miles travelled. There will be no significant adverse impacts on air quality.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
BIOLOGICAL RESOURCES (SECTION 4.5)		
Environmental Impacts	Elimination of three coast live oaks. Removal of trees in planters along Second Street.	Removal of mature palm trees in medians on Huntington Drive. Removal of trees in planters along Second Street.
Mitigation Measures	A permit for removal of oak trees must be requested from the City of Los Angeles Board of Public Works. Trees will be replaced. *	Palm trees will be transplanted or replaced along sides of Huntington Drive. *
	Landscaping shall be replaced, added, and maintained in conformance with surrounding environment.*	Landscaping shall be replaced, added, and maintained in conformance with surrounding environment.*
Significance After Mitigation	Removal of three coast live oaks will be mitigated by their replacement. No significant adverse impacts will result after mitigation.	Removal of palm trees will be mitigated by their replacement or transplanting. No significant adverse impacts will result after mitigation.
NOISE AND VIBRATION (SECTION 4.6)		
Environmental Impacts	Noise impacts to 121 residences along alignments and peak hour noise impacts at stations at Avenues 51 and 57. Noise impacts will occur to 27 additional residences along that portion of the route alignment which extends through Pasadena and South Pasadena. Mitigation measures will be effective in reducing level of impact. No vibration impacts expected.	No significant impact on noise-sensitive structures. No vibration impact expected. Short-term construction noise impacts.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
NOISE AND VIBRATION (continued)		
Environmental Impacts (continued)	Short-term construction noise impacts.	
Mitigation Measures	Sound walls ranging from 4 to 8 feet high will be construted at noise sensitive areas. * Mitigation of construction noise will be required of contractors to comply with local noise ordinances. A set of guidelines for the planning and operation of construction machinery will be provided. *	Mitigation of construction noise will be required of contractors to comply with local noise ordinances. A set of guidelines for the planning and operation of construction operations will be provided. *
Significance After Mitigation	Some noise impacts along this alignment will remain after mitigation, though these impacts will not be significant.	Some noise impacts along this alignment will remain after mitigation, though these impacts will not be significant.
LIGHT AND GLARE (SECTION 4.7)		
Environmental Impacts	Lighting at stations and station areas will introduce new sources of light and glare into the area. Shadow impacts from temporary cut and cover construction.	Lighting at stations and station areas will introduce new sources of light and glare. Shadow impacts from temporary cut and cover construction Shadow impacts from aerial guideway structures.
Mitigation Measures	Lighting fixtures shall incorporate directional shielding where needed.* Traction power substations shall be shielded from adjacent sensitive land uses.*	Lighting fixtures shall incorporate directional shielding where needed.* Traction power substations shall be shielded from adjacent sensitive land uses.*

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
LIGHT AND GLARE (SECTION 4.7)		
Mitigation Measures (continued)	Noise walls and landscaping will also screen lighting from adjacent land uses.*	Noise walls and landscaping will also screen lighting from adjacent land uses.*
Significance after Mitigation	Localized impacts from lighting may remain after mitigation. No significant adverse impacts will remain.	Shadow impacts will remain on North Main Street and Mission Road due to aerial structures. These impacts are not judged to be significant.
RISK OF UPSET (SECTION 4.8)		
Environmental Impacts	Potential for encountering contaminated soils or hazardous waste during excavation or tunneling for downtown routes. Methane gas could be encountered or released in a number of areas through excavation.	Potential for encountering contaminated soils or hazardous waste during excavation or tunneling for downtown routes. Methane gas could be encountered or released in a number of areas through excavation.
Mitigation Measures	Detailed geotechnical and hazardous materials investigations will be conducted after the preferred alignment is selected. * All underground structures must be designed to include adequate ventilation to reduce the potential for methane gas accumulation. *	Detailed geotechnical and hazardous materials investigations will be conducted after the preferred alignment is selected. * All underground structures must be designed to include adequate ventilation to reduce the potential for methane gas accumulation. *

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
RISK OF UPSET (continued)		
Mtigation Measures (continued)	Where necessary, relief wells will be used to remove underground methane gas. *	Where necessary, relief wells will be used to remove underground methane gas. *
	High-density polyethylene (HDPE) gas barrier membranes shall be applied in underground construction. *	High-density polyethylene (HDPE) gas barrier membranes shall be applied in underground construction. *
	Ventilization features and systems will be incorporated into the operating system to prevent gas buildup. *	Ventilization features and systems will be incorporated into the operating system to prevent gas buildup. *
	A gas sensing system will be used to detect changes in level of gas and sources of gas infiltration. *	A gas sensing system will be used to detect changes in level of gas and sources of gas infiltration. *
Significance After Mitigation	Hazardous substances may be encountered during construction, but the level of risk is reduced to acceptable, less than significant levels through the proposed mitigation measures.	Hazardous substances may be encountered during construction, but the level of risk is reduced to acceptable, less than significant levels through the proposed mitigation measures.
POPULATION AND HOUSING (SECTION 4.9)		
Environmental Impacts	Seven housing units would be displaced and the residents would require relocation. Thirty-six housing units are located immediately adjacent to the Chinatown option and 760 are adjacent to this alignment in Highland Park, South Pasadena, and Pasadena.	Up to 28 housing units would be displaced and the residents would require relocation. Thirty-six housing units are located immediately adjacent to the Chinatown option and 408 are adjacent to this alignment.

Issue	Highland Park Alignment	North Main Street Alignment
POPULATION AND HOUSING (SECTION 4.9)		
Mitigation Measures	Property owners and tenants will be compensated for property acquired and to cover relocation costs. *	Property owners and tenants will be compensated for property acquired and to cover relocation costs. *
Significance After Mitigation	The implementation of the project will not result in any significant adverse impact after mitigation.	The implementation of the project will not result in any significant adverse impact after mitigation.
PUBLIC SERVICES (SECTION 4.10)		
a. Police:		
Environmental Impacts	Increased commuter and pedestrian traffic may result in increased number of crimes or accidents and transit police may require back-up support from Los Angeles, South Pasadena, or the Pasadena Police Departments.	Increased commuter and pedestrian traffic may result in increased number of crimes or accidents and transit police may require back-up support from Los Angeles Police Department.
Mitigation Measures	Security of the LRT should be incorporated into the design features of the system. These design features should enhance the perceived, as well as the actual, security of the buildings, equipment, and patrons. In addition, the following mitigation measures should be implemented: • Two-way voice communication on-board the trains between the passengers and the train operator should be installed.*	Security of the LRT should be incorporated into the design features of the system. These design features should enhance the perceived, as well as the actual, security of the buildings, equipment, and patrons. In addition, the following mitigation measures should be implemented: • Two-way voice communication on-board the trains between the passengers and the train operator should be installed.*

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
PUBLIC SERVICES (continued)		
Mitigation Measures (continued)	• Closed-circuit television should be provided at high-risk and security areas throughout the system.*	• Closed-circuit television should be provided at high-risk and security areas throughout the system.*
	• An alarm system shall be installed to prevent unauthorized entry and tampering with equipment, such as fare vending machines.*	• An alarm system shall be installed to prevent unauthorized entry and tampering with equipment, such as fare vending machines.*
	• In order to eliminate dark or obscured areas, the design of all passenger stations and shelter stops should be open with long, unbroken lines of sight.*	• In order to eliminate dark or obscured areas, the design of all passenger stations and shelter stops should be open with long, unbroken lines of sight.*
	• Where practical, rights-of-way shall be protected from encroachment of people, objects thrown, or unauthorized vehicles.*	• Where practical, rights-of-way shall be protected from encroachment of people, objects thrown, or unauthorized vehicles.*
	• At-grade street crossings provide access for emergency vehicles. *	• At-grade street crossings provide access for emergency vehicles. *
	• Power substation access shall be limited to authorized personnel only.*	• Power substation access shall be limited to authorized personnel only.*
	• Parking lots associated with the LRT shall be designed to maximize visibility within the lots and from surrounding areas. *	• Parking lots associated with the LRT shall be designed to maximize visibility within the lots and from surrounding areas. *
	• Interior finish of the vehicle shall be of vandal-resistant materials. *	• Interior finish of the vehicle shall be of vandal-resistant materials. *

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
PUBLIC SERVICES (continued)		
Mitigation Measures (continued)	• A "silent alarm" device shall be installed so the car operator may summon police or alert the central control to a problem on the train. *	• A "silent alarm" device shall be installed so the car operator may summon police or alert the central control to a problem on the train.*
Significance After Mitigation	No significant adverse impacts are anticipated after mitigation.	No significant adverse impacts are anticipated after mitigation.
b. Fire Protection		
Environmental Impacts	The project will impact the Los Angeles, South Pasadena, and Pasadena Fire Departments due to the increased demand for firefighting and paramedic units, increased inspection load, and increased incidence of false alarms. Concentrations of traffic in and around stations during peak hours may lengthen response times, increase potentially hazardous situations, and trains may interfere with the movement of emergency vehicles.	The project will impact the Los Angeles Fire Department due to the increased demand for firefighting and paramedic units, increased inspection load, and increased incidence of false alarms. Concentrations of traffic in and around stations during peak hours may lengthen response times, increase potentially hazardous situations, and trains may interfere with the movement of emergency vehicles.
Mitigation Measures	Tracks, substations, power stations, storage, and maintenance yards will be designed and constructed in accordance with all applicable fire codes. The following mitigation measures shall be implemented.	Tracks, substations, power stations, storage, and maintenance yards will be designed and constructed in accordance with all applicable fire codes. The following mitigation measures shall be implemented.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
PUBLIC SERVICES (continued)		
Mitigation Measures (continued)	• As required by the fire department(s), access for fire equipment must be maintained during construction and operation of the transit system.*	• As required by the fire department access for fire equipment must be maintained during construction and operation of the transit system.*
	• Other fire prevention measures will be observed, such as use of smoke detectors in stations and on trains.*	• Other fire prevention measures will be observed, such as use of smoke detectors in stations and on trains.*
	• Use of fire retardant materials on trains and in stations.*	• Use of fire retardant materials on trains and in stations.*
	• Access to telephones in stations and parking areas to report emergencies to the fire departments.	• Access to telephones in stations and parking areas to report emergencies to the fire departments. *
	• Communication devices onboard the trains to alert operators about emergencies. *	• Communication devices onboard the trains to alert operators about emergencies. *
	• Fire alarm systems shall be installed on trains, power stations, and storage areas.*	• Fire alarm systems shall be installed on trains, power stations, and storage areas.*
	• Installation of automatic sprinkler systems within substations. *	• Installation of automatic sprinkler systems within substations. *
	• Installation of automatic fire fighting systems in power stations and storage areas commensurate to their fire hazards. *	• Installation of automatic fire fighting systems in power stations and storage areas commensurate to their fire hazards. *

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
PUBLIC SERVICES (continued)		
Mitigation Measures (continued)	• Availability of hand-held fire extinguishers on trains and in substations. *	• Availability of hand-held fire extinguishers on trains and in substations. *
Significance After Mitigation	The implementation of the proposed project will not result in any significant adverse impacts.	The implementation of the proposed project will not result in any significant adverse impacts.
c. **Schools**		
Environmental Impacts	Five schools are located immediately adjacent to the alignment. Two will have sound walls to mitigate noise impacts. Since none are adjacent to stations, no traffic-related impacts are anticipated.	Two schools are located adjacent to the alignment, but neither will be impacted by noise generated by passing LRT vehicles nor by station-area traffic.
	Short-term construction activities will also impact local schools. The greatest potential for disruption will come from construction noise.	Short-term construction activities will also impact local schools. The greatest potential for disruption will come from construction noise.
Mitigation Measures	The following list of safety features shall be observed where applicable during the construction and operation of the proposed project.	The following list of safety features shall be observed where applicable during the construction and operation of the proposed project.
	• Separation of rail line and pedestrian right-of-ways, by using curbs, fences, walls, and landscaping. *	• Separation of rail line and pedestrian right-of-ways, by using curbs, fences, walls, and landscaping. *

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
PUBLIC SERVICES (continued)		
Mitigation Measures (continued)	• Trespass attractions of construction sites, stations, and parking lots shall be reduced by security measures and barriers. *	• Trespass attractions of construction sites, stations, and parking lots shall be reduced by security measures and barriers. *
	• Rail lines must be isolated from pedestrian routes used by school children, to prevent off-street walking along railways. *	• Rail lines must be isolated from pedestrian routes used by school children, to prevent off-street walking along railways. *
	• Overhead power sources and power stations must be secured to prevent unauthorized access and warning signs conspicuously posted. *	• Overhead power sources and power stations must be secured to prevent unauthorized access and warning signs conspicuously posted. *
	• Rail tracks on overhead bridges and grade separations shall be inaccessible to pedestrian traffic. *	• Rail tracks on overhead bridges and grade separations shall be inaccessible to pedestrian traffic. *
	• Construction sites shall be secured by barriers or guards to discourage trespassing and vandalism. *	• Construction sites shall be secured by barriers or guards to discourage trespassing and vandalism. *
	• Warning signs shall be posted around all crossings, overhead power sources, power stations, and construction sites. *	
	• Phasing of construction, route alignments, and scheduling of trains should be coordinated with local communities in order to minimize conflicts with	• Phasing of construction, route alignments, and scheduling of trains should be coordinated with local communities in order to minimize conflicts with

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
PUBLIC SERVICES (continued)		
Mitigation Measures (continued)	school buses, pedestrians, and automobile school routes. *	school buses, pedestrians, and automobile school routes. *
	• The LACTC will distribute pamphlets that describe potential hazards of the proposed project if proper safety procedures are not followed and provide a corresponding education program.*	• The LACTC will distribute pamphlets that describe potential hazards of the proposed project if proper safety procedures are not followed and provide a corresponding education program.*
	• A fence or barrier shall be constructed between the rail line and any school located immediately adjacent to the alignment. This barrier will also lessen other types of disruption which may arise from passing trains every several minutes.*	• A fence or barrier shall be constructed between the rail line and any school located immediately adjacent to the alignment. This barrier will also lessen other types of disruption which may arise from passing trains every several minutes.*
Significance After Mitigation	Impact will be reduced to a level that is not significant after mitigation.	Impact will be reduced to a level that is not significant after mitigation.

Issue	Highland Park Alignment	North Main Street Alignment
PUBLIC UTILITIES (SECTION 4.11)		
a. Electrical Consumption		
Environmental Impacts	Chinatown option will use 368,903 kWh per day. Second Street option will use 381,511 kWh per day of electricity. The Second Street-Union Station option will use 379,069 kWh of electricity per day. The Union Station "No Subway" alternative will use 336,569 kWh of electricity per day.	Chinatown option will use 165,647 kWh of electricity per day. Second Street option will use 178,363 kWh per day of electricity.
Mitigation Measures	In order to reduce energy consumption as part of final design activities, energy conservation features and operating procedures shall be developed for operating systems and subsystems. Such features shall be made part of the normal operations of the systems, if practical and cost-effective. Examples of energy conservation measures which have been incorporated into system design include: • "Chopper" rail vehicle motor speed controls. • Regenerative braking. • Coordination of traffic and rail signal systems.	In order to reduce energy consumption as part of final design activities, energy conservation features and operating procedures shall be developed for operating systems and subsystems. Such features shall be made part of the normal operations of the systems, if practical and cost-effective. Examples of energy conservation measures which have been incorporated into system design include: • "Chopper" rail vehicle motor speed controls. • Regenerative braking. • Coordination of traffic ad rail signal systems.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
PUBLIC UTILITIES (continued)		
Mitigation Measures (continued)	Other energy conservation measures which are under consideration include: • Separate electrical meters at major facilities. • Integrating stations with adjacent uses. • The use of solar power where practical. • Consolidation of yard vehicle movements.	Other energy conservation measures which are under consideration include: • Separate electrical meters at major facilities. • Integrating stations with adjacent uses. • The use of solar power where practical. • Consolidation of yard vehicle movements.
Significance After Mitigation	No adverse impacts are anticipated from the additional use of electrical energy by the system.	No adverse impacts are anticipated from the additional use of electrical energy by the system.
b. Underground Facilities and Infrastructure		
Environmental Impacts	Relocation of all utilities which would conflict with at-grade and underground track, stations, or other LRT facilities will be necessary. Some utilities will need to be upgraded to provide service to LRT stations. The utilities affected include sewer lines, water mains, storm drains, and electrical power ducts.	Relocation of all utilities which would conflict with at-grade and underground track, stations, or other LRT facilities will be necessary. Some utilities will need to be upgraded to provide service to LRT stations. The utilities affected include sewer lines, water mains, storm drains, and electrical power ducts.

Issue	Highland Park Alignment	North Main Street Alignment
PUBLIC UTILITIES (continued)		
Mitigation Measures	The relocation and in-place support of utilities will require coordination and careful design for construction phasing of the LRT. Each utility along all segments of the LRT will be examined in detail to determine the exact mitigation measures required.*	The relocation and in-place support of utilities will require coordination and careful design for construction phasing of the LRT. Each utility along all segments of the LRT will be examined in detail to determine the exact mitigation measures required.*
Significance After Mitigation	No adverse impacts are anticipated after mitigation.	No adverse impacts are anticipated after mitigation.
AESTHETICS (SECTION 4.12)		
Environmental Impacts	For subway portions, impacts will result from construction and station entrances. The at-grade portion will impact the aesthetic setting by the addition of stations, overhead catenary power system, and traction power substations.	For subway portions, impacts will result from construction and station entrance. The aerial guideway and overhead catenary system will affect the aesthetic setting and views, especially at Parque de Mexico and Lincoln Park. The use of straddle bents to support the aerial structure further affects the setting. The palms in the landscaped median of Huntington Drive will need to be moved, changing the appearance of the street. The aesthetic impacts of the aerial structure in the vicinity of Parque de Mexico and Lincoln Park should be considered a significant unavoidable adverse impact.

Issue	Highland Park Alignment	North Main Street Alignment
AESTHETICS (continued)		
Mitigation Measures	The following mitigation measures will help reduce the visual impacts of the proposed project: • Stations will be designed to be attractive and nonintrusive on surrounding areas. Station design and building materials used in their construction will emphasize low maintenance.* • Landscaping will be used to shield or enhance stations, traction power substation sites, the yards, and the right-of-way. Plants and ground cover that are compatible with the Southern California climate and the architecture of the surrounding area will be selected.* • Additional shielding of track and station structures will be accomplished by the construction of sound walls and fencing at points along the rail way.*	The following mitigation measures will help reduce the visual impacts of the proposed project: • Stations will be designed to be attractive and nonintrusive on surrounding areas. Station design and building materials used in their construction will emphasize low maintenance.* • Landscaping will be used to shield or enhance stations, traction power substation sites, the yards, and the right-of-way. Plants and ground cover that are compatible with the Southern California climate and the architecture of the surrounding area will be selected.* • Additional shielding of track and station structures will be accomplished by the construction of sound walls and fencing at points along the rail way.* • Removed palms along medians on Huntington Drive will be replaced along sidewalks.*

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
AESTHETICS (continued)		
Significance After Mitigation	Any adverse impacts will be mitigated to a level below significance.	Visual impacts on North Main Street, Mission Road, and the parks will remain. The impacts on views and aesthetics are judged to be a significant adverse impact.
RECREATION (SECTION 4.13)		
Environmental Impacts	The alignment will cross the Arroyo Seco on the existing AT&SF right-of-way. In addition, that portion of the alignment passing through Pasadena is located adjacent to Memorial Park.	Lincoln Park will be impacted by right-of-way requirements for a station planned adjacent to this park. The elevated LRT structure will reduce views of the park at street level, but will provide a scenic vista from the aerial structure.
Mitigation Measures	No mitigation required.	Station design measures described in Section 4.12 will reduce aesthetic impacts on Lincoln Park.
Significance After Mitigation	None.	Acquisition of right-of-way and visual impact on Lincoln Park are unmitigable though judged not to be significant. Enhanced access to the park provides a beneficial impact.

Issue	Highland Park Alignment	North Main Street Alignment
CULTURAL RESOURCES (SECTION 4.14)		
a. Historical Resources		
Environmental Impacts	The Arroyo Seco Bridge will be impacted by physical alterations. The route passes within the South Pasadena Historic Business District and is located adjacent to the Santa Fe Station in Pasadena.	None.
Mitigation Measures	The degree of modification required for the Arroyo Seco Bridge will not be known until additional engineering studies are completed.	None required at this time.
Significance After Mitigation	The modification of the bridge will remain a significant adverse impact. However this impact is unavoidable to ensure public safety.	None.
b. Archaeological Resources		
Environmental Impacts	There is a potential for destruction of archaeological sites and/or artifacts in the downtown area where excavation for the LRT takes place. Excavation in the vicinity of Union Station could result in the discovery of historic artifacts from "Old Chinatown" or prehistoric artifacts from "Yangna," a Gabrielino indian village.	Minor potential for destruction of archaeological sites and/or artifacts in the downtown area where excavation for the LRT takes place. Excavation in the vicinity of Union Station could result in the discovery of historic artifacts from "Old Chinatown" or prehistoric artifacts from "Yangna," a Gabrielino indian village.

TABLE 2-1 (continued)

Issue	Highland Park Alignment	North Main Street Alignment
CULTURAL RESOURCES (SECTION 4.14)		
Mitigation Measures	If archaeological sites and/or artifacts are discovered during excavation, CEQA law and guidelines will be followed to insure proper protection of these resources.	If archaeological sites and/or artifacts are discovered during excavation, CEQA law and guidelines will be followed to insure proper protection of these resources.
Significance After Mitigation	No significant adverse impacts are anticipated following mitigation.	No significant adverse impacts area anticipated following mitigation.

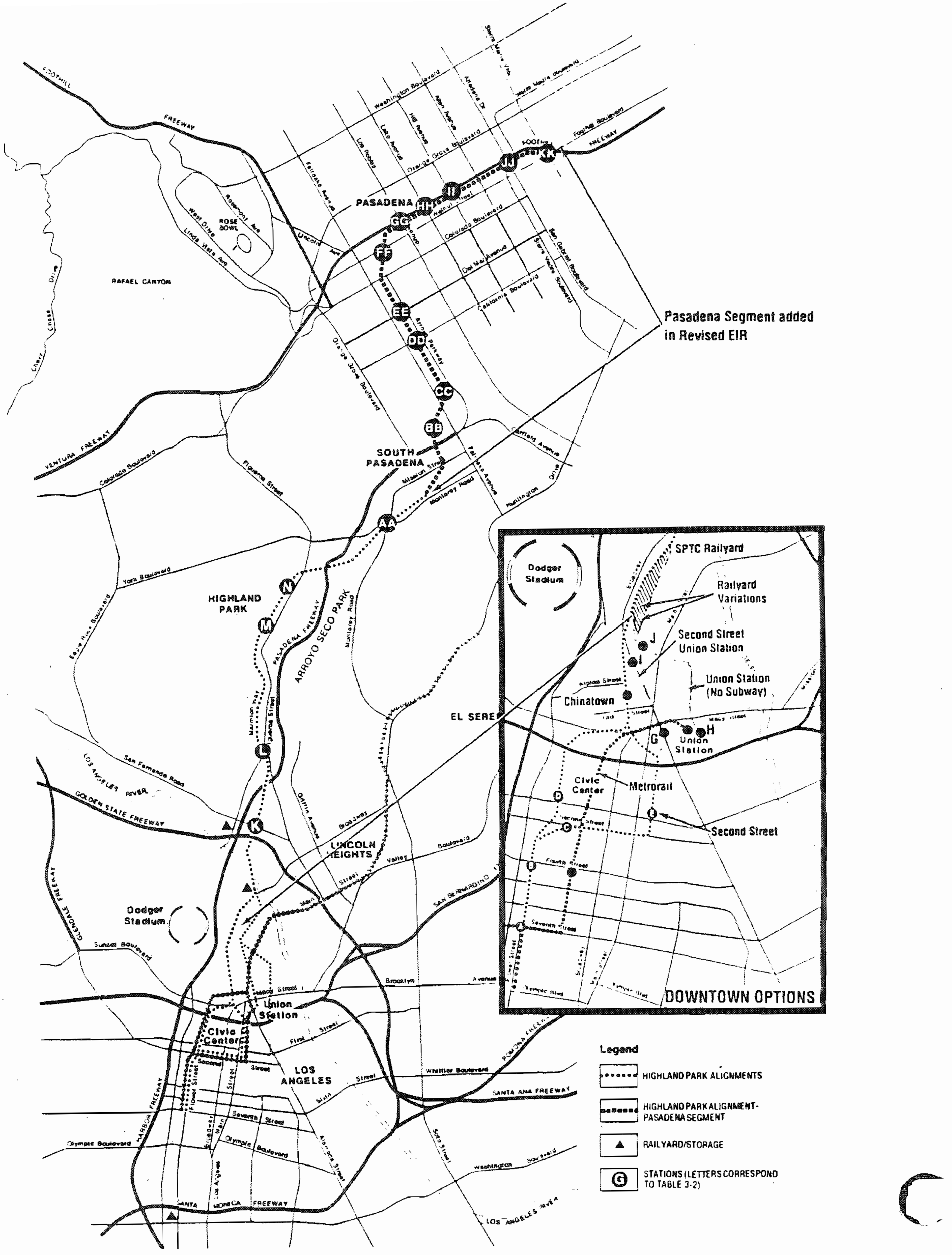
SECTION 3
PROJECT DESCRIPTION

3.1 PROJECT LOCATION

The proposed Pasadena-Los Angeles Rail Transit Project is located in the central portion of Los Angeles County. The project is a proposed LRT facility that begins in downtown Los Angeles and extends in a northeasterly direction through Pasadena. The regional location of the project area is shown in Exhibit 2-1. Exhibit 2-1 also indicates other regional transit projects proposed, planned, or under construction in relation to the proposed Pasadena-Los Angeles Rail Transit Project.

The EIR considers two main alignment alternatives referred to as the Highland Park alternative and the North Main Street alternative. The Highland Park alternative extends through the Mount Washington and Highland Park districts of Los Angeles, South Pasadena, and Pasadena. The North Main Street alignment extends along Main Street, Mission Road, and Huntington Drive through the Lincoln Heights and El Sereno districts of the City of Los Angeles, terminating near the proposed Long Beach Freeway (I-710) extension.

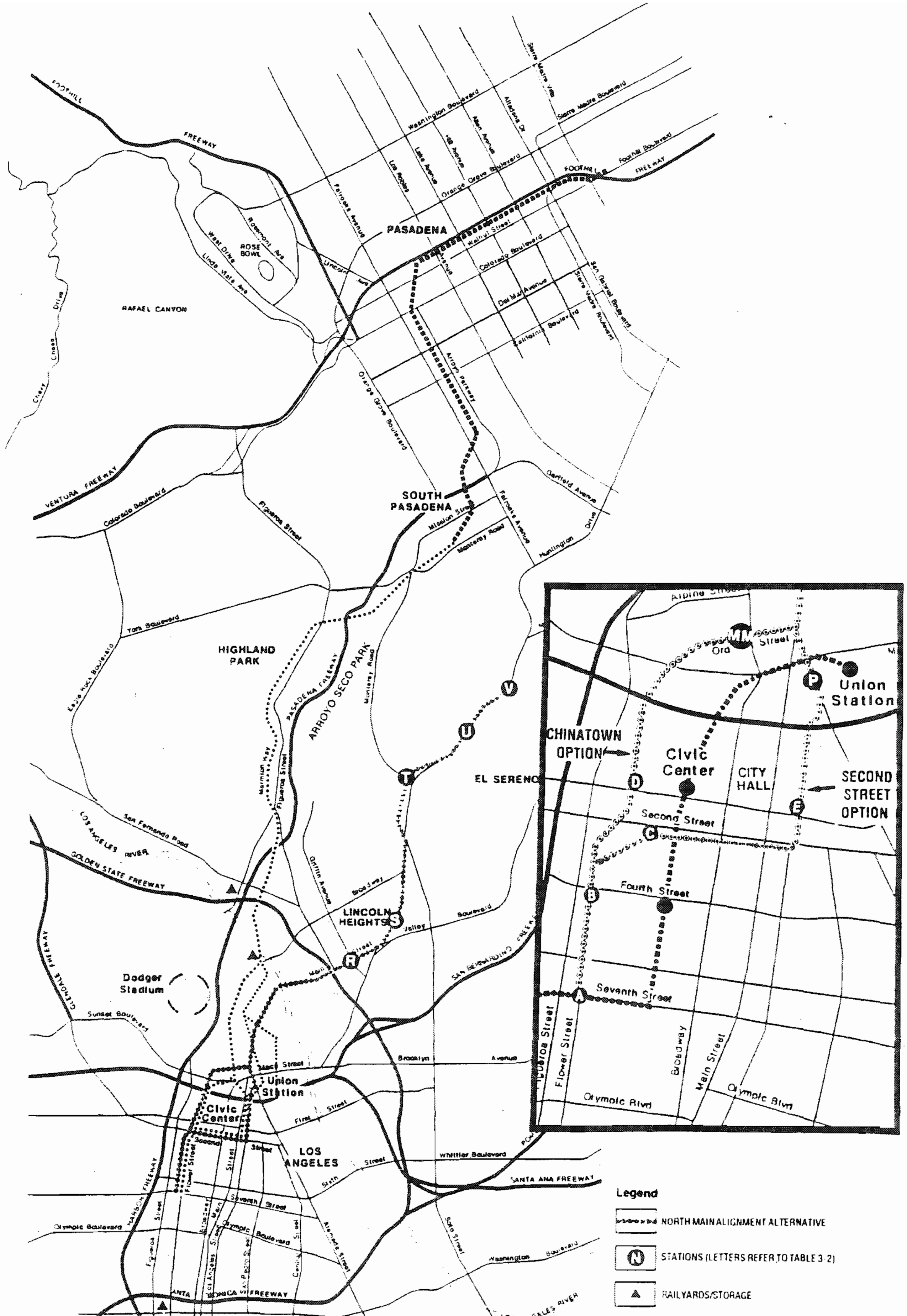
The Highland Park and North Main Street alignments, shown in Exhibits 3-1 and 3-2, respectively, can connect to the planned terminus of the Los Angeles-Long Beach LRT line at 7th and Flower streets in downtown Los Angeles, using a number of downtown alignment options. The downtown options examined in the previous DEIR and re-evaluated here include the Chinatown and Second Street options. An additional Second Street option that connects the Highland Park alternative with Union Station is referred to as the Second Street-Union Station option. This option can also be phased to begin at Union Station, heading northward to Pasadena; the subway portion connecting Union Station with the Long Beach-Los Angeles line could be completed in a future phase. Finally, a downtown option for the Highland Park alignment with a southern terminus at Union Station, referred to as the Union Station "No Subway" option, has also been added. In this latter instance, a direct connection between the Long Beach-Los Angeles line and the Pasadena-Los Angeles line would not be provided, though a connection could ultimately be constructed. The alignments of the Chinatown option, Second Street option, Second Street-Union Station options, and the Union Station "No Subway" option are shown in Exhibits 3-1 and 3-2.



Highland Park Alternative

Pasadena-Los Angeles Light Transit Project

Exhibit 3-1



North Main Alternative
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 3-2

3.2 PROJECT OBJECTIVES

The Pasadena-Los Angeles Rail Transit Project is part of an ongoing regional rail transit system in the County of Los Angeles developed by the LACTC. The proposed project is identified as a candidate for rail transit development along with 12 other corridors in the county, in keeping with the mandate of Proposition A passed in November 1980. Proposition A enacted a one-half cent sales tax to be used for transit development in Los Angeles County.

In addition to complying with the public mandate outlined in Proposition A, the LACTC expects to accomplish the following objectives through this transit project:

- To provide the citizens in the Pasadena-Los Angeles Corridor with a safe and efficient light rail transit system.
- To alleviate overcrowding and traffic congestion on local freeways that presently serve the region extending from Pasadena/West San Gabriel Valley to downtown Los Angeles.
- To improve transportation mobility in the Pasadena-Los Angeles Corridor.
- To connect Pasadena and the San Gabriel Valley with the regional transportation network consisting of Metro Rail, light rail, and busway facilities.
- To improve regional air quality through the reduction of vehicle trips and roadway congestion.
- To construct this project and the other projects as expeditiously and cost-effectively as possible.

3.3 HISTORY OF THE PROJECT

The LACTC initially identified five potential routes for consideration as candidates for the Pasadena-Los Angeles Rail Transit Project in earlier route refinement studies completed in 1987 and 1988. All the routes considered in these studies involved extending the Long Beach-Los Angeles Rail Transit project in downtown Los Angeles to the proposed I-710 extension either through South Pasadena or the El Sereno area of Los Angeles. Following this route refinement phase, the Highland Park and North Main Street alignments and a number of downtown options were selected for further environmental study. Route alignment options studied further include the following:

- Highland Park Alignment Alternative. The Highland Park alignment begins in downtown Los Angeles and extends through Highland Park, South Pasadena, and Pasadena. The alignment leaves the downtown area on a right-of-way currently utilized by the AT&SF railroad. The alignment considered in the previous DEIR terminated in the City of South Pasadena.

- North Main Street Alignment Alternative. The North Main alignment extends north from the Los Angeles downtown area through Lincoln Heights to El Sereno. To the east of Chinatown, the LRT ascends to an elevated structure that follows the centerline of North Main Street and continues traveling northeast in an elevated profile to Mission Road. The elevated LRT continues along Mission Road where it descends to street level at Huntington Drive. The alignment continues at-grade along Huntington Drive where it terminates just before Poplar Boulevard in El Sereno.

- Downtown Connections. The previous DEIR considered two downtown alignment options that would connect either the Highland Park alignment or the North Main Street option with the Long Beach-Los Angeles LRT line. Two variations were possible (Second Street and Chinatown) for each alignment alternative with a total of four variations possible (Second Street/Highland Park, Second Street/North Main, Chinatown/Highland Park, and Chinatown/North Main).

The following studies relate to the development of rail alignment alternatives within the Pasadena - Los Angeles corridor:

- Pasadena-Los Angeles Expanded Route Refinement Study: General Environmental Analysis (Technical Memorandum--Task 2.5). This report outlined the potential environmental impacts that would be anticipated from a number of alignment options that were being considered at that time for those portions of the LRT alignments located in Highland Park and El Sereno.

- Draft Environmental Impact Report, Pasadena-Los Angeles Rail Transit Project (State Clearinghouse No. 88042713). The draft EIR analyzed the environmental impacts anticipated with the construction and operation of a LRT facility from downtown Los Angeles to Pasadena. The draft EIR focused on two alignment options in downtown Los Angeles which would connect with either the Highland Park alignment through Highland Park to South Pasadena, or with the North Main Street alignment through Lincoln Heights and El Sereno to the proposed I-710 right-of-way extension.

- Pasadena-Los Angeles Rail Transit Route Refinement Study--Northern Portion: Preliminary Evaluation of Routes in the City of Pasadena. This study identified the potential environmental impacts anticipated to result from the construction and operation of a number of alignment alternatives that were being considered in the City of Pasadena.

The LACTC, acting as lead agency, circulated the draft EIR for the Pasadena-Los Angeles rail transit project (State Clearinghouse No. 88042713) during the months of January and February 1989. Following public review of the draft EIR and in response to the comments received, the LACTC decided to expand the scope of the project to consider the following:

- Second Street-Union Station Option. This is a revision of the Second Street downtown route option considered in the draft EIR which connects with the Highland Park alignment. Under this design scenario, the alignment is reconfigured so that it serves Union Station. This option can be constructed as a direct extension of the Long Beach-Los Angeles line. In addition, this option can be phased to originate at Union Station heading northward. If this latter option is selected, a connection with the 7th and Flower LRT station could be completed at a later date.

- Union Station "No Subway" Option. This alignment proposal eliminates the subway segment in downtown Los Angeles and locates the LRT line's southern terminus at Union Station. Under this scenario, the Long Beach line would terminate at the 7th Street and Flower Street station in downtown Los Angeles. As a result, there would not be a continuous link between the Long Beach-Los Angeles line and the Pasadena-Los Angeles line. However, the design would not preclude such a future connection.

- New Rail Yard. For the Union Station "No Subway" option and the Second Street-Union Station option, both of which can be phased to proceed north from Union Station, access to the Long Beach-Los Angeles main yard would not be possible. Thus, a larger full-maintenance yard would be developed. A site north of US-101 between the Los Angeles River and San Fernando Road would be examined.

- Elimination of the North Main Street Alignment Maintenance Yard. In response to comments received from Chinatown merchants and residents, the maintenance yard for the North Main alignment, as it was depicted in the draft EIR for the Pasadena-Los Angeles rail transit project, was eliminated.

- Pasadena-Los Angeles Alignment--Northern Portion. The route refinement studies prepared for the proposed extension of the LRT line through the City of Pasadena provided a qualitative environmental assessment of several routes. The City of Pasadena selected the AT&SF right-of-way extending onto I-210 as its preferred route. The LACTC, as lead agency, expanded the project scope of the EIR to include this alignment extending to eastern Pasadena and terminating at Sierra Madre Villa.

- Elimination of South Pasadena Station. The earlier draft EIR identified a station located at Pasadena Avenue and Monterey Road in the City of South Pasadena. This station has been eliminated from further consideration, and two other station sites within South Pasadena are now considered in this revised DEIR.

3.4 PHYSICAL CHARACTERISTICS

A. ALIGNMENT CHARACTERISTICS

The proposed project will be one segment of a regional transportation network (refer to Exhibit 2-1) extending light rail transit from downtown Los Angeles into the Pasadena or El Sereno area, depending on the final alignment selected. This transit link is a single component of a comprehensive regional transportation system that includes Metro Rail, busways (which may be converted to rail in the future) and other light rail links designed to connect cities within Los Angeles County. The alignments and downtown options considered in the original and revised EIR are summarized in Table 3-1.

The following sections describe both the Highland Park and North Main Street alignment alternatives. In addition, the downtown options that connect with each alternative are also described.

Highland Park Alternative

The Highland Park alternative begins in downtown Los Angeles using the Chinatown option, Second Street-Broadway option, Second Street-Union Station option, or Union Station "No Subway" option. After leaving the downtown area, this at-grade alignment follows the existing AT&SF railroad right-of-way which passes through Mount Washington, Highland Park, and South Pasadena, continuing on into Pasadena. The line will then terminate in the vicinity of the Foothill Freeway (I-210) and Sierra Madre Villa in eastern Pasadena. The proposed alignment is depicted in Exhibit 3-1.

TABLE 3-1

SUMMARY OF ALIGNMENTS

Alignment	Downtown Options	Nature of Change[a]
Highland Park Alternative		Revised[b]
	Second Street	Unchanged
	Chinatown	Unchanged
	Second Street-Union Station (two variations)[c]	Addition
	Union Station "No Subway" (two variations)[c]	Addition
North Main Alternative		Revised[d]
	Second Street	Unchanged
	Chinatown	Unchanged

a Changes to scope of project over that described in previous draft EIR for the Pasadena-Los Angeles Rail Transit Project.

b The Highland Park alignment now extends through South Pasadena and Pasadena to Sierra Madre Villa using the existing AT&SF railroad right-of-way west of the Arroyo Parkway and continuing eastward in the median of I-210.

c The two variations refer to the configuration of the alignment as it approaches the Southern Pacific main railyard located between North Broadway and North Spring. One variation involves placing the LRT right-of-way along Spring on the east side of the railyard and the variation places the right-of-way on the west (Broadway) side.

d The rail storage yard for the North Main alignment has been eliminated.

Source: Los Angeles County Transportation Commission (LACTC), 1989.

Downtown Connections to Highland Park Alternative

Chinatown Option: From the northern terminus of the Long Beach-Los Angeles LRT, the Chinatown option of the Pasadena-Los Angeles LRT extends under Flower Street to the intersection of Flower and Hope Streets. The subway continues north under Hope Street, then curves in a gentle "S" as it passes beneath US-101 and intersects with North Broadway (refer to Exhibit 3-1). The subway continues under North Broadway, surfacing at the SPTC main freight yard and linking with the AT&SF line near the Los Angeles River.

Second Street Option: From the 7th and Flower Long Beach-Los Angeles station, the Second Street option remains under Flower Street until it passes 3rd Street, and then turns east, crossing under the intersection of Hope Street and General Thaddeus Kosciuszko Way. The subway route then shifts east to align under Second Street. As the route passes under South Main Street, it begins a northerly turn to proceed north beneath Los Angeles Street. Continuing beneath Los Angeles Street, the subway passes under US-101. The alignment shifts west under El Pueblo de Los Angeles State Historic Park, then turns north to line up with North Broadway. The subway continues under North Broadway, surfacing at the SPTC main freight yard and linking with the AT&SF line near the west bank of the Los Angeles River. This option is illustrated in Exhibit 3-1.

Second Street-Union Station Option: This downtown option is similar to the Second Street option except that the alignment allows a light rail station at Union Station. Under this scenario, the Second Street-Union Station subway follows the same general subway alignment proposed for the Second Street option (refer to Exhibit 3-1). Instead of turning west under El Pueblo Park, the alignment meets Alameda Street and provides a stop at Union Station near Macy Street. After leaving Union Station, the subway continues northward under Alameda Street where the line surfaces near the SPTC main freight yard. Two variations of this option are being considered in the vicinity of the SPTC main freight yard, where the alignment can proceed on either side of the yard. One variation placed the LRT right-of-way on the east side of the yard adjacent to North Spring Street while the other variation places the LRT right-of-way on the west side of the SPTC yard.

Unlike the two previously described options, this option can be phased to begin construction at Union Station, extending toward Pasadena. If this occurs, a full-maintenance yard site, as identified for the Union Station "No Subway" option, would be needed.

Union Station "No Subway" Option. This option begins at Union Station and connects with the Highland Park alternative, primarily using a railroad rights-of-way. In the vicinity of the SPTC main freight yard, two variations using either boundary of this yard are also being considered similar to those discussed for the previous option. The selection of this option would mean that there would not be a direct connection between the proposed Pasadena-Los Angeles LRT line and the Long Beach-Los Angeles line which will terminate at the 7th Street and Flower station in downtown Los Angeles. However, such a connection can be made in the future. Since the operations and maintenance of both lines would be independent of each other, a full-maintenance yard would be needed. The route of the proposed alignment is shown in Exhibit 3-1.

North Main Street Alternative

The North Main Street alternative traverses the downtown area using either the Chinatown option or the Second Street option. To the east of Chinatown, the LRT ascends to an elevated structure that follows the centerline of North Main Street crossing the Los Angeles River and I-5. It continues in an elevated profile along the centerline of North Main Street, then shifts onto Mission Road near Lincoln Park. Continuing along Mission, the route crosses the North Broadway/Mission intersection, then descends to street level as it approaches Huntington Drive. The route aligns with Huntington Drive and continues at-grade along this street where it terminates just before Poplar Boulevard. The route of the North Main Street alternative is shown in Exhibit 3-2.

Downtown Connections to North Main Street Alternative

Chinatown Option: The Chinatown option route is identical to the one described for the Highland Park alignment from 7th and Flower Streets to Hope and Temple. After that point, the North Main Street connection passes beneath US-101 and makes a sweeping curve east to proceed under Ord Street. It then turns north to connect with North Main Street. Once on North Main Street, it emerges from the subway at a portal located between Alameda and Augusta Street. This option is illustrated in Exhibit 3-2.

Second Street Option: The Second Street option for the North Main Street alternative has an identical alignment to the one described for the Highland Park alternative from 7th and Flower to US-101. After the subway passes beneath the freeway, it curves northeast becoming contiguous with Alameda Street near Union Station. The route continues underground north beyond Macy Street then curves east to align with North Main Street. The subway emerges between Alpine Street and Bruno Street. From the portal the alignment continues on an elevated structure along North Main Street. This option is illustrated in Exhibit 3-2.

B. RAIL STORAGE YARDS, STATIONS, AND OTHER FACILITIES

Rail Storage Yards

The proposed project involves the development of rail storage yards to provide storage for light rail vehicles and provide space for the daily inspection and light maintenance of vehicles, control of yard operations, and personnel changes. Storage tracks will be provided for rail vehicles and for the rail-mounted maintenance equipment. Two alternate storage yard sites are proposed for the Highland Park alignment, depending on the downtown route option selected. In addition, a turnback track is proposed at a location underneath I-10 east of Flower Street and north of 18th Street. The location of each rail storage yard and the turnback track is indicated in both Exhibits 3-1 and 3.2. Conceptual engineering drawings of the rail storage yards are provided in Appendix F under separate cover.

Highland Park Alignment Rail Storage Yard Sites: For the Highland Park alignment, two rail storage yard sites are being considered. The first site referred to as the Midway Yard is proposed north of Broadway, adjacent to the west bank of the Los Angeles River. This site, currently owned by SPTC, is parallel to the Los Angeles River, located south of the intersection of the river and I-110.

The rail yard will serve as both a storage and light maintenance facility for the proposed Pasadena-Los Angeles LRT. The design calls for eight storage tracks to provide vehicle storage and switching capacity. The maintenance facility will consist of a maintenance building for the repair of vehicles and storage of tools and equipment. A work pit will be positioned for access to vehicle undercarriages for maintenance and inspection. An existing railroad line immediately parallel to the Los Angeles River will be maintained for continued railroad use or, in the future, can be converted for use by rail transit.

The rail storage yard will be accessible to both inbound (southbound) and outbound (northbound) trains. Outbound trains will be able to move directly into the yard from the alignment. Inbound trains will move onto storage tracks and then back up into the yard.

The selection of either the Highland Park "No Subway" alignment option or the Second Street-Union Station option without a connection to 7th and Flower, would require a rail storage and full-maintenance yard since the route would not provide a direct connection to the Long Beach-Los Angeles line facilities. As a result, a vehicle maintenance and storage site for the northern segment (Pasadena-Los Angeles) has been identified north of I-110 between the Los Angeles River and San Fernando Road.

Flower Street /Santa Monica Freeway Turnback Track: A turnback track is being proposed as part of this project under the I-10 at Flower Street. The turnback would branch off the Long Beach-Los Angeles route currently under construction. As the Long Beach-Los Angeles LRT project has already been subject to CEQA review (LACTC, 1985), the turnback for the LRT is being evaluated in this EIR. The trackage will consist of two parallel spurs that can provide some vehicle storage. The track diverges from the Long Beach-Los Angeles LRT under the eastbound on-ramp to the I-10 and then continues east parallel to the freeway. The turnback separates into two parallel tracks located under the eastbound lanes of the freeway.

The northern connection of the track with the LRT route passes under the freeway, following an "S" pattern, linking to both the northbound and southbound tracks of the Long Beach-Los Angeles LRT just north of I-10, on the east side of Flower Street.

Stations

Three types of stations will be required to accommodate the different configurations of the Pasadena-Los Angeles rail transit alternatives: aerial, at-grade, and subway. The majority of the stations will be either at-grade or in subway. The stations serving the downtown options for both alignments are in subway. There are two aerial stations proposed: one for the North Main Street alternative at Mission Road/Lincoln Park and another at Griffin/North Main. The remainder of the stations on the North Main Street alignment, as well as all stations east of the Los Angeles River for the Highland Park alternative, are at-grade. Some of the stations serving that portion of the alignment of the Highland Park alternative located in the median of I-210 will be constructed over the freeway providing access from the tracks to the roadways spanning the freeway.

Station design will be standardized throughout the system to the extent possible using a center platform, except when conditions require a side platform. At-grade and aerial stations will be covered by canopies for protection from weather; lighting and benches will be provided at each station.

Stations will provide opportunities for connection between the different modes of transportation serving each station area. Depending on the site characteristics of each station, provisions for long-term parking lots, "kiss-and-ride" drop-offs, and short-term parking for passenger loading and unloading would be included. Key parking and circulation factors considered in the evaluation of potential station parking sites included:

- Safety of entry and exit locations.
- Visibility of the site from adjacent streets.
- Traffic control through traffic signals or stop signs.
- Turning movements including left-turn pockets and turns in the vicinity of other adjacent intersections and driveways.
- Traffic impacts from alignments in traffic center medians
- Levels of pedestrian activity.
- Number of parking spaces possible.
- Existing observed levels of traffic congestion.
- Potential alternate site locations.
- Ease and safety of potential pedestrian access.

Bus stop locations would be coordinated with RTD, other public transit operators, and local jurisdictions to provide convenient transfers to the rail stations. Pedestrian crosswalks will provide access to passengers arriving at the station site on foot or transferring from a bus. Parking facilities for motorcycles and bicycles will be provided, as needed.

Station locations have been sited through the use of ridership forecasts, existing traffic conditions, and physical characteristics, such as access and available space in order to accommodate the maximum number of potential riders. To the extent possible, stations were located to reinforce existing and planned activity centers. Station location was also influenced by the need to minimize property takings, especially residential uses, wherever possible. Street entrances were sized and located to leave sufficient sidewalk space and to provide smooth transitions to building entrances and driveways.

Key land use factors used in the evaluation of potential station parking sites included:

- Available vacant land.
- Compatibility of potential station with adjacent and prevailing and uses.
- Types and intensity of residential, commercial, and industrial activity.
- Underdeveloped land in the immediate vicinity.
- Right-of-way/site acquisition needs.
- Existing improvements which could affect site development: e.g., drainage channels, informal use of vacant land, planned roadways, and other traffic and transportation improvements, and proximity to major thoroughfares.

It should be noted that a number of candidate station sites have been identified for that portion of the Highland Park route that extends through South Pasadena and Pasadena. While a range of station sites are being studied for this segment, the final project would identify a subset of these potential stations according to a general station spacing standard of approximately one station per mile.

Table 3-2 summarizes the stations planned for the Highland Park and North Main Street alignments. Some stations are unique to a certain combination of a downtown option and a particular alignment. Ancillary facilities, such as parking or "kiss-and-ride" drop offs are also indicated. Station locations are shown on the alignment maps in Exhibits 3-1 and 3-2. Stations identified in those exhibits are indicated by a letter corresponding to those listed in Table 3-2.

Conceptual station site drawings follow the engineering drawings in Appendix F under separate cover. Potential station entrances have been developed in coordination with several public agencies. Over time, additional stations or station entrances may be added to better serve communities and to take advantage of future development patterns which could benefit future LRT ridership and operations. Other possible stations or station entrances which may be added include a station or entrance at the Music Center expansion site and a station at the Southern

Pacific railyard which would serve as an interface to a shuttle service between the light rail line and Dodger Stadium.

TABLE 3-2

SUMMARY OF STATION CHARACTERISTICS

		Downtown Options			
Stations	Station Configuration/ Facilities	Chinatown	Second St.	Second St./ Union Station	Union Station (No Subway)
Highland Park Alternative					
A. 7th/Flower[a]	Subway/center platform	X	X	X	
B. 4th/Flower	Subway/center platform	X	X	X	
C. 2nd/Grand	Subway/center platform		X	X	
D. 1st/Hope	Subway/center platform	X			
E. 1st/Los Angeles	Subway/center platform		X	X	
F. Broadway/Alpine	Subway/center platform	X	X		
G. Union Station/ Alameda	Subway/center platform			X	
H. Union Station	At-grade/center platform				X
I. College/Alameda	At-grade/center platform			X	
J. North of College/ Alameda	At-grade/center platform				X
K. Avenue 26/ Santa Fe	At-grade/side platform; long- and short-term parking	X	X	X	X
L. Figueroa/ Marmion	At-grade/side platform; curbside drop-off	X	X	X	X
M. Avenue 51/ Santa Fe	At-grade/side platform curbside drop-off; parking	X	X	X	X

TABLE 3-2 (continued)

Stations	Station Configuration/ Facilities	Downtown Options: Chinatown	Second St.	Second St. Union Station	Union Station (No Subway)
Highland Park Alternative Study Stations[b]					
N. Avenue 57/ Santa Fe (Marmion Way)	At-grade/side platform; long- and short-term parking	X	X	X	X
AA. Mission	At-grade/side platform	X	X	X	X
BB. Oak Lawn	At-grade/center platform	X	X	X	X
CC. Glenarm	At-grade/side platform	X	X	X	X
DD. California Blvd.	At-grade/side platform	X	X	X	X
EE. Del Mar Blvd.	At-grade/side platform	X	X	X	X
FF. Memorial Park	At-grade/center platform	X	X	X	X
GG. Los Robles	At-grade/center platform	X	X	X	X
HH. Lake Avenue	At-grade/center platform	X	X	X	X
II. Hill Avenue	At-grade/center platform	X	X	X	X
JJ. Altadena Drive	At-grade/center platform	X	X	X	X
KK. Sierra Madre Villa	At-grade/center platform	X	X	X	X
North Main Alternative					
A. 7th/Flower[a]	Subway/center platform	X	X		
B. 4th/Flower	Subway/center platform	X	X		
C. 2nd/Grand	Subway/center platform		X		
D. 1st/Hope	Subway/center Platform	X			
E. 1st/Los Angeles	Subway/center platform		X		
MM. Ord/Broadway	Subway/center platform	X			
P. Alameda/Macy	Subway/center platform		X		

TABLE 3-2 (continued)

Stations	Station Configuration/ Facilities	Downtown Options: Chinatown	Second St.	Second St. Union Station	Union Station (No Subway)
R. Main/Griffin	Aerial/side platform	X	X		
S. Mission/Lincoln Park	Aerial/side platform Curbside drop-off; parking	X	X		
T. Huntington/ Monterey	At-grade/center platform Kiss and ride; long-term parking	X	X		
U. Huntington/ Eastern	At-grade/center platform; curbside drop-off	X	X		
V. Poplar/Horne	At-grade/side platform Long- and short-term parking	X	X		

a 7th and Flower Station is not considered part of this project.
b Not all stations identified as candidate stations for the Highland Park alignment will be selected.

Note: The letters to the left of the station names correspond to the locations indicated in Exhibits 3-1 and 3-2.

Source: Bechtel Civil, Inc., 1988.
LACTC, 1988.

Other Facilities

Traction power substations will be situated along the alignment and will draw power from the utility grids of the Los Angeles Department of Water and Power and Southern California Edison which is then fed into the overhead lines used by the LRT vehicles. The overhead cantenary system (OCS) will maintain a continuous voltage of at least 550 V at the light rail vehicle. The OCS distributes the 750-Vdc power by overhead wires from the traction power substations to the light rail vehicles. A pantograph collector on the top of the vehicle will maintain the contact with the overhead wires.

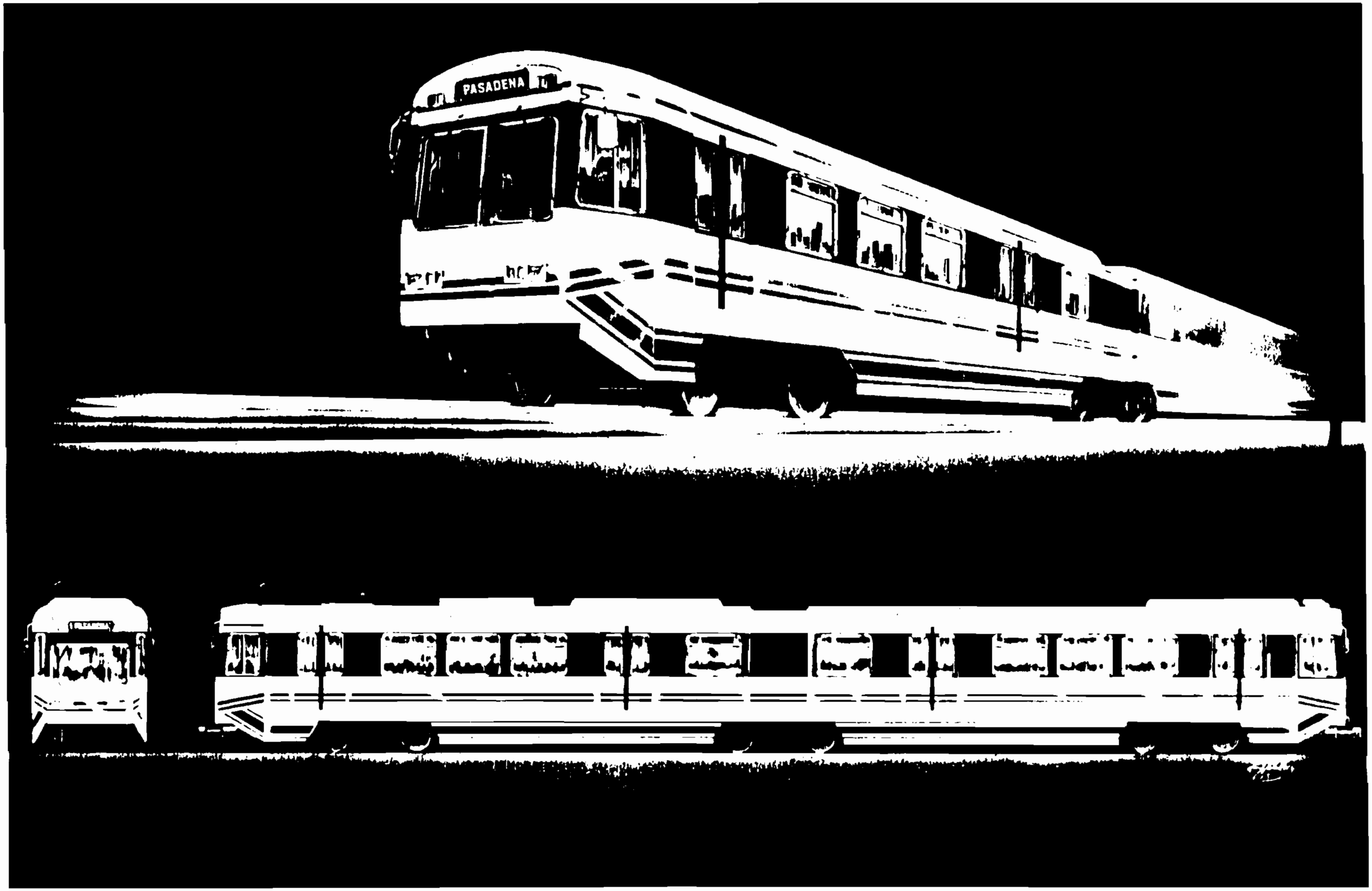
Substations generally have been located about 1.2 miles apart. Because of the power drain associated with vehicles accelerating out of stations, a traction power substation is located at stations where practical. Additional traction power substations will be located at other intervals, where required. Each traction power substation housing will include an area adequate to accommodate traction equipment and ancillary components. Substations will be prefabricated units designed to operate unattended.

C. VEHICLE CHARACTERISTICS

The vehicles which would be operating on the proposed alignment are identical to those which will be operating on the Long Beach-Los Angeles light rail line. The individual vehicles would be 11 feet-6 inches in height, 87 feet in length, and 8 feet, 8 and 3/4 inches in width. The cars will be powered by two 195 horsepower DC electric motors. An artist's rendering of the type of vehicle that has been selected for the proposed LRT system is provided in Exhibit 3-3.

The vehicles would be articulated with accordion connections, double ended with four doors on each side providing access to and from high level platforms into the cars to avoid steps between platform and vehicle. The design and construction of the vehicle would utilize as much "off the shelf" technology as possible.

Each car provides 76 seats with two seats located at each end of the car that can be folded up to provide space for one wheelchair passenger. The maximum capacity (76 seated plus 161 standing) is 238, including an operator. The vehicle weight is 94,000 pounds empty and 131,000 pounds at full capacity (238 on-board). The vehicle has a maximum speed of 55 miles per hour (mph) and is able to accelerate 3 mph per second. The vehicle reaches top speed in less than 45 seconds. The preliminary basic design characteristics are summarized in Table 3-3.



Prototype Vehicle
Pasadena-Los Angeles Light Rail Transit Project

Michael Brandman Associates
Exhibit 3-3

TABLE 3-3

SUMMARY OF VEHICLE CHARACTERISTICS

Feature	Characteristics
Length of car over coupler faces	90'-0" maximum
Overall width of car over rub rails	8'-8-3/4" maximum
Width of car at thresholds	8'-8-3/4" maximum
Width of passenger side doors when fully opened	4'-0" clear, minimum
Height of car from top of roof-mounted equipment to top of rail (static)	12'-0" maximum
Interior height - from floor to ceiling (at car centerline)	6'-6" minimum
Minimum running clearance (except track brakes)	2-1/2"
Minimum running clearance: under car equipment, level track	8"

Source: LACTC, 1988.

3.5 OPERATIONAL CHARACTERISTICS

This section of the EIR describes the operational characteristics of the proposed Pasadena-Los Angeles Rail Transit Project. The description of operational characteristics is based on studies provided in 1988 and 1989 by the Southern California Association of Governments (SCAG) and Manuel Padron & Associates.

Operating plans were developed for the year 2010 ridership forecasts prepared by the Southern California Association of Governments (SCAG) and the estimated running times of the LRT vehicles. The operational characteristics depicting travel times and distances are shown in Table 3-4. Minimum operating headways in the peak hour would typically be every 6 minutes for 3-car trains between the Los Angeles central business district and the Del Mar Station in Pasadena. Headways would be less frequent, at approximately 9 minutes, between the Del Mar Station and the terminus at Sierra Madre Villa Station.

TABLE 3-4

OPERATIONAL CHARACTERISTICS
OPERATING SEGMENT LENGTHS AND TRAVEL TIMES

	Downtown to Alpine/Brwy College/Spring		To Marmion/ Figueroa		To Avenue 57		To Del Mar Blvd.		To Sierra Madre Villa	
	LL[a]	TT[b]	LL	TT	LL	TT	LL	TT	LL	TT
Highland Park Alignment										
From 7th/Flower Metro Rail Station										
via Chinatown	1.6	4:26	4.3	9:32	6.1	13:19	10.3	20:51	14.7	29:14
via Second Street	2.0	5:50	4.8	10:23	6.6	13:54	10.8	21:26	15.2	29:49
via Second Street-Union Station	2.3	6:26	4.7	10:29	6.5	14:00	10.7	21:32	15.1	29:55
From Union Station Metro Rail										
via Second Street-Union Station	--	--	--	--	--	--	9.1	16:11	13.6	23:46
via Union Station-No Subway	--	--	--	--	--	--	9.1	16:11	13.6	23:46

	To Orlin/ Brway		To Huntington/ Monterey		To Poplar/ Horne	
	LL	TT	LL	TT	LL	TT
North Main Street Alternative						
From 7th/Flower Metro Rail Station						
via Chinatown	1.1	2:45	5.1	10:24	6.6	13:30
via Second Street	1.3	4:09	5.3	11:58	6.8	15:04

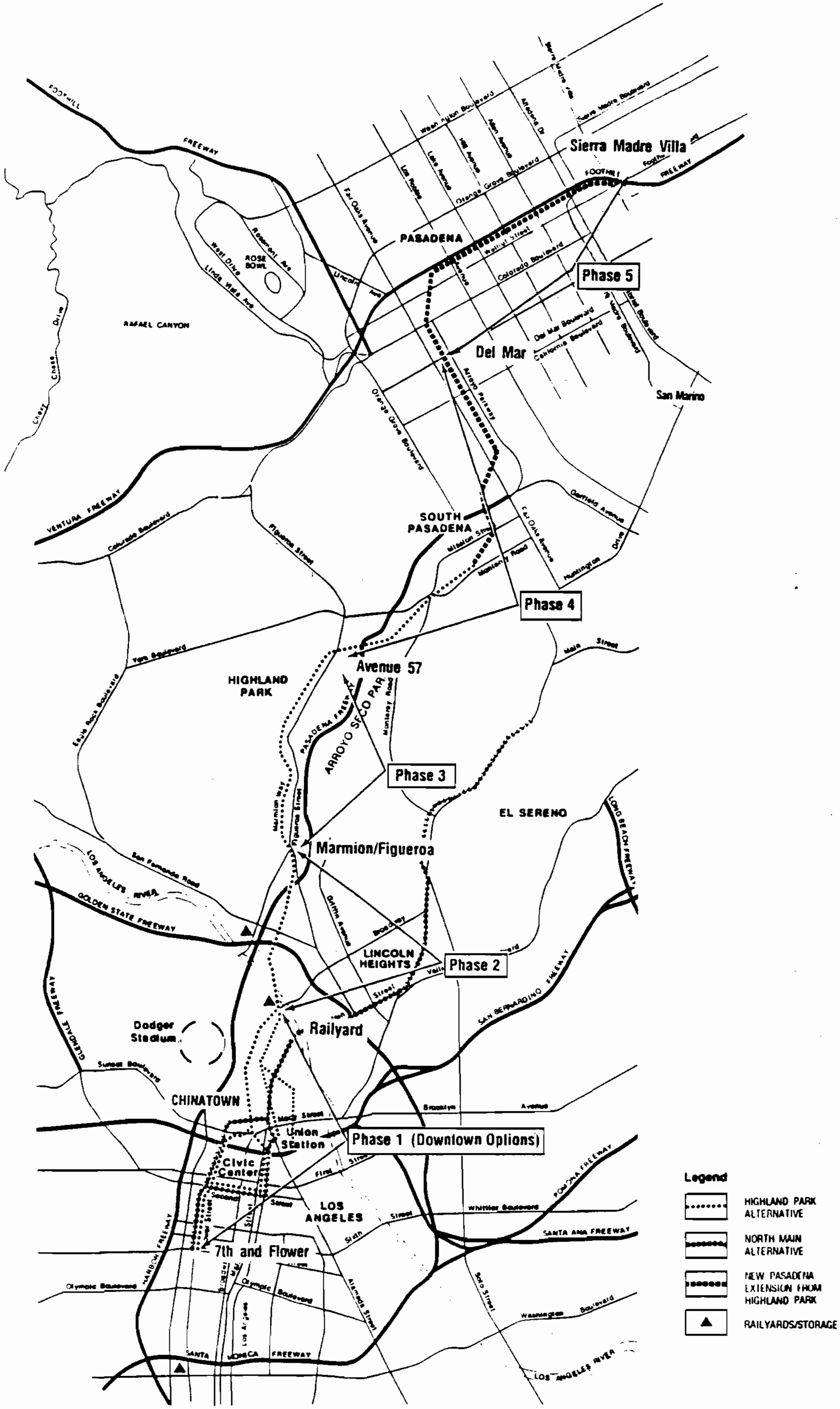
a LL = length of line in miles--cumulative measurement
b TT = travel time (from beginning station)--cumulative measurement.

After the proposed project begins operation, bus routes may be changed or added to promote home-to-work commutes using a combination of bus and rail transit. Feeder lines would provide service to commuters between stations and major destination points. In addition, existing bus routes serving the corridor would be modified to include regular scheduled stops at the stations. For example, bus service connections from the light rail to the USC Medical Center would be achieved by adding bus service from the Avenue 26 station to the Medical Center for the Highland Park Alignment, or from the Main/Griffin or Mission/Lincoln Park stations for the North Main alignment. Another example would be the creation of a shuttle service between the light rail line and Dodger Stadium. In this case, a shuttle service would be established between a future station which could be constructed in the Southern Pacific railyard in downtown Los Angeles.

3.6 PHASED DEVELOPMENT OF PROPOSED PROJECT

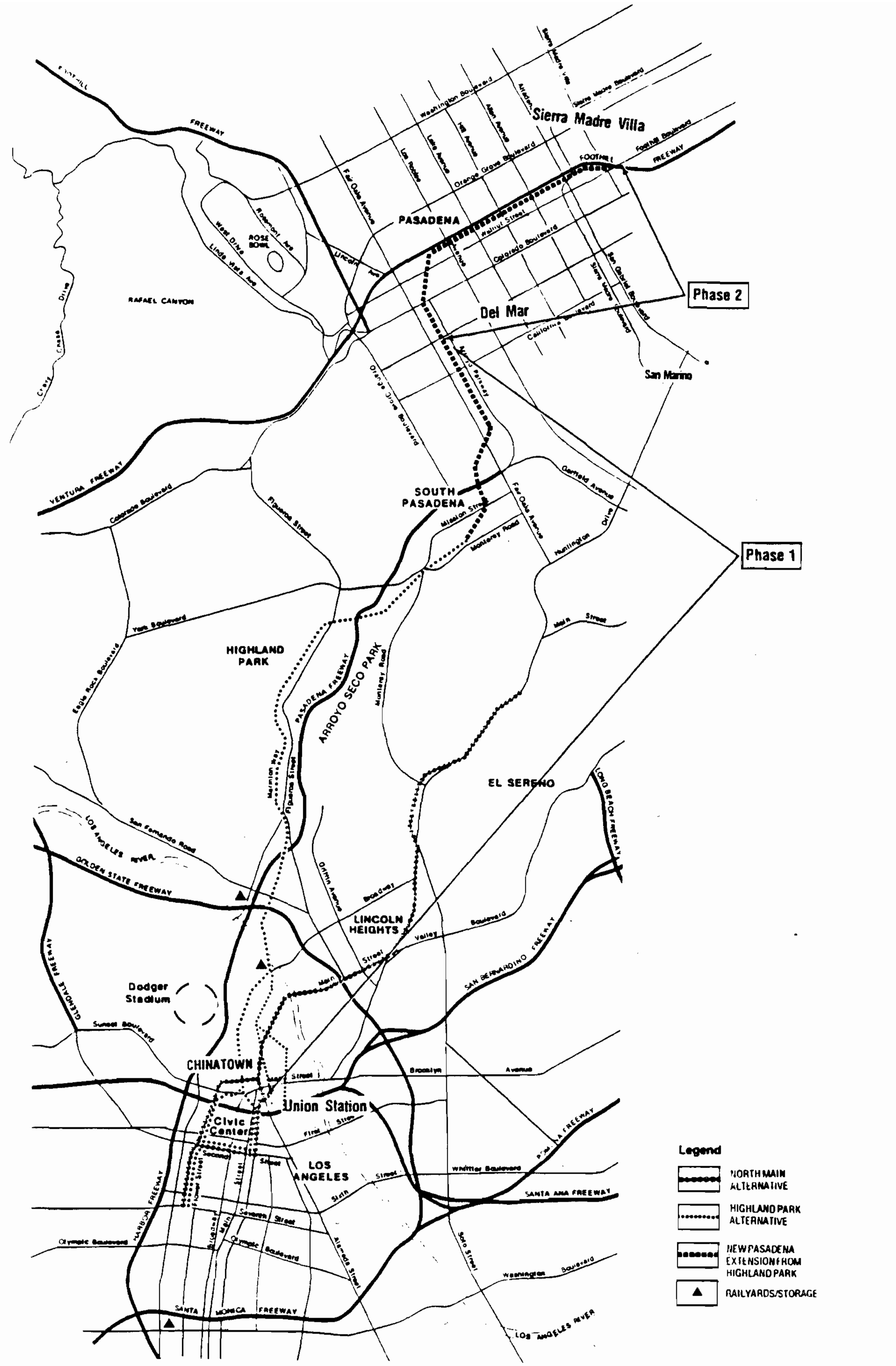
To allow flexibility for funding availability, the construction of the proposed Pasadena-Los Angeles Rail Transit Project may proceed in phases. The potential phased development of the North Main Street and Highland Park alternatives is illustrated in Exhibits 3-4, 3-5, and 3-6 is summarized in Table 3-5.

The phased development of these alignments is an important factor that requires consideration in this analysis. Those stations that would serve as terminal stations in the interim may experience increased levels of traffic and noise while they serve as terminal facilities. These impacts around affected stations are discussed in Section 4 of this EIR.



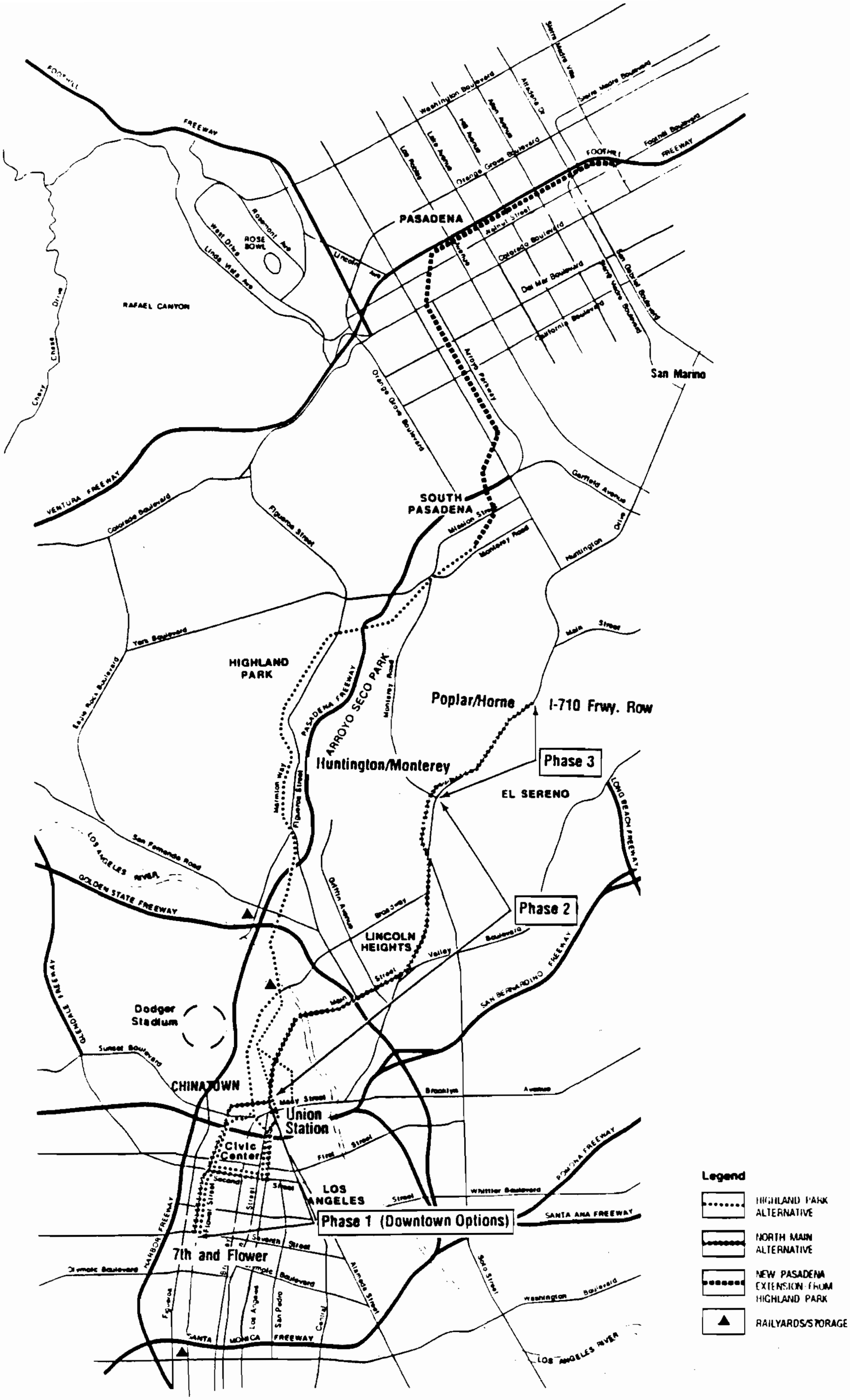
Phasing Plan: Highland Park Alternative
7th and Flower to Sierra Madre Villa
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 3 – 4



Phasing Plan: Highland Park Alternative
Union Station to Sierra Madre Villa
Pasadena Light Rail Transit Project

Exhibit 3-5



Phasing Plan: North Main Street Alternative
7th and Flower to Polar/Horne
Pasadena Light Rail Transit Project

Exhibit 3-6

TABLE 3-5

POSSIBLE PHASING ALTERNATIVES

Phase	Phase Segment	Exhibit Reference
Highland Park Alternative (7th and Flower to Sierra Madre Villa)		
1	7th and Flower to railyard	3-4
2	Railyard to Marmion and Figueroa	3-4
3	Marmion and Figueroa to Avenue 57	3-4
4	Avenue 57 to Del Mar	3-4
5	Del Mar to Sierra Madre Villa	3-4
Highland Park Alternative (Union Station to Sierra Madre Villa)		
1	Union Station to Del Mar	3-5
2	Del Mar to Sierra Madre Villa	3-5
North Main Street Alternative (7th and Flower to Proposed I-710 Extension)		
1	7th and Flower to Union Station	3-6
2	Union Station to Huntington and Monterey	3-6
3	Huntington and Monterey to Poplar and Horne	3-6

3.7 PROJECTED CONSTRUCTION COSTS AND PATRONAGE OF PROPOSED PROJECT

Tables 3-6 through 3-8 summarize the estimated total project costs for the five alignment alternatives, both in current dollars (1989 dollars) and the possible mid-point of construction (1994 dollars). The mid-point is presented to show the effects of inflation. Total project costs include the following elements:

- Construction (guideways, structures, stations, electrification, trackwork, yards, utility relocations, systemwide facilities, etc.).
- Transit vehicles

- Testing and operations (start-up)
- Right-of-way acquisition
- Professional services (design, construction management, project administration, affirmative action, community involvement, etc.)
- Owners insurance
- Special programs (such as arts program).

Once these elements are estimated, a construction contingency is applied to construction items and a project reserve account is established for the total project. Table 3-8 presents a summary of the current year (1989 dollars) and mid-point of construction (1994 dollars) total estimated costs for each of the alternative alignments. It should be noted that the construction costs have been estimated using quantity takeoffs from the conceptual plans and profiles which are contained in the separately bound Appendix F of this EIR. Also, a 4.5 percent annual cost escalation has been used to estimate the 1994 costs.

TABLE 3-6

SUMMARY OF PATRONAGE AND COST

Alternative	Operational Characteristics: Line Length	Operational Characteristics: Daily Patronage	Total Cost $1989 $1994[a] (millions)	Total Cost per Mile $1989 $1994[a] (millions)
Highland Park Alternatives				
Chinatown Option	14.7	85,200	$1,110 $1,324	$75 $90
Second Street Option	15.2	80,400	$1,199 ($1,430)	$79 ($94)
Second Street- Union Station Option	15.1	78,700	$1,198 $1,428	$79 ($94)
Union Station- "No Subway" Option	13.6	68,200	$ 776 $ 925	$56 ($67)
North Main Street Alternatives				
Chinatown Option	6.6	48,600	$ 702 $ 838	$106 ($126)
Second Street Option	6.8	42,000	$ 777 $ 927	$113 ($135)

a Estimated midpoint of construction.

Source: LACTC, 1989; Bechtel Civil, Inc., 1989.

TABLE 3-7

PROJECTED PATRONAGE SUMMARY FOR PHASED DEVELOPMENT
YEAR 2010

Highland Park Alternative from 7th/Flower	Phase 1 7th/ Flower to Railyard	Phase 2 Railyard to Marmion/ Figueroa	Phase 3 Marmion/ Figueroa to Avenue 57	Phase 4 Avenue 57 to Del Mar	Phase 5 Del Mar to Sierra Madre Villa
Chinatown Option					
Line Length	1.6	4.3	6.1	10.3	14.7
Patronage	11,100	44,100	53,200	73,600	85,200
Second Street Option					
Line Length	2.0	4.8	6.6	10.8	15.2
Patronage	6,800	39,600	48,400	68,800	80,400
Second Street-Union Station Option					
Line Length	2.3	4.7	6.5	10.7	15.1
Patronage	18,700	38,200	46,700	67,100	78,700

Highland Park Alternative from Union Station	Phase 1 Del Mar Union Station to Del Mar	Phase 2 to Sierra Madre Villa
Union Station "No Subway" Option		
Line Length	9.1	13.6
Patronage	56,600	68,200

North Main St. Alternative from 7th/Flower	Phase 1 to Union Station or Chinatown	Phase 2 Union Station to Huntington/ Monterey	Phase 3 Huntington Monterey to Poplar Horne
Chinatown Option			
Line Length	1.1	5.1	6.6
Patronage	13,300	42,200	48,600
Second Street Option			
Line Length	1.3	5.3	6.8
Patronage	9,100	37,500	42,000

TABLE 3-8

PROJECTED COST BY PHASE

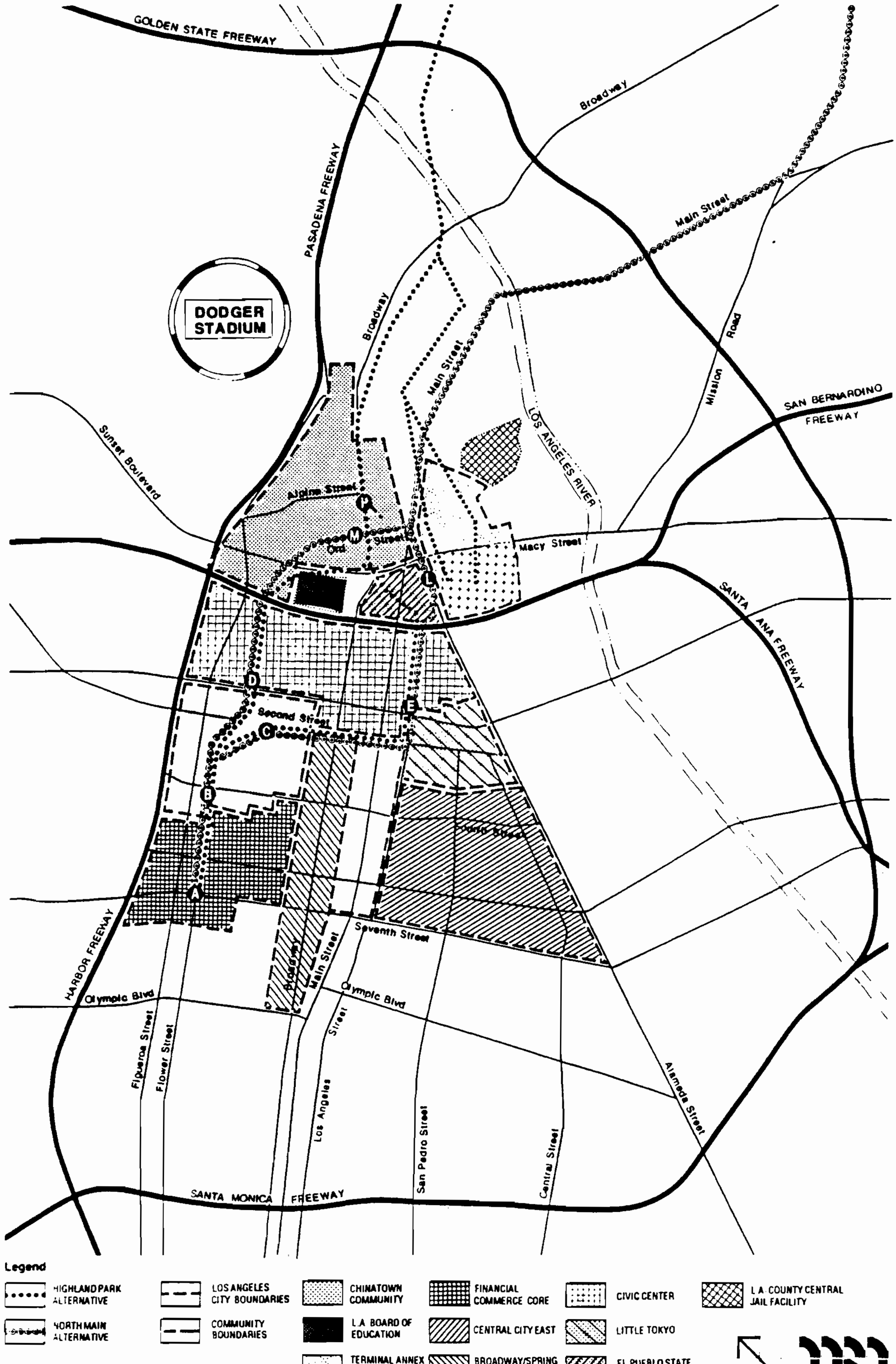
Highland Park Alternative from 7th/Flower	Phase 1 to Railyard $1989 $1994a	Phase 3 Railyard to Marmion/ Figueroa	Phase 3 Marmion/ Figueroa to Avenue 57	Phase 4 Avenue 57 to Del Mar	Phase 5 Del Mar to Sierra Madre Villa
Chinatown Option	$515 $614	$600 ($715)	$693 ($826)	$885 ($1,055)	$1,110 ($1,324)
Second Street Option	$603 $720	$688 ($821)	$781 ($932)	$974 ($1,161)	$1,199 ($1,430)
Second Street-Union Station Option	$602 $718	$687 ($819)	$780 ($930)	$972 ($1,159)	$1,197 ($1,428)

Highland Park Alterative from Union Station	Phase 1 Del Mar Union Station to Del Mar	Phase 2 to Sierra Madre Villa
Union Station "No Subway" Option	$558 $665	$776 ($925)

North Main St. Alternative from 7th/Flower	Phase 1 to Union Station or Chinatown	Phase 2 Union Station to Huntington/ Monterey	Phase 3 Huntington Monterey to Poplar Horne
Chinatown Option	$399 $475	$651 ($776)	$702 ($838)
Second Street Option	$473 $565	$726 ($866)	$777 ($927)

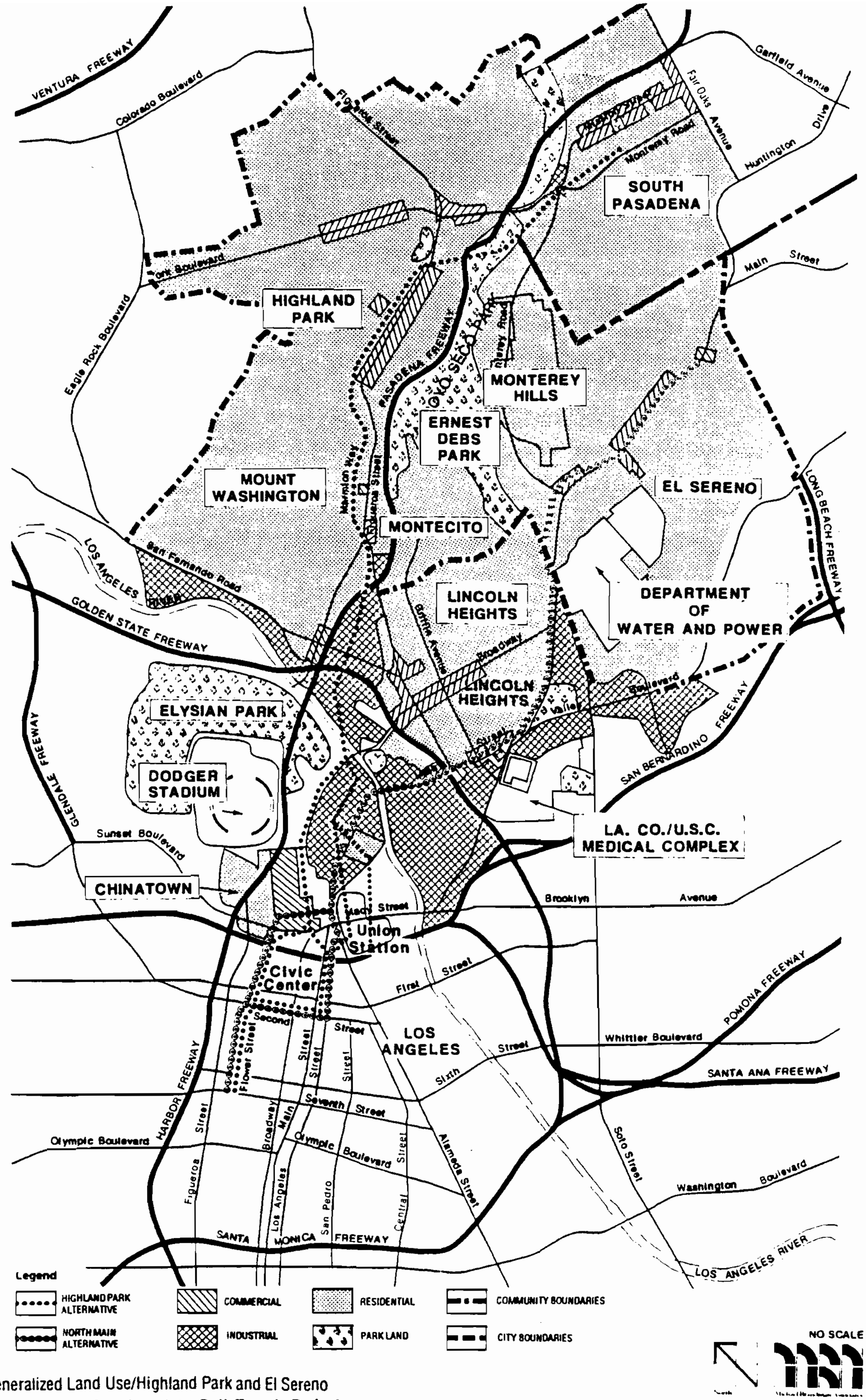
a Estimated midpoint of construction.

Source: LACTC, 1989; Bechtel Civil, Inc., 1989.

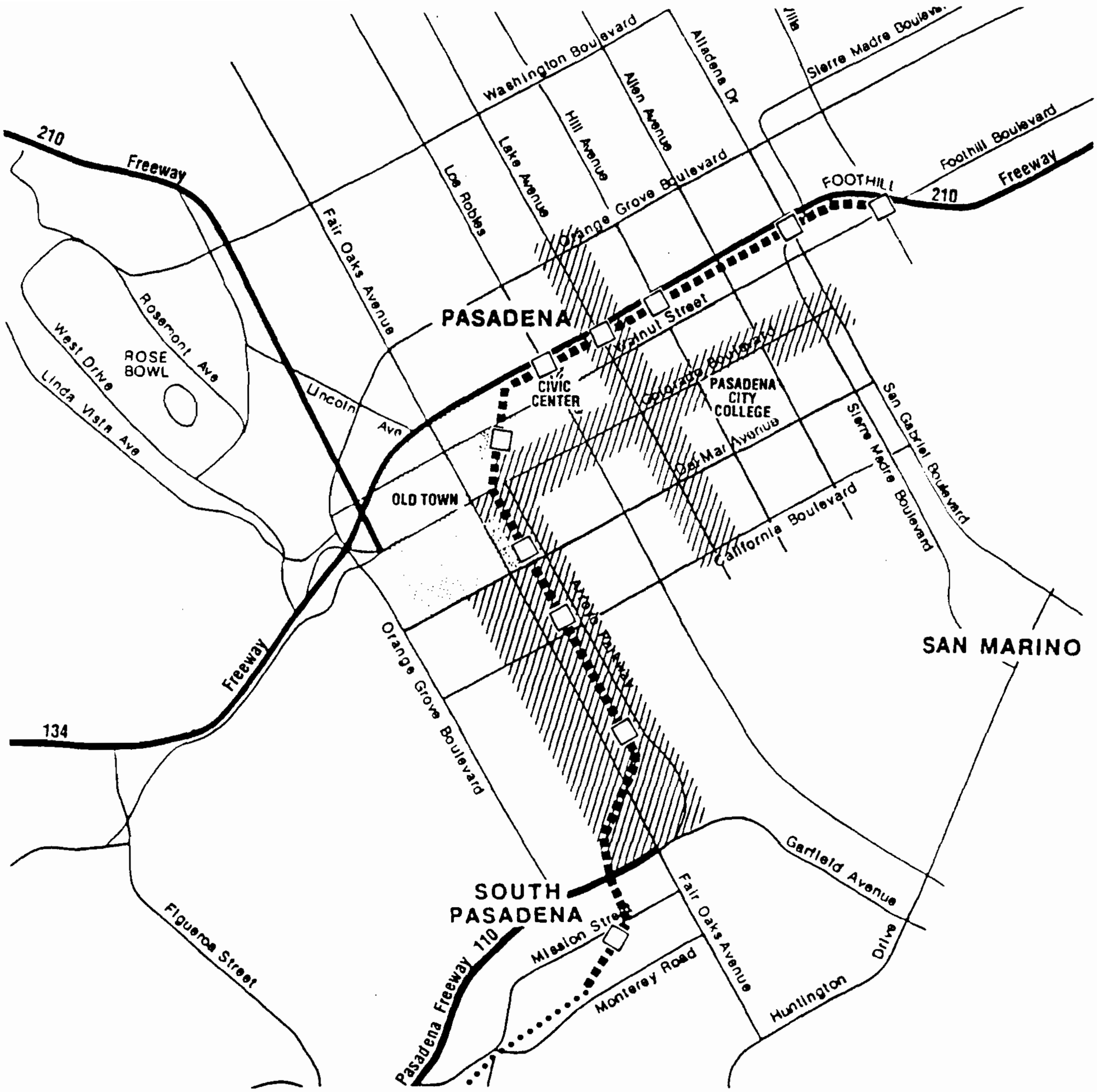


Generalized Land Use/Downtown
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-1



Generalized Land Use/Highland Park and El Sereno
Pasadena-Los Angeles Light Rail Transit Project



Legend

NEW PASADENA EXTENSION FROM HIGHLAND PARK

RESIDENTIAL

COMMERCIAL

PARK LAND

PUBLIC

STUDY STATIONS

Generalized Land Use/Pasadena Area

Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-3

If the North Main alignment is chosen, the LRT will turn onto Ord Street. The land uses in the portion of the Chinatown option just beyond the Music Center include US-101 right-of-way, low- to mid-rise commercial structures, and some residential land uses. The route will then turn north onto North Main Street where development is characterized by low-rise commercial and light to medium industrial uses.

Second Street Options - Existing Land Use

The Second Street route options follow the same route as that of the Chinatown option (under Flower Street through high-rise commercial and institutional uses) initially. The route heads east in the Bunker Hill portion of downtown Los Angeles, lining up with Second Street. The alignment passes the Junipero Serra Building, the California State Building, the Civic Center Law Building, the Times-Mirror Square, the Caltrans Administrative Building, and several other major commercial/office developments as it makes its way down Second Street. The route then heads north under Los Angeles Street from Second Street passing by the New Otani Hotel, City Hall South and East, LAPD Parker Center, the Federal Building, and the Los Angeles Children's Museum. The Second Street option will then connect with either the North Main Street alignment or the Highland Park alignment.

If the Highland Park alignment is chosen, one possible Second Street option passes under I-5 and El Pueblo de Los Angeles (Olvera Street), and then connects with North Broadway as it passes the Chinatown Senior Citizen Housing and Service Center. The route then passes by several other low-rise commercial uses and vacant lots as it continues down North Broadway to the Highland Park alignment connection. Another Second Street option for the Highland Park alternative, referred to as the Second Street-Union Station option, will continue along Alameda with a station at Union Station. From Union Station, the alignment turns in a northwesterly direction to the SPTC railyard.

If the North Main Street alignment is selected, the route will be diverted eastward so it passes under US-101 and Father Serra Park in the El Pueblo area. The route then heads slightly north, lining up with Alameda Street in front of Union Station. The alignment then passes Terminal

SECTION 4

ENVIRONMENTAL IMPACT ANALYSIS

This section of the EIR identifies the potential environmental impacts that may result from the construction and operation of the proposed Pasadena-Los Angeles Rail Transit Project. This analysis focuses on those issues identified in the Initial Study and in Section 1.2 of this EIR.

Each issue area is discussed individually and addressed according to the following:

> **Environmental Setting**: A description of existing facilities, services, and/or the environment.
>
> **Environmental Impacts**: A qualitative or quantitative analysis of the project's potential impacts.
>
> **Mitigation Measures**: An identification of specific measures or strategies which will be effective in reducing potential adverse environmental effects.
>
> **Unavoidable Significant Adverse Effects**: A description of the unavoidable adverse impact, if any, which may result from project implementation.

The analysis of environmental impacts will address the Highland Park and North Main Street alignments and the possible route variations when the downtown connections are considered. These variations include: (1) the North Main Street alignment/Chinatown option; (2) the Highland Park alignment/Chinatown option; (3) the North Main Street alignment/Second Street option; (4) the Highland Park alignment/Second Street option; (5) the Highland Park/Second Street-Union Station option; and (6) the Highland Park/Union Station "No Subway" option. The latter two alignment options were added to this revised DEIR.

To allow flexibility for funding availability, the proposed project is likely to be constructed and operated in phases as indicated in Section 3.6 of this EIR. In certain instances, the phased development will result in environmental impacts which may be substantially different at the interim terminal stations from those anticipated when the entire transit corridor is completed and operational. For this reason, the potential impacts which may be unique for the phased development of the Pasadena-Los Angeles LRT will also be evaluated (Section 3.6).

The proposed project will also have the potential for generating cumulative, growth-inducing, and long-term effects which are addressed in other sections of this EIR. Cumulative impacts are examined in Section 5, long-term effects in Section 8, and growth-inducing impacts in Section 9.

4.1 LAND USE

This section of the EIR discusses the proposed project's impacts on existing land uses and development located both within and adjacent to the proposed alignments. The analysis considers direct land use impacts, such as displacement, land use conflicts, and potential changes in land use which may occur over time after the project is operational.

Environmental Setting

The area in which the project would be located is urbanized and exhibits considerable diversity in the type and character of development. The Los Angeles central business district is located at the southwest end of the project area. After the alignments leave the downtown area, they pass through an industrial district. From there, the Pasadena-Los Angeles Rail Transit Project passes a wide range of commercial and residential land uses. Generalized development patterns and land uses in the vicinity of each alignment are indicated in Exhibits 4-1, 4-2, and 4-3.

Chinatown Options - Existing Land Use

Existing development adjacent to the Chinatown route options is characterized by high-rise office and commercial development located along the corridor south of I-5. Examples of this development include the Atlantic Richfield Plaza, the Westin Bonaventure Hotel, the World Trade Center, the Bunker Hill and Promenade development, City of Los Angeles Department of Water and Power Administration Building, and the Los Angeles County Music Center.

Immediately beyond the freeway, the Chinatown option will follow one of the two routes, depending on the connection selected (Highland Park or North Main alignment). If the Highland Park alignment is selected, the LRT will be located under Broadway. Existing development along this corridor is characterized by smaller low-rise commercial establishments.

Annex as it heads for North Main Street, passing Fire Station #4 and parking structures on its way to connect with the North Main Street alignment.

Union Station "No Subway" Option

This downtown option for the Highland Park alignment begins at Union Station and then turns in a northwesterly direction towards the SPTC railyard east of Broadway. Land uses within this area are characterized by older industrial and warehousing activities. Land uses along this alignment are shown in Exhibit 4-1.

North Main Street Alignment - Existing Land Use

The North Main alignment becomes an aerial transitway north of Alameda Street after leaving downtown Los Angeles. The route travels along the center median of North Main Street to Mission Road. The route continues on Mission to Huntington Drive where it becomes at-grade and follows Huntington Drive to its terminus.

The land uses along the North Main alignment vary from industrial as the alignment leaves the downtown area to residential and commercial as it passes through Lincoln Heights and El Sereno. West of the Los Angeles River, the route passes the William Mead public housing project and the Ann Street School, the Carnation facility and the City of Los Angeles Department of Water and Power (DWP) Main Street yard. The route then crosses the Los Angeles River, passing through an industrial district along North Main Street.

The composition of the land uses along the alignment becomes more residential as the route continues northeast toward the community of Lincoln Heights where there are numerous multiple-family buildings. As the alignment passes Lincoln Park, it turns onto Mission Road and passes a Department of Motor Vehicles facility and the Minami Keiro Hospital and Adult Care Center, Lincoln Park, the Broadway Warehouse facility and several other multiple-family buildings before coming to Huntington Drive.

Land uses on Huntington Drive are primarily commercial, with retail and some auto-body uses predominating. There are scattered residential uses mixed in at various locations, especially west of Monterey Road. Huntington Drive divides into three roadways at Monterey Road: North Huntington, Huntington, and South Huntington Drives. The islands between them are developed with commercial and residential uses. As the route progresses, the three drives become two, with narrower medians or islands, planted with palm trees.

Highland Park Alignment - Existing Land Use

The Highland Park alignment becomes aligned with North Broadway in the vicinity of Alpine Street after making the connection with either the Chinatown or Second Street options. At this point, the line remains a subway, passing commercial and light industrial buildings on both sides of North Broadway. The LRT emerges from the subway through a portal just before the line reaches the existing Southern Pacific railyard and becomes an at-grade rail line. The line runs along the northern border of the rail yard. The route crosses under North Broadway as it leaves the rail yard.

As the line approaches the Los Angeles River, it is aligned with the existing Santa Fe Railroad bridge and merges with the existing AT&SF railroad right-of-way on the eastern side of the river. The remainder of the Highland Park alignment follows this railroad right-of-way to its terminus in South Pasadena. From the Los Angeles River to I-5, development along the railroad right-of-way consists mainly of light industrial and commercial activities. North of I-110, the railroad right-of-way passes through portions of the Highland Park neighborhood of Los Angeles where land uses vary from local commercial and light industrial to high density residential uses as the route continues parallel to Marmion Way. The LRT route crosses I-110 once again at Arroyo Seco Park. Land uses in this area include single- and multiple-family residential development and local commercial.

The LRT route enters the City of South Pasadena just north of Monterey Road and parallels Monterey Road until turning northeastward eventually aligning north/south and parallel to Fair Oaks Avenue. The land uses in this area vary from single- and multiple-family residential to local commercial.

As the LRT right-of-way enters Pasadena, land uses adjacent to the rail line make a transition to predominantly industrial and warehousing activities interspersed with commercial uses. North of Del Mar, the alignment enters the Old Town Pasadena district which is characterized by a mix of older commercial (office and retail) buildings in the process of being restored. The alignment is located near Central Park and is adjacent to Memorial Park.

After leaving Memorial Park, the alignment goes underground beneath the eastbound lanes of I-210 to the center median. From here, the LRT line terminates just east of Sierra Madre-Villa.

Yard Sites and Turnback Track

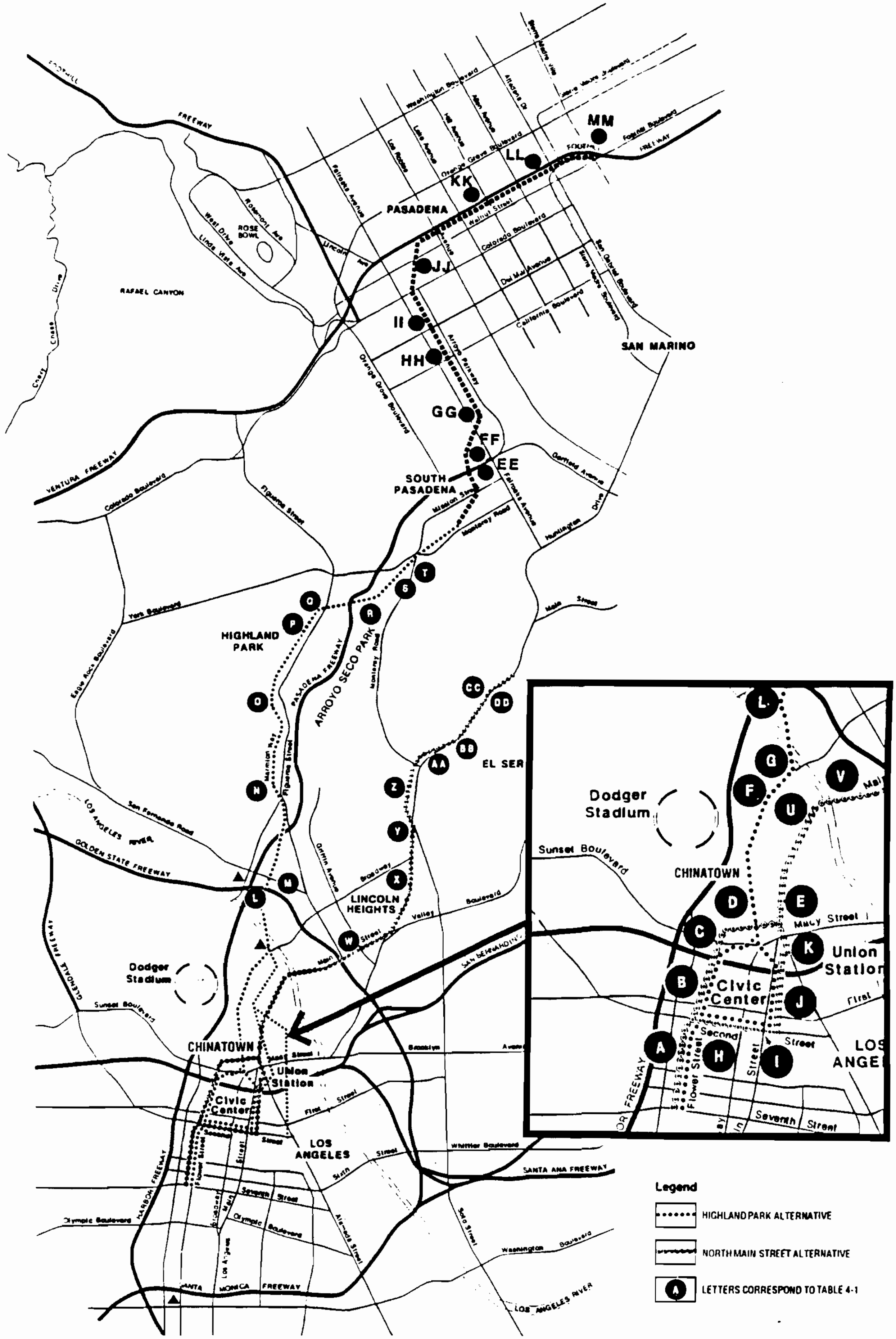
The proposed yard site for the Highland Park alignment currently serves as part of Southern Pacific's railyard. If an option originating at Union Station is selected for the Highland Park alignment, a railyard site north of I-110 between the Los Angeles River and San Fernando Road has been identified. This is currently part of a large yard also owned by Southern Pacific. The proposed Pasadena-Los Angeles rail project will require additional storage track located at Flower Street underneath I-10 (refer to Section 3.4B of this EIR). Caltrans presently leases out this site for parking.

Environmental Impacts

This section examines the potential land use impacts which may arise from the construction and operation of the Pasadena-Los Angeles LRT. These impacts include the displacement of existing land uses and possible land use conflicts between the LRT and adjacent uses, such as parking and access.

Displacement/Right-of-Way Impacts

Table 4-1 indicates those land uses located along the right-of-way of the proposed alignments currently under consideration. In a number of instances, the LRT will be located underground and no direct displacement impacts are anticipated. The presence of this proposed rail transit project underground may require consideration in any future development or redevelopment of these properties. In other cases, displacement impacts will occur because the improvements are located



Displacement/R.O.W. Impacts
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-4

in the proposed project's right-of-way. The potential displacement impacts will involve removal of existing development and its replacement with LRT facilities, such as stations and station entrances, traction power substations, parking, and other transit station facilities. The table also indicates the corresponding map reference (Exhibit 4-4, as well as the engineering drawings included in Appendix F) indicating where the displacement will occur.

TABLE 4-1

DISPLACEMENT/RIGHT-OF-WAY IMPACTS

Map References[a]	Location	Description of Impact
Downtown Connections to Highland Park Alternative		
Chinatown Option		
SC101/A	4th/Flower Street Station	Potential land taking required for right-of-way for station entrance near 5th Street.
SC102/B	Hope Street Station	Potential entrance to proposed Music Center expansion site at Hope Street Station by others; right-of-way needed for entrance at Music Center; potential entrance at DWP.
SC103,104/C	US-101 to Broadway at Ord Street	Subsurface easements for tunnel. No impacts anticipated.
SC104/D	Broadway between Ord and Alpine	Right-of-way for station entrance on west side of Broadway; possibly on east side.
SC105,106,107/G	SPTC yard area	Right-of-way needed in SPTC yard area for portal at-grade guideway.
SC701/A	Same as SC101	Same as SC101.
SC702/H	Between Flower and Olive Street	Subsurface easements for tunnel and station. Potential for surface easements around station site. Right-of-way required for station entrances.
SC703/I	Between Second and 1st/ Los Angeles Station	Subsurface easement under Caltrans parking area.
SC703,704/J	1st/Los Angeles Station	Right-of-way required for station entrances east of Los Angeles Street.

TABLE 4-1 (continued)

Map References[a]	Location	Description of Impact
SC704/K	El Pueblo de Los Angeles State Historic Park.	Subsurface easement for tunnel between Los Angeles St. and Sunset Boulevard.
SC705,706,707,708/D		Refer to SC104,105,106,107
Second Street-Union Station Option (also applies to operating segment that would begin at Union Station)		
SC901/K	Union Station area	Subsurface easements for tunnel; right-of-way requirement for station and entrances.
SC902/E	East of Alameda Street between Macy and College	Subsurface easement for underground section; right-of-way acquisition for portal and at-grade section. Commercial building bounded by Alameda, Alpine, and North Main Street to be removed. Site can be rebuilt upon.
SC903,904,905/E	SPTC freight yard area	Right-of-way requirement for stations, line segments, yard area, and traction power substations (TPS).
Union Station "No Subway" Option		
SC1201/K	Union Station area	Right-of-way requirement for Union LRT station, TPS, and line section.
SC1202/E	Near College Street and Rondout Street	Right-of-way requirement for guideway. Removal of one industry required.
SC1203/E	Spring Street, SPTC yard	Right-of-way requirement for stations and line sections in SPTC property.
SC1204,1205/E	SPTC yard	Right-of-way requirement for line section and a substation in SPTC property.
Highland Park Alternative		
SC108-121, SCR111-115, SCF115-122/L-LL	AT&SF railroad From Los Angeles River to Sierra Madre Villa	Purchase of AT&SF railroad right-of-way.
SC108/L	AT&SF right-of-way	Acquisition of Railroad right-of-way and land near Avenue 26 Station for station parking and substation.

TABLE 4-1 (continued)

Map References[a]	Location	Description of Impact
SC109/M	AT&SF right-of-way	Additional right-of-way, required from Union Pacific Railroad.
SC110/N	Marmion/Figueroa	Land acquisition north and south sides of Marmion Way to allow for street realignment at station location.
SC112/O	Avenue 50	Acquisition of property for traction power substation.
SC112,SC113/P	Avenue 51 Station	Acquisition of land for parking area located next to station.
SC114/R	Marmion Way/Avenue 57 Station	Acquisition of right-of-way for parking and station.
SC115/R	AT&SF right-of-way	Additional right-of-way required for turnback track and traction power substation, the latter displacing six residential units.
SC116/S	AT&SF right-of-way	Acquisition of railroad right-of-way conflicts with apparent encroachment of Stancliff School.
SC117/T	Monterey/Pasadena	Acquisition of property, removal of one house and garage for traction power substation.
SC119/EE	Mission Street	Right-of-way required for traction power substation and station access. Partial acquisition of storage facility required.
SC121/FF	Private land adjacent	Right-of-way required for traction powered substation and possibly for station site.
SCR111/GG	Glenarm Street	Right-of-way required for Glenarm Station site. Impact to underground parking structure.
SCR112/HH	California Street	Right-of-way required for California Station site. Removal of two commercial buildings required.
SCR113/II	Del Mar Boulevard	Potential land acquisition for Del Mar Boulevard station.

TABLE 4-1 (continued)

Map References[a]	Location	Description of Impact
SCR114/JJ	Memorial Park	Right-of-way required for Memorial Park Station.
SCF117/KK	Hill Avenue	Land acquisition for traction power substation. in the southwest quadrant of Corson/Hill intersection.
SCF120/LL	Altadena Drive	Land acquisition for traction power substation in the southeast quadrant of Corson/Altadena intersection.
SCF121/MM	Sierra Madre Villa	Land acquisition for station, parking lot and traction power substation. Removal of 14 industrial buildings for parking lot.

Downtown Connection to North Main Street Alternative

Chinatown Option

SC201,202/A,B		Refer to SC101,102
SC203/C	Between US-101 and North Hill Street	Subsurface easement for tunnel
SC204/C	Ord Street/North Hill Street intersection	Land acquisition required for station entrance.
SC204/C	North Main Street	Land acquisition required for portal area and
bent structure.	between Ord and Vignes	Removal of one business at Ord/Alameda.

Second Street Option

SC801,802,803, 804/A,H,I,J		Refer to SC701,702,703,704
SC805/E	US-101 Union Station area	Subsurface easement for tunnel and right-of-way required for access at Alameda/Macy Station.
SC806/E	Alameda/Main	Acquisition of Southern Pacific tracks in street and land acquisition west of North Main between Vignes and Rondout for traction power substation near Rondout.

TABLE 4-1 (continued)

Map References[a]	Location	Description of Impact
North Main Alternative		
SC206/U	West of Los Angeles River	Land acquisition for traction power substation (TPS).
SC207/V	East of Daly	Acquisition of additional right-of-way for aerial supports. Commercial uses on North Main Street on east side of Daly may be impacted.
SC208/W	North Main/Griffin	Acquisition of land for Station aerial supports. Land acquisition and removal of gas station for TPS and property for LRT station entrance.
SC209/X	Mission/Lincoln Park	Acquisition of right-of-way for supports for station at Gates Street. Land acquisition and removal of vacant building east of Lincoln Park Avenue for station parking area and station entrance. (South of Mission Road).
SC210/Y	North of Broadway	Acquisition of right-of-way for supports at Broadway and land acquisition for TPS north of Broadway.
SC212/AA	Huntington/Monterey Station Area	Land acquisition for TPS and parking and displacement of up to 25 residences and 2 businesses.
SC214/CC	Poplar/Horne Station	Property acquisition for TPS and removal of 3 residences and 1 business for station parking.
Yard and Yard Lead Impacts		
SCY01	Flower Street and I-10	Property requirement for temporary storage beneath the freeway.
SCY02	SPTC right-of-way along Los Angeles River	Right-of-way required for daily inspection and storage yard on west bank of Los Angeles River.
SCY03	SPTC right-of-way along Los Angeles River	Right-of-way required for relocation of Southern Pacific tracks for yard lead tracks and for major repair and storage facility.

a SC number refers to engineering drawings included in Appendix F and letters to locations shown in Exhibit 4-4.

Source: Bechtel Civil, Inc., 1989.

The selection of the Highland Park alignment requires the acquisition of a segment of the Atchison, Topeka and Santa Fe (AT&SF) rail referred to as the Second Division. Currently, the Second Division carries an average of five freight trains a day. Due to the limited width of this right-of-way, freight operations could not operate along the segment being used for LRT. At this time, there are no service deliveries on the Second Division west of Pasadena, so implementation of this proposed rail project does not directly require cutting off service to freight customers located north and east of the project's terminus. A more complete list of affected customers would be compiled as part of right-of-way negotiations.

However, AT&SF has indicated that it would only be interested in selling all of the right-of-way from Los Angeles to San Bernardino. In this case, all freight traffic formerly using the Second Division would be shifted to the Third Division. Therefore, the few customers east of Pasadena whose service is affected would need to be compensated or an alternate way to provide service would need to be developed. Compensation is included in estimated projects costs.

In addition, Amtrak has a contract with Santa Fe for use of the Second Division, which serves as one of two routes for Amtrak's "Southwest Chief" service between Chicago and Los Angeles. (The other route uses AT&SF's Third Division.) Once again, the constrained right-of-way does not allow Amtrak to operate along the segment being used for the LRT. Thus, Amtrak service along this corridor must be re-routed to Santa Fe's Third Division. This causes a removal of service at the lightly-used Amtrak Pasadena station along the Second Division. Amtrak has indicated that, providing their capital and operating costs are not increased, they would not necessarily object to re-routing this service.

It should be noted that AT&SF has identified improvements to be made to the Third Division to allow a successful re-routing of service. Santa Fe intends to implement only those improvements that do not result in any significant environmental impact.

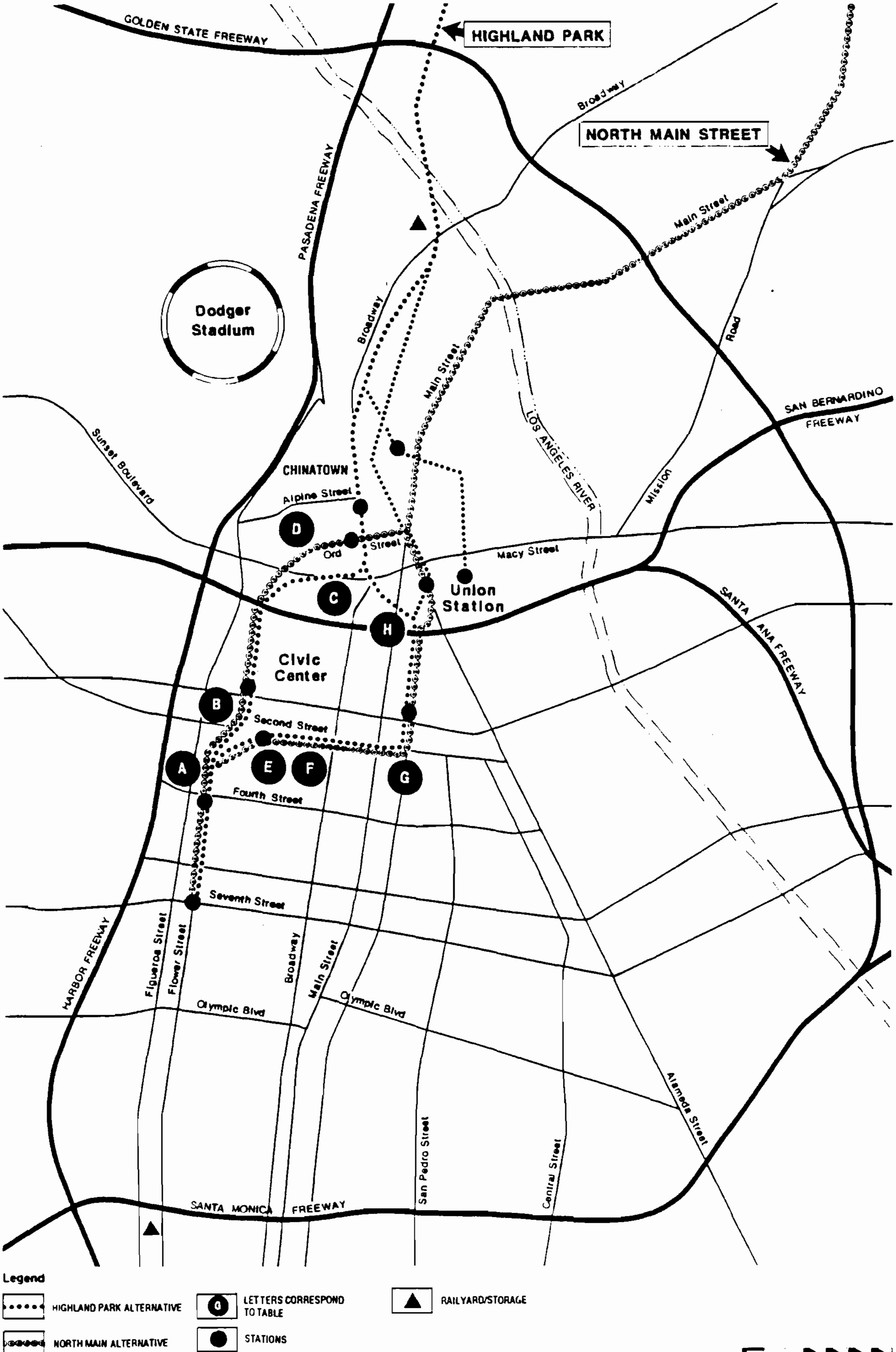
LACTC has the power to acquire by grant, purchase, gift, lease or condemnation, real and personal property, as outlined in the California Public Utilities Code, Section 30600. In addition, Section 30503 of the code gives LACTC the power, by exercising the right of eminent domain within the boundaries of Los Angeles County, to take any property necessary or convenient to the exercise of the powers granted to the agency. This exercise of the right of eminent domain, however, must comply with the requirements of the California Eminent Domain Law (Code of Civil Procedure, Section 1230.010, et seq.).

Displacement Related to Parking and Access

The proposed LRT project would result in some parking impacts along portions of the alignments under consideration. Short-term loss of parking may occur due to construction activities resulting in street closures or restricted access. Other impacts would involve the permanent removal of on-street parking to compensate for the loss of travel lanes which would be occupied by the LRT. The potential parking impact for each segment is described in Table 4-2.

For downtown Los Angeles, the impact of the LRT on parking and access would occur primarily during the construction phase of the proposed project. The downtown route options call for a subway profile and construction of the underground route segments would involve cut-and-cover or tunneling construction. Cut-and-cover construction will occur only at station areas and involves excavation to the required depth for the station box. After construction of the station is completed, the excavated area is backfilled. Tunnel boring between stations will be completely underground. Portions of the route using cut-and-cover construction would experience the most extensive construction disturbance of streets. Tunnel construction disturbances would be limited to access shafts to the tunnel. These types of construction are currently being utilized in the downtown area for Metro Rail and Long Beach LRT. Access to existing land uses will be maintained during construction and restored when construction is completed.

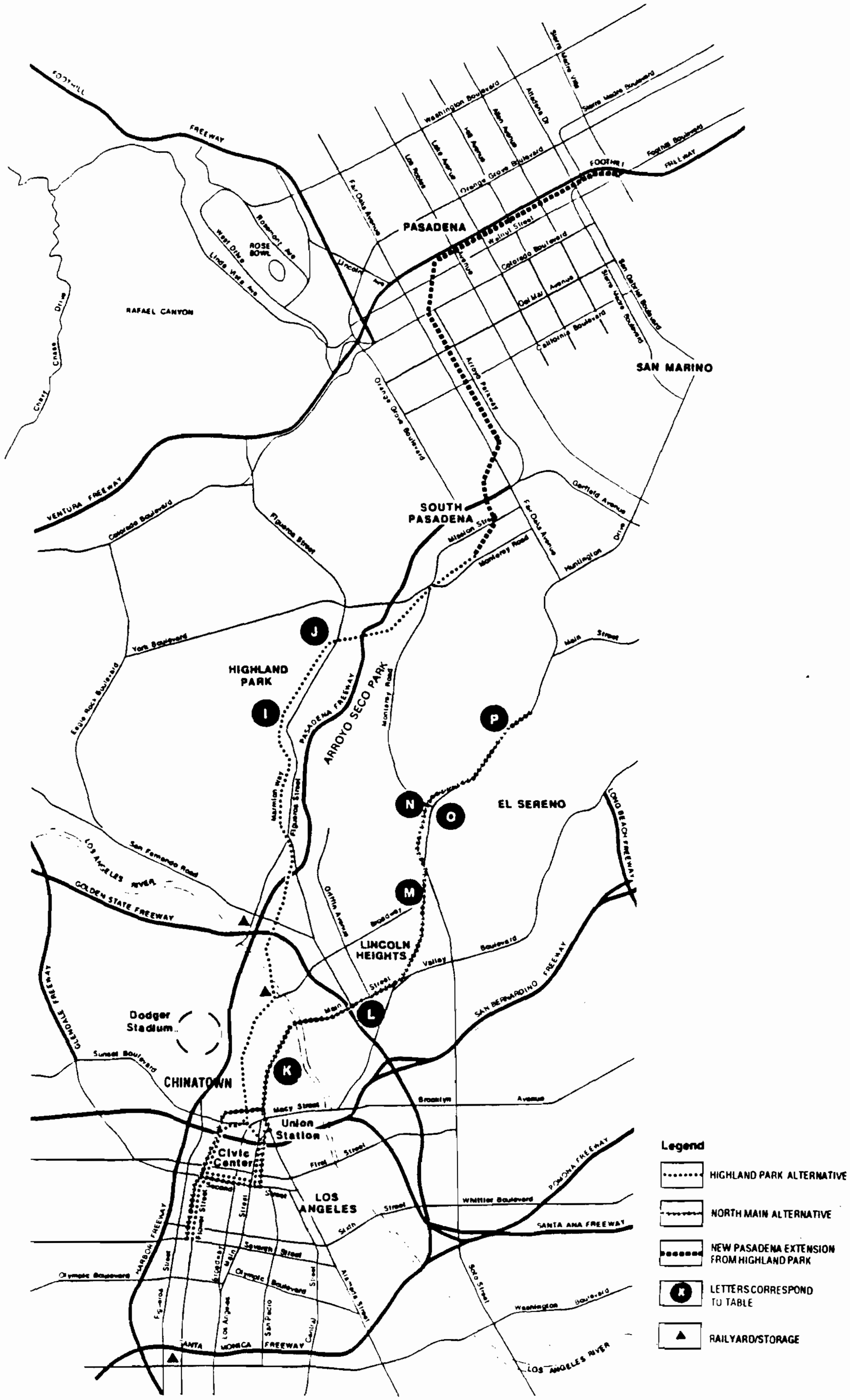
Table 4-2 summarizes the potential access and parking impacts for each alignment. The location of this potential impact is indicated in Exhibits 4-5 and 4-6.



Downtown Options-Loss of Access and Parking Impacts

Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-5



Loss of Access and Parking Impacts

Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-6

TABLE 4-2

LOSS OF ACCESS AND PARKING IMPACTS

Map Reference	Location	Description of Impact
Chinatown Downtown Option		
A	Flower St. from 7th St. to 3rd St.	Temporary blocking of parking entrances and/or exits during construction at the following: Pacific Financial Center, the Bank of California, Atlantic Richfield Plaza, Los Angeles Athletic Club, Los Angeles Central Library (construction site), Westin Bonaventure Hotel, Wells Fargo Bank, the YMCA, the World Trade Center, and Security Pacific Bank.
B	Flower St. from 3rd St. to 2nd St., Hope St. from 2nd St. to Temple Pavilion,	Temporary blockage of parking and loading entrances and exists during construction at the following buildings: The Dorothy Chandler Pavillion, the Mark Taper Forum, the Ahmanson Theater, and the City of Los Angeles Department of Water and Power.
C	Alpine/Broadway 2 Stations	Temporary blocking of parking and loading facilities at several small commercial establishments. Currently 10 points of access/egress exist in this block.
D	Ord St. from North Hill to Alameda (Ord/N. Broadway)	Temporary blocking of parking and loading facilities at several small commercial establishments. Currently three points of access/egress exist in this area.
E	Second/Grand Station Grand Avenue and Second Place	Temporary blocking of access to an unimproved parking lot at northeast corner of 2nd and Grand and possible loss of some parking spaces.
F	Second St. from Olive St. to Main St.	Temporary blocking of parking and loading access at the following locations: State of California Administrative Office Building, Times-Mirror Building, Caltrans permit parking lot, and the alley midway between Spring and Main Streets. There are currently five points of access/egress in this area.

TABLE 4-2 (continued)

Map Reference	Location	Description of Impact
G	Second and Main to to 1st/Los Angeles Station	Temporary loss of parking spaces at Caltrans parking lot. Temporary blocking of parking lots at Los Angeles City Hall South, Los Angeles Police Department and possibly at the self and valet parking areas at the New Otani Hotel.
H	Alameda St. from Los Angeles St. to Sunset Blvd.	Temporary blocking of parking entrance/exit at Union Station and at Olvera Street parking lot.
Second Street-Union Station Option		
Q	Union Station	Loss of some parking in Union Station parking lot for station site.
Highland Park Alignment		
I	Marmion Way from Avenue 50 to Avenue 57	Displacement of existing on-street parking.
J	Marmion Way from Avenue 57 to Avenue 58	Approximately 30 on-street parking spaces removed.
R	Glenarm Station	Potential for shared parking with adjacent business.
North Main Street Alignment		
K	North Main St. from Alameda St. to Griffin St.	307 on-street parking spaces removed.
L	North Main St. from Griffin to Mission Rd. at Lincoln Park Ave.	98 on-street parking spaces removed.
M	Mission Rd. from Lincoln Park Ave. to Monterey Rd. at Huntington Dr.	148 on-street parking spaces removed.

TABLE 4-2 (continued)

Map Reference	Location	Description of Impact
N	Traffic Island at North Huntington Dr. and Monterey Rd.	Bus stop will be moved.
O	Huntington Dr. South from Soto St. to Eastern Avenue	Approximately 90 spaces removed on one side of Huntington Drive South.
P	Huntington Dr. from Guardia Ave. to Poplar/Horne Station	Access to commercial establishments and residential neighborhoods impaired by closure of left-turn cuts in traffic islands.

Source: Bechtel Civil, Inc., 1989.

Impacts on Sensitive Land Uses

Development of the LRT would have a potential impact on the sensitive land uses immediately adjacent to the alignment that is ultimately selected. The physical impacts associated with the LRT construction would have the potential to impact land uses in a variety of other ways, including light and glare, noise and vibration, and others. These impacts are discussed separately for each appropriate environmental topic area in other subsections of Section 4.

The proposed Pasadena-Los Angeles light rail project would be located in close proximity to a number of land uses which could be adversely impacted by the construction and operation of the proposed rail system. These sensitive land uses include residences, schools, hospitals, and other activities. Table 4-3 indicates the sensitive land use activities located immediately adjacent to the route alignments being considered in this EIR.

TABLE 4-3

SENSITIVE LAND USES ADJACENT TO PROPOSED PROJECT[a]

North Main Street	Highland Park	Chinatown Options	Second Street Options
Homes			
325 multiple-family units located adjacent to LRT alignment	355 multiple-family units located adjacent to LRT alignment	18 multiple-family units located above LRT subway	18 multiple-family units located above LRT subway
85 single-family units located adjacent to LRT alignment	289 single-family units located adjacent to LRT alignment	57 multiple-family units located adjacent to right-of-way	8 single-family
Churches			
1 church	4 churches Orion Studio	1 church	4 churches
Schools			
Ann Elementary Huntington Dr. Elem. El Sereno Elem. El Sereno Jr. High	Stancliff Arroyo Seco Alternative	Evans Adult	
Hospitals			
Casa Descanso Conval Minami Keiro Hospital and Adult Care	Sycamore Grove Conval.		
Parks	Memorial Park Central Park		

a Land uses located immediately to the LRT tracks.

Source: Michael Brandman Associates, 1988.

Other indirect impacts may result from changing land uses around the stations. The passenger activity level at stations would be high at certain times of the day for many of the stations due to pedestrian and vehicular traffic. Stations may have short- and long-term parking, curb side drop off points known as "kiss-and-rides," and other transit interfaces. In addition, the location of a station may encourage the development of land uses, such as services, restaurants, and other retail uses that cater to LRT patrons such as dry cleaning facilities, video rental facilities, newstands, and gift shops.

Mitigation Measures

The LACTC would provide just and appropriate compensation in accordance with California law to property owners and tenants that would be displaced by the proposed rail project. In the acquisition of real property by a public agency, the state requires that agencies: (1) ensure consistent and fair treatment for owners of real property; (2) encourage and expedite acquisition by agreement in order to avoid litigation and relieve congestion in the courts; and (3) promote confidence in public land acquisition.

The removal of on-street parking is considered to be an unavoidable significant adverse impact which cannot be successfully mitigated. Many of the businesses located along the affected portions of North Main Street rely solely on the on-street parking for their patrons.

Near station areas, parking overflow may become a problem. The extent of this problem cannot be identified until the LRT system is in operation. It is recommended that once parking overflow is identified as a problem, special parking permit programs in commercial areas to enforce time limits be implemented. Mitigations for sensitive land uses are discussed under specific impact categories, such as noise, aesthetics, etc.

Unavoidable Significant Adverse Effects

Development of any of the four route combinations will result in the displacement of a number of existing uses to make room for the LRT right-of-way and the associated facilities. In some areas, residential and other sensitive land uses will also be subject to land use compatibility impacts. These impacts are discussed throughout this EIR and in Section 4.1. The dislocation impacts would be mitigated to levels considered to be "less than significant" since property owners and tenants will be provided just and adequate compensation as provided in state and federal statutes.

4.2 TRANSPORTATION AND CIRCULATION

This section of the EIR is concerned with the potential transportation impacts which will result from the construction and operation of the LRT. The traffic analysis prepared for this project by DKS Associates is summarized in this section. DKS' traffic report is provided in its entirety in Appendix C.

Environmental Setting

Traffic patterns in the Pasadena-Los Angeles Corridor which would be served by the Pasadena-Los Angeles Rail Transit Program are predominantly inbound towards downtown in the morning and outbound in the evening. I-110 runs parallel to this corridor and is currently very congested during peak hours, especially in the segment between I-5 and downtown Los Angeles. If I-710 extension to Pasadena were completed, Interstates 10 and 710 would combine to serve as an alternative freeway link from downtown Los Angeles to Pasadena. Finally, the I-210 serves that portion of the San Gabriel Valley near the foothills of the San Gabriel Mountains.

- Pasadena Freeway (I-110) - I-110 is an extension of the Harbor Freeway (I-110) from downtown Los Angeles. It starts from the four-level Harbor/Hollywood/Santa Ana/Pasadena freeway interchange and extends northeast towards the City of Pasadena. The roadway width varies from three to four lanes in each direction. Currently, it carries approximately 198,000 vehicles a day in the segment closest to downtown Los Angeles and approximately 80,000 vehicles per day near the City of Pasadena. Both morning and evening peak hour (peak hour refers to the morning and evening hour when traffic is the greatest) congestion is regularly observed on this freeway, especially along the segment between I-5 and downtown Los Angeles.

- Golden State Freeway (I-5) - I-5 is an eight-lane freeway with current daily traffic volumes in excess of 230,000 vehicles. Peak hour traffic congestion is regularly observed on this freeway, especially at the segment south of I-110. This congestion also regularly spills over to local roadways, such as North Main Street.

- Long Beach Freeway (I-710) - I-710 currently terminates northwest of downtown Pasadena in the vicinity of Pasadena Avenue and Del Mar Boulevard. In the current design the roadway carries from 29,000 to 31,000 vehicles a day. The contemplated north/south extension of this freeway would significantly increase daily volumes on this facility. A related change in current travel patterns through west Pasadena is the likely diversion of through auto trips away from existing major north/south arterials.

- Foothill Freeway (I-210) - I-210 runs east/west along the San Gabriel Valley. This 10-lane roadway carries approximately 189,000 vehicles a day at the junction with I-134 and I-710 in west Pasadena. Near the Lake Avenue interchange, the ADT volume increases up to 200,000 vehicles. Further east near Sierra Madre Villa Avenue, the 10-lane roadway carries daily volumes of the same magnitude as in west Pasadena. Major interchanges along this freeway are located at Los Robles Avenue, Lake Avenue, Hill Avenue, Allen Avenue, and Altadena Drive. Current Caltrans plans call for the opening of a full interchange at Fair Oaks Avenue.

North Main Street Alignment: Existing Circulation

A number of major roadways serve the area around the proposed North Main alignment including North Main Street, Mission Road, Soto Street, Huntington Drive, Daly Street, Marengo Street, Griffin Avenue, and Zonal Avenue.

- North Main Street - North Main Street is a four-lane secondary highway with parking on both sides. The roadway width is approximately 60 feet, and it carries an average of between 13,000 to 18,000 vehicles per day. The maximum speed limit for this roadway is 35 mph.

- Mission Road - Mission Road has a roadway width of approximately 60 feet, except at several short segments where it is wider. It is currently striped for either four lanes with parking or six lanes without parking. The average daily traffic varies from 19,000 to 31,000 vehicles, with the busiest segment near I-5 by the county USC Medical Center. The current speed limit is 35 mph.

- Soto Street - Soto Street is a major highway with a four-lane cross section with no parking. Approximately 12,000 vehicles use the road on a daily basis. Its speed limit is 35 mph.

- Huntington Drive - Huntington Drive is a divided major highway traversing the communities of El Sereno and South Pasadena within the study corridor. The roadway width and configuration varies significantly west of Eastern Avenue. Generally, however, the roadway consists of six lanes with a raised median.

- Daly/Marengo Streets - Daly Street and Marengo Street are secondary highways that traverse the North Main Street Corridor. At the North Main intersection, Daly Street has a five-lane section with two through lanes in each direction and one left-turn lane in the median. The average daily traffic volume for this roadway is about 13,000 vehicles.

- Griffin/Zonal Avenues - Griffin Avenue and Zonal Avenue are both secondary highways. At the North Main intersection, Griffin Avenue has two through lanes and one left-turn lane in each direction. The average daily traffic is estimated to be 10,000 vehicles.

Existing traffic conditions along the light rail corridors under study are depicted by the level of service (LOS) and volume/capacity (V/C) ratio at selected critical intersections. The LOS ratio of the intersection during the peak hour is a qualitative measure from A to F of the intersection's traffic conditions. LOS A is considered the optimal operating condition with free traffic flows moving at the posted speed limit with no delays. LOS D is most often considered the lowest acceptable LOS for planning purposes. The V/C ratio is simply the ratio of existing traffic volumes at a given intersection to the design capacity of that intersection. For the City of Los Angeles, LOS D or better (V/C ratio of less than 0.90) is considered satisfactory. Table 4-4 provides a brief description of each level of service.

Nine critical intersections along the proposed North Main alignment were chosen to evaluate existing and future conditions both with or without the project. These intersections indicated in Table 4-5 were identified in coordination with the City of Los Angeles Department of Transportation. The criteria used in this selection included the facility type, daily and peak hour traffic volumes, and proximity to the proposed North Main Street alignment. The existing levels of service and V/C ratios for these intersections are presented in Table 4-5.

Review of existing traffic volumes for these intersections indicate that with the exception of the Monterey Road/Huntington Drive intersection, all intersections currently experience acceptable LOS, at or above LOS D. The Monterey Road/Huntington Drive intersection operates currently at LOS E, with a V/C ratio of 0.99, in the a.m. peak hour.

TABLE 4-4

LEVEL OF SERVICE INTERPRETATION

Level of Service	Volume to Capacity Ratio	Description
A	0-0.59	Excellent operation. All approaches to the intersection appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation.
B	0.60-0.69	Very good operation. Many driers begin to feel somewhat restricted within platoons of vehicles. This represents stable flow. An approach to an intersection may occasionally be fully utilized and traffic queues start to form.
C	0.70-0.79	Good operation. Occasionally drivers may have to wait more than 60 seconds, and back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted.
D	0.80-0.89	Fair operation. Cars are sometimes required to wait more than 60 seconds during short peaks. There are no long-standing traffic queues. This level is typically associated with design practice for peak periods.
E	0.90-1.00	Poor operation. Some long-standing vehicular queues develop on critical approaches to intersections. Delays may be up to several minutes.
F	Over 1.00	Forced flow. Represents jammed conditions. Back-ups from locations downstream or on the cross street may restrict or prevent movement of vehicles out of the intersection approach lanes; therefore, volumes carried are not predictable. Potential for stop-and-go type traffic flow.

Source: Highway Capacity Manual, Highway Research Board, Special Report No. 87, Washington, D.C., 1965, and the update of the manual.

TABLE 4-5

EXISTING LEVELS OF SERVICE - NORTH MAIN STREET ALIGNMENT

Intersection	Peak Hour Period	V/C	LOS
North Main/Alpine/Vignes	a.m.	0.52	A
	p.m.	0.46	A
North Main/Daly	a.m.	0.43	A
	p.m.	0.54	A
North Main/Griffin	a.m.	0.60	B
	p.m.	0.61	B
North Main/Mission	a.m.	0.82	D
	p.m.	0.56	A
North Broadway/Mission	a.m.	0.70	C
	p.m.	0.75	C
Lincoln Park/Mission[a]	a.m.	0.37	A
	p.m.	0.41	A
Monterey Road/Huntington	a.m.	0.99	E
	p.m.	0.57	A
Monterey Road/Huntington Drive South[a]	a.m.	0.25	A
	p.m.	0.39	A
Eastern/Huntington	a.m.	0.51	A
	p.m.	0.72	C

a Not signalized. V/C and LOS estimated as if signalized.

Source: DKS Associates, 1988.

Transit service within the North Main Street alignment corridor is provided primarily by the Southern California Rapid Transit District (SCRTD). Existing bus lines that run parallel to the proposed North Main Street alignment LRT corridor include:

Route 483	Express bus from downtown Los Angeles to Altadena via El Monte Busway.
Route 485	Similar to 483.
Route 76	Downtown Los Angeles to El Monte via North Main Street.
Route 78	Downtown Los Angeles to Alhambra.
Route 79	Downtown Los Angeles to Monrovia.
Route 378	Same as 78 except limited stop service.
Route 379	Same as 79 except limited stop service.

Bus patronage in the northeast corridor is very high. This confirms the transit-dependent characteristics of the residents who live and work in this region. Section 6.3 of this EIR includes a description of existing ridership and bus service in this corridor.

Highland Park Alignment: Existing Circulation

The major roadways in the City of Los Angeles which presently serve this corridor, excluding the freeways, include North Broadway, Figueroa Street, Avenue 50, Avenue 43, and Avenue 60. Each facility is described below.

- North Broadway - North Broadway is a major highway with four through lanes. Parking is prohibited in the segment through Chinatown but is generally allowed in the Lincoln Heights segment. The average daily traffic on North Broadway is approximately 45,000 vehicles at the busiest segment near I-5. The speed limit is 30 mph.

- Figueroa Street - Figueroa Street is a major highway in Highland Park. It parallels I-110. The current geometry dictates a five-lane section with parking on both sides. The speed limit on Figueroa Street is 30 mph.

- Avenues 50, 54, and 60 - These roadways are secondary highways traversing the light rail corridor in Highland Park. They are all striped currently for one lane in each direction with parking on both sides. Their average daily traffic volumes are estimated to be 10,000, 5,000, and 1,000 vehicles per day, respectively.

A number of major arterials in South Pasadena either parallel or cross the proposed Highland Park alignment:

- Meridian Avenue. This avenue runs north/south and parallels the proposed LRT line. This two-lane roadway carries approximately 4,400 vehicles a day near its intersection with Monterey Road.
- Fair Oaks Avenue. This arterial runs north/south a few blocks west of the proposed LRT line. This four-lane roadway carries from 25,000 vehicles per day south of California Boulevard to 19,000 vehicles per day near Colorado Boulevard.
- Mission Street. Mission runs east/west and crosses the Santa Fe Railroad at-grade in the vicinity of Meridian Avenue. This four-lane roadway carries approximately 13,000 vehicles a day near Orange Grove Boulevard, a few blocks to the west of the Santa Fe Railroad right-of-way.

The following major arterial roadways either intercept or parallel the Highland Park alignment in the City of Pasadena:

- Arroyo Parkway. This is a four- to six-lane roadway, which runs immediately east of the proposed LRT line. This roadway carries approximately 38,000 vehicles a day south of Colorado Boulevard. Arroyo Parkway has some curbside parking on the blocks south of Del Mar Boulevard.
- Walnut Street. This is a four-lane roadway which carries 17,000 vehicles a day near Lake and Los Robles Avenues and parallels the Highland Park-I-210 alignment.
- Corson Street. This is a two-lane eastbound frontage road for the I-210 which carries 5,500 vehicles a day near downtown Pasadena. Volumes decrease to 4,000 vehicles a day east of downtown.
- Maple Street. This is a two-lane westbound frontage road for the I-210 which carries 4,400 vehicles a day near and east of downtown. Volumes increase to 10,500 vehicles a day west of downtown, near Fair Oaks Avenue.
- Foothill Boulevard. This is a four-lane roadway which carries approximately 19,400 vehicles a day near the proposed LRT terminus at Sierra Madre Villa.
- California Boulevard. This is a four-lane roadway which carries approximately 24,300 vehicles a day.
- Colorado Boulevard. This is a four-lane roadway which carries from 16,000 vehicles a day near Fair Oaks Avenue to 23,000 vehicles a day near Los Robles Avenue.

Both California Boulevard and Colorado Boulevard cross the Santa Fe Railroad line at-grade along with Glenarm Street, Del Mar Boulevard, Cordova Street, Green Street, Union Street, and Holly Street. The railroad line runs into a depressed cut under Walnut Street before approaching the I-210 median. All these existing at-grade crossings would become LRT at-grade crossings along this segment of the Highland Park alternative.

North and east of downtown Pasadena, the following north/south arterials run perpendicular to the proposed LRT alignment. Because the alignment is within the I-210 median, there will not be any at-grade crossing along this portion of the Highland Park alternative.

- Los Robles Avenue. This is a four-lane roadway which carries approximately 19,000 vehicles a day in downtown Pasadena. Volumes increase to 20,500 vehicles a day near the I-210 overpass.

- Lake Avenue. This is a four-lane roadway which carries approximately 28,000 vehicles a day south of Colorado Boulevard and up to 39,000 vehicles a day north of Colorado Boulevard. Volumes increase even further to 42,000 vehicles a day near the I-210 overpass.

- Hill Avenue. This is a four-lane roadway which has some curbside parking near Colorado Boulevard. It carries from 15,000 vehicles a day south of Colorado Boulevard to 28,000 vehicles a day north of Colorado Boulevard. Volumes slightly decrease to 26,000 vehicles a day near the I-210 underpass.

- Altadena Drive. This is a four-lane roadway which carries 12,000 vehicles a day near Foothill Boulevard, south of I-210. Volumes increase to 18,000 vehicles a day north of the I-210 underpass.

- Sierra Madre Boulevard. This is a four-lane roadway which carries approximately 14,000 vehicles a day south of Foothill Boulevard. Volumes decrease to 11,000 vehicles a day near the I-210 underpass.

With input from transportation staff of affected cities, critical intersections along the Highland Park alignment were chosen to analyze both existing and future conditions, either with or without the project. Table 4-6 summarizes the V/C ratio and LOS of these intersections based on existing traffic volumes.

TABLE 4-6

EXISTING LEVELS OF SERVICE - HIGHLAND PARK ALIGNMENT

Intersection	Peak Hour Period	V/C	LOS
Avenue 26/I-110 Ramp	a.m.	0.32	A
	p.m.	0.55	A
Figueroa/Marmion Pasadena	a.m.	0.49	A
	p.m.	0.48	A
Avenue 50/Figueroa	a.m.	0.64	B
	p.m.	0.43	A
Avenue 57/Figueroa	a.m.	0.67	B
	p.m.	0.47	A
Avenue 60/Figueroa	a.m.	0.54	A
	p.m.	0.76	C
Lincoln Park Place/Monterey Road	a.m.	0.30	A
	p.m.	0.36	A
Meridian Avenue/Mission Street	p.m.	0.32	A
Arroyo Parkway/Glenarm Street	p.m.	0.89	D
Arroyo Parkway/California Boulevard	p.m.	0.59	A
Fair Oaks Avenue/Del Mar Boulevard	p.m.	0.60	B
Arroyo Parkway/Del Mar Boulevard	p.m.	0.60	B
Arroyo Parkway/Cordova Street	p.m.	0.44	A
Fair Oaks Avenue/Green Street	p.m.	0.41	A
Arroyo Parkway/Green Street	p.m.	0.35	A
Fair Oaks Avenue/Colorado Boulevard	p.m.	0.95	E
Arroyo Parkway/Colorado Boulevard	p.m.	0.46	A
Fair Oaks Avenue/Union Street	p.m.	0.32	A
Arroyo Parkway/Union Street	p.m.	0.17	A

TABLE 4-6 (continued)

Intersection	Peak Hour Period	V/C	LOS
Fair Oaks Avenue/Holly Street	p.m.	0.51	A
Arroyo Parkway/Holly Street	p.m.	0.27	A
Fair Oaks Avenue/Walnut Street	p.m.	0.54	A
Los Robles Avenue/Maple Street	p.m.	0.40	A
Los Robles Avenue/Corson Street	p.m.	0.57	B
Los Robles Avenue/Walnut Street	p.m.	0.49	A
Lake Avenue/Maple Street	p.m.	0.91	E
Lake Avenue/Corson Street	p.m.	0.81	D
Lake Avenue/Walnut Street	p.m.	0.76	C
Hill Avenue/Maple Street	p.m.	0.85	D
Hill Avenue/Corson Street	p.m.	0.72	C
Hill Avenue/Walnut Street	p.m.	0.89	D
Altadena Drive/Maple Street	p.m.	0.62	B
Altadena Drive/Corson Street	p.m.	0.71	C
Foothill Boulevard/Sierra Madre Villa	p.m.	0.75	C
Sierra Madre Villa/WB Frontage Road	p.m.	0.62	B
Sierra Madre Villa/EB Frontage Road	p.m.	0.63	B

Source: DKS Associates, 1988, 1989.

Most study intersections along the alignment portion with at-grade crossings experience LOS C or better. Two exceptions are found at Arroyo Parkway and Glenarm Street, as well as Fair Oaks Avenue and Colorado Boulevard. Both intersections currently operate at LOS E. The former is at the northern terminus of the I-110, in close proximity to the proposed Glenarm Street LRT station. The latter is in west Pasadena near the I-134/I-210/I-710 junction.

Higher levels of service are observed along the frontage roads for I-210. Nearly half of these intersections experience LOS C or D in the p.m. peak hour. This is due to the proximity of the I-210 interchanges. Of all existing interchange approaches, the Lake Avenue/I-210 is the busiest. An LRT station in the vicinity of this interchange is proposed as a study site.

Transit service within the corridor which is to be served by the Highland Park alignment is also provided by the SCRTD and Foothill Transit. The primary service along the corridor includes the following routes.

Route 401	Express bus from downtown Los Angeles to Pasadena.
Route 402	Similar to 401, peak hour service only.
Route 46	Downtown Los Angeles to Highland Park.
Route 81	Downtown Los Angeles to Glendale.
Route 83	Downtown Los Angeles to Highland Park.
Route 176	El Monte to Highland Park.

Environmental Impacts

Future Traffic Assumptions

For the purpose of this analysis, the year 2010 was chosen as the design year in which future traffic conditions with and without the project are assessed. A methodology of projecting future traffic volumes was identified based on discussions with City of Los Angeles Department of Transportation staff.

A background traffic growth of 1 percent per annum was assumed throughout the study area. This figure was verified by the Southern California Association of Governments (SCAG) regional traffic projection for the project area. SCAG's traffic projection of major highway network links in this area has growth rates averaging 0.3 percent to 0.9 percent per annum for the Highland Park route and North Main Street route, respectively. The assumed background growth of 1 percent per annum is, therefore, considered adequate and somewhat conservative. Future traffic projections based on 1 percent per annum constitute the "base case." The SCAG traffic projections for the major roadways serving the project area are provided in Tables 2-1 and 2-2 of the traffic study included in Appendix C.

The next step involved estimating the traffic volumes generated by the proposed LRT. SCAG's model runs indicate that this project will have no significant adverse impact on the regional traffic projections. Future traffic volumes projected by SCAG for the "base case" and "with LRT" differ only in the order of 1 percent or less. Therefore, traffic generation by LRT will only be localized at or near stations during the peak traffic periods in the mornings and evenings.

Approaches were developed to estimate the number of trips generated at LRT stations. For a full description of the methodology, please refer to the traffic impact study prepared by DKS Associates included in Appendix C.

Trip generation rates were based on the following number of parking lot spaces assumed at each station (no parking is provided for downtown Los Angeles stations):

<u>Highland Park Alignment</u>

• Avenue 26	100 spaces
• Marmion Way/Figueroa	0 spaces
• Avenue 50	50 spaces
• Avenue 57	100 spaces
• Mission	0 spaces
• Fair Oaks	40 spaces
• Glenarm	200 spaces
• California	0 spaces
• Del Mar	600 spaces
• Holly	0 spaces
• Los Robles	0 spaces
• Lake	0 spaces
• Hill	0 spaces
• Altadena	0 spaces
• Sierra Madre Villa	1,000 spaces

North Main Street Alignment

• North Main/Griffin	0 spaces
• Mission/Lincoln Park	115 spaces
• Huntington/Monterey	50 spaces
• Huntington/Eastern	0 spaces
• Huntington/I-710	300 spaces

The station generated trips were then distributed onto nearby intersections according to existing directional distribution patterns. Only those intersections in close proximity to LRT stations were studied. The resulting analysis compares both year 2010 "base case" without the project and year 2010 with project. The results are summarized in Tables 4-7 and 4-8 for the Highland Park and North Main Street routes, respectively.

The year 2010 impact criteria used by DKS Associates for the LRT traffic impact analysis were as follows:

- Within the City of Los Angeles and the City of South Pasadena, study intersections have a threshold V/C ratio of 0.89. Hence, an acceptable V/C ratio with the LRT corresponds to a predicted LOS D or better. At the sites, where the pre-LRT ratio is already at LOS E or F, the intersection will be impacted by LRT only if V/C ratio is expected to increase by 0.02 or more.

- Within the City of Pasadena, the year 2010 impact criteria developed for the route refinement study with input from the City of Pasadena were used for this analysis. These varied with the location of the study intersection as follows:

  (1) Between Pasadena and Wilson Avenue, downtown Pasadena intersections (north of California Boulevard and south of Corson Street) have a threshold V/C ratio of 0.89. Hence, an acceptable V/C ratio corresponds to LOS D or better at these sites.

  (2) Study intersections in Pasadena found near I-210 interchanges have a threshold V/C ratio of 0.99. Hence, an acceptable V/C ratio corresponds to LOS E or better at each I-210 approach.

  (3) Other Pasadena study intersections (south of California or east of Wilson) located away from I-210 interchanges, have a threshold ratio of 0.79. Hence, an acceptable V/C ratio corresponds to LOS C or better at these sites.

Mitigation measures will be needed if the LRT impacts caused the V/C ratio to exceed the corresponding threshold values. At those study intersections where the pre-LRT V/C ratio already exceeds the threshold, mitigation measures will be needed if LRT impacts cause a V/C ratio increase equal to or greater than 0.02.

Mitigation measures were defined at the study intersections impacted by LRT to achieve the following results:

either

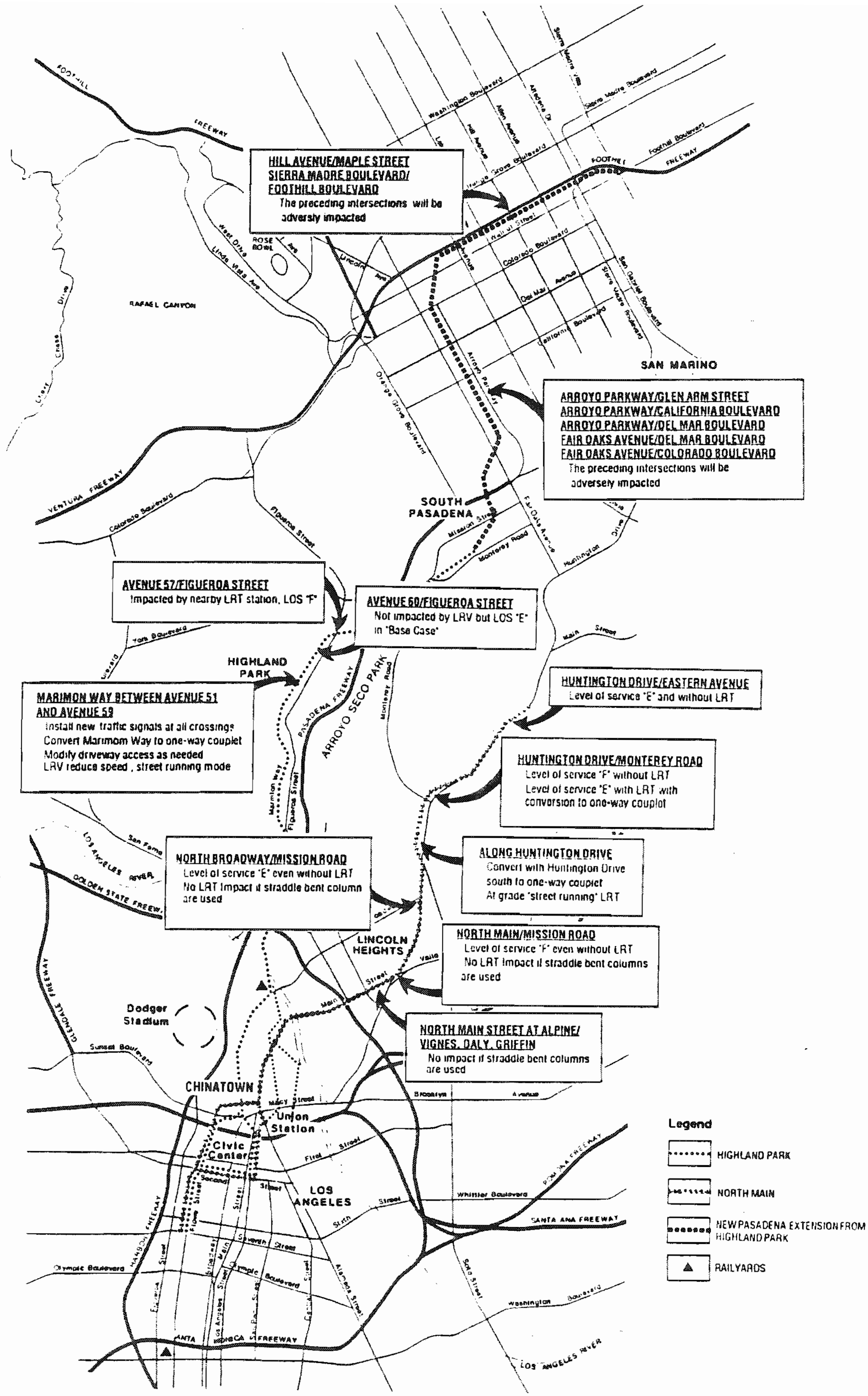
- Lower the V/C ratio to the applicable threshold (i.e., 0.89 or below in downtown, 0.99 or below at interchanges).

or

- Lower the V/C ratio to the estimated pre-LRT 2010 V/C ratio, whichever is greater.

Overall, the LRT operations may impact the LOS at critical intersections in one of three ways: (1) the LRT would reduce the roadway capacity; (2) the LRT would preempt crossing traffic; or (3) LRT station-generated traffic from park-and-ride or kiss-and-ride users would add to future traffic volumes of critical phases.

The year 2010 baseline column in Tables 4-7 and 4-8 suggest that the LOS at most intersections would deteriorate as a result of traffic growth. These future LOS before LRT implementation most likely represent worst-case conditions as no roadway improvements and no route specific mitigations of traffic generated by new developments were included in the base case simulation. The subsequent actions cover the magnitude and the location of potential traffic impacts due to the LRT operations. These represent what relative increases in future LOS might take place above the year 2010 base case estimates.



Traffic Impacts
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-7

TABLE 4-7

YEAR 2010 LEVELS OF SERVICE - HIGHLAND PARK ROUTE

Intersection	Peak Hour Period	Existing V/C	Existing LOS	Base Case Year 2010 without LRT V/C	Base Case Year 2010 without LRT LOS	Year 2010 with LRT[a] V/C	Year 2010 with LRT[a] LOS
Avenue 26/Pasadena Fwy. Ramp	a.m.	0.32	A	0.41	A	0.45	A
	p.m.	0.55	A	0.70	C	0.76	C
Figueroa/Marmion/Pasadena	a.m.	0.49	A	0.64	B	0.84	D
	p.m.	0.48	A	0.64	B	0.72	C
Avenue 50/Figueroa	a.m.	0.64	B	0.80	D	0.89	D
	p.m.	0.43	A	0.55	A	0.68	B
Avenue 57/Figueroa	a.m.	0.67	B	0.85	D	1.12	F[b]
	p.m.	0.57	A	0.60	B	0.82	D
Avenue 60/Figueroa	a.m.	0.54	A	0.68	B	0.68	B
	p.m.	0.76	C	0.97	E	0.97	E
Lincoln Park/Monterey Rd.	a.m.	0.30	A	0.42	A	0.50	A
	p.m.	0.36	A	0.56	A	0.57	A

a Before mitigation.
b Significant impact due to LRT.

Note: Tables 3 and 5 in the DKS traffic study for the Pasadena segment indicate levels of service of key intersections.

Source: DKS Associates, 1988, 1989.

TABLE 4-8

YEAR 2010 LEVELS OF SERVICE - NORTH MAIN ROUTE

Intersection	Peak Hour Period	Existing V/C	Existing LOS	Year 2010 Base Case without LRT V/C	Year 2010 Base Case without LRT LOS	Year 2010 Base Case with LRT V/C	Year 2010 Base Case with LRT LOS
North Main/Alpine/Vignes	a.m.	0.52	A	0.67	B	0.67	B[a]
	p.m.	0.46	A	0.61	B	0.61	B[a]
North Main/Daly	a.m.	0.43	A	0.57	A	0.57	A[a]
	p.m.	0.54	A	0.79	C	0.79	C[a]
North Main/Griffin	a.m.	0.60	B	0.77	C	0.80	D[a]
	p.m.	0.61	B	0.84	D	0.87	D[a]
North Main/Mission	a.m.	0.82	D	1.03	F	1.03	F[a]
	p.m.	0.56	A	0.70	C	0.70	C[a]
North Broadway/Mission	a.m.	0.70	C	1.00	F	1.00	F[a]
	p.m.	0.75	C	0.95	E	0.95	E[a]
Lincoln Park/Mission[b]	a.m.	0.37	A	0.47	A	0.58	A
	p.m.	0.61	B	0.54	A	0.70	C
Monterey Road/Huntington	a.m.	0.99	E	1.26	F	0.99	E[c]
	p.m.	0.57	A	0.72	C	0.32	A[c]
Monterey Road/Huntington Drive South[b]	a.m.	0.25	A	0.32	A	0.30	A[c]
	p.m.	0.39	A	0.49	A	0.62	B[c]
Eastern/Huntington	a.m.	0.51	A	0.67	B	0.68	B
	p.m.	0.72	C	0.92	E	0.94	E

a Assume use of straddle bent columns.
b Existing not signalized. Year 2010 will be signalized.
c Existing not signalized. Year 2010 will be signalized.
d Assume roadway converted to one way couplet.

Source: DKS Associates, 1988.

Highland Park Alignment Traffic Impacts

For the Highland Park route, LRT impacts would be mostly related to the latter two categories above, since the LRT runs mostly in existing railroad right-of-way. Most of the alignments being studied in downtown Los Angeles are in a subway configuration. However, two of the downtown alignment options feature an LRT at-grade crossing of North Spring Street north of College Street (the Second Street-Union Station and Union Station "No Subway" options). The LRT should not impact traffic at this crossing as long as the crossing is a sufficient distance away from the intersection of Alameda Street and College Street to prevent traffic queues from spanning the distance. The Second Street-Union Station option also crosses North Main Street at-grade; this should not adversely affect traffic.

Under the Second Street/Union Station option, the proposed portal north of Union Station requires the permanent closure of College Street between North Spring Street (Alameda Street) and North Main Street. This closure appears feasible from a traffic standpoint since nearby intersections appear able to handle diverted traffic.

Outside the downtown/Chinatown area, six critical intersections were studied along the portion of the route within the City of Los Angeles. One was identified as being impacted. This was Avenue 57/Figueroa Street projected to operate at LOS F, a significant increase over the base case LOS D. Avenue 57/Figueroa Street is impacted by the LRT station in the vicinity and suitable mitigation measures are developed as discussed in the next section. Avenue 60/Figueroa Street is not expected to be impacted by the LRT.

In South Pasadena, whichever station site is assumed (Mission Street at Meridian Avenue or Fair Oaks Avenue north of I-110), the LRT operation would have no significant traffic impact from at-grade crossings and kiss-and-ride access.

Along the route segment within Pasadena, the LRT operation would impact a total of seven study intersections based on the year 2010 traffic impact criteria:

- Arroyo Parkway and Glenarm Street
- Arroyo Parkway and California Boulevard

- Arroyo Parkway and Del Mar Boulevard
- Fair Oaks Avenue and Del Mar Boulevard
- Fair Oaks Avenue and Colorado Boulevard
- Hill Avenue and Maple Street, with an LRT station at Hill Avenue
- Sierra Madre Villa Avenue and Foothill Boulevard

Impacts reflect the combined effects of station-related park-and-ride and kiss-and-ride auto trips, as well as the at-grade crossings along Arroyo Parkway. Mitigation measures have been proposed for all impacted intersections and are described in a later section.

In Pasadena, the phasing option that terminates at the Del Mar Station would impact five study intersections including Arroyo Parkway/Glenarm, Arroyo Parkway/California, Arroyo Parkway/Del Mar, Fair Oaks/Del Mar, and Fair Oaks/Colorado. These intersections and their mitigations are identical to the above findings along the Pasadena route segment with at-grade crossings under the full length option.

Other Traffic Impacts: Highland Park Route

Besides the direct quantifiable impacts of the LOS at intersections, other traffic impacts caused by LRT may include loss of roadway space, access to driveways, turning prohibitions, loss of parking, impacts on the existing bus transit system, and other traffic safety concerns.

From the Southern Pacific railyard to Avenue 50 gated control for LRT where a proposed station is located at the Figueroa Street/Pasadena Avenue/Marmion Way crossing, analysis indicates that LRT preemption with gated control is feasible. The crossing gates should be maintained in the "up" position while a southbound light rail vehicle is stopped at the station to avoid unnecessary additional delay to traffic by light rail. This is consistent with operating rules developed along the Long Beach-Los Angeles line.

Between Avenues 51 and 57, the proposed light rail alignment runs in the median of Marmion Way. To accommodate two light rail tracks in this segment, the two Marmion Way roadways should be converted into a one-way couplet, as shown schematically in Exhibit 4-8 for Avenue 54, as an example. No parking should be allowed along either roadway. The two roadways of Marmion Way would each be about 17 feet wide, measured from the edge of the LRT right-of-way to the property line of homes. Residents would encounter tight turning radii while directing cars into their driveways. If a sound wall is installed beside the LRT tracks, as proposed to mitigate noise impacts, the turning radius becomes more critical as motorists avoid hitting the wall. Modification to driveway gates, longer curb returns at alleys, and relocation of utility poles may be required at some locations to maintain access.

For safety reasons, light rail vehicles may need to reduce speed to match the parallel roadway speed along the Marmion Way segment between Avenues 50 and 60. Otherwise, railroad gates with flashers and bells would be activated over 30 times per hour during peak periods. To avoid such a frequent distraction, the current stop signs and railroad gates along Marmion Way should be removed. Traffic signals should be installed at every intersection from Avenue 51 to Avenue 60. Light rail vehicles should operate in a street-running mode, observing traffic signals and stopping as necessary. LRT priority can be provided to maintain reasonable LRT speeds along this segment.

Light rail should impact bus transit patronage along the Figueroa Street Corridor. Bus schedules and routes should be revised to augment light rail by providing local transit service feeding to the regional transit service offered by LRT.

For the segment from Avenue 60 through South Pasadena, gated control for LRT should be feasible. No changes to the roadway or parking removal is expected. Along the Pasadena segment parallel to Arroyo Parkway, the LOS analysis assumed standard railroad preemption similar to the previously described segments, using railroad gates, flashers, and bells. Two alternate schemes were considered in the traffic analysis, using "window preemption" or the use of LRT signals at grade crossings. However, neither method offered clear advantages over standard railroad preemption, as they ed to substantial delays for LRT users at the cost of marginal benefit to cross-corridor vehicular traffic.

Along the Pasadena segment within the I-210 median, no LRT preemption is necessary since there are no at-grade crossings along this segment.

North Main Street Alignment Traffic Impacts

Two intersections along Mission Road are projected to operate with substandard LOS in the year 2010 even without light rail. These are the intersections of North Main Street/Mission Road and North Broadway/Mission Road. The light rail would not impact these two locations if support columns are located outside of the roadway rights-of-way.

Two intersections along Huntington Drive are anticipated to operate at substandard LOS in the year 2010 without light rail. They are Huntington Drive/Monterey Road and Huntington Drive/Eastern Avenue. To effectively accommodate light rail, Huntington Drive and Huntington Drive South should be converted to a one-way couplet. This would actually improve the LOS at the Huntington Drive/Monterey Road intersection from LOS F (V/C ratio of 1.26) to LOS E (V/C ratio of 0.99).

The Huntington Drive/Eastern Avenue intersection would be marginally impacted by light rail due to the proximity of a light rail station. The V/C ratio of this intersection is projected to increase from the base case of 0.92 to 0.94 with LRT. This falls within the threshold of City of Los Angeles Department of Transportation's planning guidelines for requiring mitigation measures when an intersection's V/C ratio exceeds 0.90 and would increase by over 0.02 with the project.

Other Traffic Impacts: North Main Street Route

While the downtown options are primarily in subway, the proposed LRT alignment transitions to aerial structure at North Main Street near the Vignes Street and Alpine Street intersection north of Union Station. Between Vignes Street and Mission Road, North Main Street is approximately 60 feet wide. In order to maintain two through lanes in each direction with a center running aerial LRT, all parking along North Main Street would be lost.

Due to the large amount of industrial land use along North Main Street, the geometric design of major intersections must accommodate turning movements of trucks. With center-running LRT, support columns will displace the left-turn lanes and reduce the two existing through lanes to one. The two off-center left-turn lanes will cause the truck turn-paths to interlock, hence requiring protected left-turn phases and "split-phase" signal operation. These two factors will adversely affect the LOS at intersections requiring extensive roadway widening in these areas.

To avoid the need for extensive roadway widening, support columns should be placed outside of the roadway right-of-way at all major intersections. This is achieved by using straddle bent columns which support the aerial structure with two columns placed on either side of the roadway instead of a single column placed in the center of the roadway. This method ensures that the current roadway geometric configuration can be maintained and that all turning movements will not be impaired. The impact of straddle bent columns to the visibility of drivers and pedestrians should be carefully addressed in the design to avoid potential safety problems.

At other minor intersections along North Main Street, median columns may be used. Left turns from North Main Street into these side streets will have to be made from the outside through lane. Column locations should be designed for adequate visibility distance for left turning motorists. Straddle bent columns should also be used at all intersections where the potential of two trucks making simultaneous left-turns is high. Center support columns may also interfere with large trucks turning out of the side streets along North Main Street. Curb return radii may need to be improved at most intersections, and this should be addressed in the design.

Along Mission Road between North Main Street and Soto Street, the proposed LRT alignment remains aerial in the median of Mission Road. Two lanes of traffic should be maintained in each direction though this will result in the loss of on-street parking along this segment.

A station is proposed near Lincoln Park Avenue near the unsignalized intersection of Mission Road/Lincoln Park Avenue. With the projected traffic growth at 1 percent per annum, this intersection is expected to warrant a traffic signal and should be signalized in the future. The LOS should be in the comfortable LOS A range, as indicated in Table 4-8.

The proposed LRT alignment would transition from aerial to at-grade on Mission Road south of the Soto Street intersection. The alignment would utilize the existing westbound lane to cross under the existing Soto Street Bridge (which is recommended to be removed) and turn north onto Huntington Drive remaining at-grade on the current westbound roadway of Huntington Drive.

The Soto Street/Mission Road/Huntington Drive interchange should be reconfigured, and is discussed in the section describing mitigation measures.

It is assumed that at-grade LRT would operate in a "street-running" mode along Huntington Drive at comparable speeds with parallel traffic and would not preempt any traffic signals. LRT has to observe traffic signals like other traffic, although priority can be provided at some intersections and at certain times of the day.

Presently, both Huntington Drive and Huntington Drive South are two-way streets. It is recommended to convert them to a one-way couplet system, with traffic on Huntington Drive South running eastbound and that on the north roadway of Huntington Drive running westbound. The south roadway of Huntington Drive can, therefore, be used by light rail. Conversion of the two Huntington Drive roadways to a one-way couplet would not cause significant impacts in the traffic perspective. Three through lanes should be maintained on each roadway with parking on one side (except in restrictive segments). Local access can be maintained through local streets connecting the two roadways.

Between Collins Avenue and Eastern Avenue, the Huntington Drive and Huntington Drive South roadway merges. It is proposed to run LRT at-grade in the wide median separating the two roadways. Again, as LRT is not expected to preempt the traffic signals, traffic impact at intersections will be confined to: (1) station impacts as discussed previously; and (3) the need to provide protected left-turn phases at all intersections.

Between Eastern Avenue and Van Horne Avenue, the light rail tracks would occupy the median of Huntington Drive. Without reducing the number of traffic lanes, the width of the two roadways of Huntington Drive can be reduced to accommodate a wider median for the LRT tracks. No traffic impacts would result if the existing lane configuration is maintained.

It is proposed to locate a light rail station east of the Van Horne Avenue. In order to accommodate the station, Huntington Drive needs to be widened to maintain the existing number of traffic lanes. This can be done by relocating the north curb cutting into a wide island that is within the street right-of-way. Again, no traffic impacts would result if the existing lane configuration is maintained.

Light rail should impact bus transit patronage along the North Main and Huntington Corridor. Bus routes and schedules should be revised to augment light rail by providing local transit service feeding to the regional transit service provided by LRT.

Exhibit 4-7 summarizes the major traffic impacts along the North Main route.

Parking Overflow

Passengers attempting to use parking lots provided at stations may overflow into neighborhood streets and lots. This is more likely to occur at stations further from downtown and at stations where some parking is provided, encouraging commuters from nearby areas to drive to a station to take the LRT to work. Parking overflow is also likely to occur at stations further from downtown and where no parking is provided.

<u>**Highland Park Alternative**</u>

The following stations serving the Highland Park alternative have been identified as locations where overflow parking is likely to occur along with any existing limitations or parking restrictions.

- <u>Avenue 26 and Santa Fe Railroad Station</u>: About 100 parking spaces will be provided in a lot. Little parking overflow is anticipated due to existing posted rush-hour street parking regulations, the interference of freeway ramps, and the industrial nature of the area.

- <u>Avenue 51 Station</u>: About 50 parking places are planned. Parking could overflow onto Avenues 50 and 51, Monte Vista Street (residential) and into the commercial area on Figueroa Street.

- <u>Avenue 57 Station</u>: A large City of Los Angeles parking lot currently provides parking for the Figueroa commercial corridor. As it is adjacent to a station, it may be used for LRT station parking. In addition, a parking lot with approximately 100 spaces will be provided. Parking may overflow onto Marmion Way and Avenues 57 and 58, north of Marmion Way, as well as onto Piedmont Avenue.

- <u>Mission Street/Meridian Avenue Station</u>: No parking lot will be provided. Parking may overflow onto Meridian Avenue, Glendora Avenue, and other local streets in the surrounding neighborhood. Parking restrictions and traffic flow will prevent overflow on Mission Street.

- Del Mar Transportation Center: A potential park-and-ride lot may be developed at this station which is presently occupied by the Santa Fe rail station. Some overflow parking may occur on nearby streets in the absence of adequate mitigation, including Raymond Avenue, Del Mar Boulevard, and others in areas where parking restrictions do not apply.

- Sierra Madre Villa Station: This terminal station will include park-and-ride areas onsite. Some overflow may occur in parking areas serving larger commercial centers located in the vicinity of Rosemead Boulevard and Foothill Boulevard.

North Main Alternative

The following stations serving the North Main Street alternative have been identified as stations where overflow parking is likely to acrue along with any existing limitations or parking restrictions.

- North Main/Griffin Avenue Station: No parking lot is provided. Parking may occur on Sichel Street, Griffin Avenue, and Johnson Street. Parking on North Main will be removed for the LRT.

- Mission/Lincoln Park Station: Short-term and long-term parking will be provided. Parking could overflow onto Lincoln Park Avenue, Barbee Street, Keish Street, and Alta Street.

- Huntington/Monterey Station: Some long-term and short-term parking will be provided. Parking may overflow onto North Huntington Drive, Yorba Street, Mercury Avenue, and Beryl Street.

- Huntington/Eastern Station: No parking facilities are planned for this station. Parking for the LRT station may occur on the east side of El Sereno and Eastern Avenues, or on Thelma Avenue.

- Poplar/Van Horne Station: Parking will be provided in lots between Van Horne Avenue and Barrett Road. Overflow parking could occur on Van Horne Avenue, Guardia Avenue, Barrett Road, Almont Street, or Navarro Avenue.

Construction Impacts

Since this project entails construction on or near to major roadways with considerable interface with traffic, significant short-term traffic impacts are envisaged during the 18- to 24-month construction timeframe per station area. Likely impacts are discussed below, along with proposed mitigation measures.

Downtown Los Angeles Subway Options: For subway segments, tunneling is preferred over cut-and-cover to minimize construction traffic impacts. For some underground station construction where cut-and-cover is inevitable, and for any other construction activities where street closure is required, suitable construction detour plans must be developed and approved by the City of Los Angeles prior to start of construction. During cut-and-cover construction, temporary decking will allow one traffic lane in each direction to be maintained, with the elimination of parking and modification of bus stops and schedules. Every effort should be made in station construction areas to maintain at least one traffic lane at all times for local access and emergency vehicles. Finally, major parking access must be maintained.

Union Station "No Subway" Option: Construction of the Union Station "No Subway" segment of the Highland Park Alternative would have minimal traffic impacts. Under the newly proposed options, the LRT construction would occur at an existing rail station (Union Station), within the Southern Pacific railyard and along connecting branch lines north of Union Station. Traffic detours will be needed at the grade crossings on North Main and North Spring Streets.

The magnitude of other LRT construction-related impacts upon downtown Los Angeles traffic varies somewhat among the downtown options:

- Any LRT implementation with Union Station as its southern terminus would have little impact south and west of Union Station.

- Subway construction between the 7th and Flower Station and Union Station would impact traffic at cut-and-cover station locations. Although some traffic would be able to pass over wooden decking at the cut-and-cover site, full detours would be needed on occasions when the entire street must be closed.

- In the case of the Second Street-Union Station option, an LRT subway portal transition to an at-grade line is proposed east of the intersection of College Street and North Spring Street. This portal requires the permanent closure of College Street. Once College Street is closed, the construction impacts to traffic would be considered minimal.

- There is no major difference in the magnitude of construction impacts to traffic between the north side and south side LRT route options within the Southern Pacific railyard.

__Highland Park Alignment__: For the Highland Park route, where most construction activities are within existing railroad right-of-way, construction traffic impacts are confined to those at-grade crossings. Detailed detour plans should be developed and approved by the City of Los Angeles prior to construction for at least the following locations:

- Avenue 26/Lacy Street/I-5 off-ramp intersection
- Figueroa Avenue/Marmion Way/Pasadena Avenue intersection
- Marmion Way between Avenue 50 and Avenue 60

For the segment from South Pasadena to I-210, construction would mostly occur within the Santa Fe Railroad right-of-way. Short-term construction impacts upon traffic would be significant at approximately 10 to 15 at-grade crossings. Other impacts of a lesser magnitude would take place at those LRT stations with new construction or proposed expansion of park-and-ride facilities. During LRT construction, care should be taken to avoid closing too many adjacent crossings at the same time. Detailed detour plans should be developed and approved by the City of South Pasadena and the City of Pasadena.

For the segment along the I-210 median, LRT construction is expected to have significant impacts upon traffic operations. The lack of convenient access points for heavy equipment and the narrow width of the existing median will contribute further to the following disruptions along the I-210 corridor:

- The construction of LRT station platforms and their vertical circulation elements will conflict with the freeway traffic at each potential station site: Los Robles Avenue, Lake or Hill Avenue, Altadena Drive and Sierra Madre Villa.

- At certain potential station sites, the required widening of an existing under or overpass will also interfere with traffic using the interchange approaches.

- For the full length of the impacted freeway median (from north of Walnut Street portal to Sierra Madre Villa), the installation of the LRT tracks may warrant closure of one or two center lane(s); this would impact the I-210 capacity through this congested section of the corridor.

Potential mitigations to construction impacts includes:

- Limiting center-lane closures to off-peak or late evening hours.

- Closing only one lane at a time instead of both center lanes.

- Implementing a ramp metering program during all construction hours.

- Proposing interim high-occupancy vehicle lanes along I-210 through the Pasadena area.

- Diverting some through traffic to Walnut Street and Colorado Boulevard via variable message signs.

North Main Street Alignment: For the North Main Street alignment, LRT construction would have significant traffic impacts as most construction activities will take place within roadway right-of-way. Unless otherwise agreed to by the Los Angeles Department of Transportation, two through lanes of traffic in each direction should be maintained along North Main Street and Mission Road throughout the construction period. Should construction necessitate reducing the roadway width to one lane in each direction, a phased construction sequence should be designed such that only a limited area (construction zone) would be operating in one lane in each direction at any given time. The extent of the construction zone and the phasing sequence should be agreed upon by the City of Los Angeles during the design. All on-street parking would be removed. In addition, no construction equipment should be allowed to impair the turning movement of trucks at major intersections.

Huntington Drive and Huntington Drive South should be converted into a one-way couplet system prior to start of LRT construction. This will minimize adverse traffic impacts during construction. Detailed detour plans should be developed and approved by the City of Los Angeles prior to construction for at least the Huntington Drive/Monterey Road and Huntington Drive/Eastern Avenue intersections.

Phasing Impacts

This analysis focuses upon interim phasing impacts associated with the phasing of each proposed route. The phased development of the Pasadena-Los Angeles LRT project is identified in Section 3.6. Traffic generation due to the phased light rail routes has been identified at each station and trips have been assigned to adjacent intersections. The same methodology used to assess potential impacts of the complete project has been used to identify station impacts due to the proposed project in phases.

The phasing impact analysis has only been conducted at those locations where traffic generated by the LRT station is estimated to be greater under the phasing plan than with the entire line.

Table 4-9 illustrates estimated station traffic generation as calculated for the entire line and for the phased projects.

TABLE 4-9

TRAFFIC GENERATION AT LRT STATIONS FOR PHASED AND NONPHASED ALTERNATIVES[a]

Station Name	Estimated Traffic Generation for Final Project	Station Name	Estimated Traffic Generation for Final Project
Highland Park Route		North Main Route	
Avenue 26	254	North Main/Griffin	134
Marmion/Figueroa	107	Mission/Lincoln Park	314
Avenue 51	238	Monterey	248
Marmion Way/Avenue 57	386	Eastern	92
Mission/Fair Oaks	49		
Glenarm	106		
Del Mar	658		
Holly Street or Los Robles	39		
Laken Hill	38		
Altadena	17		
Sierra Madre Villa	723		

a Generations are a.m. and p.m. peak hour auto trips. Generations are assumed for federal project.
b N/A = not applicable, phase terminates before station or no phase.

Source: DKS Associates, Inc., 1988, 1989.

Tables 4-10 and 4-11 illustrate intersection LOS in year 2010 with the LRT line and with the phased development of the Highland Park and North Main Street alignment at applicable locations. No significant traffic impacts are forecast for Phase 1 (in downtown Los Angeles) due to the below grade alignment of that phase.

TABLE 4-10

YEAR 2010 LEVEL OF SERVICE WITH AND WITHOUT PROJECT PHASES
HIGHLAND PARK ROUTE

Intersection	Period	Year 2010[a] With LRT V/C	Year 2010[a] With LRT LOS	Phase 2 With LRT V/C	Phase 2 With LRT LOS	Phase 3 With LRT V/C	Phase 3 With LRT LOS
Avenue 26/Pasadena Fwy Ramp	a.m.	0.45	A	0.45	A	0.45	A
	p.m.	0.76	C	0.77	C	0.77	C
Figueroa/Marmion/Pasadena	a.m.	0.84	D	0.98	E	0.98	E[b]
	p.m.	0.72	C	0.76	C	0.76	C
Avenue 50/Figueroa	a.m.	0.89	D	N/A		0.90	E
	p.m.	0.68	B	N/A		0.68	B
Avenue 57/Figueroa	a.m.	1.12	F[a]	N/A		1.12	F[b]
	p.m.	0.82	D	N/A		0.82	D
Avenue 60/Figueroa	a.m.	0.68	B	N/A		N/A	
	p.m.	0.97	E	N/A		N/A	
Lincoln Park/Monterey Road	a.m.	0.50	A	N/A		N/A	
	p.m.	0.57	A	N/A		N/A	
Arroyo Parkway/Glenarm St.	p.m.	0.95	E				
Arroyo Parkway/California Blvd.	p.m.	0.89	D				
Arroyo Parkway/Del Mar Blvd.	p.m.	0.85	D				
Fair Oaks Ave./Del Mar Blvd.	p.m.	0.85	D				
Fair Oaks Ave./Colorado Blvd.	p.m.	1.61	F				
Hill Ave./Maple St.	p.m.	0.92	E				
Sierra Madre Villa/Foothill Blvd.	p.m.	0.94	E				

a Significant impact due to LRT.

b For the Pasadena Stations, the LOS is based on completion of phas 4 and 5.

Source: DKS Associates, Inc., 1988, 1989.

TABLE 4-11

YEAR 2010 LEVEL OF SERVICE WITH AND WITHOUT PROJECT PHASES
NORTH MAIN ROUTE

Intersection	Year 2010 With LRT Period	Phase 2 With LRT V/C	Phase 2 With LRT LOS	Phase 3 With LRT V/C	Phase 3 With LRT LOS
North Main/Alpine/Vignes	a.m.	0.67	B[a]	0.67	B[a]
	p.m.	0.61	B[a]	0.61	B[a]
North Main/Daly	a.m.	0.57	A	0.57	A[a]
	p.m.	0.79	C[a]	0.79	C[c]
North Main/Griffin	a.m.	0.80	D[a]	0.80	D[a]
	p.m.	0.87	D[a]	0.87	D[a]
North Main/Mission	a.m.	1.03	F[a]	1.03	F[a]
	p.m.	0.70	C[a]	0.70	C[a]
North Broadway/Mission	a.m.	1.00	F[a]	1.00	F[a]
	p.m.	0.95	E[a]	0.95	E[a]
Lincoln Park/Mission[b]	a.m.	0.58	A	0.59	A
	p.m.	0.70	C	0.72	C
Monterey Road/Huntington	a.m.	0.99	E[c]	1.01	F[c]
	p.m.	0.32	A[c]	0.35	A[c]
Monterey Road/Huntington Drive South	a.m.	0.30	A[c]	0.35	A[c]
	p.m.	0.62	B[c]	0.62	B[c]
Eastern/Huntington	a.m.	0.68	B	N/A	
	p.m.	0.94	E	N/A	

a Assume use of straddle bent columns.
b Existing not signalized. Year 2010 will be signalized.
c Assume roadway converted to one-way couplet.

Source: DKS Associates, Inc., 1988.

Significant impacts are forecast for Phases 2 and 3 at the intersection of Figueroa/Marmion/Pasadena for the Highland Park alignment. The LOS is expected to decrease to a LOS E with a V/C ratio of 0.98. Phase 3 interim phasing impacts are expected at the intersection Avenue 50/Figueroa Street during the p.m. peak hour.

Construction of the phasing option to Del Mar Station would result in much fewer impacts upon I-210. LRT construction impacts in South Pasadena and near Arroyo Parkway would be identical to the full-length option.

No LRT-related impacts for the North Main Street alignment are expected as a result of interim phasing.

Mitigation Measures

This section focuses on the mitigation measures which will be effective in reducing adverse impacts. According to the Los Angeles City Department of Transportation (LADOT) planning guidelines, significant impacts are defined by those that cause the intersection V/C ratio exceeding 0.90 to increase by over 0.02 above the base case and no suitable mitigation measures can be identified. For intersections within the City of Pasadena, acceptable V/C ratios and corresponding LOS vary from 0.79 (LOS C) to 0.99 (LOS E) depending on location. Mitigations are proposed where these thresholds are exceeded. The projected level of service for the Highland Park route both with and without mitigation is indicated in Table 4-12.

TABLE 4-12

YEAR 2010 LEVELS OF SERVICE AT CRITICAL INTERSECTIONS

Intersection	Period	Year 2010 With LRT Unmitigated V/C	Unmitigated LOS	Mitigated V/C	Mitigated LOS	Recommended Mitigation Measures
Avenue 57/Figueroa	a.m.	1.12	F	0.84	D	Restripe Figueroa to seven lanes near intersection
	p.m.	0.82	D	0.76	C	
North Main/Alpine/Vignes[a]	a.m.	1.14	F	0.66	B	Widen roadway to add two lanes.[a]
	p.m.	1.18	F	0.72	C	
North Main/Daly[a]	a.m.	1.00	F	0.63	B	Widen roadway to add two lanes.[a]
	p.m.	1.35	F	0.84	D	
North Main/Griffin[a]	a.m.	1.67	F	0.95	E	Widen roadway to add two lanes.[a]
	p.m.	1.57	F	0.90	E	
Arroyo Parkway/Glenarm St.	p.m.	1.14	F	0.95	E	
Arroyo Parkway/California Blvd.	p.m.	0.92	E	0.89	D	
Arroyo Parkway/Del Mar Blvd.	p.m.	0.90	E	0.85	D	
Fair Oaks Ave./Del Mar Blvd.	p.m.	0.91	E	0.85	D	
Fair Oaks Ave./Colorado Blvd.	p.m.	1.67	F	1.61	F	
Hill Avenue/Maple Street	p.m.	1.10	F	0.92	E	
Sierra Madre Villa/Foothill Blvd.	p.m.	0.97	E	0.94	E	

a Assumes median support LRT columns. If straddle bent columns are used, no mitigation measures are necessary.

Source: DKS Associates, Inc.

Highland Park Route Mitigation Measures

The following mitigation measures will be effective in reducing potential adverse impacts at major intersections located along the Highland Park route.

- Avenue 50-57/Marmion Way: Between Avenue 50 and Avenue 57, the proposed light rail alignment runs in the median of Marmion Way. To accommodate two light rail tracks in this segment, the two Marmion Way roadways should be converted into a one-way couplet, as shown schematically in Exhibit 4-9 for Avenue 54, as an example. Driveway modification may be necessary to retain sufficient room for maneuvering cars into and out of driveways. No parking should be allowed along either roadway.

- Avenue 57/Figueroa Street: This intersection is projected to operate at a critical V/C ratio of 1.12 in the year 2010 with LRT. This represents a significant increase over the base case V/C ratio of 0.85. One major reason for this increase is that Avenue 57 serves as a primary entry to the proposed Avenue 57 station from Figueroa Street, thereby causing eastbound left-turn volumes to increase significantly. This, together with the high a.m. peak hour westbound traffic volumes, gives rise to a substandard LOS.

This problem can be mitigated by peak hour parking prohibition within 300 feet of both sides of the intersection and reconfiguring it to two eastbound left-turn lanes, two eastbound through lanes, one westbound left-turn lane, two westbound through lanes, and one westbound through and right-turn lane. This would reduce the V/C ratio to 0.84 (LOS D). No roadway widening will be necessary as these improvements can be made within existing roadway right-of-way. Exhibit 4-9 shows the recommended geometric configuration.

- Avenue 51 - Avenue 60/Marmion Way: Stop signs and railroad gates should be removed and replaced by traffic signals.

Pasadena Segment: In addition, the following mitigations are required for the segment within the City of Pasadena:

- Adding a north to east right-turn only lane on Arroyo Parkway and Glenarm Street, requiring the purchase of additional right-of-way.

- Adding a south to west right-turn only lane on Arroyo Parkway at California Boulevard, requiring the purchase of additional right-of-way.

- Adding a west to north right-turn only lane on California Boulevard at Fair Oaks Avenue, requiring the purchase of additional right-of-way.

- Adding an east to south right-turn only lane on Del Mar Boulevard at Arroyo parkway, by widening Del Mar Boulevard by 2 feet west of the intersection, and reducing sidewalk width to 9 feet.

- Adding a west to north right-turn only lane on Colorado Boulevard at Fair Oaks Avenue, by restriping Colorado Boulevard.

- Restriping the westbound approach to Hill Avenue at Maple Street intersection to provide an additional west to south left-turn on Maple Street. This mitigation measure would only be required if an LRT station is built at the Hill Avenue interchange.

- Restriping the westbound approach to Sierra Madre Villa Avenue at Foothill Boulevard would provide a double left-turn lane (instead of the current single eft-turn lane) on Foothill Boulevard. This mitigation would require the removal of the existing right-turn only lane on the eastbound approach to this intersection.

Mitigation Measures for Construction Impact: Potential mitigation measures that should be effective at reducing congestion and disruption on I-210 during construction phases include the following:

- Limiting center lane closures to off-peak or late evening hours.

- Closing only one lane at a time instead of both center lanes.

- Implementing a ramp metering program during all construction hours.

- Proposing interim high occupancy vehicle lanes along I-210 through the Pasadena area.

- Diverting some through traffic to Walnut Street and Colorado Boulevard via variable message signs.

Mitigation Measures for Interim Phasing: If the project is extended through Phase 2 (terminating at the Marmion/Figueroa station), additional mitigation will be required for the Figueroa Street/Marmion/Pasadena intersection. The southbound intersection approach on Marmion Way should be widened to provide room for a third lane in the southbound direction. If the project is extended through Phase 3 (terminating at the Avenue 57/Figueroa station), all mitigation measures identified for the entire project plus mitigation of the Figueroa Street/Marmion/Pasadena intersection should be implemented. Mitigation measures numbers 1 through 4 under the City of Pasadena extension will be implemented for the extension of Del Mar (Phase 4).

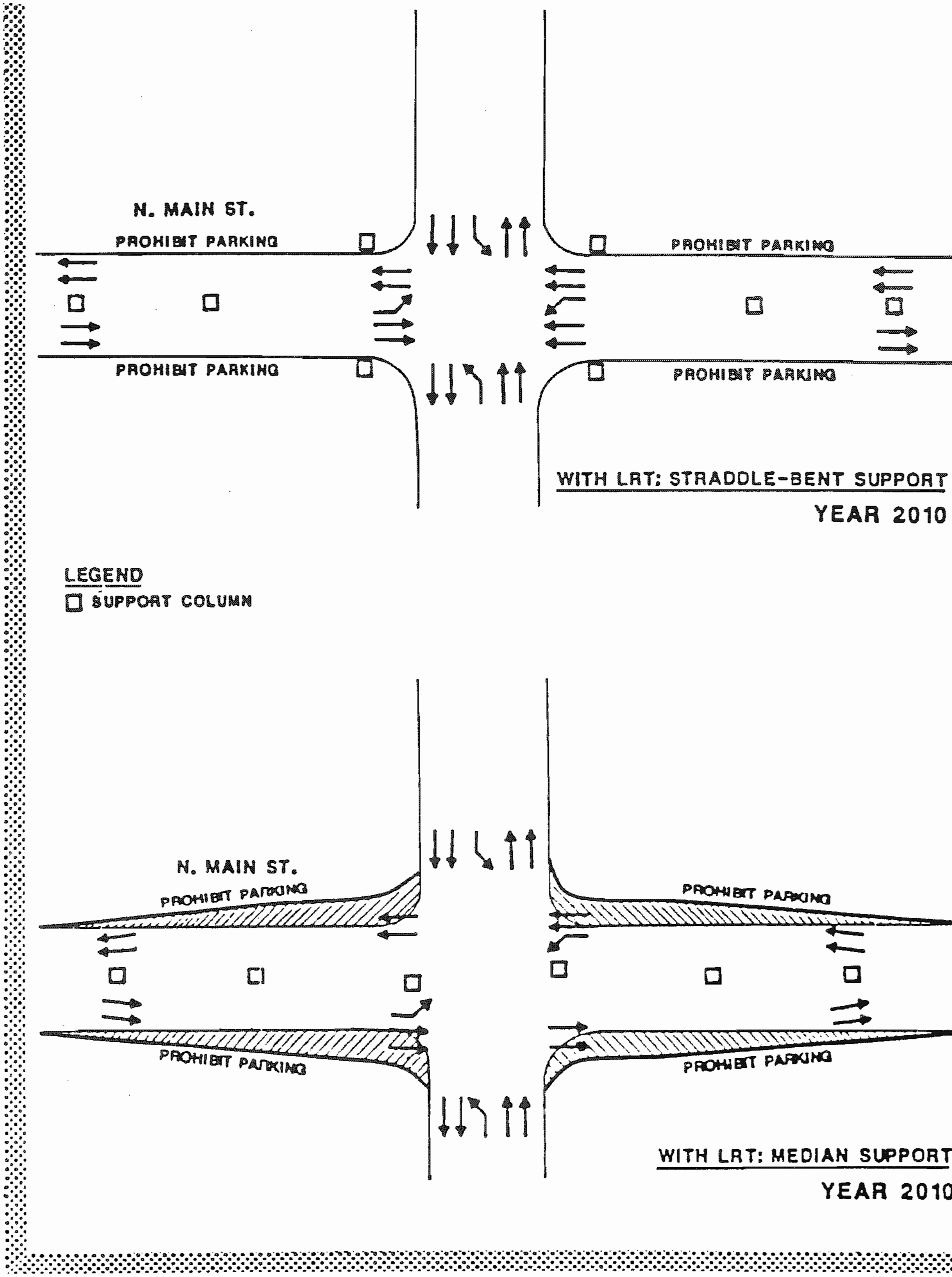
North Main Route Mitigation Measures

The following mitigation measures will be effective in mitigating traffic impacts at selected intersections located along the North Main alignment.

Major Intersections Along North Main Street: The use of straddle bent columns at all major intersections along North Main Street would eliminate LRT impacts due to geometric displacements. In the event that median support columns were used, however, significant traffic impacts would be experienced and mitigation measures would be warranted.

If center support columns were used, the three major intersections of North Main/Alpine/Vignes, North Main/Daly Street and North Main/Griffin Street would all operate at LOS F, as shown in Table 4-12. In this case, the widening of North Main Street appears to be the only feasible solution. To mitigate this, North Main Street should be widened by at least 20 feet within 300 feet of both sides of every major intersection. This would reduce the V/C ratio and bring the LOS to an acceptable level, as shown also in Table 4-12. Exhibit 4-8 depicts the necessary geometric modification to North Main Street at major intersections under the scenarios of using straddle bent columns or median support columns. In order to avoid extensive property acquisition and roadway widening, it is preferable to use straddle bent columns instead of median support columns.

Soto Street/Mission Road/Huntington Drive Interchange: Exhibit 4-9 shows the current geometry of the Soto/Mission/Huntington interchange. It is essentially an unsignalized intersection with the minor movements controlled by a number of "stop" and "yield" signs. The Soto Street bridge spans over this intersection to provide a direct connection from Soto Street to Huntington Drive.



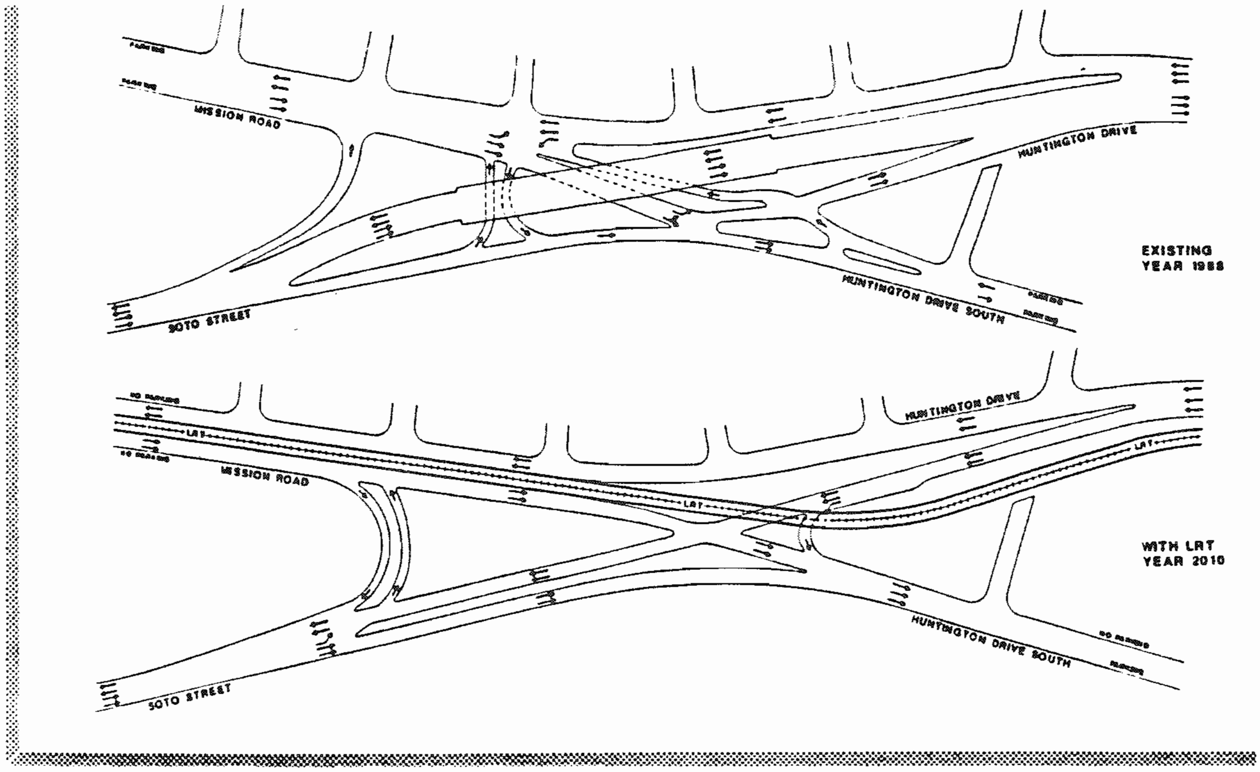
SOURCE: DKS ASSOCIATES

NO SCALE

Mitigation Measures A - North Broadway at Mission Road

Pasadena-Los Angeles Light Rail Transit Project

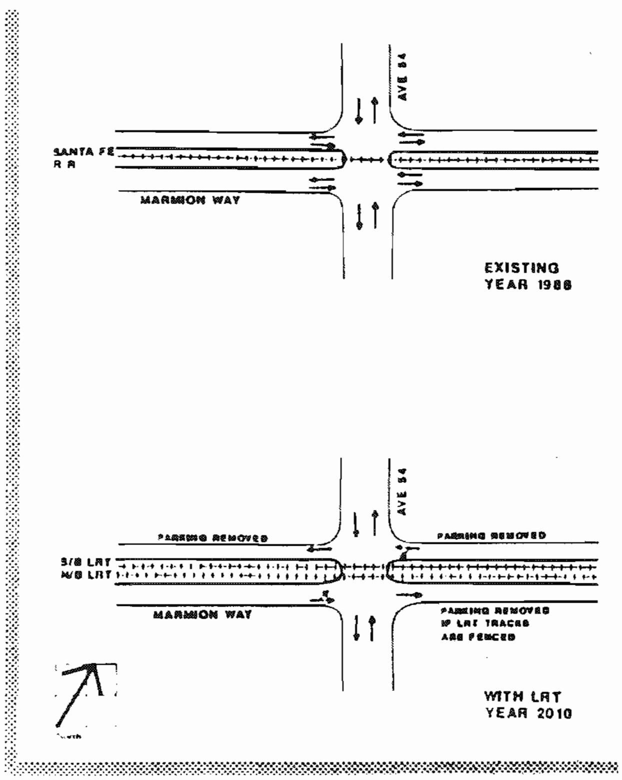
Exhibit 4-8



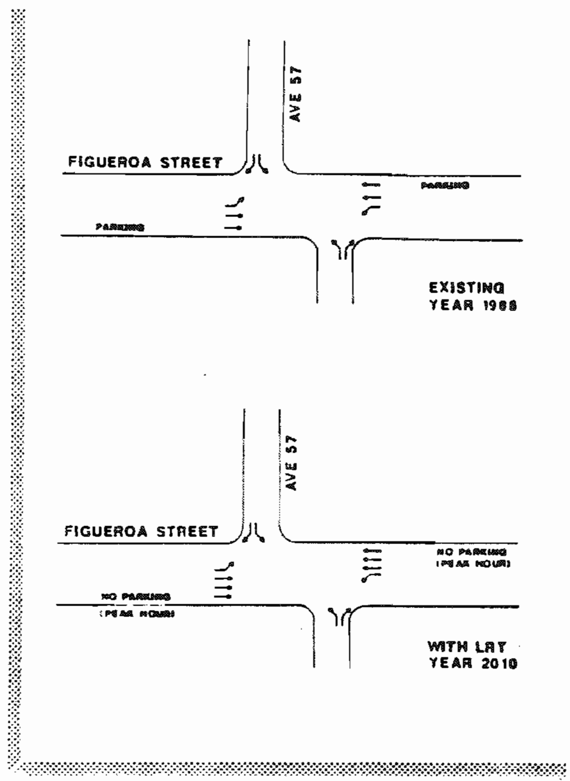
MITIGATION MEASURES
SOTO STREET, MISSION ROAD AND HUNTINGTON DRIVE INTERCHANGE

NORTH MAIN STREET ALIGNMENT

SOURCE: DKS ASSOCIATES



INTERSECTION GEOMETRY
AVENUE 54 AND MARMION WAY



MITIGATION MEASURES
FIGUEROA STREET AT AVENUE 57

HIGHLAND PARK ALIGNMENT

SOURCE: DKS ASSOCIATES

NO SCALE

With LRT, two problems are identified at this interchange. First, with conversion of Huntington Drive and Huntington Drive South into a one-way couplet system, a U-turn loop is required for westbound traffic on Huntington Drive to access Huntington Drive South. The current geometry provides for this movement by a U-turn lane under the Soto Street bridge, accessible by making a left turn from Mission Road. This left turn is potentially dangerous in the future with the westbound LRT coming from behind, unless the intersection is signalized with protected left-turn phasing. Second, the current clearance under the bridge is only 14 feet. For at-grade light rail to fit under the bridge, the clearance has to be increased to about 19 feet. This can be achieved by lowering the LRT tracks. However, the left-turn movement discussed previously would have to be cut off due to the grade difference. The U-turn loop becomes inaccessible.

To overcome these problems, demolishing the Soto Street bridge is recommended, with a complete reconfiguration of the interchange. With Huntington Drive being one-way westbound, a four-lane, two-way bridge is not required. As shown in Exhibit 4-9, demolishing the bridge provides an opportunity to reconfigure this into a simpler four-leg interchange with a reduced number of conflicts among the traffic streams. The central intersection can be signalized with LRT having some priority over vehicular traffic.

Soto-Eastern/Huntington Drive: Huntington Drive should be converted to a one-way westbound street and Huntington Drive South a one-way eastbound street. This would improve both LRT and traffic operations. Huntington Drive, east of Van Howl needs to be widened to maintain the existing number of traffic lanes. This can be accomplished by relocating the north curb cutting into a wide island that is within the street right-of-way.

Mitigation of Parking Overflow: Near station areas, parking overflow may become a problem. The extent of this problem cannot be identified until the LRT system is in operation. It is recommended that once parking overflow is identified as a problem, the community can petition the local agency to implement a special parking permit program or, in commercial areas, enforce time limits. Mitigations for sensitive land uses are discussed under specific impact categories, such as noise, aesthetics, etc.

Unavoidable Significant Adverse Effects

As discussed in the previous chapter, suitable mitigation measures are identified for all locations where the light rail project causes a significant impact. Besides the traffic impact at intersections, another significant traffic impact involves the loss of on-street parking. In this respect, the North Main Street alignment has a higher impact as all parking spaces along North Main Street, most parking spaces along Mission Road, and parking on one side of Huntington Drive South would have to be removed. In comparison, the Highland Park route results in very little parking loss as it runs mostly in existing railroad right-of-way.

4.3 GEOLOGY AND EARTH

A. SEISMIC

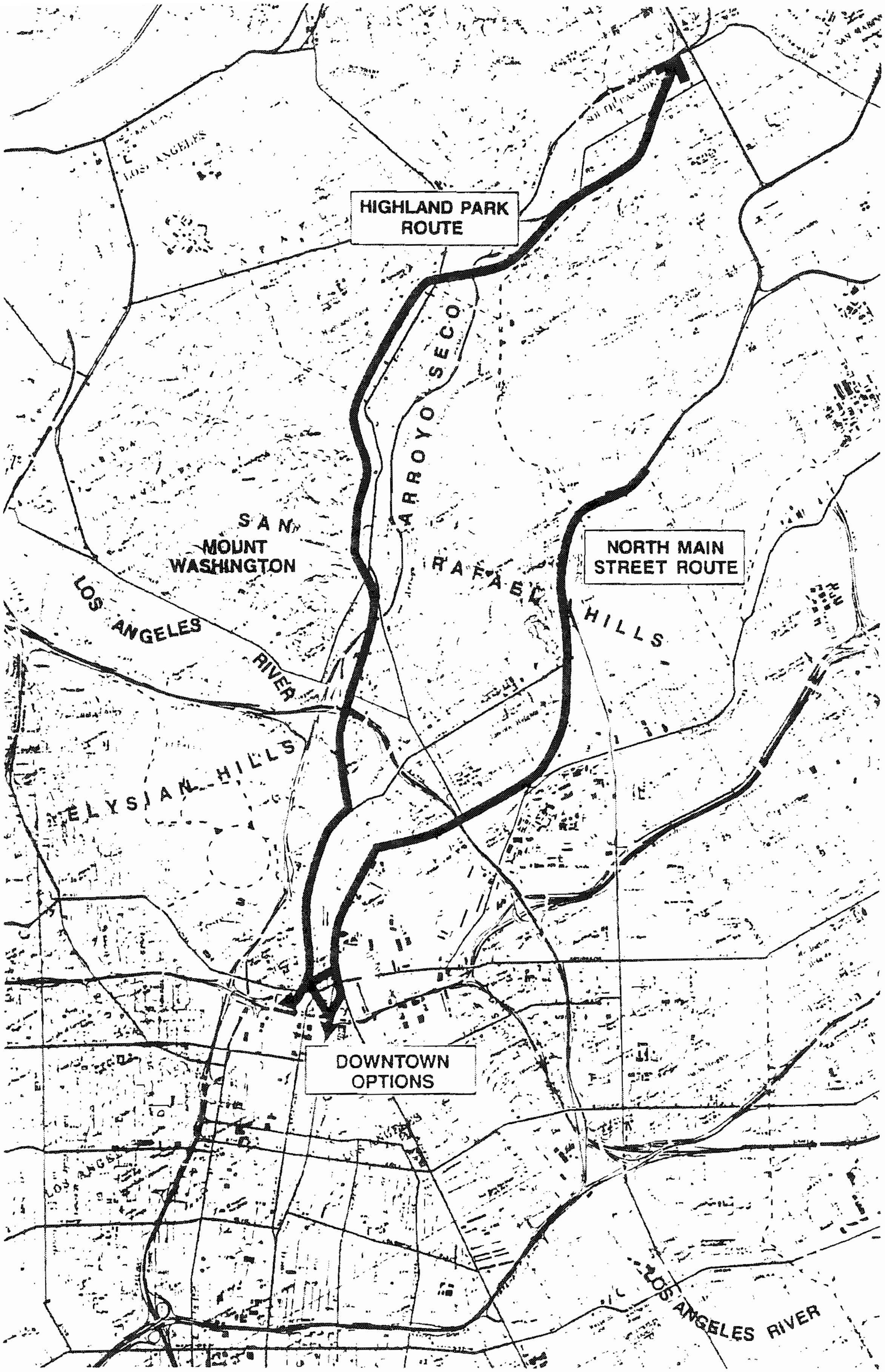
Environmental Setting

Geology and Soils

The terrain within the project area exhibits considerable variation, ranging from relatively level topography in the vicinity of downtown Los Angeles to sloping dissected hills in the northeast. Major physiographic features within and immediately adjacent to the project area include the Elysian Hills and the Repetto Hills which are separated from each other by the Los Angeles River flood plain. The Repetto Hills are further bisected by the Arroyo Seco, which empties into the Los Angeles River near Elysian Park. Local topography is shown in Exhibit 4-10.

The topography within the planning area is gently sloping toward the Los Angeles River and forms gentle hills to the north, southwest of the Arroyo Trabuco junction with the Los Angeles River where the LRT alignments begin in downtown Los Angeles. In the vicinity of the river, topography is nearly flat except near the Elysian Hills.

Through the San Rafael Hills, the Arroyo Seco has formed a narrow valley consisting of gently sloping topography surrounded by moderate hills. The Highland Park alignment follows the



Major Topographic Features
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-10

Arroyo Seco closely as it provides one of the few fairly level passages through the San Rafael Hills.

Elevations in the project area range from 300 feet above mean sea level (MSL) near the Los Angeles River to 640 feet above MSL near the northwestern edge of the project area. Mount Washington, the highest point in the area at 870 feet above MSL, where the Highland Park alignment turns eastward in the median of the freeway.

Stream beds and valleys within the project area are underlaid by loosely-to-moderately compacted sand and gravel. Densely compacted gravel and sand are also found in the basins. Consolidated clays with gravels are exposed along the Raymond Hill and Sierra Madre Fault Zones (Bryant, 1978).

The North Main alignment follows Huntington Drive which bisects the San Rafael Hills. Sedimentary rocks form the San Rafael Hills, which are located nearby, as well as the stream valleys (Bryant, 1978). This sedimentary rock unit, referred as the Topanga Formation, underlies much of the proposed North Main alignment as it passes through the San Rafael Hills. The Topanga Formation consists of soft brown shales interbedded with hard sandstone layers 2 to 36 inches thick. (Stone, 1988).

The Highland Park alignment is located in the Arroyo Seco which also bisects the San Rafael Hills in the Arroyo Seco. The Ramona Placentia association soil type is found in this area occurring on 2 to 5 percent slopes and gently sloping terraces and is well drained and slightly permeable. South of the Arroyo Seco, Allamont Diablo soil association covers the hills. The soil type occurs on 9 to 30 percent slopes and is found on strongly sloping and steep hilly areas.

Seismic Characteristics

The project area is located in a seismically active region which contains a number of active faults including the San Andreas, Newport-Inglewood, San Fernando, Sierra Madre, Whittier, and Raymond Hill faults. Several of these faults are considered capable of affecting the project area. Other potentially active faults in the vicinity of the site include the Norwalk, Malibu Coast-Santa Monica-Hollywood, and Verdugo faults.

Table 4-13 identifies the historic earthquakes that have affected the region. Earthquakes prior to the 1933 Long Beach earthquake have been assigned approximate Richter magnitudes based upon historical accounts. The project area's distance to the epicenters of the major historic earthquakes is also shown in Table 4-13. The locations of these historic earthquakes are shown in Exhibit 4-11.

TABLE 4-13

HISTORIC EARTHQUAKE FAULTS THAT HAVE AFFECTED THE PROJECT AREA

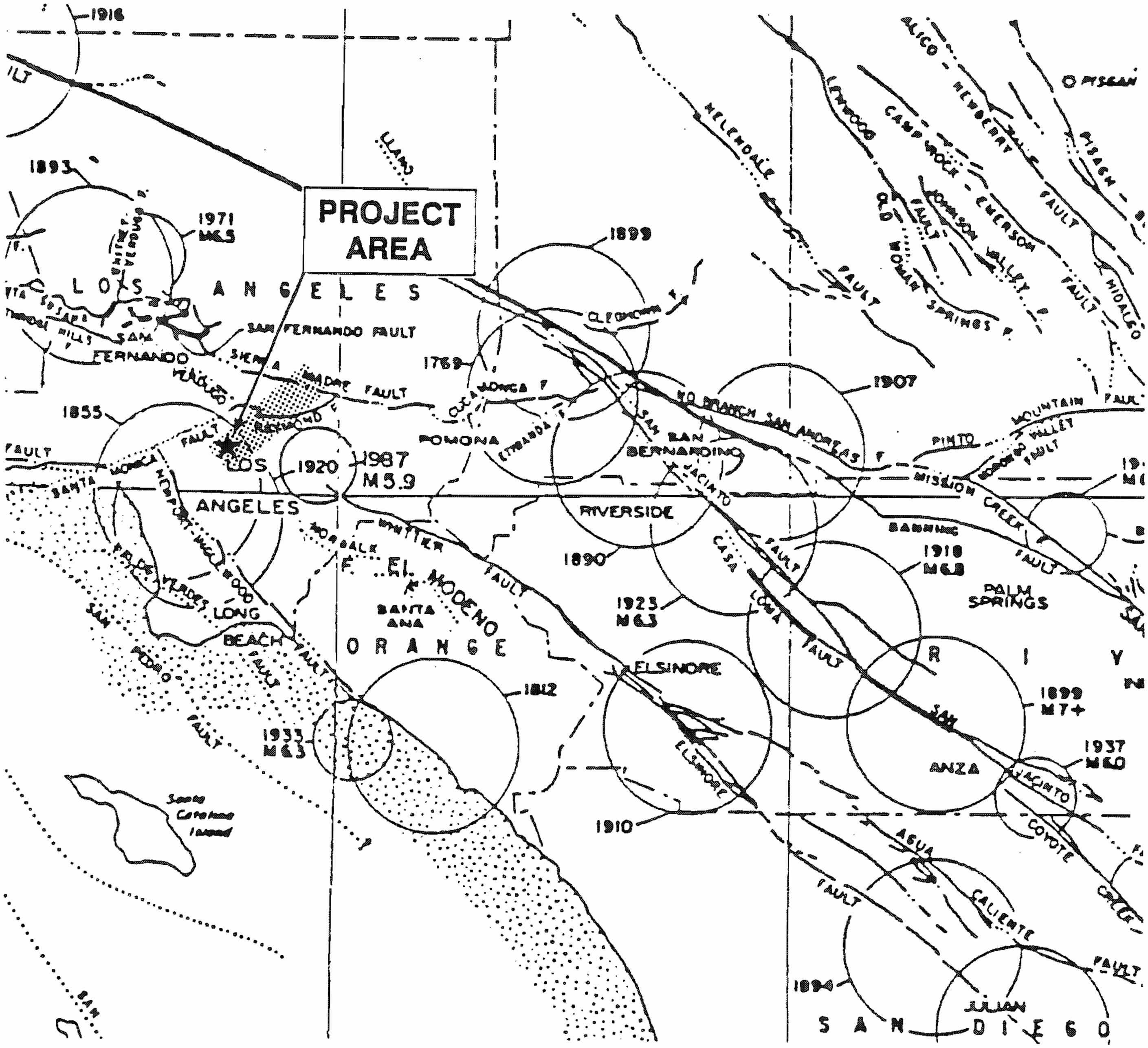
Date	Fault or Location	Richter Magnitude	Distance (Miles)[a]
1857	San Andreas	8.0[b]	32
1920	Newport-Inglewood	5.5[b]	12
1925	Santa Barbara	6.3	80
1933	Newport-Inglewood (Long Beach)	6.3	25
1941	Torrance-Gardena	6.5	20
1941	Santa Barbara	6.0	80
1971	San Fernando	6.4	9
1987	Unnamed fault near Montebello	5.9	14

a Approximate distance from study area.
b Estimated.

Note: Richter magnitudes are estimated prior to 1933 and are based on historical accounts.

Source: Albee, et. al., 1969.

The Raymond Hill Fault is a potentially active fault zone located within the project area. The fault trace crosses the Highland Park alignment just north of I-110 before it terminates into Arroyo Parkway. The Raymond Hill fault is a northeast/southeast trending fault extending from the foothills of the San Gabriel Mountains in the City of Sierra Madre to the Adams Hill area of Glendale. Age dating of fault gouge material (earth displaced by an earthquake)



MAJOR EARTHQUAKES AND RECENTLY ACTIVE FAULTS IN THE SOUTHERN CALIFORNIA REGION

EXPLANATION*

ACTIVE FAULTS

Total length of fault zone that breaks Holocene deposits or that has had seismic activity

Fault segment with surface rupture during an historic earthquake, or with aseismic fault creep.

o Holocene volcanic activity (Amboy, Pisgah, Cerro Prieto and Salton Buttes)

EARTHQUAKE LOCATIONS

1899 M 7+

Approximate epicentral area of earthquakes that occurred 1769-1933. Magnitudes not recorded by instruments prior to 1906 were estimated from damage reports assigned an intensity VII (Modified Mercalli scale) or greater; this is roughly equivalent to Richter M 6.0. 31 moderate** earthquakes, 7 major and one great earthquake (1857) were reported in the 164-year period 1769-1933.

1952 M 7.7

Earthquake epicenters since 1933, plotted from improved instruments. 29 moderate** and three major earthquakes were recorded in the 40-year period 1933-1973.

NO SCALE

North

Michael Brandman Associates

Major Earthquake and Recently Active Faults in the Southern California Region

Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-11

suggests the most recent movement occurred less than 3,000 years ago. Actual vertical movement or displacement of this reverse fault has been in excess of 222 feet (Bryant, 1978). The maximum credible earthquake potential is predicted to have a Richter magnitude of 6.8. The Raymond Hill Fault has been classified as potentially active by the California Division of Mines and Geology and the area along its entire 16-mile length has been designated as an Alquist-Priolo Special Studies Zone.

A second fault trace, the San Rafael fault, crosses the Highland Park alignment in the vicinity of Fair Oaks Avenue. The San Rafael fault is a northwest/southeast trending fault approximately 6 miles in length. According to physiographic features along the fault trace, the most recent surface faulting possibly occurred during the late Quaternary (during the last 750,000 years). The approximate location of the San Rafael fault trace is indicated in Exhibit 4-11.

The Sierra Madre Fault zone is located at the base of the San Gabriel Mountains approximately 3 miles north of the Highland Park alignment at is closest point. The Sierra Madre Fault system consists of a series of east/west-trending, north-dipping, thrust faults. The San Fernando segment of the Sierra Madre Fault zone produced the magnitude 6.4 San Fernando earthquake in 1971. Seismologists believe that the recurrence interval at any one point on this fault ranges between 200 and 5,000 years.

The Whittier Fault is another active fault located approximately 14 miles east of the project area. According to seismologists, the Whittier Fault can produce a maximum credible earthquake of Richter magnitude 7.5. It is estimated that the maximum probable earthquake along the Whittier Fault would be on the order of Richter magnitude 6.5.

The Norwalk Fault, located 14 miles southeast of the project area, is a north-dipping reverse fault thought by Richter to be the fault which produced the 1929 Whittier earthquake. Richter emphasized that the Norwalk Fault is capable of producing an earthquake of the magnitude of the Long Beach earthquake (6.25 on the Richter scale).

The Newport-Inglewood Fault system is located 10 miles southwest of the project area and consists of a series of northwest-trending, strike-slip faults. The 1933 Long Beach earthquake with a magnitude 6.3 and 1920 Inglewood earthquake with an estimated magnitude 5.0 to 5.5 occurred on faults located within the Newport-Inglewood Fault system. The Newport-Inglewood Fault is expected to be capable of a maximum credible earthquake of Richter magnitude 7.0. Based upon the historic record, it is estimated that the maximum probable earthquake along the Newport-Inglewood Fault would be on the order of Richter magnitude 6.3 to 6.5.

The San Andreas Fault is a major northwest-trending, right-lateral, strike-slip fault which, at its closest point, is located approximately 32 miles northeast of the project area. The San Andreas is classified as an active fault with the most recent earthquake on the central section occurring in 1857; it had a magnitude that has been estimated to be greater than 8.0 on the Richter scale. The recurrence interval on the central portion of the San Andreas is estimated to be between 126 to 300 years. The San Andreas is assumed to be capable of producing a maximum credible earthquake of Richter magnitude 8.25. Based upon the historic record, it is also estimated that the maximum probable earthquake along the San Andreas Fault would have a Richter magnitude on the order of 8.25.

The most recent significant seismic activity in the Southern California region occurred along a previously unknown fault near Montebello. The earthquake, which occurred October 1, 1987, had an estimated Richter magnitude of 5.9. The epicenter of this earthquake was located in the vicinity of Whittier Narrows between Rosemead and Montebello. Scientists have recently reported a similar deep fault underlying the City of Los Angeles in the vicinity of the downtown. This fault is at a depth of approximately 5 miles and may be capable of producing an earthquake with a Richter magnitude of 7.0 or more (Harksson et al, 1988).

The probability of an earthquake occurring on the potentially active Raymond Hills, Norwalk, Verdugo, or Malibu Coast-Santa Monica-Hollywood Faults during the design life of the structures is considered remote. The faults considered to be the most likely sources of strong ground shaking at the site during the design life of the structures are the Whittier, Newport-Inglewood, and San Andreas faults.

Table 4-14 indicates the maximum credible and probable magnitudes that may be expected from the faults located in the region.

TABLE 4-14

MAXIMUM CREDIBLE/PROBABLE EARTHQUAKE

Fault	Distance From Project Area	Maximum Credible Magnitude[a]	Maximum Probable Magnitude[b]
Raymond Hill	in project area[c]	7.5	6.5
Whittier	14 miles	7.5	6.5
Sierra Madre	10 miles	6.5	6.5
Verdugo	5 miles	6.5	6.5
Malibu Coast-Santa Monica-Hollywood	3 miles	7.5	6.5
Newport-Inglewood	10 miles	7.0	6.5
San Andreas	32 miles	8.25	8.25
Norwalk	14 miles	6.5	7.0

a Theoretical maximum based upon empirical data. Very low probability of occurrence.
b Estimated maximum earthquake based upon historic record and geologic evidence. Low to moderate probability of occurrence.
c The Raymond Hill fault trace bisects the Highland Park alignment as it enters Pasadena.

Sources: Greensfelder, 1973.

Environmental Impacts

Geology and Earth

Alluvium and soft shale should not pose a constraint in those areas where tunneling is proposed. Harder sandstone layers are also generally not thick enough to inhibit tunneling. Alluvium should be easily removable, but may not be cohesive during tunneling excavation. However, large cobles were encountered in the course of the construction and tunneling activities for Metro Rail in the downtown area in the vicinity of Union Station. The potential for tunnel collapse due to weak bedrock and regolith can be prevented with mitigation measures designed to support the tunnel structure during construction.

Stability of surface materials is dependent on topography, geology, and seismicity. For example, areas of unconsolidated alluvium are generally stable, but soils of this type may not support building structures. Alluvium may settle and compact over a period of time causing differential settlement. In addition, alluvium is generally more easily eroded than bedrock and may be quickly removed in stream valleys.

Seismic Impacts

In general, the level of risk from seismic hazards does not appear to be any greater along the alternative alignments than that for other areas within the Pasadena-Los Angeles Corridor. Dipping bedrock units may fail following an earthquake or after becoming saturated with water due to heavy rains. Angles of 24 to 37 degrees may be significant enough to cause a major slope failure along bedding planes. Slope failure and the resulting landslides in the San Rafael Hills would negatively impact any surface structures including LRT facilities located along the base of these hills. Localized slope failure could occur in the event of a major earthquake resulting in debris blocking the LRT right-of-way along certain segments of the Highland Park alignment.

Seismic activity may affect the construction or operation of the proposed LRT facility. The numerous active earthquake faults in the region may produce significant ground shaking. Fault rupture and displacement may also occur along the Raymond Hill Fault trace. The Raymond Hill fault is located approximately 200 feet north of the Highland park alignment as it crosses over I-110 just before the freeway transitions into Arroyo Parkway. It is likely an LRT bridge may be damaged at this point due to surface rupture or ground shaking in the event of a major earthquake along this fault. Liquefaction may also occur in areas where the water table is high and soil conditions are such that liquefaction is possible.

Ground shaking could disturb above and below ground facilities. Shaking may also induce slope failure, landslides, and other mass movements which may adversely impact the proposed project.

Mitigation Measures

The following mitigation measures will be effective in reducing the potential for adverse impacts in the event of a major earthquake.

1. Stability of subsurface materials where the subway is to be located will be evaluated in subsequent geotechnical analysis.

2. Sloping topography may produce rapid runoff and experience erosion. Disturbed areas should be revegetated soon after construction to reduce the potential for erosion in areas of weak soil and steep topography.

3. All structures above and underground will be constructed in anticipation of a major earthquake. Structures will be constructed to withstand the maximum probable earthquake predicted for the area.

4. The structures and facilities must conform to the City of Los Angeies Seismic Safety Plan and emergency evacuation plans must be prepared to outline procedures to follow in the event of a major earthquake.

5. Surface rupture may occur on or nearby the Raymond Hill Fault, or places not previously affected by recent faulting. In the event of surface rupture, all rail activities should be halted. In the event of a major earthquake, rail activity should be stopped until it is ascertained that no damage to rail has been incurred.

6. Site specific engineering studies will be conducted at all sites where subsequent geotechnical studies indicate there is an increased potential for seismic risk.

Unavoidable Significant Adverse Effects

The potential for a major earthquake within the operational life of the proposed project is high. However, the seismic risk for the proposed project and the alignments being considered is no greater than that for other areas within the Pasadena-Los Angeles Corridor or the Los Angeles region as a whole.

B. GRADING

This section of the EIR addresses the project's potential impact on the earth due to cut and cover and grading activities during the construction phases of the project.

Environmental Setting

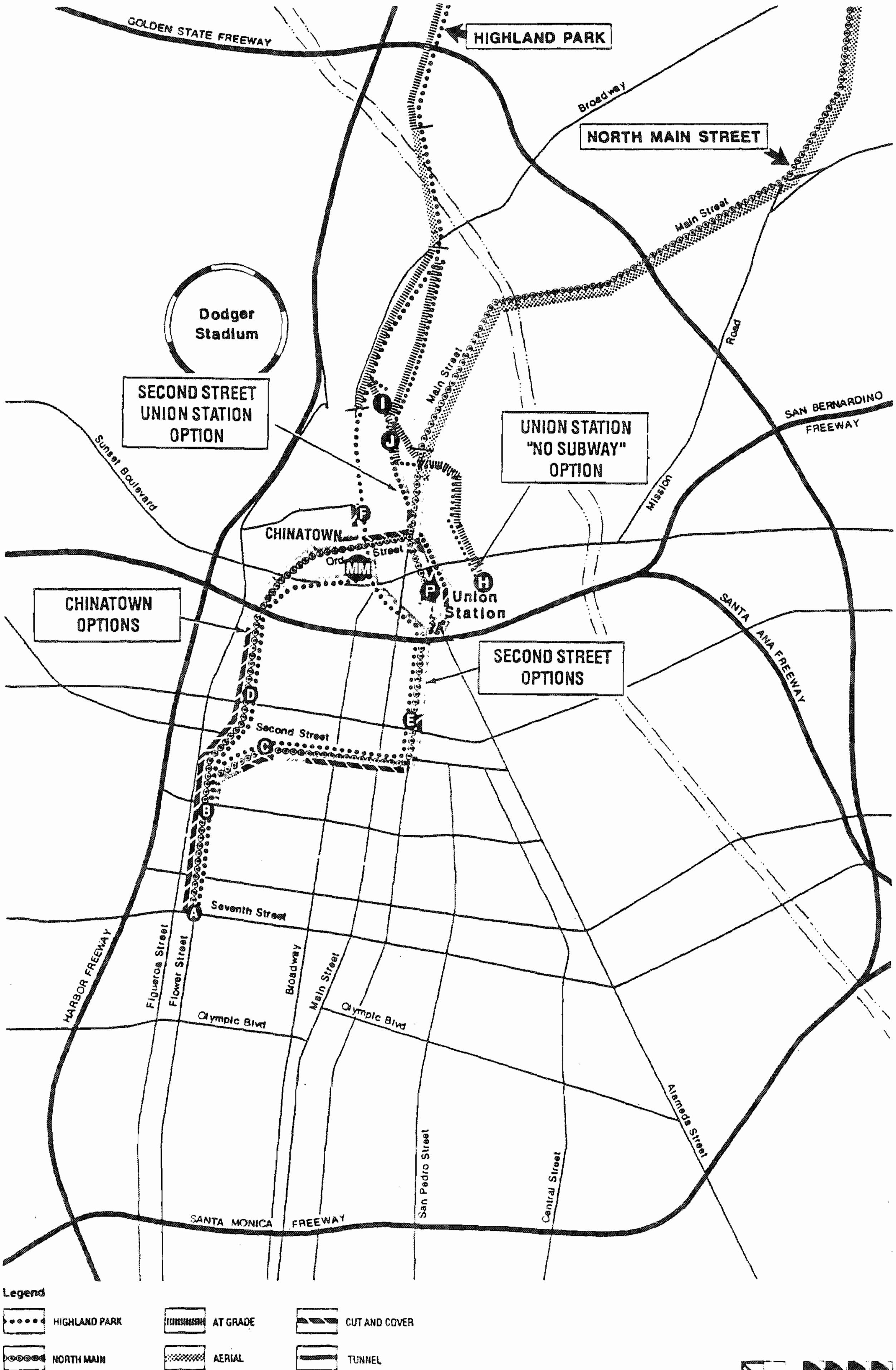
Subsurface soil material in the vicinity of the project alignments consists mainly of alluvial material composed of silt, sand, gravel, and boulders; younger alluvium composed of similar loose deposits of sand and gravel; old alluvium containing fine grained and cohesive material composed of clay, silt, sand, and gravel; and Puente Formation materials composed of claystone, silt stone, and sandstone (RTD, 1987). Soils of this type consist of inert materials and are considered a nonhazardous group 3 soil. That is, these soils are suitable for use as fill materials in parks and recreation areas, land reclamation, and highway construction.

Soils contaminated with hazardous substances could be encountered during the course of construction. Contaminated soils were encountered in the vicinity of Union Station in the course of Metro Rail construction. Section 4.8 of this EIR examines the potential impacts related to hazardous substances and identifies appropriate mitigation measures should these materials be encountered.

Environmental Impacts

The construction of the proposed project will involve the construction of tunnelled subway, cut and cover subway, and grading. Exhibit 4-12 indicates those locations along the alignments under consideration where these activities will occur.

Bechtel Civil, Inc. prepared a preliminary estimate of the amount of excess earth which would be excavated for each project alternative. The quantities of earth indicated in Table 4-15 would need to be removed from the project site to other locations. As indicated in this table, those alternatives that include the Second Street option represent the greatest impacts in terms of excavation.



Grading and Excavation
Pasadena-Los Angeles Light Transit Project

Exhibit 4-12

TABLE 4-15

ESTIMATED EARTH REMOVAL
(cubic yards)

Project Alternative	Cut and Cover Subway Construction	Tunnel Construction	Total
Downtown Connections to Highland Park Alternative			
Chinatown Option	135,000	170,000	305,000
Second Street Option	70,000	300,000	370,000
Second Street-Union Station Option	69,600	298,000	367,600
Union Station "No Subway" Option	None	None	None
Downtown Connections to North Main Alternative			
Chinatown	165,000	210,000	235,000
Second Street	82,000	210,000	292,000

Source: Bechtel Civil, Inc., 1988, 1989.

Inert soils removed from the project site may be used as fill material at other construction sites (see discussion above) or disposed of at Class III landfills. Class III landfills handle Group 3 wastes or those materials that consist entirely of nonwater soluble, nondecomposable inert solids. Examples of Group 3 wastes include natural alluvial material, asphalt, paving fragments, inert plastics, demolition materials containing small amounts of wood and metal, tires, inert rubber, glass, and miscellaneous domestic garbage. Table 4-16 indicates the Class III landfills in Los Angeles County which are presently receiving Group 3 wastes. The table also indicates the quantity of waste each landfill receives on an annual basis.

TABLE 4-16

CLASS III LANDFILLS IN LOS ANGELES COUNTY

Landfill	Waste Quantity (tons per year)
Nu-Way Landfill	1,750,000
Chandler Landfill	200,000
South Gate Landfill	6,000
Stone Canyon Reservoir Landfill	21,000
Livingston Pit	200,000
Manning Brothers Brick and Sand Company	30,000
Consolidated Rock Products	40,000
Armco Steel	10,000
Sheldon Arleta	14,000
Hewitt Pit	150,000
Other	1,000
Total	2,442,000

Source: Los Angeles County Solid Waste Management Plan. Triennial Review, Vol. 1, 1985.

Mitigation Measures

The following measures will be effective in reducing any adverse impacts due to grading and excavation activities:

1. Applicable provisions of the Los Angeles Municipal Code and recommendations of the City Engineer/Department of Building and Public Safety will be addressed.
2. Recommendations of a qualified geotechnical engineer concerning appropriate procedures to follow during grading and excavation must be adhered to.
3. Haul routes must be approved by the City of Los Angeles.

Unavoidable Significant Adverse Effects

An undetermined quality and quantity of earthen materials may require disposal at Class I or III landfills in the county depending on whether the soils contain hazardous substances. Any incremental decrease in landfill capacity is considered an adverse impact given the limited capacity of existing landfills and the scarcity of sites available for future landfills. However, the great majority of earth removed during construction phases is expected to be inert and may be used at other construction sites in the region.

4.4 AIR QUALITY

This section evaluates the proposed project's impacts on both local air quality and regional air quality. The project is located in the South Coast Air Basin (SCAB) of California, a 6,600 square mile area encompassing Orange County and the nondesert portions of Los Angeles, Riverside, and San Bernardino counties. The South Coast Air Quality Management District (SCAQMD) samples ambient air at 29 monitoring stations in the basin. The Los Angeles and Pasadena stations monitor air quality in the vicinity of the alignments presently under consideration.

Environmental Setting

Contaminant levels of air samples are compared to federal and state standards to determine air quality. These standards are set by the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (ARB) at levels to protect public health and welfare with an adequate margin of safety. There are both federal and state standards for ozone, carbon monoxide, nitrogen dioxide, PM10 (suspended particulate matter 10 microns or less in diameter), sulfur dioxide, and lead. The SCAQMD also measures for compliance with two other state standards: sulfate and visibility. Table 4-17 indicates the maximum readings for the past 6 years for the Los Angeles and Pasadena monitoring stations. Table 4-18 shows the number of days the standards for these pollutants were exceeded over the past 5 years.

TABLE 4-17

MAXIMUM READING FOR 1983 - 1987
LOS ANGELES AND PASADENA[a] STATIONS

Pollutant/Measurement Unit	Maximum Reading for Each Year					
	1983	1984	1985	1986	1987	1988
Ozone	0.26	0.29	0.30	0.22	0.22	0.21
Maximum 1 hr (-10 ppm)	(0.34)	(0.30)	(0.37)	(0.26)	(0.28)	(0.29)
Carbon Monoxide	17.0	15.0	14.0	13.0	15.0	16.0
Maximum 1 hr (20 ppm)	(19.0)	(13.0)	(17.0)	(14.0)	(15.0)	(17.0)
Nitrogen Dioxide	0.33	0.23	0.27	0.33	0.42	16.0
Maximum 1 hr (0.25 ppm)	(0.35)	(0.21)	(0.27)	(0.24)	(0.21)	(0.27)
Sulfur Dioxide	0.07	0.07	0.04	0.03	0.03	0.04
Maximum 1 hr (0.05 ppm)	(0.35)	(0.21)	(0.27)	(0.24)	(0.21)	(0.27)
Suspended Particulates PM10[a]	(*)	(*)	146	178	(*)	130
Maximum 24 hr (30 ug/m^3)	(*)	(*)	(*)	(*)	(*)	(*)

a Data for the Pasadena Station is indicated in parenthesis.

* Not monitored.
PPM = parts by volume per million parts of air.
Ug/m^3 = micrograms per cubic meter of air.

Source: South Coast Air Quality Management District. California Air Quality Data. 1983 through 1987.

TABLE 4-18

ANNUAL SUMMARY OF AIR QUALITY STANDARDS VIOLATIONS 1983-1987 LOS ANGELES-PASADENA STATIONS

	Number of Days Standards Exceeded Pollutant Standard[a]					
	1983	1984	1985	1986	1987	1988
Ozone						
1 hr $\geq$ 0.10 ppm (state)	114 (113)	114 (169)	107 (113)	99 (166)	91 (150)	68 (175)
1 hr $\geq$ 0.12 ppm (federal)	69 (95)	53 (125)	56 (116)	48 (110)	36 (95)	24 (119)
Carbon Monoxide						
1 hr $\geq$ 20 ppm (state)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1 hr $\geq$ 35 ppm (state and federal)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
8 hr $\geq$ 9.5 ppm (federal)	8 (8)	0 (0)	1 (3)	2 (1)	1 (2)	3 (3)
8 hr $\geq$ 9.1 ppm (state)	10 (8)	2 (0)	2 (3)	2 (1)	1 (2)	5 (3)
Nitrogen Dioxide						
1 hr $\geq$ 0.25 ppm (state-# of days)	5 (5)	0 (0)	3 (1)	7 (0)	4 (0)	6 (2)
Annual Arithmetic Mean > 0.0534 ppm (federal)	-- (0)	-- (--)	12.6 (0)	14.6 (0)	0.56 (0)	148 (0)
Sulfur Dioxide						
24 hr $\geq$ 0.05 ppm (state)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
24 hr $\geq$ 0.14 ppm (federal	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Suspended Particulates PM10[a]						
24 hr $\geq$ 50 ug/m^3 (state)	-- (--)	-- (--)	46/39 (--)	58/38 (--)	58/36 (-)	58/33 (--)
24 hr $\geq$ 150 ug/m^3 (federal)	-- (--)	-- (--)	-- (--)	-- (--)	58/1 (--)	58/0 (--)

a Data for the Pasadena station is indicated in parenthesis.
b Standards indicated are for 1988. Standards for particulates have changed between 1983-1988.

-- indicates that pollutants are not monitored at this location.

Source: South Coast Air Quality Management District. California Air Quality Data. 1983 through 1987.

Ozone levels exceed federal and state standards everywhere in the basin. In 1987, the peak ozone reading was three times the federal standard. The Los Angeles urban area exceeds this standard more frequently than any other area in the United States, and also records the highest peak readings.

Federal and state standards for carbon monoxide are exceeded in Los Angeles and Orange counties, but not in less densely populated Riverside and San Bernardino counties. The federal standard for nitrogen dioxide is exceeded in Los Angeles County, the only area in the nation which still exceeds this standard. In addition, the state standard for nitrogen dioxide is exceeded in both Los Angeles and Orange counties; the number of readings over the standard fluctuates from year to year, depending on weather patterns. PM10 levels regularly exceed the federal standard in Los Angeles, Riverside, and San Bernardino counties; in 1987, the standard was also exceeded in Orange County. Sulfur dioxide and lead levels in all areas of the basin are below federal and state standard limits.

Table 4-19 describes the major pollutants currently being monitored, the major sources of the pollutants and their effects.

TABLE 4-19

EFFECTS OF MAJOR POLLUTANTS

Pollutant	Description	Major Sources	Effects
Carbon Monoxide (CO)	Colorless, odorless gas produced by incomplete combustion of carbon based fuels.	Automobiles	CO interferes with transfer of oxygen to the blood, thus depriving sensitive tissues of oxygen.
Oxides of Nitrogen (NOx)	Nitric oxide (NO) and nitrogen dioxide (NO_2) are important contributers to air pollutants. NO is a colorless, odorless gas formed from atmospheric nitrogen and oxygen when combustion occurs at high pressure or temperature. NO_2 is a reddish-brown irritating gas formed by the combination of nitric oxide and oxygen.	Vehicle engines, power plants, refineries, and industrial plants	NOx is an important component in photochemical reactions. No_2 at high levels can cause breathing difficulty in healthy, as well as unhealthy, persons. At low to moderate levels No_2 can impair sensory and pulmonary responses.

TABLE 4-19 (continued)

Pollutant	Description	Major Sources	Effects
Sulfur Oxide (SO_2)	A colorless, pungent, irritating gas which is a by-product of the combustion of fossil fuels containing sulfur SO_2 may be changed to sulfur trioxide and sulfuric acid mist under humid conditions.	Fuel combustion is the major source, while chemical plants, sulfur recovery plants and metal processing are minor contributors. Ambient levels of SO_2 reflect the amount of the natural gas used in power plants and boilers.	SO_2 irritates the upper respiratory tract and can cause injury to lung tissues.
Photochemical Oxidants (Ozone)	Ozone is the primary pollutant (more than 90%) in this category, which also includes a group of chemicals called organic peroxynitrates. Ozone is a pungent, colorless toxic gas produced by the photochemical process. Federal and state standards are based on ozone only.	Photochemical smog is caused by complex atmospheric reactions involving oxides of nitrogen and reactive organic gases and the ultraviolet energy from sunlight. Motor vehicles paints and solvents, gasoline storage, disposal, and combustion are the major sources of ozone.	Photochemical oxidants can damage vegetation and crack untreated rubber. In high concentrations, they may also cause respiratory irritation and possible changes in lung functions.
Suspended Particulates	Atmospheric particulates consist of finely divided solids or liquids such as soot, dust, aerosols, fumes, and mists. Particulate matter under 10 microns (called PM^{10}) can be inhaled by persons.	Dust and fume-producing industrial and agricultural operations, combustion, vehicles on roadways, and atmospheric photochemical reactions are principal sources.	Very small particles of certain substances may produce injury by themselves or may act in conjunction with gases to irritate the respiratory system.

TABLE 4-19 (continued)

Pollutant	Description	Major Sources	Effects
Hydrocarbons	The numerous compounds consisting of hydrogen and carbon in various combinations are known as hydrocarbons. Reactive hydrocarbons are the group of hydrocarbons which react with nitrogen dioxide in the atmosphere to form ozone.	Fossil fuels are major sources of hydrocarbons in the basin. Vehicle exhaust and evaporative emissions, gasoline, distribution, evaporation of organic solvents and paints are contributors.	Hydrocarbons damage plants by inhibiting growth and causing flowers and leaves to fall. Certain members of this contaminant group are important components in the reactions which produce photochemical oxidants.

Source: SCAQMD, 1987.
Michael Brandman Associates, Inc.

Climate

Bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east, the South Coast Basin is an area of high air pollution potential resulting from both physiographic and climatological influences.

The strength and location of a semipermanent, subtropical high pressure cell over the Pacific Ocean primarily controls the climate of the basin. Climate is also affected by the moderating effects of the nearby oceanic heat reservoir. Warm summers, mild winters, infrequent rainfall, moderate daytime onshore breezes, and moderate humidities characterize local climatic conditions.

Temperatures range from a monthly average minimum of 57.5°F in January to an average monthly maximum of 79.2°F in July. The mean annual temperature is 67°F, with relatively small daily and seasonal variations above or below the mean. Because of the moderating marine influence that decreases with distance from the ocean, monthly and annual spreads between temperatures are greatest inland and smallest at the coast. Temperature has an important influence on basin wind flow, dispersion along mountain ridges, vertical mixing, and photochemistry.

Precipitation usually occurs between November and March, with a mean annual precipitation of 8.92 inches. Annual rainfall is lowest in the coastal plain and inland valleys, higher in the foothills, and highest in the mountains.

The prevailing summer daytime winds in the area come from the southwest at 8 to 22 miles per hour (mph). On summer nights, the pattern reverses, with winds coming from the north at 4 to 6 mph. In winter months, daytime ocean winds range from 7 to 9 mph, and night winds range from 3 to 8 mph. Approximately 5 to 10 times a year the basin experiences hot, dry easterly winds, called Santa Anas, which usually occur during autumn months and last an average of 2 to 3 days.

Meteorological Conditions

Meteorological conditions (such as light winds and shallow vertical mixing) and topographical features (such as surrounding mountain ranges) hinder the dispersal of air pollutants. The basin is an area of high air pollution potential because frequent temperature inversions tend to trap air pollutants in a limited atmospheric volume near the ground and hamper dispersion. In January, a surface inversion exists on 70 percent of the mornings. The average wind speed in downtown Los Angeles is less than 5 miles per hour on 80 percent of the days during the summer smog season. This is a measure of daily stagnation.

During summer's long daylight hours, plentiful sunshine provides the energy needed to fuel photochemical reactions between nitrogen dioxide and reactive hydrocarbons which result in ozone formation. To reach high levels of ozone requires adequate sunshine, early morning stagnation in source areas, high surface temperatures, strong and low morning inversions, greatly restricted vertical mixing during the day and daytime subsidence that strengthens the inversion layer. The most frequent ozone transport route is from source areas in coastal areas to receptor areas along the base of the San Gabriel and San Bernardino mountains. With offshore flows, ozone transport is more limited and highest concentrations occur in the western portion of the basin.

In the winter, temperature inversions occur close to ground level during the night and early morning hours. At this time, the greatest pollution problems are from carbon monoxide and nitrogen oxides. High carbon monoxide concentrations occur on winter days with strong surface inversions and light winds. Carbon monoxide transport is extremely limited, and highest concentrations are associated with areas of highest traffic density.

High nitrogen dioxide levels usually occur during the autumn or winter on days with weather conditions similar to summer. These conditions include low inversions, limited daytime mixing, and stagnant windflow conditions. Although days are clear, sunlight is limited in duration and intensity, and photochemical reactions necessary to form ozone are incomplete.

As with ozone, a substantial fraction of PM10 forms in the atmosphere as a result of chemical reactions. Peak concentrations of both ozone and PM10 occur downwind of precursor emission sources.

Consistency With Air Quality Management Plan (AQMP)

The Clean Air Act requires that designated agencies in all areas of the nation which do not meet federal clean air standards must prepare a plan which demonstrates the steps which will be taken to bring the area into compliance. The national deadline for meeting all standards was December 31, 1987.

In the South Coast Air Basin, the designated agencies are the SCAQMD and the Southern California Association of Governments (SCAG). The two agencies prepared a preliminary plan in 1977 and a plan revision in 1982. However, the agencies were unable to demonstrate attainment by the 1987 deadline. Instead, the agencies committed to a long-range plan with attainment in 20 years. In January 1988, a federal court disallowed the plan because it did not demonstrate attainment by the statutory deadline. The revised plan, adopted in 1989, projects attainment for all standards by the year 2007 and is now the state implementation plan for the region.

It has been the policy of the two agencies that projects are consistent with the plan if they are consistent with the SCAG growth forecast used as the basis for the AQMP, comply with all applicable rules and regulations, and include all feasible measures to mitigate local impacts. The 1979 and 1982 plans assumed that adoption by the responsible agency of measures included in the AQMP would be the means to mitigate regional impacts, including those associated with growth.

Environmental Impact

The California Environmental Quality Act (CEQA) indicates a project will be considered to have a significant impact on air quality if the project "violates" any ambient air quality standard, contributes measurably to an existing air quality violation, or exposes sensitive receptors to substantial level of pollutants (Office of Planning Research, 1986).

The SCAQMD provides criteria for determining whether the potential air quality impacts need to be analyzed in an EIR. The threshold criteria include measurable emission levels, consistency with the existing air quality management plan, and a number of other factors. The determination that a project will have a significant impact on air quality, as well as any subsequent finding, including a Statement of Overriding Considerations, must be made by the lead agency.

The proposed Pasadena-Los Angeles Rail Transit Project will result in three types of air quality impacts:

- Short-Term Construction Emissions: Airborne dust and emissions from heavy equipment during the demolition and construction phases of the proposed project.
- Long-Term Mobile Emissions: Vehicle emissions resulting from traffic traveling to and from the proposed project.
- Long-Term Stationary Emissions: Stationary emissions resulting from off-site electrical power generation.

Short-Term Construction Emissions

The implementation of the proposed project will result in short-term emissions being generated during the course of construction. The emissions will come from two sources: fugitive dust emissions due to excavation and grading activities and emissions from heavy equipment involved in the construction.

Construction emissions can be estimated if the types of equipment and the duration of their use are known. Once these variables are known, the emissions can be determined by multiplying the usage (expressed in hours) by a given emissions generation factor for each type of equipment. The latter information is derived from heavy construction equipment generation factors provided by the EPA (EPA, 1988).

Table 4-20 indicates the estimated usage of various heavy equipment which will be utilized in the construction phases of the project. The types of equipment and the estimated usage time is based on preliminary estimates provided by Bechtel Civil, Inc.

Table 4-21 indicates the estimated emissions from the various types of construction equipment itemized for each project alternative. The emissions indicated in Table 4-21 are both the anticipated emissions for the entire construction phase and those anticipated to occur on a daily basis. It is important to remember that each alternative will be different in terms of the time anticipated to complete construction as indicated at the bottom of Table 4-20.

The anticipated emissions from construction activities will be substantially less when considering average daily emissions. In addition, the emissions will be distributed along the entire alignment further reducing the adverse affects of these emissions. Thus, it is unlikely that construction emissions will be significant.

TABLE 4-20

ESTIMATED USAGE OF CONSTRUCTION EQUIPMENT
(total number of hours)

Equipment Type	Chinatown	Second St.	Second St. Union St.	Union St. "No Subway"
Highland Park Alignment				
Auger	2,666	1,808	1,772	905
Bulldozer	2,649	1,218	1,194	609
Backhoe	2,742	1,962	1,922	981
Loader	4,272	2,946	2,887	1,473
Roller	2,666	1,808	1,772	904
Truck	11,370	8,238	8,073	4,119
Crane	11,370	6,357	6,229	3,179
Boring Machine	5,021	3,764	3,688	N/A
North Main Street Alignment				
Auger	4,865	4345		
Bulldozer	1,594	1,282		
Backhoe	8,106	7,586		
Loader	8,238	7,458		
Roller	2,664	2,146		
Truck	11,240	10,200		
Crane	8,418	7,378		
Boring Machine	2,509	2,509		

Notes: The construction period will be different for each alternative. Construction estimates for each alternative are as follows:

Chinatown/Highland Park - 27 months
Second Street/Highland Park - 27 months
Chinatown/North Main - 12 months
Second Street/North Main - 12 months
Second Street-Union Station/Highland Park - 27 months
Union Station "No Subway"/Highland Park - 10 to 12 months

Source: Bechtel Civil, Inc., 1988.

TABLE 4-21

SHORT-TERM CONSTRUCTION EQUIPMENT EMISSIONS POUNDS/CONSTRUCTION PERIOD AND POUNDS/DAY[a]

Highland Park	Chinatown	Second Street	Second St Union St.	Union Station "No Subway"
Carbon Monoxide	16	16	16	8
Exhaust Hydrocarbons	2	2	2	1
Nitrogen Oxides	26	21	21	10
Sulfur Oxides	3	2	12	1
Particulates	2	2	2	1
North Main Street				
Carbon Monoxide	20	18		
Exhaust Hydrocarbons	4	3		
Nitrogen Oxides	50	46		
Sulfur Oxides	5	5		
Particulates	4	3		

Notes: Factors used in determining equipment emissions are from Compilation of Air Pollutant Emission Factors, 4th Edition, AP-42 Volume II. EPA. 1985. The construction period for each alignment is indicated at the bottom of Table 4-20.

a Daily emissions are indicated in parenthesis.

Source: Environmental Protection Agency, 1985.
Michael Brandman Associates, 1988.

Long-Term Mobile Emissions

A primary objective of the proposed LRT is to provide residents living in and around the Pasadena-Los Angeles corridor an alternative mode of transit. It is estimated that the proposed project will result in a peak hour trip reduction of between 4,600 and 2,500 private vehicles used to make home/work commutes. The removal of these vehicles from local freeways and arterials will result in decreased emissions.

The projected ridership along the various segments. Section 4.2 further documents the projected traffic generated at each station. This information is important in estimating the number of vehicle trips (home-to-work) that will be eliminated or reduced.

A number of assumptions has been made to complete this analysis. First, the number of vehicle trips identified in Section 4.2 that are classified as kiss-and-ride or park-and-ride are used in calculating mobile emissions for the proposed project. The assumption is that these trips (park-and-ride and kiss-and-ride) would have involved more lengthy home-to-work commutes if the LRT was not operational.

For purposes of this analysis, it is assumed that the average trip length of home/work commutes is 8.8 miles each way. This figure was derived from SCAG estimates concerning average trip lengths. The 8.8 miles is the distance commuters using the LRT would be required to drive if they were using their private vehicles for the home-to-work commute. The home-to-LRT station trip distance was assumed to be 3.2 miles (one way), which is considered a local trip by SCAG.

The average round-trip length for both home-to-work and home-to-LRT trip types was multiplied by standard pollutant emission factors provided by the SCAQMD (1988). The resulting emission calculations for carbon monoxide, oxides of nitrogen, sulfur dioxide, hydrocarbons, and suspended particulates are indicated in Table 4-22. Some vehicle trips will be generated by employees operating the LRT. However, the number of trips in this category is relatively small and was not included in the estimation of mobile emissions.

Examination of Table 4-22 reveals that the implementation of the project alternatives would actually result in a slight decrease in emissions. However, this improvement will be partially offset by increased congestion at those intersections which will be impacted by LRT operations. Roadway congestion will result in increased travel time due to idling and slow-moving traffic.

TABLE 4-22

PROJECTED MOBILE EMISSIONS
(pounds per day)

Alignment/Project	CO	NOx	SOx	ROG	TSP
No Project					
Highland Park	94.1	8.7	7.71	24.8	6.3
North Main Street	61.4	5.7	5.01	16.2	4.1
Highland Park					
Total emissions	51.1	4.7	4.2	13.5	3.3
Difference from No Project	(43.0)	(4.0)	(3.5)	(11.3)	(3.0)
North Main Street					
Total emissions	22.3	2.1	1.85	5.9	1.5
Difference from No Project	(39.1)	(3.6)	(3.2)	(10.3)	(2.6)

Source: Michael Brandman Associates, 1988.
DKS Associates, 1988.

Local Air Quality Impacts

Although there will be a net decease in regional pollutants emitted, the proposed project will result in increased vehicular traffic in the vicinity of the stations and, as a result, increased local emissions. Localized pollutant concentrations (primarily carbon monoxide, nitrogen dioxide, and particulates) may increase near roadways. To analyze the potential local impacts, this analysis used Caline 4, a Gaussian diffusion air quality model developed by the State of California Air Resources Board (CARB). Table 4-23 indicates the average carbon monoxide concentrations at the station sites resulting from existing traffic and existing-plus-project traffic during peak hours. Only those stations providing park and ride and kiss-and-ride lots were analyzed. According to this analysis, the carbon monoxide concentrations for both existing traffic and existing plus project traffic will not exceed state or federal standards.

TABLE 4-23

LOCAL AIR QUALITY IMPACTS FROM MOBILE SOURCES
(Maximum Carbon Monoxide Concentrations)

Alignment/Station	Existing 1 hr Average	Existing Plus Project
Highland Park Route		
Avenue 26	2.8	3.1
Marmion/Figueroa	2.8	3.0
Avenue 51	2.8	3.1
Marmion Way/Avenue 57	2.6	3.1
Del Mar	3.0	3.1
Sierra Madre Villa	2.9	3.2
North Main Route		
North Main/Griffin	10.0	10.2
Mission/Lincoln Park	15.0	15.4
Monterey	2.8	3.1
Eastern	2.8	3.0

Note: The federal standard for 1-hour carbon monoxide concentrations is 35 parts per million (ppm) and the state standard is 20 ppm.

Source: State of California Air Resources Board. AQAT-2 Air Quality Analysis Tools, 1987.
Michael Brandman Associates, 1988.

Long-Term Stationary Emissions

Long-term air quality impacts for stationary sources are, in this instance, directly related to the generation of energy required for system operation. Energy consumption has been divided into two categories: (1) electrical consumption related to station operations; and (2) electrical consumption related to LRT vehicles operations. Section 4.10.2 of this EIR indicates the projected energy consumption for each of the LRT alternatives presently under consideration. These estimates were used in projecting emissions from power generation.

Electrical power for the proposed project will be provided by the City of Los Angeles Department of Water and Power (LADWP) and by the City of Pasadena Department of Water an Power. Most of the power provided by LADWP is generated at sites located outside the South Coast Basin which will not affect air quality in the region. In addition, a significant portion of this power is obtained through hydrogeneration which does not result in any emissions.

Table 4-39 in Section 4.11.A identifies the major sources of power generation for LADWP. As indicated in Section 4.10.2, approximately 20 percent of the LADWP's power is generated by plants (oil and gas) within the South Coast Air Basin, an additional 60 percent is generated by plants (nuclear and coal) located outside the basin, and the remaining 20 percent of power generation comes from hydrogeneration.

Table 4-24 indicates the amount of stationary source emissions which would be generated if all of the power generation would occur at plants within the South Coast Air Basin. These worst-case estimates are then compared to a more likely scenario where 20 percent of the total power consumed by the facility's operation would actually be generated by power plants in the air basin.

Mitigation Measures

The overall air quality impacts anticipated to result from the construction and operation of the LRT are judged to be minor. A number of mitigation measures, however, should be implemented to reduce emissions which will impact local air quality. The following measures will be effective in reducing short-term impacts related to construction activities and long-term impacts resulting from the project's operation.

1. Fugitive dust emissions during the construction phases will be controlled with regular watering or other airborne dust reduction measures in compliance with SCAQMD Rule 403.

2. All construction equipment will be maintained and kept tuned to reduce emissions from heavy equipment.

3. All grading operations will be halted during first- and second-stage smog alerts.

TABLE 4-24

PROJECTED STATIONARY EMISSIONS FROM POWER GENERATION
(pounds per day)

Alignment/Project	CO	NOx	SOx	ROG	TSP[a]
Highland Park Alternative					
Chinatown Option					
Worst-case scenario	72	414	43	4	14
Normal Consumption	14	83	9	1	3
Second Street Option					
Worst-case scenario	76	438	46	4	5
Normal consumption	15	88	9	1	3
Second Street-Union Option					
Worst-case scenario	76	436	46	4	15
Normal consumption	115	87	91	1	3
Union Station "No Subway" Option					
Worst-case scenario	67	387	40	3	14
Normal consumption	13	77	8	1	3
North Main Street Alternative					
Chinatown Option					
Worst-Case scenario	33	191	20	2	7
Normal consumption	7	38	4	0.3	1
Second Street Option					
Worst-case scenario	36	206	22	2	7
Normal distribution	7	41	4	0.4	1

a A total suspended particulate (TSP emissions include the fraction in the fine particulate (PM_{10}) category and represent worst-case for both scenarios.

Note: The worst-case scenario assumes all of the power requirements will be met by power plants (oil and gas) located in the South Coast Air Basin.

Source: Michael Brandman Associates, 1988.
DKS Associates, 1988.

The following measures will be effective in reducing long-term emissions from mobile sources.

1. The project will maintain convenient access to transit stops and provide for easy pedestrian access.

2. Transit improvements, such as bus shelters, benches, and bus pockets, will be included in the project design.

Unavoidable Significant Adverse Effects

The proposed LRT project will not result in any significant adverse impacts on local or regional air quality. Although the project will result in mobile and stationary emissions, the impacts will be offset by the reduction in vehicle trips on local freeways.

4.5 BIOLOGICAL RESOURCES

This section of the EIR examines the project's potential impacts on plant and animal species living in the vicinity of the proposed alignment.

Environmental Setting

The project area is, for the most part, fully urbanized though there are some important open space areas in the vicinity of the project. Elysian Park and the Arroyo Park are the largest areas of open space in the immediate vicinity of the Highland Park segment. A large regional park, Ernest E. Debs Regional Park, is located midway between the two alignments. A number of other parks are located in the vicinity of both alignments and these are identified in Section 4.13.

The analysis focused on only the open space and landscaped areas that would be directly impacted by the construction and operation of the project. The primary site, identified in Exhibit 4-13, is a one-half acre site adjacent to the Highland Park Alignment (referred to herein as Highland Park site). Other areas where plants may be impacted include street trees along Second Street and large palm trees located in the median of Huntington Drive near the terminus of the North Main alignment.

Highland Park Alignment

This particular area of concern is located adjacent to the Highland Park alignment along the north side of the existing Santa Fe Railroad right-of-way between Arroyo Verde Road in the City of South Pasadena to a point 300 feet east of the Arroyo Seco Channel in the City of Los Angeles (refer to Exhibit 4-13). The area is approximately 10 feet wide and 2,290 feet long, terminating at the west end of a half circle area with a 50-foot radius. The total land area of this parcel is approximately one-half acre.

MBA conducted a field survey of the site to determine the nature of plants and animals present that would be impacted by grading activities. The results of this survey are summarized in this section and the report in its entirety is included in Appendix E.

The native vegetation on the affected site is characterized by species typical of a Southern California chaparral plant community, with oak-walnut woodland components also present. In addition, several non-native species occupy the site, including species which are naturalized, the result of landscaping, or have escaped from residential gardens adjacent to the site.

The chaparral-oak-walnut woodland plant community is dominated by toyon (Heteromeles arbutifolia) and California black walnut (Juglans californica). Poison oak (Toxicodendron diversilobum) is the dominant understory shrub species, with grasses, such as slender wild oat (Avena barbata) and red brome (Bromus rubens) also abundant. There are also three coast live oak trees (Quercus agrifolia) that will be affected by grading for the project.

The trees on the site that are a result of landscaping are primarily red and blue gum eucalyptus (Eucalyptus camaldulensis and E. globulus, respectively). There is little or no understory vegetation within the areas dominated by eucalyptus trees. Near the residential area adjacent to Arroyo Verde Road, garden escapees, such as passion vine (Passiflora sp.) and cape plumbago (Plumbago auriculata) occur.

Along the margins of the existing railroad bed, ruderal (weedy) species, including horseweed (Conyza canadensis), telegraph weed (Heterotheca grandiflora), horehound (Marublum vulgare), and tocalote (Centaurea melitensis) are dominant.

Because of the predominantly disturbed nature of the project site, the wildlife species diversity and abundance is expected to be low.

No amphibians are expected to occur on the site. The only reptile observed on the site was the side-blotched lizard (Uta stansburiana). Several other reptile species are expected on the site, including the western fence lizard (Sceloporus occidentalis), southern alligator lizard (Gerrhonotus multicarinatus), and gopher snake (Pituophis melanoleucus).

Birds observed on the site include both native and introduced species which are acclimated to an urban environment. These include the mourning dove, scrub jay, house finch, and house sparrow. Other species that are expected to occur on the project site are listed in the floral and faunal compendium (Appendix D).

The only mammal observed on the site was the California ground squirrel (Spermophilus beechyl). Other mammal species expected on the site include both feral and domestic dogs and cats, as well as both native and introduced species such as the coyote and the Virginia opossum, that survive well in an urban environment. A complete list of mammal species expected on the site is located in the floral and faunal compendium provided in Appendix D.

One sensitive habitat, a California walnut woodland community, presently occurs on the site. Oak trees are considered a valuable resource by the California Department of Fish and Game. The oaks on the site are located within the boundaries of the City of Los Angeles and, thus, any activity affecting these trees will be subject to Los Angeles City Ordinance 153478.

The California walnut woodland community is listed in the California Natural Diversity Data Base (CNDDB) as a sensitive resource. Walnut forests were once extensive throughout the region but have been greatly reduced through agricultural practices and urbanization. Relatively extensive areas of walnut forest remain locally in undeveloped portions of the eastern San Gabriel Valley. The walnut woodland on the site is of relatively poor quality;

however, due to the regional scarcity of this habitat, it may be considered an important resource.

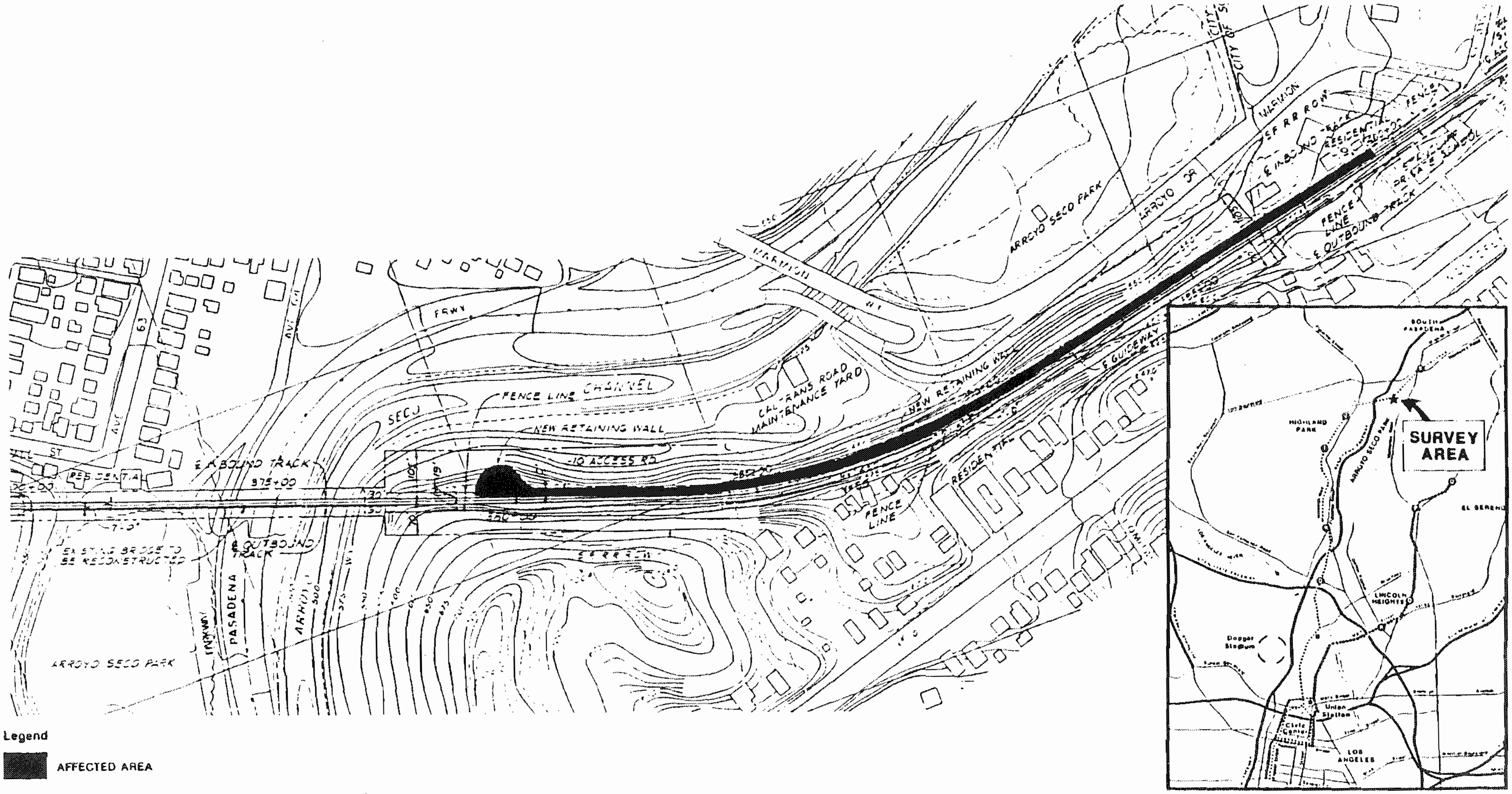
Environmental Impacts

Highland Park Alignment

The majority of the Highland Park alignment utilizes an existing railroad right-of-way and little or no alteration or existing vegetation would result. The only measurable impacts would occur on the parcel described above in the preceding section which consists of 0.53 acres of vegetated area consisting of chaparral, oak-walnut woodland, and nonnative scrub habitat. Because the native vegetation present is of low quality and very limited extent, this impact is not considered significant.

The process of transporting, grading, and compacting fill would have an impact on areas within the project site and possibly adjacent areas. Turnaround maneuvers by earthmoving equipment would disrupt soils and vegetation additionally beyond the major areas of concentrated vehicular traffic. Disturbed and compacted soils are subject to greater erosion potential unless properly graded and revegetated. This, in turn, may affect oaks and other vegetation adjacent to the project. However, given the small area potentially affected, this impact is not considered significant. Project implementation will also result in the elimination of three coast live oaks trees, which is considered a significant impact.

The removal of the limited walnut woodland on the site will contribute to the incremental loss of this already regionally scarce habitat. However, the removal of the California black walnut trees on the site will not in itself be a significant impact (this species is not listed as rare or endangered). Construction activity would disturb all wildlife in the vicinity and many species could be expected to move to adjacent areas of similar habitat, provided it is available at the onset of activity. Wildlife that emigrate are vulnerable to mortality by predation and unsuccessful competition for food and territory. Species of low mobility, particularly burrowing mammals and reptiles, would be eliminated by site preparation. Because of the small area to be permanently converted, this is not considered to be a significant impact.



Legend

AFFECTED AREA

0 50 100 FEET

Biological Survey

Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-13

Second Street Option

There are approximately 32 deciduous trees along Second Street between Hill and Los Angeles Streets. Eight of these trees are in large concrete planters. The rest are planted in openings in the sidewalk paving. These will be removed for cut and cover construction but may be replaced following construction.

North Main Street Alignment

Between Eastern Avenue and Van Horne Avenue, the center median is planted with palm trees in clumps of four, totaling about 32. Additional palms have been planted in the center median before Eastern Avenue, but are not yet mature. The majority of these would need to be removed to accommodate a station and rail facility.

Landscaping will be provided at station locations and in accompanying parking areas. LACTC guidelines indicate that native plant materials would be used wherever possible. In addition, in those areas where street trees are present, trees of the same species shall be used in any plantings around the stations.

Mitigation Measures

For the Highland Park alignment, a permit for removal of oak trees at the Highland Park site must be requested from the City of Los Angeles Board of Public Works. It is possible that Ordinance Number 153.478, Article 6, Section 46.02(b).4 will apply in this case. The ordinance states that a permit is justified when "the presence of the oak tree interferes with utility services and roadways within or without the subject property and the only reasonable alternative to the interference is the removal of the tree." The slope below the railroad bed should be planted with coast live oaks and California black walnuts in quantities sufficient to insure replacement of those lost due to project implementation.

For the North Main Street alignment, the palm trees along the median of Huntington Drive should be transplanted or replaced where possible. To avoid conflicts with the LRT's catenary system, palm trees are likely to be relocated to the sidewalks along Huntington Drive.

Additional mitigation measures which will be effective in mitigating the project's potential impacts on plant and animal life include:

- Where existing landscaping must be removed, new landscaping shall be planted as specified in an established landscaping plan.
- The landscape plan shall include a master plant list which shall call for new vegetation that is designed to conform with the surrounding environment.
- Landscaping shall extend to the system right-of-way, station, parking, and public areas, as well as other areas of fixed system facilities.
- A program shall be developed as part of the overall operating procedures for the light rail system which shall provide for the regular maintenance of system-related landscaping.

Unavoidable Significant Adverse Effects

The removal of three coast live oaks due to grading on the Highland Park site is considered an adverse significant impact. The implementation of the recommended measures calling for replacement of those trees removed will successfully mitigate the impacts.

4.6 NOISE AND VIBRATION

This section of the EIR describes the existing noise and vibration environment and evaluates the potential noise and vibration impact associated with the construction and operation of the proposed light rail. The noise analysis was prepared by Acoustical Analysis Associates, Inc. (AAA Inc.) and the report summarizing the analysis is provided in its entirety in Appendix D.

Noise Concepts and Study Methodology

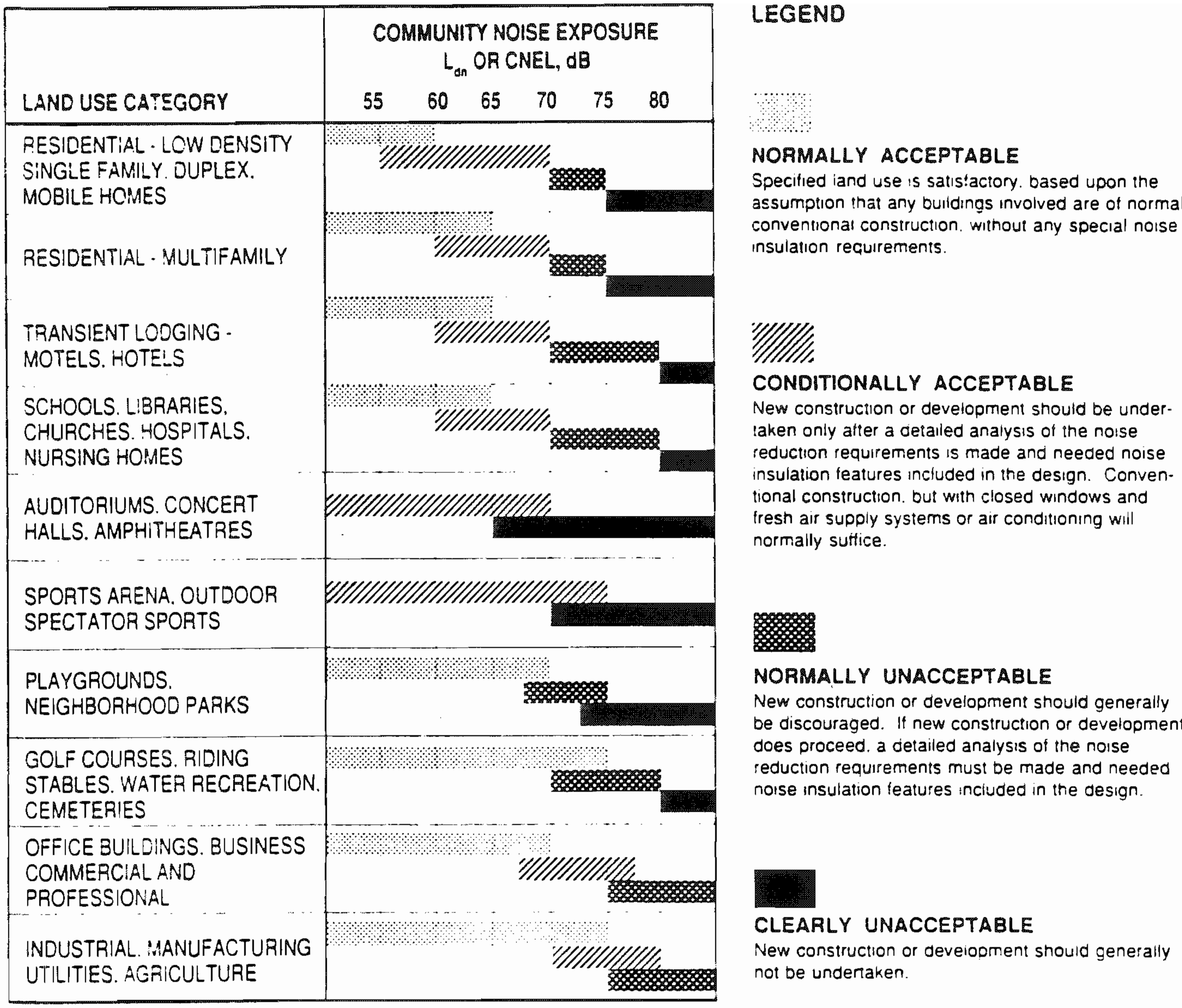
Sound is created when an object vibrates and radiates part of its energy as acoustic pressure or waves through a medium, such as air, water, or a solid object. The degree to which there is annoyance and/or activity interference depends upon the magnitude of the intruding noise level, the frequency with which it occurs, and the time of day of occurrence. At present, there is a consensus among a variety of government agencies charged with establishing noise standards and criteria that the day-night average sound level is the preferred unit of noise exposure for use in assessing the potential impact of an intruding noise source. The day-night sound level (Ldn) represents an average of the A-weighted noise levels occurring during a complete 24-hour period; however, it includes a weighting applied to those noises occurring during nighttime (10 p.m. to 7 a.m.) hours.

For residential land uses, a Ldn of 65 dB has been selected by a number of federal agencies (HUD, DOD, etc.) as a general dividing line between an unacceptable and an acceptable noise environment, based upon several considerations including the potential for disturbance of various activities that normally are conducted at home. Other noise sensitive land uses, such as schools, churches, hospitals, etc., also use an Ldn value of 65 dB as the dividing line between an unacceptable and an acceptable noise environment. Exhibit 4-14 illustrates guidelines for compatible land use for the City of Los Angeles.

In California, several agencies use an alternative measure of noise exposure known as the community noise equivalent level (CNEL). The CNEL is identical to the Ldn with one exception: in the CNEL measure there is a weighting of 5 dB applied to those noises occurring during evening hours (7 p.m. to 10 p.m.). Thus, both measures represent a 24-hour average of the A-weighted noise levels at a particular location; the Ldn includes a nighttime weighting, and the CNEL includes both an evening and a nighttime weighting. For most transportation and community noise sources, the CNEL and Ldn are equal to within 1 dB (typically CNEL = Ldn + 0.6 dB). In the remainder of this document, the CNEL measure will be utilized.

<u>Environmental Setting</u>

In order to document the existing noise and vibration environment along the proposed alignments, a field measurement survey was conducted in June and July 1988 and additional measurement surveys were conducted in March and September 1989 for the extended portion of the Highland Park alignment alternative located in South Pasadena and Pasadena. During the earlier surveys, community noise levels were monitored for a continuous 24-hour period at four noise sensitive locations along the proposed routes. Short-term samples of noise were also



CONSIDERATIONS IN DETERMINATION OF NOISE-COMPATIBLE LAND USE

A. NORMALIZED NOISE EXPOSURE INFORMATION DESIRED

Where sufficient data exists, evaluate land use suitability with respect to a "normalized" value of CNEL or L_{dn}. Normalized values are obtained by adding or subtracting the constants described in Table 1 to the measured or calculated value of CNEL or L_{dn}.

B. NOISE SOURCE CHARACTERISTICS

The land use-noise compatibility recommendations should be viewed in relation to the specific source of the noise. For example, aircraft and railroad noise is normally made up of higher single noise events than auto traffic but occurs less frequently. Therefore, different sources yielding the same composite noise exposure do not necessarily create the same noise environment. The State Aeronautics Act uses 65 dB CNEL as the criterion which airports must eventually meet to protect existing residential communities from unacceptable exposure to aircraft noise. In order to facilitate the purposes of the Act, one of which is to encourage land uses compatible with the 65 dB CNEL criterion wherever possible, and in order to facilitate the ability of airports to comply with the Act, residential uses located in Community Noise Exposure Areas greater than 65 dB should be discouraged and considered located within normally unacceptable areas.

C. SUITABLE INTERIOR ENVIRONMENTS

One objective of locating residential units relative to a known noise source is to maintain a suitable interior noise environment at no greater than 45 dB CNEL or L_{dn}. This requirement, coupled with the measured or calculated noise reduction performance of the type of structure under consideration, should govern the minimum acceptable distance to a noise source.

D. ACCEPTABLE OUTDOOR ENVIRONMENTS

Another consideration, which in some communities is an overriding factor, is the desire for an acceptable outdoor noise environment. When this is the case, more restrictive standards for land use compatibility, typically below the maximum considered "normally acceptable" for that land use category, may be appropriate.

Source: California Department of Health, Guidelines for the Preparation and Content of Noise Elements of The General Plan, February, 1976

7200002-JULY 1989

Michael Brandman Associates

Noise and Land Use Compatibility Guidelines

Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-14

obtained at an additional five measurement locations. These data were supplemented by the short-term measurements conducted at eight locations along the proposed routes as part of the project route refinement study in December 1987. Vibration measurements were also gathered at four locations along the proposed routes, including two sites where existing train vibration levels were measured (as well as ambient vibration levels in the absence of train passbys) and two locations where ambient vibration data were collected. For the more recent surveys, short term (10 minutes) samples were taken at the study sites.

Noise and vibration measurement locations were selected to cover the entire range of noise and vibration conditions existing along sensitive portions of the proposed alignments. Table 4-25 lists the information describing the four locations at which 24-hour noise monitoring was conducted, the five locations where short-term noise data were gathered, and the four locations at which vibration measurements were obtained. The results of the noise and vibration measurements are described in the noise study included in Appendix D.

TABLE 4-25

NOISE AND VIBRATION MEASUREMENT

Address	Major Sources	Comments
L.A. Music Center	Street traffic	Ambient vibration measurements on Dorothy Pavilion steps.
Orion Pictures Production Bldg.	Railroad, industrial	Ambient and train vibration measurements on retaining wall at edge of right-of-way.
136 N. Avenue 52 Highland Park	Traffic, railroad	Ambient and trail vibration measurements on on sidewalk.
North Main St. and Sichel	Street traffic	Ambient vibration measurements on sidewalk.
1043 Adelaine South Pasadena	Traffic, railroad	24-hour noise measurement in backyard, 5 feet above ground.
136 N. Avenue 52 Highland Park	Traffic, railroad	24-hour noise measurement in backyard 5 feet above ground.
134 W. Avenue 43 Highland Park	Traffic, railroad	24-hour noise measurement in backyard 5 feet above ground.

TABLE 4-25 (continued)

Address	Major Sources	Comments
El Sereno Branch Library	Street traffic	24-hour noise measurement on roof, 20 feet above ground.
6234 Bertha Highland Park	Freeway traffic, local traffic	Short-term noise measurements at curbside, 5 feet above ground.
S. Huntington and Torquoise St.	Street traffic	Short-term noise measurements at curbside, 5 feet above ground.
North Main Street and Bloomlocal	Street traffic,	Short-term noise measurements at curbside, 5 feet above ground.
North Main Street and Alpine	Street traffic	Short-term noise measurements at curbside, 5 feet above ground.
4709 Woodside Highland Park	Railroad, distant and local traffic	Short-term noise and train measurements at curbside 8 feet above ground.
716 Fairview South Pasadena	Distant and local traffic, railroad	Short-term noise measurements at curbside, 5 feet above ground
385 Grace Drive South Pasadena	Distant street traffic, railroad	Short-term noise measurements at curbside, 5 feet above ground.
716 Fairview South Pasadena	Local traffic, occasional train	Ambient vibration measurements.
385 Grace Drive South Pasadena	Street traffic	Ambient vibration measurements.
Memorial Park South Pasadena	Street traffic, occasional	Ambient vibration measurements. train
Memorial Park Pasadena	Street traffic, railroad.	Short-term noise measurements 60 feet from Raymond, 5 feet above ground.
165 Chestnut Pasadena	Distant and local street traffic, railroad	Short-term noise measurements at end of cul-de-sac 6 feet above ground.

Source: AAA Inc., 1988.

Environmental Impacts

In evaluating the potential noise impact of a new transportation noise source, there are generally two factors which should be considered. First, the expected noise of the new system should be compared to applicable criteria to insure compliance with local, state, or federal regulations and guidelines to minimize interference with specific activities as a function of the land use. Second, expected system levels should be compared with existing levels in areas along the alignment to ensure that the noise environment is not degraded.

In the Los Angeles central business district, all proposed LRT alignments are subway, and will have no potential for noise impacts. Therefore, the project noise impact analysis properly begins at the proposed LRT portal locations: northeast of Chinatown on Broadway for the Highland Park alternative, and east of Olvera Street on North Main for the North Main alternative.

Along the Highland Park alignment, all locations noted currently experience maximum A-levels higher (84 to 100 dBA) than those projected for LRT operations. Along the North Main alignment, existing maximum noise levels from roadway traffic are comparable (80 to 85 dBA) to those expected from LRT passbys.

Table 4-26 presents the maximum A-weighted sound levels expected from various transportation modes at typical distances from the noise source. Since the Highland Park alignment follows much of the existing AT&SF rail line, a comparison with maximum levels due to freight train operations is shown. As can be seen from the table, the existing maximum level from freight operations at such locations is much higher than that expected from a single light rail vehicle passby; however, the existing number of freight operations is low (average of 7 per weekday observed), compared to the number of LRT operations proposed.

Table 4-27 provides a comparison of the light-rail system with other transportation systems on a noise exposure (CNEL) basis. The table shows that the CNEL 50 feet from the centerline of a typical urban street with moderate traffic flow would be approximately 67 dB. In comparison, the CNEL from the currently proposed operating schedule would be 67 dB for an aerial guideway configuration, and 64 dB for an at-grade configuration, both at 30 mph.

TABLE 4-26

MAXIMUM A-WEIGHTED SOUND LEVELS FOR VARIOUS TRANSPORTATION MODES (dBA)

Distance From Vehicle Path Centerline (feet) Mode	50 Feet	100 Feet
For speeds of 35 mph/55 mph		
Auto	64/70	58/64
Bus	74/80	68/74
LRT At Grade	74/80	68/74
LRT Aerial	77/83	71/77
Freight Train:		
Normal Throttle	88/88	83/83
Maximum Throttle	95/95	90/90

Source: AAA Inc., 1988.

TABLE 4-27

COMPARISON OF NOISE EXPOSURE FOR VARIOUS TRANSPORTATION MODES

Transportation Source	CNEL at 50 feet, dB
Major Street Traffic (20,000 ADT)	67
Major Freeway Traffic (120,000 ADT)	84
Current AT&SF Railroad Traffic (7 trains per day)	63
LRT Using Proposed Operating Schedule	
30 mph at-grade	64
30 mph on aerial guideway	67
45 mph at-grade	67
45 mph on aerial guideway	70

Source: AAA Inc., 1988.

The impact of the light rail vehicle noise source, although not substantial on a maximum noise level basis, may be significant due to the large number of passing vehicles on a typical weekday. For this reason, a measure of long-term noise exposure, such as CNEL, may be more appropriate in assessing impact from light rail operations. The operating schedule used to compute LRT CNEL was provided by Manuel Padron Associates. Existing and future roadway traffic levels (assuming 1 percent growth per year) were provided by DKS Associates and used to compute traffic noise CNELs. The CNEL associated with train operations on the AT&SF line was projected assuming that the daily number of passbys would remain constant if no LRT system was constructed.

The results of the system-wide noise exposure analysis are provided in the noise study and are summarized in Table 4-28 for the Highland Park alternative and in Table 4-29 for the North Main. The totals indicate change in future CNEL resulting from the project implementation (with project vs. no project). In cases where the increase is less than 3 dB, the impact is insignificant, since a 3 dB increase in level is the point at which the average listener can detect the change. Where the increase is 3 to 5 dB, the noise impact is significant. An increase in CNEL of more than 5 dB is generally considered to be adverse. Exhibit 4-15 indicates the locations measurements were taken along the alignments. The locations of the adversely impacted segments referred to in the tables are indicated with asterisks and identified in Exhibit 4-16.

TABLE 4-28

NOISE EXPOSURE IMPACT
HIGHLAND PARK ALTERNATIVE

Map Segment[3] (Impact)		LRT Building	AT&SF Railroad CNEL	Future Roadway CNEL	Total Future Noise Levels: No Project CNEL	With Project CNEL	CNEL Change CNEL
H-1	Typical	62.1	55.9	71.9	72.0	72.4	0.3
Cath. High	Nearest	63.2	57.0	72.6	72.8	73.1	0.3

TABLE 4-28 (continued)

Map Segment	Building	LRT CNEL	AT&SF Railroad CNEL	Future Roadway CNEL	Total Future Noise Levels: No Project CNEL	With Project CNEL	CNEL Change (Impact)
H-2 Oharo	Typical	60.6	50.7	70.2	70.2	70.6	0.4
	Nearest	66.5	56.5	70.2	70.4	71.7	1.4
H-3 Oharo	Typical	65.7	59.2	57.5	61.5	66.3	4.8[a]
	Nearest	67.1	60.7	60.5	63.6	68.0	4.4[a]
H-4 Sgl Res	Typical	69.6	59.2	78.1	78.1	78.7	0.5
	Nearest	71.0	60.7	76.6	76.7	77.7	1.0
H-5 Church	Typical	66.3	55.9	67.0	67.3	69.6	2.3
	Nearest	66.9	56.5	68.8	69.1	71.0	1.9
H-6 Sgl Res	Typical	66.0	57.3	70.7	70.9	72.0	1.1
	Nearest	68.7	59.9	65.4	66.5	70.4	3.9
H-7 Sgl Res	Typical	68.1	58.1	70.7	71.0	72.6	1.7
	Nearest	69.9	59.9	66.0	66.9	71.3	4.4[a]
H-8 Hlth Ctr	Typical	66.2	56.2	67.7	68.0	70.0	2.0
	Nearest	68.6	58.7	65.2	66.1	70.2	4.2[a]
H-9 MF Res	Typical	66.8	56.9	60.7	62.2	67.8	5.6[a]
	Nearest	67.6	57.7	62.9	64.1	68.9	4.8[a]
H-10 Sgl Res	Typical	67.6	57.7	59.8	61.9	68.3	6.4[a]
	Nearest	69.8	59.9	58.0	62.1	70.1	8.0[a]
H-11 MF Res	Typical	67.4	58.7	65.5	66.3	69.6	3.3
	Nearest	68.7	59.9	54.5	61.0	68.8	7.8[a]
H-12 Sgl Res	Typical	69.7	59.2	71.5	71.8	73.7	2.0
	Nearest	70.4	59.9	73.9	74.1	75.5	1.4
H-13 Sgl Res	Typical	72.7	59.2	74.3	74.4	76.6	2.2
	Nearest	73.4	59.9	78.3	78.3	79.5	1.2
H-14 Sgl Res	Typical	66.4	55.9	73.0	73.1	73.9	0.8
	Nearest	68.7	58.1	73.8	73.9	75.0	1.0

TABLE 4-28 (continued)

Map Segment	Building	LRT CNEL	AT&SF Railroad CNEL	Future Roadway CNEL	Total Future Noise Levels: No Project CNEL	With Project CNEL	CNEL Change (Impact)
H-15	Typical	69.7	58.1	59.9	62.1	70.1	8.0[a]
Pvt Sch	Nearest	73.2	61.7	63.1	65.5	73.6	8.1[a]
H-16	Typical	69.7	59.2	62.2	64.0	70.4	6.5[a]
Sgl Res	Nearest	73.2	61.7	65.8	67.2	73.9	6.7[a]
H-17	Typical	62.9	55.6	66.5	66.8	68.0	1.2
MF Res	Nearest	64.9	57.7	64.9	65.6	67.9	2.3
H-18	Typical	64.3	59.9	50.1	60.3	64.5	4.1
MF & Sgl	Nearest	65.1	60.7	51.0	61.1	65.3	4.1
H-19	Typical	65.7	58.7	65.5	66.3	68.6	2.3
Comm	Nearest	68.7	61.7	64.5	66.3	70.1	3.8
H-20	Typical	66.3	59.2	67.1	67.8	69.7	2.0
MF & Sgl	Nearest	67.8	60.7	61.5	64.1	68.7	4.5
H-21	Typical	62.2	54.7	70.6	70.7	71.2	0.5
Sgl Res	Nearest	69.2	61.7	72.1	72.5	73.9	1.4
H-22	Typical	61.2	53.7	66.6	66.8	67.7	0.9
Sgl Res	Nearest	63.4	55.9	68.5	68.7	69.7	0.9
H-23	Typical	65.2	57.7	66.9	67.4	69.1	1.8
Ind	Nearest	65.7	58.1	70.8	71.1	72.0	0.9
H-24	Typical	65.6	57.7	66.9	67.4	69.3	1.9
Comm/Ind	Nearest	66.1	58.1	74.3	74.4	74.9	0.5
H-25	Typical	65.6	57.7	64.8	65.6	68.3	2.7
Comm/Ind	Nearest	66.1	58.1	71.9	72.0	71.9	0.8
H-26	Typical	65.6	57.17	68.1	68.5	70.0	1.6
Comm/Ind	Nearest	66.1	58.1	75.6	75.7	76.1	0.4
H-27	Typical	65.6	57.7	64.7	65.5	68.2	2.7
Comm/Ind	Nearest	66.1	58.1	71.7	71.9	72.8	0.9
H-28	Typical	65.6	57.7	66.6	671	69.1	2.0
Comm/Ind	Nearest	66.1	58.1	71.8	71.9	72.8	0.9

TABLE 4-28 (continued)

Map Segment	Building	LRT CNEL	AT&SF Railroad CNEL	Future Roadway CNEL	Total Future Noise Levels: No Project CNEL	With Project CNEL	CNEL Change (Impact)
H-29	Typical	64.0	57.7	637	64.7	66.9	2.2
Comm/Ind	Nearest	64.5	58.1	70.7	71.0	71.7	0.7 H-30
H-30	Typical	64.0	57.7	66.1	66.7	68.2	1.5
Comm/Ind	Nearest	64.5	58.1	74.1	74.2	74.5	0.3
H-31	Typical	58.8	54.7	58.1	59.8	61.5	1.7
Mem. Park	Nearest	59.2	55.1	68.1	68.4	68.7	0.3
H-32	Typical	58.8	54.7	77.1	77.1	77.1	0.0
Res/Com	Nearest	64.8	60.7	80.4	80.5	80.5	0.1
H-33	Typical	59.7	54.7	78.9	78.9	78.9	0.0
Sgl Res	Nearest	65.7	60.7	79.7	79.7	79.9	0.1
H-34	Typical	59.2	50.7	78.9	78.9	78.9	0.0
Res/Comm	Nearest	60.2	51.7	79.7	79.7	79.7	0.0

a Measurement locations indicated in Exhibit 4-15.

b Change in noise level represents a significant impact. The locations of the map segments are indicated in Exhibit 4-16.

Source: AAA Inc., 1988.

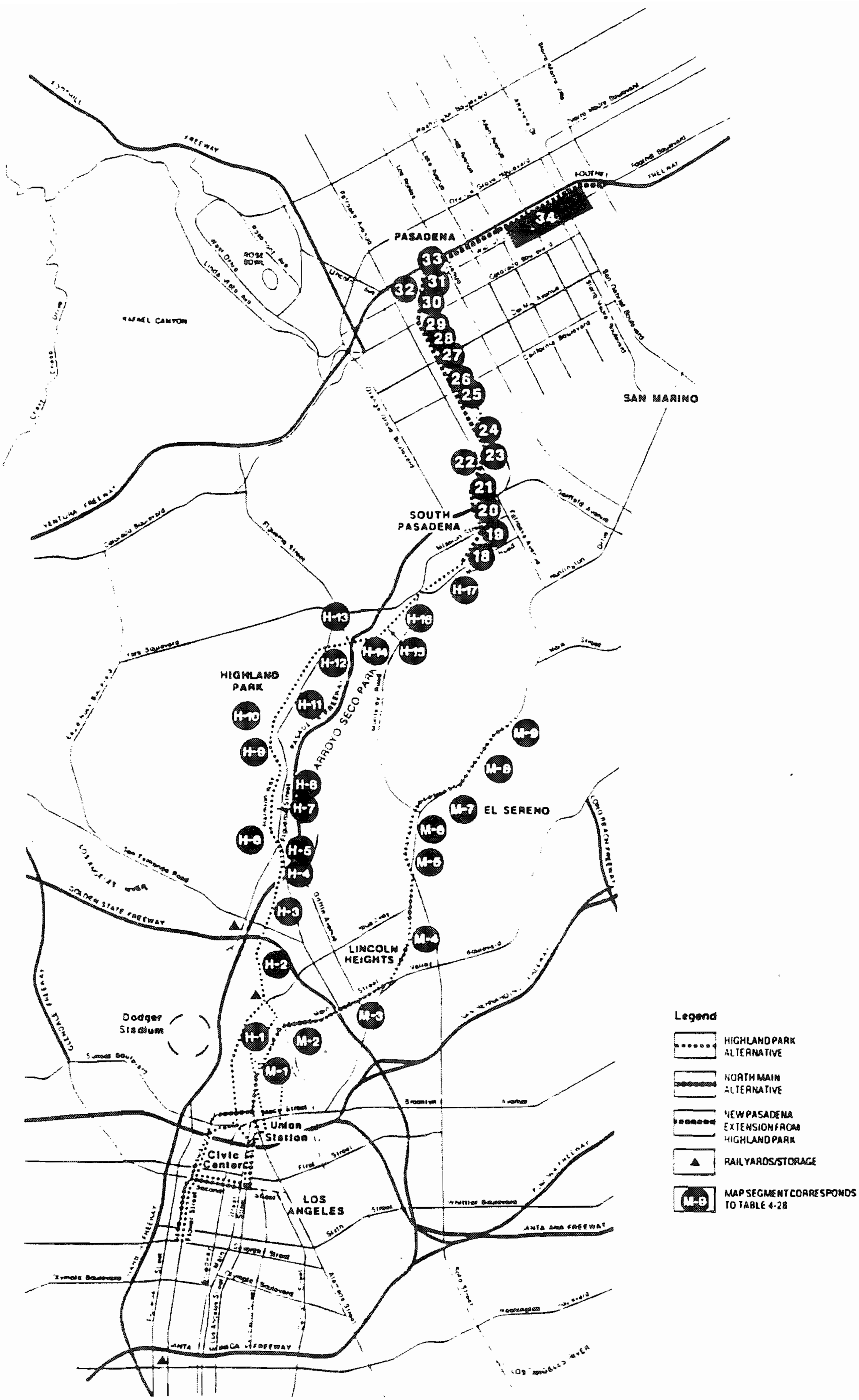
TABLE 4-29

NOISE EXPOSURE IMPACT
NORTH MAIN ALTERNATIVE

				Total Future Noise Levels		
Map Segment	Building	LRT CNEL	Future Roadway CNEL	No Project CNEL	With Project CNEL	CNEL Change (Impact)
M-1	Typical	69.6	72.0	72.0	74.0	2.0
MF Res	Nearest	70.0	72.0	72.0	74.2	2.1
M-2	Typical	70.3	71.7	7.17	74.0	2.4
Sgl Res	Nearest	70.8	72.2	72.2	74.6	2.4
M-3	Typical	68.7	71.4	71.4	73.3	1.9
Sgl Res	Nearest	70.2	73.0	73.0	74.8	1.9
M-4	Typical	69.8	71.7	71.7	73.9	2.2
MF Res	Nearest	67.1	72.4	72.4	73.6	1.1
M-5	Typical	66.9	71.5	71.5	72.8	1.3
Sgl Res	Nearest	68.4	70.9	70.9	72.8	1.9
M-6	Typical	65.0	72.8	72.8	73.4	0.7
Sgl Res	Nearest	65.9	73.6	73.6	74.2	0.7
M-7	Typical	60.7	69.7	69.7	70.2	0.5
MF Res	Nearest	61.1	70.1	70.1	70.6	0.5
M-8	Typical	62.6	71.3	71.3	71.8	0.5
Comm	Nearest	63.1	71.8	71.8	72.4	0.5
M-9	Typical	60.6	69.4	69.4	69.9	0.5
MF Res	Nearest	63.7	72.4	72.4	72.9	0.5

Note:The locations of the map segments are indicated in Exhibit 4-15.

Source:AAA, Inc.



Noise Exposure Analysis Locations
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-15

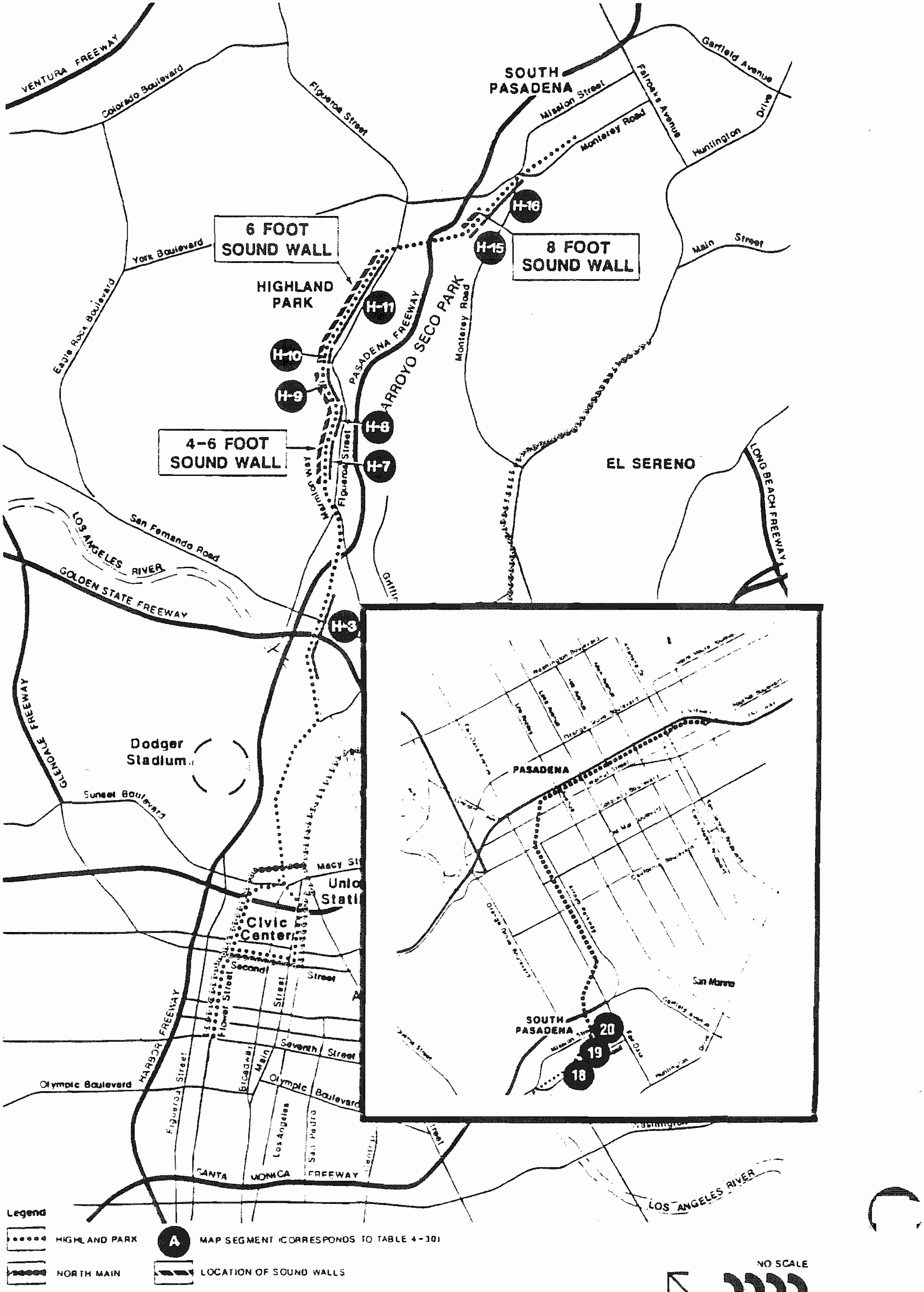


Exhibit 4-16

Adverse Noise Impacts
Pasadena-Los Angeles Light Rail Transit Project

Along portions of the alignment where structures are located within 50 feet of the nearest rail, LRT vibrations may be felt by building occupants. This is particularly likely in the portion between Monterey Road and I-60. Existing vibration levels from train passbys on the AT&SF railroad are much higher but occur less often than would LRT passes by. The LRt vibration levels will fall in the range between "No Impact-Any Condition," and "No Impact-Nighttime" given by CHABA.

Ground-borne vibration generated by the light rail system is not expected to create an impact on sensitive structures for two reasons. First, the expected vibration levels lie below the CHABA criteria for daytime and nighttime periods even at 30 foot distances. Second, comparison of the expected vibration levels from the RT with measured levels along the alignment resulting from railroad activity shows that existing vibration levels from train passbys are several decibels above those projected for the LRT vehicles.

Table 4-30 summarizes the findings of the noise exposure impact analysis, and quantifies the number of impacted structures under each alternative. Based on these results, project implementation using the Highland Park alternative would result in significant noise impacts to 121 structures in the absence of any mitigation while the North Main alternative would not have any significant impact on noise-sensitive structures. Table 4-30 also indicates the change in noise levels if the recommended mitigation measures are implemented. The location of the areas subject to significant noise impacts are identified in Exhibit 4-16.

TABLE 4-30

ADVERSE NOISE EXPOSURE - HIGHLAND PARK ALIGNMENT WITH AND WITHOUT MITIGATION

Route Segment	Change in CNEL, dB	Number of Structures: Single Family	Multiple Family	Other	Change in CNEL with Mitigation
H-3	4.8	0	0	1 (Orion Pictures)	0.0
H-7	3.9	1	0		0.1
H-8	4.2	0	1	1 (Sycamore Hospital)	0.4
H-9	5.6	2	2	0	0.7

TABLE 4-30 (continued)

Route Segment	Change in CNEL, dB	Number of Structures: Single Family	Multiple Family	Other	Change in CNEL with Mitigation
H-10	8.0	2	2	0	1.3
H-11	7.8	54	16	0	0.6
H-15	8.1	2	1	1 (Stancliffe School)	1.8
H-16	6.7	1	0	0	1.3
H-17	4.1	12	0	1 (commercial/industrial)	-0.5
H-18	3.8	0	0	6 (commercial/industrial)	0.8
H-19	4.5	13	2	0	1.1
	Totals	87	24	10	

Note: Locations of adversely impacted segments are identified in Exhibit 4-16.

Source: AAA, Inc., 1988.

Vibration Impacts

Groundborne vibration is generated during light rail vehicle operations as the steel wheels of the rail vehicle impact the rail. In the vicinity of existing roadway transportation facilities, in which there are only rubber-tired vehicles, groundborne vibration is generally low (as for the North Main alternative). However, in the vicinity of existing rail corridors (as along the Highland Park alternative) the wheel/rail generated vibration is transmitted to the ground via the connection through the tie and ballast; it travels through the ground to nearby building foundations and is transmitted through the structural members of the building to its occupants.

The level of groundborne vibration in the vicinity of a rail transit system depends on a number of factors, including the type of transit structure, type of soil, and condition of track. Vibration levels would be expected to increase in the vicinity of track discontinuities or if the track became rough and worn. Further, light rail operations on concrete aerial guideways or in subway structures typically produce vibration levels below those generated on an at-grade structure. Therefore, the vibration estimates presented reflect a worst-case estimate of subway vibration levels, and indicate no impact in such areas.

Along the Highland Park alignment, groundborne vibration generated by the light rail system is not expected to create an impact on sensitive structures for two reasons. First, vibration levels are expected to be below the acceptable criteria for daytime and nighttime periods. For those areas where the LRT will travel at speeds greater than 30 mph, the expected vibration levels may be 2 to 4 dB higher than shown. However, these levels will still be below the daytime and nighttime criteria at distances greater than 50 feet. Second, comparison of the expected vibration levels from the LRT with measured levels along the Highland Park alignment resulting from railroad activity shows that existing vibration levels from train passbys are several decibels above those projected for the LRT vehicles.

Along the North Main alignment, no vibration impact from the LRT operations are expected because the distances to sensitive areas are, for the most part, greater than 50 feet. The aerial portion of the North Main alternative would typically experience lower vibration levels due to the reduced coupling between the wheel/rail source and the ground surface in the aerial configuration.

Noise Impacts Near LRT Stations

Because the noise of light rail vehicles emanates primarily from the interaction of the wheel on the rail, noise levels increase with operating speeds. For this reason, in the immediate vicinity of passenger stations noise levels would be considerably less than would be expected if the rail vehicles were to pass through the station without stopping. Any potential noise impact resulting from a passenger station, then, arises from the increase in traffic flow in the vicinity of the station rather than from rail operations.

A straightforward way of measuring the potential impact is to look at the increase in CNEL resulting from projected increases in traffic flow. In reviewing such increases, however, the way in which people perceive changes in noise levels must be taken into account. Typically, most people cannot distinguish either individual noise levels or noise environments, which differ by 1 to 2 dB. A 3-dB difference in level or exposure is barely noticeable. On the other hand, a difference of 10 dB is usually perceived as a doubling in the loudness of a sound or in the noisiness of an environment.

In order for CNEL values to increase by as much as 3 dB, which would be barely noticeable, traffic volumes would have to increase by a factor of 2. Preliminary estimates of the changes in traffic flow in the vicinity of passenger stations resulting from the light rail system are relatively small, typically well below 20 percent at most of the stations. Such an increase in traffic flow would result in less than 1 dB increase in noise exposure, which is clearly an insignificant increase in exposure. The notable exceptions are two stations planned along the Marmion Way portion of the Highland Park alignment, at Avenue 51 and Avenue 57. Preliminary estimates indicate that an increase of 3 to 5 dB in peak hour Leq (average) sound level can be expected in the vicinity of these stations. The exact magnitude of the increase depends, of course, upon the mode of arrival to each station, specifically on the increase in vehicle trips in the station areas. As a result, peak hour noise impacts are expected in the vicinity of these two passenger stations, but no others.

The notable exception is the Del Mar Boulevard station, where the increase in traffic on Del Mar Boulevard during the p.m. peak traffic hour would be 44 percent. Preliminary estimates indicate that an increase of 1.6 dB in peak Leq (average) sound level can be expected in the vicinity of this station, which would be undetectable and insignificant.

Impacts of Construction

Although construction activities are temporary in nature, the unusually high noise levels generated by many pieces of construction equipment are often a source of annoyance to people in the immediate vicinity of a construction site. The vibration generated by construction activities can also be a serious concern, particularly in vibration-sensitive locations; however, at many construction sites, the noise of construction is sufficiently severe that the vibration impact is considered a secondary problem.

In order to assess the potential noise impact of expected construction activities along the proposed corridor, CNEL estimates have been developed for five different types of construction operations. For each type of operation, usage factors for equipment and potential length of time equipment would be utilized were estimated. At present, these estimates involve many simplifying assumptions; however, they are considered adequate for an initial estimate of noise exposure since the exact type of equipment and construction methods will not be known until final design is complete and construction bids received. A general description of each of the types of construction, the alternatives on which they would be utilized, and the major noise sources associated with each operation are described in the following, based on information provided by Bechtel Civil, Inc.

Trench, Retaining Wall, and Fill Construction (transition construction): This type of construction activity would be used between North Broadway and Los Angeles River on the Highland Park alternative. For the North Main alternative, this activity would occur between Alameda Street and Vignes Street for the Chinatown option, or between Alpine Street and College Street for the Second Street option. Both downtown options for North Main would require this activity between North Broadway and Superior Court. An intense construction effort over a 3-month period is estimated in each of the above areas. For these activities, major noise sources include bulldozers, loaders, cranes, backhoes, and trucks.

At-Grade Sections Along City Streets With Pavement Removal: This type of construction would occur between Superior Court and Lifurm Avenue for the North Main alternative. Considerable effort would be concentrated at the Soto Street bridge which is to be demolished and the embankment removed and replaced by an at-grade intersection. Total time required along the entire portion is 18 months. Major noise sources include bulldozers, rollers, loaders, graders, pavement busters, backhoes, welders, compressors, and trucks.

At-Grade Construction With Little or No Pavement Removal: This type of construction is appropriate for the bulk of the Highland Park alternative from the Los Angeles River to the end of the line with an additional section along North Broadway in the S.P.T.C. yard. Total time for the effort is estimated at 27 months. Major noise sources include bulldozers, backhoes, loaders, graders, and trucks.

Subway Cut and Cover: This type of construction would be appropriate for the initial portions of the Chinatown option for both the Highland Park and North Main Street alternatives from the 7th and Flower Station to Temple Street, and for the North Main Street/Chinatown option from North Hill to Alameda Street. Under the Second Street option, both alternatives, this would occur from the 7th and Flower Station to 4th Street and from Hill Street to South Main Street. Total time of this activity would be 18 months for the Highland Park/Chinatown, 30 months for the North Main Street/Chinatown, 36 months for the Highland Park/Second Street and the North Main Street/Second Street options. Major noise sources used would be augers, cranes, backhoes, loaders, pavement busters, compressors, trucks, bulldozers, and rollers.

Subway Tunneling: This activity would occur from Temple Street to the portal at the S.P.T.C. yard for the Highland Park/Chinatown option. For the Highland Park/Second Street tunneling would be from Fourth Street to Hill and Second Streets and from South Main and Second Streets to the portal at the S.P.T.C. yard. Approximately 2 years would be required for the construction. The North Main alternative would require tunneling from Temple Street to Hill and Ord Streets for the Chinatown option, and from Fourth Street to Hill and from Second Streets and South Main and Second Streets to Alameda and North Main Streets for the Second Street option. Major noise sources include augers, cranes, loaders, trucks and compressors.

Aerial Guideway: This type of construction would occur only at the Los Angeles River crossing for the Highland Park alternative, for perhaps 6 months. The North Main alternative would require aerial guideway from Alpine Street and from Rondent Street for the Second Street option to North Broadway for both options. Total time required would be 36 months. Major noise sources used would be auger, cranes, backhoes, loaders, rollers, and trucks.

Based on the average noise levels for construction equipment (listed in Table 11 of the noise study) and the equipment usage factors and operating durations for each of the types of construction, Leq and CNEL estimates have been developed for the alignment alternatives and options utilizing the noise prediction procedure described in the noise study (reference 6). Table 4-31 indicates the potential noise impacts due to construction. First, the average daytime (7 a.m. to 7 p.m.) sound level or Leq during construction working hours is shown for a 50-foot distance from the construction area. Second is shown the 24-hour average noise level, CNEL, for 1 day of work. Finally, the annual average CNEL is displayed, based on 20 working days per month. It should be noted that the annual CNEL estimates are necessarily over-predicted, since most of the construction activities will be staggered as each segment of the line is constructed.

TABLE 4-31

LOS ANGELES-PASADENA LRT EIR (SW) CONSTRUCTION NOISE ESTIMATES

	A-Weighted Sound Level at 50 Feet dB		
Type of Construction	Daytime Leq	Daily CNEL	Annual CNEL
Trench, retailing wall and fill	83	70	62
At grade with pavement removal	89	76	74
At grade, minimal pavement removal	89	75	74
Subway cut and cover	92	78	76
Subway tunnel	90	76	75
Aerial guideway	91	77	75

Source: AAA, Inc., 1988.

The daily CNEL estimated are all below 80 dB, and would be considered acceptable for noise-sensitive land uses if the construction were to last for a short period of time. However, the annual average CNEL values are high, indicative of the long time frame during which construction will be underway. These annual CNEL values demonstrate the need to consider noise mitigation measures where conflicts with noise sensitive land uses exist. The CNEL will diminish with distance from the construction site; however, many land uses along the corridor are within 50 feet of potential construction sites.

The daily CNEL (75 db) projected for construction would normally be considered acceptable for residential and noise sensitive land uses if the construction were to last for short periods of time. However, the annual average CNEL is also high, indicative of the long time frame which construction will be underway. Therefore, construction noise mitigation should be considered where conflicts with noise-sensitive land uses adjacent to the right-of-way exist.

Mitigation Measures

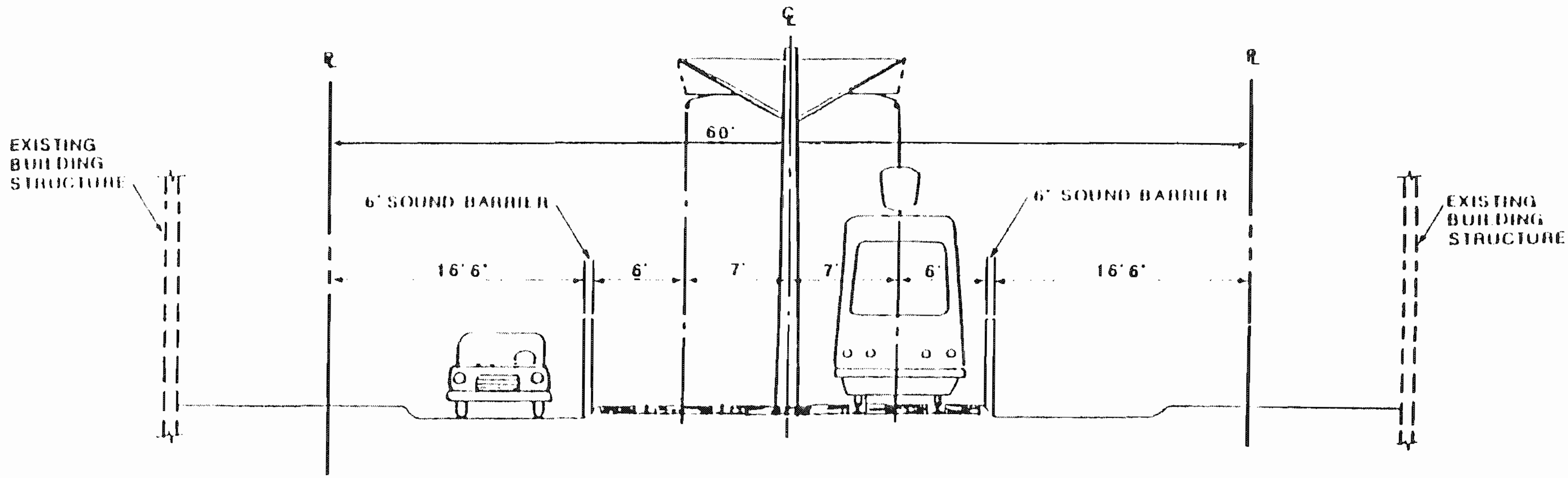
Effective LRT noise level reduction could take the form of soundwalls placed along the right-of-way. Proper placement and construction of soundwalls would reduce the wheel/rail noise source levels by 5 to 15 dBA. In cases where noise sensitive receivers are located on both sides of the right-of-way, acoustically absorbent panels should be placed on the interior wall surfaces in order to minimize reflections to the opposite side land uses. The effectiveness of a soundwall is dependent upon the degree to which the wall breaks line-of-sight between the wheel/rail noise source and the sensitive receptor. The height of the soundwall would vary, depending upon local terrain conditions (i.e., tracks at-grade, in a cutting, or above-grade) and receiver conditions (one-story or multiple-floor structure).

The following recommendations for soundwall placement will mitigate the noise impacts associated with the Highland Park alternative. The locations of the recommended sound walls are indicated in Exhibit 4-16. A prototypical cross-section along the Marmion Way segment (between Avenues 50 and 57) is provided in Exhibit 4-17.

1. Four- to six-foot high soundwall on the south side of the right-of-way from midway between Avenue 41 and Avenue 42 to Shanley Avenue. Acoustically absorbent panels should be used on the side of the wall facing the LRT noise source.

2. Six-foot high soundwall on both sides of the right-of-way from Shanley Avenue to midway between Avenue 60 and Avenue 61. The recommended height of this soundwall is based on the assumption that the LRT s more at 35 mph. However, in actuality, the LRt is more likely to be traveling at lower speeds due to the numerous street crossings between Avenues 50 and 60. A lower height of soundwall should, therefore, be considered along this segment, which would allow enhanced visibility in this constrained segment Acoustically absorbent panels are required on inner face of both soundwalls.

3. Eight-foot high soundwall on the south side of the right-of-way from the intersection of Marmion Way and Arroyo Drive and to Arroyo Verde Road. Six-foot high soundwall on the north side of the right-of-way at the same location should be provided. Inner faces of both walls must consist of acoustically absorbent panels.



Prototypical Marmion Way Segment

Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-17

4. Four-foot high soundwall on both sides of the right-of-way from Adelaine Avenue to Orange Grove Place on the north side of the alignment, and to El Centro Street on the south side. Acoustically absorbent panels should be used on the sides of the walls facing the LRT noise source.

5. Four-foot high soundwall on both sides of the right-of-way between the intersection of Mission Street and Meridian Avenue and the intersection of Fremont Avenue and Grevelia Street. Acoustically absorbent panels required on inner face of both soundwalls.

Vibration Mitigation of LRT Operations

The vibration analysis completed for the Pasadena-Los Angeles Rail Transit Project did not document any specific areas where vibration mitigation measures should be considered though there are certain precautionary measures which should be incorporated into the project design to ensure that no vibration impacts will occur. The following mitigation measures should be employed:

1. For subway segments, the subway box structure should never be in direct contact with a building structure or foundation. Ideally, there should be at least 2 feet of intervening soil between the subway structure and any building structure or foundation.

2. In cases where the box structure will be next to a building, an elastomer element should be placed between the subway box and the building or foundation to prevent direct transmission of groundborne noise and vibration into the building.

Station Noise Mitigation

The stations at Avenue 51 and Avenue 57 have the potential for noise impact from roadway vehicles entering and leaving the station. Increases of 3 to 5 dBA in peak hour Leq or CNEL are expected in these station areas. Noise mitigation in the form of soundwalls would effectively negate this impact if properly placed and constructed. Soundwalls should be used at station property lines which abut residential land uses to reduce the transmission of car and bus noise. The wall could be constructed of standard concrete block material, and should be at least 6 feet high.

Construction Noise Mitigation

Minimizing construction noise in sensitive areas requires consideration of best available equipment during the construction planning stage. Such consideration includes a well-written set of noise specifications for subsequent inclusion in the construction documents to which contractors must comply. The noise specification should be written in the interest of complying with local noise ordinances and should include a set of guidelines to enable contractors to bid properly. These guidelines give the maximum emission levels for specific items of equipment. Quieted machinery is available to contractors, which can result in considerable reduction in construction noise.

Construction noise can also be reduced by planning and proper selection of the quietest way in which to perform an operation. The use of auger-piling rather than pile-driving, as planned for this project, is one example. An example of planning is proper placement of equipment to maximize the distance between noisy equipment and residential properties, such as offsite concrete mixing. Further, temporary noise barriers can be placed around some of the noisiest operations.

Unavoidable Significant Adverse Effects

The mitigation measures recommended in the previous section should be effective in mitigating potential noise and vibration impacts due to LRT operations.

4.7 LIGHT AND GLARE

Light and glare impacts are defined as excessive or undesirable light or reflection sources that induce aesthetic impacts by introducing light at inappropriate times or locations. This analysis also summarizes the potential shade and shadow impacts from structures located within the sun's path.

Environmental Setting

The existing light and glare environment of the proposed project varies in intensity over the various route segments, but the entire project is generally well lighted due to the degree of existing urbanization. Main sources of light and glare include commercial and industrial land uses and other urban features. In addition, a substantial amount of light and glare impacts occur along roadways in the project area.

The greatest shade and shadow impacts from development in downtown Los Angeles in areas adjacent to high-rise structures. Both the Chinatown and Second Street options traverse portions of downtown Los Angeles that are currently affected by shade and shadow impacts of existing land uses. There are no high-rise structures along either the Highland Park or North Main Street alignments outside of downtown Los Angeles.

Environmental Impacts

During the construction phase of the LRT project, construction equipment, safety lighting, and other sources of lighting will create excessive light and glare. In some segments of the route alignment, these impacts will be severe. However, in instances where light and glare impacts would most directly affect residences, light and glare and noise standards may prevent 24-hour construction activities.

In particular, the cut-and-cover construction of the downtown portions of the downtown alignment options and the aerial structures proposed for the North Main Street alignment will induce shadow impacts on land immediately adjacent to the alignment. For the most part, these shadows will fall within the existing roadway right-of-way. Minimal impact is anticipated from the conversion of the existing railroad track to LRT track for the Highland Park alignment.

Once in operation, the lights from the LRT vehicle will induce light and glare impacts on certain portions of the route during the night. The vehicles themselves would cause flashes of glare on sunny days by reflection from the vehicle's sides and windows. This impact will be similar to reflections from automobiles currently experienced on roadways. The impact of reflections from the LRT vehicles, however, is not expected to be significant.

Transit stations are well lighted facilities. Lighting at stations is necessary for security and illuminating signage, platform edges, advertising, seating, fare areas, ramps, and stairs. Walkways, rail and pedestrian crossings, driveways, and parking areas are also lighted. Signal lights will be used at crossing gates. The intensity of lighting is similar to normal street and parking lot levels, so no significant impact is expected in this already urbanized corridor.

Those portions of the North Main Street alternative located on an aerial guideway structure will be affected by shadows cast by the supporting structure. For the most part, and during the majority of the daytime hours, the shadows will be confined to the existing roadway.

Mitigation Measures

1. Station area and guideway lighting fixtures shall incorporate directional shielding where needed to avoid the intrusion of unwanted light and glare into adjacent sensitive land uses, such as residential.

2. Traction power substations shall be shielded from adjacent sensitive land uses.

3. Walls constructed for noise abatement and landscaping will also screen lighting from land uses adjacent to the LRT system.

Unavoidable Significant Adverse Effects

Localized impacts will exist on streets and at crossings and stations where lighting is necessary for safe operation of the LRT. Shadow impacts will occur on North Main Street and Mission Road due to the aerial structure.

4.8 RISK OF UPSET

Risk of upset, as defined by CEQA, refers to any risk of explosion or the release of hazardous substances (including, but not limited to, oil, pesticides, hazardous or toxic chemicals, or radiation) in the event of an accident or natural disaster. Furthermore, a project may be deemed to have a significant effect on the environment if it will interfere with an emergency response or evacuation plan. The major potential for upset related to this project involves the presence of subsurface contamination in industrial areas where hazardous materials were either used, stored, or disposed.

Environmental Setting

Hazardous Materials and Contaminated Soils

The presence of subsurface contamination due to urban activities is directly correlated with the type of past and present land use. Naturally occurring hazardous soil conditions are generally attributed to unique geologic conditions which may result in methane gas accumulations, radon, and other hazardous substances.

MBA conducted a review of records and reports to determine the likelihood of finding toxic and hazardous materials contamination in the project area. The opinions rendered in this analysis are based solely on a review of documented hazardous materials sites, available maps, records, and consultations with available environmental, regulatory, or health officials. No soil or water sampling, laboratory analysis, inspection for asbestos, or subsurface testing were performed by MBA for this analysis.

According to the U.S. Environmental Protection Agency National Priorities List (NPL) Fact Book (revised June 1986 and updated July 1987), there are no NPL sites located in the project area. These NPL listed sites are commonly referred to as "superfund sites."

Each region of the EPA produces a Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) list. CERCLIS is a list of all potential hazardous waste sites identified by the EPA. Once on CERCLIS, all sites are assessed by the EPA, or an appropriate state regulatory agency, to determine what action, if any, needs to be taken. The identification of a site from the CERCLIS list does not necessarily confirm that an actual health or environmental threat exists. MBA reviewed the EPA Region 9 CERCLIS list, which includes the State of California, and identified three sites within the project area or adjacent to one of the proposed alignments. The sites are identified in Table 4-32. Locations of these sites are indicated in Exhibit 4-18.

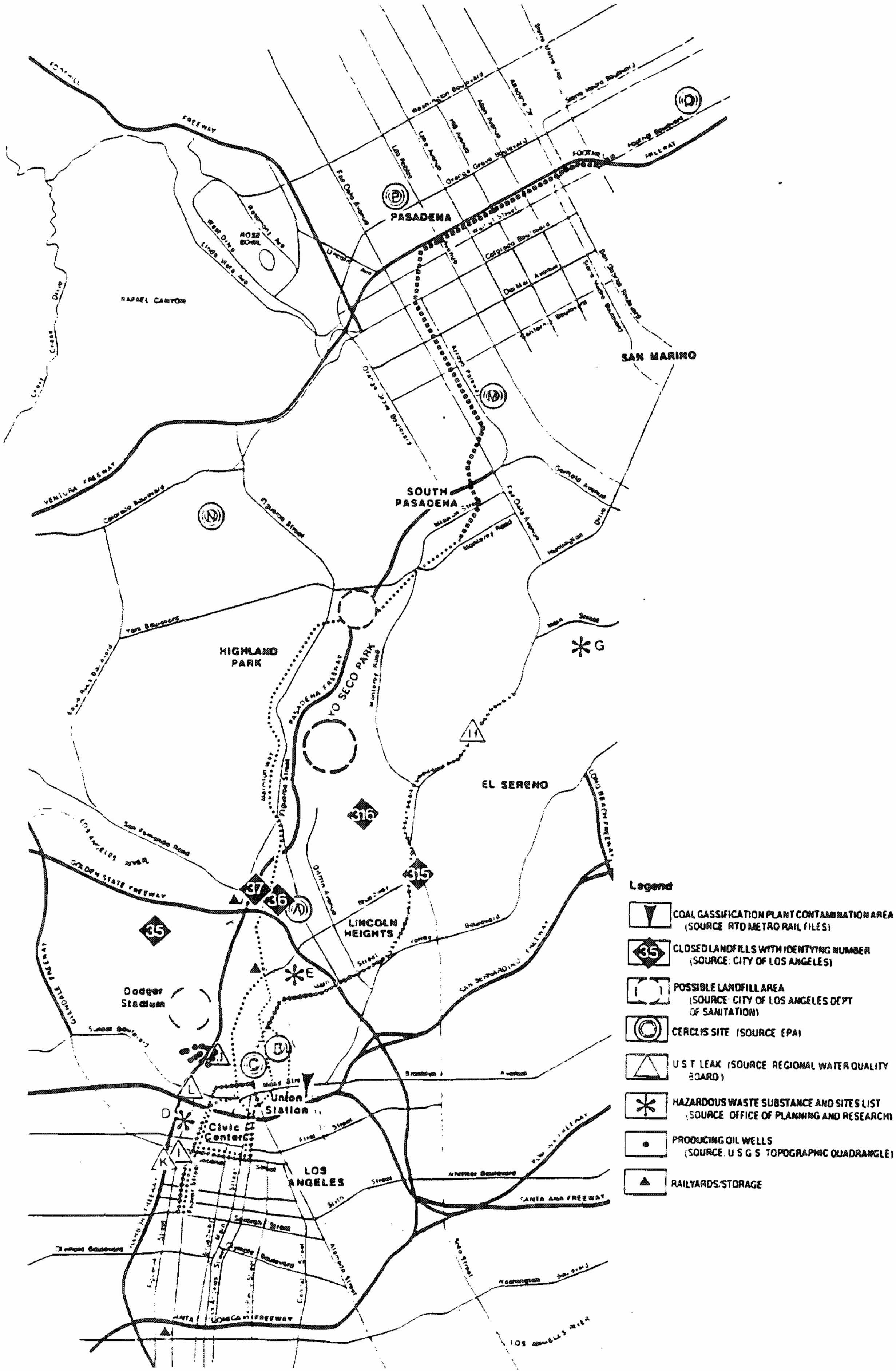
TABLE 4-32

HAZARDOUS SITES

Map Reference[a]	Facility	Address	Reference
A	Baron Manufacturing	241 Avenue 25	CERCLIS
B	Magnus Company, Inc.	860 North Main	CERCLIS
C	Mogul Corporation	967 North Vignes	CERCLIS
D	Fire Station #3	108 Fremont Avenue	OPR
E	Bortz Oil	1746 North Spring	OPR
F	Arco Parking Structure	400 South Flower Street	OPR
G	Food for Life	3580 Pasadena Avenue	OPR
H	Arco Station	4860 Huntington Drive	RWQCB
I	Chevron Station	110 West Second Street	RWQCB
J	Morgan Services, Inc.	905 Yale Street	RWQCB
K	Unocal Station	1031 West Second Street	RWQCB
L	Unocal Station	900 West Sunset Boulevard	RWQCB
M	Huntington Desk	855 S. Arroyo Parkway	CERCLIS
N	Jet Propulsion Laboratory	4800 Oak Grove Drive	CERCLIS
O	California Institute of Technology	1201 E. California Blvd.	CERCLIS
P	Pasadena Water and Power Department	311 W. Mountain	CERCLIS
Q	Air Logistics Corporation	3600 E. Foothill	CERCLIS

a Locations of sites are indicated in Exhibit 4-18.

Sources: CERCLIS: EPA Comprehensive Environmental Response, Compensation and Liability Information System.
OPR: Office of Planning, Research, Hazardous Waste Substance and Sites List.
RWQCB: Regional Water Quality Control Board. Leaking Underground Storage Tank (LUST) List.



Hazardous Waste Sites
Pasadena-Los Angeles Light Rail Transit Project

NO SCALE

Exhibit 4-18

One site, identified on the CERCLIS list as located immediately adjacent to the on the North Main Street alignment. The Magnus Company formerly operated on this site from 1927 to 1948 and manufactured bearings for railroad cars involving lead wastes. The EPA recommended that no further action be taken because site is presently paved over. Small quantities of lead drosses may be buried onsite, however (EPA, 1984).

The Office of Planning and Research for the State of California also publishes a list of hazardous waste sites. The list identified four sites in the project area, which are also identified in Table 4-32. The exact status of the sites has not been researched and actual contamination may or may not still be present in these areas. Only one site, the Arco parking structure, is located next to an alignment.

One of the sites, Bortz Oil, was also listed in the California Expenditure Plan for the Hazardous Substance Clean-Up Bond Act published by the Department of Health Services. According to this publication, soil and groundwater at the site are contaminated with benzene, toluene, xylene, ethylbenzene, acetone, methyl ethyl ketone, methylene, and chloride.

The hazardous waste substance and site list, as well as the leaking underground storage tank (LUST) list, published by the Regional Water Quality Control Board (RWQCB) lists LUST problems in the State of California. A list of five of the closest LUST sites is also provided in Table 4-32. One site, the Arco station located at 4860 Huntington Drive, is identified on the RWQCB list and is located adjacent to the North Main Street alignment.

Five sites in the project area were identified from a published list of active and closed disposal facilities, a list of known landfills provided by the City of Los Angeles. Four of the closed landfills are Class II and the remaining closed landfill is a Class III. Class II landfills are those which handle municipal solid waste while Class III landfills are those that are designated to handle inert materials only. Inert materials do not have any active chemical properties and may include rock, earth, and construction and demolition debris. The five landfills include the following:

#35 Bishop Canyon (Los Angeles City), 929 Academy Drive, Class II closed landfill.

#36 Los Angeles City Lacy Street, Avenue 26 and Lacy Street, Class II closed landfill.

#37 Avenue 26 and Figueroa (Los Angeles City), unknown ownership. Class II closed landfill.

#315 Mission Road and Broadway, ownership unknown, Class III closed landfill.

#316 Victorine Avenue, Los Angeles, ownership unknown, Class II closed landfill.

In addition to the listed landfills, the Los Angeles Department of Sanitation has information on other possible landfill areas within the project site which are indicated in Exhibit 4-18. Also shown in Exhibit 4-18 is the location of two additional "possible" closed landfills. One is located near the Montecito Heights Recreation Center in the Ernest E. Debs Regional Park, and the other in the Arroyo Seco Park. These areas are suspected to have been operational landfills in the 1950s though further information concerning these sites is unavailable.

Methane Gas Hazard

The underlying bedrock through much of the project site is part of the Puente Formation. This formation includes course grained, oil-bearing reservoir rocks, many of which are currently being mined for oil. The occurrence of oil in the area has led to several associated hazardous materials problems in subsurface construction, including the subway for Metro Rail in the vicinity (RTD, 1987). Soils are sometimes saturated with tar and hydrocarbons in areas of oil production and these soils, although naturally occurring, must still be treated as hazardous materials. Soils of this type have been found in the project area.

In 1985, a large methane gas explosion occurred at 3rd Street and Ogden Drive in the Fairfax area of Los Angeles. Gaseous vapors from oil-bearing units had seeped up to the surface, collected inside a building, and ignited. Methane gas hazards exist throughout the area, and mining and excavation could release gases into the air (RTD files).

In the area of Vignes Street and Ramirez Street, a large area of contaminated soil was found by the California Department of Transportation while excavating for a new busway. The area supported a large coal gasification plant from 1928 to 1945 that released several contaminants into the soil. Contamination may extend into the Union Station area which could impact the North Main Street alignment and those downtown options for the Highland Park alignment that extended to Union Station. Contaminants include naphthalene, iodine, ethylbenzene, biphenyl, xylene, and styrene (RTD, 1988).

Environmental Impacts

The greatest potential for encountering contaminated soils involves the alignment segments which will be underground. Contaminated soils could be encountered during excavation and/or tunneling along either the Second Street or Chinatown routes in the downtown, especially in the vicinity of Union Station.

A single known and recorded hazardous waste site is located in close proximity to the alignment proposed for the North Main Street alternative. The site is presently occupied by the Magnus Company, Inc., located at 860 North Main. A single CERCLIS site is located adjacent to the Highland Park alignment in Pasadena on a parcel presently occupied by Huntington Desk.

The downtown options located in close proximity to Union Station will be located where soil contaminants (including naphthalene, iodine, theyibenzene, biphenyl, xylene , and styrene) may be found.

The Highland Park and North Main Street alignments are also located above a number of known or suspected landfills. No excavation at these locations is planned and construction and operation of the LRT will not affect or be affected by the landfills.

Mitigation Measures

Detailed geotechnical and hazardous materials investigations will be conducted in subsequent phases of planning after final selection of the preferred alignment is made. This investigation will include field surveys, soil samplings, and soil borings. In addition, the following mitigation measures will be effective in reducing the potential for upset.

1. All underground structures must be designed to include adequate ventilation to reduce the potential for methane gas accumulations. Design measures could include impermeable membranes surrounding the tunnel and other precautionary measures.

2. Where necessary, relief wells will be employed to remove underground methane gas.

3. In cut-and-cover and subway tunnels and stations, high density polyethylene (HDPE) gas barrier membranes shall be applied in conjunction with cast-in-place concrete.

During operations, gas buildout to hazardous levels shall be prevented by the following system features:

4. System features utilizing natural ventilation, ventilation created by train movements, and by providing blast/relief shafts at the ends of stations shall be employed to reduce gas build-up.

5. A ventilation system of fans and controls that can bring in fresh air and exhaust gases will be provided where required.

6. A gas sensing system, supplemented by the use of hand-held gas detectors, that will detect changes in the level of gas present will be employed. If gas readings increase over a period of time at a given sensor location, the source of the gas infiltration will be located and sealed.

Unavoidable Significant Adverse Effects

During construction and operation of the LRT, hazardous substances may be encountered, particularly in those areas which will be underground. The level of risk can be reduced to acceptable levels with the implementation of the mitigation measures identified in the previous section.

4.9 POPULATION AND HOUSING

This section of the EIR examines the proposed Pasadena-Los Angeles LRT impacts on housing resources and population in the area to be served by the project.

Environmental Setting

The proposed alignments will pass through the cities of Los Angeles, South Pasadena, and Pasadena. The City of Los Angeles is divided into 35 community plan districts. The proposed North Main Street alignment traverses four community plan districts including the Central City, Central City North, Boyle Heights, and Northeast Los Angeles districts. The Highland Park alternative cross three community plan districts including the Central City, Silverlake-Echo Park, and the Northeast districts, as well as the City of South Pasadena and the City of Pasadena. The population and housing characteristics of affected districts are summarized in Table 4-33.

Three of the five communities, Northeast Central City, Northeast Los Angeles, and Silverlake-Echo Park, experienced more than a 10 percent increase in population between 1980 and 1986. The Northeast Central City District registered the second greatest increase in population among the 35 districts that comprise the city.

TABLE 4-33

POPULATION AND HOUSING CHARACTERISTICS OF REGION[a]

	Population			Housing		
Alignment/District	1980	1986	Change	1980	1986	Change
North Main Street Alignment Alternative						
Central City	27,480	28,490	1,010	11,887	13,626	1,739
Central City North	13,447	15,292	1,845	2,044	2,575	531
Boyle Heights	81,279	87,354	6,07	522,134	22,659	525
Northeast Los Angeles	198,229	224,753	26,524	66,624	71,321	4,697
Highland Park Alignment Alternative						
Central City	27,480	28,490	1,010	11,887	13,626	1,739
Silver Lake-Echo Park	76,054	84,420	8,366	29,045	30,764	1,719
Northeast Los Angeles	198,229	224,753	26,524	66,624	71,321	4,697
City of South Pasadena	22,681	23,926	1,245	10,391	10,635	244
City of Pasadena	118,072	129,100	11,028	49,732	50,672	940

a 1986 statistics are used in this table for comparative purposes only.

Source: City of Los Angeles Planning Department, 1986 (most recent housing and population estimates); Population Estimate and Housing Inventory, 1988; and State of California Department of Finance, 1988.

The Southern California Association of Governments (SCAG) makes growth projections which serves as the basis for regional planning and the development growth management policies. SCAG has divided its administrative region into 24 geographic subareas which are referred to as subregions. These subregions are classified as urban, urbanizing, or mountains/deserts. The current adopted growth forecast for the SCAG region includes housing, population, and employment projections for each of the subregions. The majority of the Pasadena-Los Angeles LRT project area is located in the Glendale/Pasadena and Central Los Angeles subregions. Table 4-34 indicates the growth projections for these subregions and SCAG projections for Los Angeles County.

TABLE 4-34

POPULATION, HOUSING, AND EMPLOYMENT PROJECTIONS FOR REGION

	SCAG Projection		Change -- 1984-2010	
SCAG Subregion	1984	2010	Number	Percent
Central Los Angeles				
Population	2,102,000	2,304,400	202,400	9.63
Housing	777,100	878,300	101,200	13.02
Employment	1,435,300	1,677,200	241,900	16.85
Glendale/Pasadena				
Population	1,202,200	1,432,100	229,900	19.12
Housing	4,425,000	544,300	101,800	23.95
Employment	485,400	616,800	131,400	27.07
Los Angeles County				
Population	7,862,700	10,165,600	2,302,900	29.29
Housing	2,923,600	3,728,500	1,004,900	34.37
Employment	4,053,000	5,519,400	1,466,400	36.18

Source: SCAG. SCAG-88 Modified Growth Forecast: Population, Housing, and Employment. February 1985.

Environmental Impacts

The implementation of the proposed LRT project could impact housing and population characteristics. First, the construction of the proposed project will require the demolition of existing housing units to make way for stations and other facilities. Second, the operation of the LRT may involve growth-inducing impacts including increases in residential development densities with corresponding increases in population.

Displacement Impacts

Residential densities in the vicinity of the proposed alignments range from low density single-family development to multiple-family apartments. An estimated 36 housing units are located immediately adjacent to the Chinatown alignment option in downtown, 760 units are located along the Highland Park alignment, and 408 units are located adjacent to the North Main alignment. No units are located in the immediate vicinity of the Second Street downtown alignment options or the Union Station "No Subway" option.

Section 4.1 of this EIR documents the displacement impacts associated with each project alternative. The North Main Street alignment will involve the displacement of 28 housing units. The implementation of the Highland Park alignment would involve the displacement of seven units.

Impacts on Housing Demand

Workers will be required to operate and maintain the Pasadena-Los Angeles LRT once it becomes operational. In addition, thousands of short-term jobs will be provided during construction phases of the project. The employment generation resulting from the construction and operation of the proposed LRT will utilize much of the labor resources that will be used in other LRT segments, such as Long Beach-Los Angeles line. Employment generated by the proposed project is not expected to have a measurable impact on local housing markets or demand.

There is a potential for increased development pressures and densities in the vicinity of some LRT stations where this is permitted under local land use and development controls. In addition, the operation of the LRT, together with the other nearby transit systems in the region, may have a growth-inducing effect on residential development, resulting in population growth elsewhere in the region. The growth-inducing implications of the proposed project are discussed in detail in Section 9.0 of this EIR.

Mitigation Measures

Mitigation measures focus on reducing the project's adverse impacts concerning the removal of existing residential units and fair and adequate compensation for tenants and owners of these units. Section 4.1 (Land Use) identifies the appropriate mitigation measures that should be followed to ensure that fair and adequate compensation is paid to residents and property owners who will be displaced by the proposed project.

Unavoidable Significant Adverse Effects

The implementation of those mitigation measures recommended in Section 4.1 of this EIR will be effective in reducing adverse impact levels below significance.

4.10 PUBLIC SERVICES

This section of the EIR evaluates the proposed project's impacts on local public services including police, fire, and schools.

A. POLICE AND LAW ENFORCEMENT

While the rail transit operation will maintain a separate transit police network, law enforcement personnel from either Los Angeles, South Pasadena, or Pasadena may be called upon to respond to emergencies and perform police activities. The North Main Street alignment is located entirely within the corporate boundaries of the City Los Angeles. Therefore, only the Los Angeles Police Department (LAPD) will be impacted by development of this alternative.

Environmental Setting

Los Angeles Police Department (LAPD)

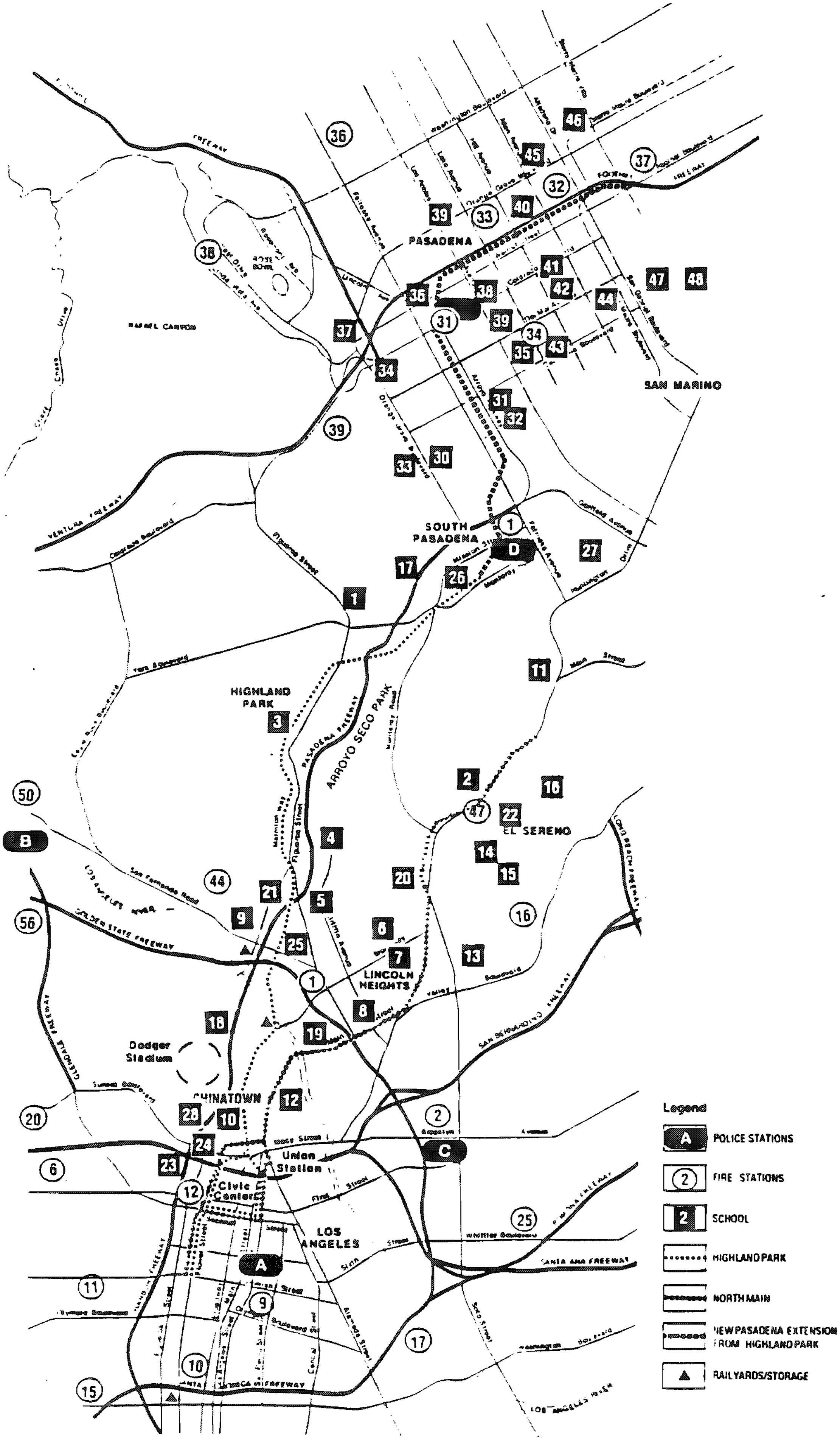
Police service for the North Main Street alternative and the major portion of the Highland Park alternative is provided by the LAPD. The project is located with the Police Department's Central Bureau. Both alignments traverse three reporting districts within the Central Bureau: Central Area, Northeast Area, and the Hollenbeck Area. The stations within the three areas indicated in Exhibit 4-19 are responsible for crime prevention, investigation, and law enforcement. The officers, equipment, and locations of the specific stations responding to calls in the project area are summarized in Table 4-35.

TABLE 4-35

POLICE LOCATION, PERSONNEL, AND EQUIPMENT

Station/Location	Personnel/Equipment
Central Division 251 East 6th Street	304 sworn officers 81 vehicles (Central Bureau Traffic Division located here - 140 vehicles)
Northeast Area Division 3353 San Fernando Road	199 sworn officers 53 vehicles
Hollenbeck Division 7111 East 1st Street	201 sworn officers 58 vehicles
South Pasadena Police Department 1422 Mission Street	30 sworn officers 8 vehicles
Pasadena Police Department	220 sworn officers 35 vehicles

Sources: City of Los Angeles Police Department Central Bureau, 1988.
City of South Pasadena Police Department, 1988.
City of Pasadena Police Department, 1989.



School, Police and Fire Locations
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-19

The City of Los Angeles is divided into 18 areas, each with its own division. The Central Bureau evaluates the distribution of personnel and equipment on an ongoing basis. Based on a citywide deployment formula, officers are transferred between divisions, commensurate with the changing needs of each area, on monthly intervals. In addition, the Central Bureau adjusts its basic car deployment semi-annually. In view of current funding and the deployment formula, the LAPD will be able to maintain a level of service in the three areas affected by the proposed alignment comparable to other portions of the city.

A review of the past annual crime statistics for the Central Bureau indicated an average crime rate higher than citywide average. Crimes most frequently reported within the project area include burglary, robbery, burglary from vehicles, and auto theft. Average response time of the stations along the route will vary from 7.9 to 8.8 minutes. This is comparable to the citywide response time of 8.5 minutes. It should be noted that these are average response times and that calls to the stations are relayed to patrol cars on the street. Therefore, a response is from where the patrol car is located on the street rather than from a car as it is dispatched directly from a station. Actual response time is dependent on traffic congestion and the distance between the unit answering a call and the site itself.

South Pasadena Police Department

Approximately 2 miles of the Highland Park alternative crosses through a portion of South Pasadena. As a result, the South Pasadena Police Department will have jurisdiction over this segment. Police service for the entire city is provided by one station located at 1422 Mission Street. The city's police department consists of 30 sworn officers and eight marked cars. The police department provides crime prevention, investigation, and law enforcement services.

The majority of crimes in the vicinity of the Highland Park alignment include burglary, burglary from automobiles, and auto theft. The area surrounding the alternative is considered to have a moderate crime rate. Response times to emergencies along this portion of the alternative is estimated to be 1-1/2 minutes. This is considered representative of the average citywide response of 1 to 2-1/2 minutes.

Pasadena Police Department

The Highland Park alignment alternative extends northward into the City of Pasadena until it reaches I-210. At this point, the alignment merges into the center of the freeway continuing eastward. The City of Pasadena Police Department has jurisdiction over law enforcement for those portions of the LRT line located in the City of Pasadena.

The City of Pasadena Police Department operates out of a single station located at 142 North Arroyo Parkway, approximately 2,500 feet east of the Highland Park alignment alternative. The police department has an authorized strength of 220 sworn officers.

Environmental Impacts

The Pasadena-Los Angeles Rail Transit Project will result in an increase in commuter and pedestrian traffic, particularly around the railway stations. Due to this concentration of commuter and pedestrian traffic, crime problems may arise from time to time. The proposed rail transit line may also increase the need for general police service in two ways. First, there is the need to insure the safety of riders, station attendants, persons using the fare machines, and unattended automobiles at stations and adjacent parking lots. Second, the police will be required to respond to accidents involving vehicles and pedestrians.

Transit police will be used to ensure the safety of riders. Only in those instances where backup support is required, would local police departments be called upon to intervene. Transit police will patrol the rail line in marked and unmarked cars and will be linked by radio with operators in the trains and with the central control facility located near the intersection of Imperial Highway and Willowbrook Avenue. Other members of the transit police will patrol stations, vehicles, and possible trouble-spots along the route. Undercover officers will be stationed along the line and will carry hidden walkie-talkies in places such as inside lunch-boxes and thermoses.

Direct communication between passengers and the train operator will be possible with passenger-assistance phones located in each rail car which would allow riders to press a button and talk with the operator. At night and during mid-day, trains will consist of one car, with the operator at the front. Two-car trains will be used only during peak hours.

Train operators will be in radio contact with central control personnel at all times. They will also have access to a silent alarm that will set lights flashing on the roofs of the rail vehicles, visible to police on the ground and in helicopters. In addition, the silent alarm will trigger an emergency signal in the central control building.

Fare inspectors riding the line will also be responsible for recognizing potentially dangerous situations and reporting these to the central control operator by using walkie-talkies or the passenger-assistance phone.

Closed-circuit cameras will be provided at each station which will be linked to the central control facility. The cameras will survey special boarding areas designated for use during nonrush hours and anyone loitering outside these areas can be questioned through loudspeakers by central control personnel.

Mitigation Measures

Because the rail transit system will have its separate transit security force, the impact on law enforcement services should be kept to a minimum. Other mitigation measures designated to reduce the impacts of these services focus on implementing general safety and security measures. Publicity and driver education programs, coupled with highly visible signage and signal systems, would be implemented in order to reduce the possibility of accidents between the LRT and either vehicles or pedestrians. Security of the LRT should be incorporated into the design features of the system. These design features will enhance the perceived, as well as the actual, security of the buildings, equipment, employees, and patrons. In addition, the Los Angeles Police Department recommended a number of mitigation measures which will be implemented by LACTC. These include the following:

1. Two-way voice communications between patrons and central control personnel will be possible at selected points throughout the route, such as fare vending areas, platforms, and shelter stops.

2. Closed-circuit television linked to the central control system will be provided at high-risk and security areas throughout the system.

3. A "silent alarm" device will be installed so the car operator may summon police or alert the central control station to a problem on the train.

4. An alarm system will be installed to protect unauthorized entry and tampering with equipment, such as fare vending machines.

5. The design of all passenger stations and shelter stops will emphasize defensible space to prevent the creation of blind spots.

6. Parking lots associated with the LRT will be designed to maximize visibility within the lots and from surrounding areas. Lighting will be designed to avoid the creation of dark corners.

7. Interior finish of the vehicle will be constructed of vandal-resistant material. Seats, seat backs, equipment access panels, etc. will only be removable with the use of special tools.

The following mitigation measures are recommended to enhance public safety:

8. Where practical, guideways shall be protected from encroachment of people, thrown objects, or unauthorized vehicles. Barriers should be of a height to prevent intrusion and deter the hurling of objects into the guideway.

9. At-grade street crossings should provide access for emergency services.

10. Power substation access shall be limited to authorized personnel only. Power substations should be enclosed by nonscalable barriers of a height to discourage hurling of objects into the enclosure. Power stations should have burglar alarms.

<u>Unavoidable Significant Adverse Effects</u>

The construction and operation of the proposed LRT is not expected to result in any significant adverse impacts on law enforcement services with the implementation of the recommended mitigation measures.

B. FIRE PROTECTION

The Highland Park alignment traverses Los Angeles, South Pasadena, and Pasadena. Potentially, fire protection personnel may be required to respond to emergencies and perform other activities within their respective jurisdictions. The North Main Street alignment is located entirely within the incorporated boundaries of the City of Los Angeles. Therefore, only the Los Angeles Fire Department (LAFD) will be potentially impacted by the development of this alternative.

Environmental Setting

Los Angeles Fire Department (LAFD)

Fire protection services for the North Main alternative and portions of the Highland Park alternative are provided by the LAFD. The LAFD is responsible for fire suppression, fire protection, design consultation, inspection, planning, and review. In addition, the fire department responds to a variety of medical emergencies. The personnel, equipment, and locations of the stations (within 3 miles) of each alignment which may be asked to respond to emergencies along the proposed routes are identified in Table 4-36. The location of the stations is indicated in Exhibit 4-19.

Response times along the route vary, depending upon the distance between the rail line and the station receiving the call. All fire stations have a 1-minute or less response between the time a call is received and the time they leave their quarters. After leaving their quarters, a company takes 2 to 3 minutes per mile to reach a site. Travel time varies according to the route chosen and traffic volumes at the time. Total response time to emergencies at the substations or rail line ranges between 4 and 5 minutes which the maximum response time throughout the city.

TABLE 4-36

LOS ANGELES FIRE DEPARTMENT STATION LOCATIONS
EQUIPMENT AND PERSONNEL

Station Number[a]	Address	Equipment Personnel	Nearest Alternative (miles)
1	2320 Pasadena Avenue Los Angeles 90031	Task Force Rescue Unit	(0.4) Highland Park
2	1962 E. Brooklyn Avenue Los Angeles 90033 (Hq. Batt. 7)	Task Force Rescue Unit	(2.2) North Main
3	108 N. Fremont Avenue Los Angeles 90012 (Hq. Batt. 1)	Heavy Utility	(0.2) Chinatown
4	800 N. Main Street Los Angeles 90012	Task Force Rescue Unit Chemical Emergency Unit Command Post Vehicle	(0.1) North Main
6	326 N. Virgil Avenue Los Angeles 90004	Engine Company	(2.6) Highland Park
9	430 E. 7th Street Los Angeles 90014 (Hq. Batt. 1)	Task Force	(0.8) Second Street
10	1335 S. Olive Street Los Angeles 90015	Task Force Rescue Unit Food Service	(0.9) North Main
11	1819 W. 7th Street Los Angeles 90057 (Hq. Batt. 11)	Task Force Rescue Unit	(1.0) Chinatown
12	5921 N. Figueroa Street Los Angeles 90042	Task Force Rescue Unit	(<0.1) Chinatown
15	915 W. Jefferson Blvd. Los Angeles 90007	Task Force Rescue Unit	(2.2) Chinatown
16	2011 N. Eastern Avenue Los Angeles 90032	Engine Company	(1.0) North Main

TABLE 4-36 (continued)

Station Number[a]	Address	Equipment Personnel	Nearest Alternative (miles)
17	1601 S. Santa Fe Avenue Los Angeles 90021	Task Force Rescue Unit Emergency Medical Tech.	(2.3) North Main
20	2144 Sunset Blvd. Los Angeles 90026	Task Force Rescue Unit	(1.8) Chinatown
25	2927 Whittier Blvd. Los Angeles 90023	Engine Company	(2.4) Second Street
42	2021 Colorado Blvd. Los Angeles 90041	Engine Company	(2.4) Highland Park
44	1410 Cypress Avenue Los Angeles 90065	Engine Company	(0.8) Highland Park
47	4575 Huntington Dr. S. Los Angeles 90032	Task Force	(<0.1) North Main
50	3036 Fletcher Drive Los Angeles 90065 (Hq. Batt. 2)	Task Force	(2.2) Highland Park
56	2838 Rowena Avenue Los Angeles 90039	Engine Company	(3.0) Highland Park

a Station locations are indicated in Exhibit 4-19.

Source: City of Los Angeles Fire Department, 1988.

South Pasadena Fire Department

Fire service for a portion of the Highland Park alternative will be provided by the South Pasadena Fire Department (SPFD). The SPFD is responsible for fire suppression, protection, inspections, planning, and review. In addition, the fire department responds to some medical emergencies.

South Pasadena has a single fire station located at 817 Grand Avenue--Station #1 (refer to Exhibit 4-19). On a 24-hour basis, the station has six firefighting personnel. The city also has seven volunteers and eight auxiliary personnel available for fire service. Station #1 has a paramedic unit and two engines, one engine with a 150-foot ladder.

Average response time throughout the city is 3 minutes. The estimated response time of Station #1 to the portion of the alternative within the city boundary is 1 minute.

Currently, neither the South Pasadena or Los Angeles fire departments have any expansion plans. However, both departments periodically evaluate their fire services and the community needs to determine if any service changes are warranted.

Pasadena Fire Department

Fire service in that portion of the Highland Park alignment located in the City of Pasadena is provided by the City of Pasadena Fire Department. The Pasadena Fire Department is responsible for a full range of services including fire suppression, protection, inspections, emergency preparedness and planning, and medical assistance.

The Pasadena Fire Department operates eight stations within the city. In the event of a major incident, all personnel and equipment from a number of stations may be called to respond. The stations closest to the alignment, their address, and staffing are summarized in Table 4-37.

TABLE 4-37

CITY OF PASADENA FIRE DEPARTMENT STATION LOCATIONS, EQUIPMENT AND PERSONNEL

Station Number[a]	Address	Equipment Personnel	Distance From Highland Park Nearest Alternative (miles)
31	175 North Marengo Pasadena, California	Engine company Ladder truck Paramedic unit	0.5
32	2424 East Villa Pasadena, California	Engine company ladder truck Paramedic unit	0.5
33	515 North Lake	Engine company	0.6
34	1126 East Del Mar	Engine company	0.6
36	1435 North Raymond	Engine company Paramedic unit	1.25
37	3430 East Foothill Boulevard	Engine company	0.5
38	1150 Linda Vista	Engine company	3.5
39	50 Avenue 64	Engine company	1.8

a Station numbers refer to map locations indicated on Exhibit 4-19.

Source: City of Pasadena Fire Department, 1989.

Environmental Impacts

The current level of fire service in Pasadena, South Pasadena, and the Los Angeles fire districts serving the proposed alignments is adequate. The project is anticipated to have an adverse impact on the fire departments in terms of increased demand for fire fighting and paramedic units, increased inspection load, and increased incidence of false alarms. Due to the project's proposed track, substations, power stations, and maintenance yards, an emergency response would require a minimum of one engine and one rescue unit. Therefore, a first alarm response to many sites could impact the department if a simultaneous incident occurs elsewhere, particularly in South Pasadena. The simultaneous demand may require additional manpower and equipment which is not currently available, and would necessitate automatic and mutual aid from neighboring jurisdictions.

Specifically, the concentrations of pedestrians and traffic in and around the substations during commuter periods may lengthen response times, particularly for medical emergencies. The concentration of people, automobiles, and flammable material at storage and maintenance yards also increases potentially hazardous situations. The scheduling of the trains and the at-grade street/track intersections may interfere with the movement of emergency vehicles.

Mitigation Measures

The services provided by the three fire departments are based upon their community's (or district) needs. All departments conduct ongoing evaluations of their community's service needs. An important consideration in this evaluation is the ability to provide emergency services within an acceptable response time. If ongoing evaluations indicate increased response time, then the acquisition of equipment, personnel, and/or new stations is considered.

Tracks, substations, power stations, storage, and maintenance yards will be designed and constructed in accordance with all applicable fire codes. Input regarding the alignment and structure design from the fire departments will be incorporated into the proposed project. Final plans will be reviewed by the fire departments. Construction and operation of the transit system will be subject to periodic department inspection. The following mitigation measures will be implemented.

1. Sufficient emergency access to allow unrestricted movement of emergency response vehicles.

2. As required by the fire department(s), access for fire equipment must be maintained during construction and operation of the transit system.

3. Other fire prevention measures will be observed, such as use of smoke detectors in stations and on trains.

4. Use of fire retardant material on trains and in stations.

5. Access to telephones in stations and parking areas to report emergencies to the fire department(s).

6. Communication devices on-board the trains to alert operators about emergencies.

7. Fire alarm systems shall be installed on trains, power stations, and storage areas.

8. Installation of automatic sprinkler systems within substations.

9. Installation of automatic fire fighting systems in power stations and storage areas commensurate to their fire hazards.

10. Availability of hand-held fire extinguishers on trains and in substations.

Unavoidable Significant Adverse Effects

The construction and operation of the proposed LRT project will result in an incremental increase in service demands. These impacts, however, are not judged to represent a significant adverse impact on the environment.

C. SCHOOLS

Environmental Setting

The proposed alignments are within three school districts: the Los Angeles Unified School District, South Pasadena School District, and the Pasadena Unified School District. The addresses and distance to the nearest alignment for all the schools (in all districts) within 1/2 mile of either alignment are listed in Table 4-38. The location of these schools are identified in Exhibit 4-19. Several of the schools are located immediately adjacent to the proposed alignments (Evans Community Adult School, Arroyo Seco Alternative, Ann Street Elementary, and Arroyo Vista School). Of the 27 schools identified, 12 schools are currently located near a freeway or a main arterial. These include Evans Adult School, Downtown Business Magnet, Solano Elementary, Ann Elementary, Loreto Elementary, Hillside Elementary, Garvanza

Elementary, Huntington Drive Elementary, Gates Elementary, Lincoln High, Sierra Vista Elementary, and Marengo School. In addition to these, there are two private schools adjacent to the alignments: Stancliff School and Cathedral High School.

TABLE 4-38

SCHOOLS LOCATED IN PROJECT AREA

Number[a]	School	Address	Distance to Alignment (miles)	
1	Garvanza Elementary	317 N. Avenue 62, L.A.	Highland	0.75
2	El Sereno Elementary	3838 Rosemead Ave. L.A.	North Main	0.2
3	Monte Vista Elementary	5423 Monte Vista St. L.A.	Highland	0.15
4	Latona Elementary	4312 Berenice Ave. L.A.	Highland	0.8
5	Hillside Elementary	120 E. Avenue 35, L.A.	Highland	0.2
6	Lincoln High	1200 N. Cornwell St. L.A.	North Main	0.5
7	Gates Elementary	3333 Manitou Ave., L.A.	North Main	0.3
8	Griffin Elementary	2025 Griffin Ave., L.A.	North Main	0.15
9	Nightingale Jr. High	3311 N. Figueroa St., L.A.	Highland	0.3
10	Castelar Elementary	840 Yale St., L.A.	Highland	0.15
11	Sierra Vista Elementary	4342 Alpha St., L.A.	North Main	0.15
12	Ann Elementary	126 E. Bloom St., L.A.	North Main	adj.
13	Multnomah Elementary	2101 N. Indiana Ave., L.A.	North Main	0.4
14	Wilson High	4500 Multnomah St., L.A.	North Main	0.5
15	Farmdale Elementary	2660 Fithian Ave., L.A.	North Main	0.8
16	Sierra Park Elementary	3170 Budace Ave., L.A.	North Main	0.4
17	San Paschal Elementary	815 San Pasqual Ave., L.A.	Highland	0.5
18	Solano Elementary	615 Solano Ave., L.A.	Highland	0.5
19	Albion Elementary	3225 Avenue 18, L.A.	North Main	0.15
20	Huntington Drive Elem.	4435 N. Huntington Dr.	North Main	0.15
21	Loreto Elementary	3408 Arroyo Seco Ave.	Highland	0.15
22	El Sereno Jr. High	2839 N. Eastern Ave., L.A.	North Main	0.3
23	Downtown Business Magnet	1081 W. Temple St., L.A.	Downtown	0.5

TABLE 4-38 (continued)

Number[a]	School	Address		Distance to Alignment (miles)
24	Evans Adult	717 N. Figueroa St., L.A.	Downtown	adj.
25	Arroyo Seco Alternative	4805 Pasadena Ave Terr., L.A,	Highland	adj.
26	Arroyo Vista Elementary	335 El Centro St., South Pasadena	Highland	adj.
27	Marengo Elementary	1400 Marengo Ave., South Pasadena	Highland	1.0
28	Cathedral High School	1253 Stadium Way	Highland	adj.
29	Stancliff School	1101 Arroyo Verde Road	Highland	adj.
30	Westridge School	324 Madeline Dr., Pasadena	Pasadena ext.	0.5
31	Blair High School	1201 S. Marengo Ave., Pasadena	Pasadena ext.	0.1
32	Allendale School	1135 S. Euclid Ave. Pasadena	Pasadena ext.	0.2
33	Mayfield High	500 Bellefontaine Pasadena	Pasadena ext.	0.2
34	Ambassador College	300 W. Green St., Pasadena	Pasadena ext.	0.6
35	Pasadena Continuation School	325 S. Oak Knoll Ave. Pasadena	Pasadena ext.	0.7
36	St. Andrew School	42 Chestnut Ave., Pasadena	Pasadena ext.	0.2
37	Roosevelt School	315 N. Pasadena Ave. Pasadena	Pasadena ext.	0.8
38	Fuller Theological Seminary	135 N. Oakland Ave. Pasadena	Pasadena ext.	0.4
39	Madison School	515 Ashtabula St., Pasadena	Pasadena ext.	0.4
40	Jefferson School	1500 E. Villa St., Pasadena	Pasadena ext.	0.1
41	Pasadena City College	1570 E. Colorado, Pasadena	Pasadena ext.	0.4
42	St. Phillips School	161 S. Hill Ave., Pasadena	Pasadena ext.	0.6
43	California Institute of Technology	1201 E. California Blvd. Pasadena	Pasadena ext.	1.0
44	Hamilton School	209 Rose Villa St., Pasadena	Pasadena ext.	0.7
45	Marshall Fundamental School	990 North Allen Ave. Pasadena	Pasadena ext.	0.7

TABLE 4-38 (continued)

Number[a]	School	Address	Distance to Alignment (miles)
46	Pasadena High	2925 E. Sierra Madre Pasadena	Pasadena ext.0.6
47	Wilard School	301 Madre St., Pasadena	Pasadena ext.0.4
48	Wilson Middle School	300 Madre St., Pasadena	Pasadena ext.0.5

a The numbers refer to map locations indicated in Exhibit 4-19.

Source: Los Angeles Unified School District, 1988.
South Pasadena School District, 1988.
Pasadena Unified School District, 1989.

Neither Pasadena, South Pasadena, or the Los Angeles Unified School Districts have any current plans for additional schools immediately near the proposed alignments.

Environmental Impacts

Safety is a primary consideration in identifying the impacts of the LRT on school facilities. Some of the major concerns identified for students include: pedestrian safety when crossing the LRT route, trespass attractions associated with the LRT, security from LRT power sources, and safety at LRT construction sites.

Another impact on schools will stem from noise generated by passing LRT vehicles and traffic around the stations. The potential noise impacts and recommended mitigations are discussed in Section 4.6 of this EIR. Traffic impacts will also be the more pronounced in the morning when school and commuter traffic coincide in the same areas. Evening impacts will be less since school children leave school in the mid-afternoon prior to the beginning of most evening commutes.

Short-term construction activities will also impact local schools. The greatest potential for disruption will come from construction noise.

Mitigation Measures

The safety of students around the rail lines, substations, and construction activities is of utmost importance. The LACTC has developed a safety education program designed for schools in rail transit project areas. In addition, the following list of safety features shall be observed where applicable during the construction and operation of the Pasadena LRT.

1. Separation of rail line and pedestrian right-of-ways, by using curbs, fences, walls, and landscaping.
2. Trespass attractions at construction sites, stations, and parking lots will be reduced by security measures and barriers.
3. Rail lines must be isolated from pedestrian routes used by school children, to prevent off-street walking along railways.
4. Overhead power sources and power stations must be secured to prevent unauthorized access and warning signs conspicuously posted.
5. Rail tracks on overhead bridges and grade separations will be inaccessible to pedestrian traffic.
6. Construction sites should be secured by barriers or guards to discourage trespassing and vandalism.
7. Warning signs will be posted around all crossings, overhead power sources, power station, and construction sites.
8. Phasing of construction, route alignments, and scheduling of trains should be coordinated with local communities in order to minimize conflicts with school buses, pedestrians, and automobile school routes.
9. The LACTC should distribute pamphlets that describe proper safety procedures. In addition, the LACTC shall conduct a school outreach program which informs students about the LRT project and hazards during construction and subsequent operation.
10. A fence or barrier will be constructed between the rail line and any school located immediately adjacent to the alignment. This barrier will also lessen other types of disruption which may arise from passing trains every several minutes.

Unavoidable Significant Adverse Effects

The proposed Pasadena-Los Angeles rail transit project may result in increased noise which may affect classroom activities in those classrooms immediately adjacent to and facing the rail line. Stancliff School, in South Pasadena, will be affected by noise impacts and will require implementation of mitigation measures. Mitigation of adverse noise impacts is discussed in the noise and vibration impact section. There are also potential hazards to children crossing the tracks. The implementation of the recommended mitigation measures will be effective in reducing the level of impact.

4.11 UTILITIES

This section of the EIR examines the proposed project's potential impacts on local utilities and infrastructure. The analysis focuses on energy consumption needed for both station and vehicle operations, as well as the possible disruption of existing infrastructure in the course of construction activities.

A. ELECTRICAL CONSUMPTION

Environmental Setting

The majority of the electrical power for the proposed project will be provided by the Los Angeles Department of Water and Power (LADWP). LADWP serves both domestic and commercial/industrial users in the greater Los Angeles area. For typical years, approximately 20 percent of the electricity provided by the LADWP comes from power plants located within the Los Angeles Basin. In drier years, such as that experienced in 1988, local power generation may account for up to 26 percent of the total power consumed by LADWP customers. Table 4-39 indicates the sources of power generation.

TABLE 4-39

LADWP GENERATION BREAKDOWN

Type of Generation	Source	% of Total Generation
Oil and Gas Plants	Los Angeles Basin	20
Coal Plants	Inter-Mountain Power, Utah	25
	Navajo Power, Arizona	12
	Mojave Power, Nevada	12
Nuclear	Palo Verde, Arizona	10
Hydroelectric	Hoover Dam, Nevada	5
	L.A. Aqueduct hydro-generators	5
	Pacific Northwest producers	10

Source: Los Angeles Department of Water and Power. Resources, Planning, and Development, 1988.

Other utility purveyors, Southern California Edison and the Pasadena Department of Water and Power, will also provide portions of LRT with power.

Environmental Impacts

For purposes of analysis, electrical consumption has been broken down for station operation and LRT vehicle power generation. Table 4-40 identifies the power consumption for each of the route options. The assumptions used in calculating power consumption are indicated at the bottom of Table 4-40.

TABLE 4-40

PROJECTED POWER CONSUMPTION
(kWh per day)

Project Alternative	Station Usage[a]	LRT Vehicle Usage[b]	Total Usage
Highland Park/Chinatown	1,403	367,500	368,903
Highland Park/Second Street	1,511	380,000	381,511
Highland Park-Union Station	1,569	377,500	379,069
Highland Park "No Subway"	1,569	335,000	336,569
North Main Street/Chinatown	647	165,000	165,647
North Main Street/Second Street	863	177,500	178,363

a Consumption factor of 19.7 kWh/year/square foot. Assuming 2,000 square feet for subway stations and 1,200 square feet for at-grade and aerial stations. Additional usage of electricity at subway stations assumed at 150 percent of at-grade, and aerial assumed at 120 percent of at-grade.

b 1.5 megawatts/1.2 miles of LRT track, 20 hours per day.

Sources: Bechtel Civil, Inc., 1988.
Michael Brandman Associates, Inc., 1988.

Mitigation Measures

In order to reduce energy consumption, as part of final design activities, energy conservation features and operating procedures shall be developed for operating systems and subsystems. Such features, if practical and cost-effective, shall be made part of the normal operations of the systems. Examples of energy conservation measures which have been incorporated into system design include:

1. "Chopper" rail vehicle motor speed controls.
2. Regenerative braking.
3. Coordination of traffic and rail signal systems.

Other energy conservation measures which are under consideration include:

4. Separate electrical meters at major facilities.
5. Integrating stations with adjacent uses.
6. The use of solar power where practical.
7. Consolidation of yard vehicle movements.
8. The use of energy efficient electrical fixtures.

<u>Unavoidable Significant Adverse Effects</u>

No adverse impacts are anticipated from the additional use of electrical energy by the systems.

B. UNDERGROUND FACILITIES AND INFRASTRUCTURE

<u>Environmental Setting</u>

There are numerous underground utility facilities along the LRT route alternatives. Electricity and natural gas, communications systems, cable television, water and sewer mains, and other underground utilities are located along the LRT route alternatives.

<u>Environmental Impacts</u>

The impact the LRT will have on underground utilities depends on the location and type of these facilities and the engineering design of the LRT. Prior to beginning LRT construction, it will be necessary to relocate or modify all utilities which would conflict with at-grade and underground track, stations, and other ancillary LRT facilities. In some instances, these utilities may also need to be upgraded to provide utility service to LRT stations (water, sewer, and power) and traction power stations (power).

Utility interference will be a major problem in areas where cut and cover construction activities are going to occur. In the downtown areas, a profusion of utilities are located in Flower Street. Most of these can be supported in place during construction, but an 84-inch diameter storm drain will have to be relocated. Additional storm drains of 15, 27, and 33-inch diameters and a 20-inch sanitary sewer may also require relocation.

North of the 4th/Flower Station, tunnel construction will commence, reducing the impact on utilities. Most should be undisturbed. A 10-foot, 3-inch square storm drain in Second Street will probably require cut-and-cover construction. This, in turn, will necessitate the relocation or support of other utilities in the street, including an 8-inch sewer, utility duct banks, and a 14-inch storm drain.

For the Second Street option, as the alignment turns onto Second Street near Grand Avenue, the existing vehicular tunnel is encountered. The profile of the LRT is depressed to facilitate the passing under of the existing tunnel. At Hill Street, the Metro Rail tunnel is encountered, with the LRT passing immediately above the Metro Rail tunnel. The LRT is once again depressed along Los Angeles Street, to allow for the existing subterranean connection between Los Angeles City Hall and LAPD headquarters. The LRT alternative route then crosses the Metro Rail tunnel at North Spring/Sunset (Highland Park alternative) or at Macy/Alameda (North Main Street alternative). In either event, the LRT passes under the Metro Rail.

Mitigation Measures

The relocation and in-place support of utilities will require coordination and careful design and construction phasing of the LRT. Each utility along all segments of the chosen LRT shall be examined in greater detail to determine the exact measures required.

A process currently utilized in on-going LACTC light rail projects will be similarly applied. This process calls for an identification of all potential conflicts with existing utilities and their operators, and an evaluation of their impact during findings become the basis of a cooperative agreement whose goal is to identify necessary utility rearrangements and responsible parties, and specify a plan leading to the least interference to all concerned parties.

Unavoidable Significant Adverse Effects

If engineering design and construction phasing are properly administered, no adverse environmental impacts are anticipated beyond temporary utility shut-offs and other maintenance and upgrading activities.

4.12 AESTHETICS

Environmental Setting

The light rail system will pass through four basic types of visual settings: a downtown high-rise/civic center environment; industrial and railway settings; commercial street frontage consisting of low-rise buildings; and predominantly single-family residential neighborhoods.

Aesthetic impacts will be caused by the addition to downtown streetscapes. A more substantial impact arises from the introduction of at-grade and aerial transit and support structures along the outlying alignments. Construction activity will also present a temporary visual impact. Aesthetic impacts are those which change the appearance or visual character of the existing environment in some way. Whether a change enhances or impairs a visual impression is ultimately a subjective opinion.

Downtown Los Angeles CBD: The visual character of downtown Los Angeles is dominated by a skyline created by the skyscrapers within the central business district. Views along Flower Street, north of 7th Street, are dominated by tall office buildings of varying historical and architectural significance. As Flower Street continues north, skyscrapers give way to civic and institutional buildings until the street ends at the I-5 interchange.

North of the freeway, the character of the area changes dramatically in the area referred to as Chinatown. The community is an ethnic commercial/residential district with few buildings taller than two stories. Most commercial buildings are one-story and of mixed uses, from retail to wholesale with restaurants, office, and cultural centers interspersed. Streets are narrow and cluttered with heavy car and pedestrian traffic. There are a number of multiple-family residential units located behind the commercial uses which line the major arterials.

Civic Center: Civic Center and institutional buildings are clustered north of 1st Street. Second Street is lined by the back sides of big office buildings and parking garages, for support uses for the Civic Center. These buildings create a continuous streetwall along the property line on the north side of the street.

Union Station: Because of the scale of the historic Union Station building with its landscaped grounds, this area is a continuation of the open space created by the El Pueblo de Los Angeles State Historic Park and the rail yards behind the station. The San Gabriel Mountains are visible to the north. Plans for the redevelopment of the Union station and Terminal Annex sites will substantially alter the existing visual setting here whether or not the LRT is built. North of Union Station, on both Broadway and North Main, the light rail will pass through industrial and warehouse uses related to the proximity of the railroads.

Highland Park: The light rail will follow the existing AT&SF right-of-way, which passes through more industrial areas after crossing the Los Angeles River. The route continues northeast through the Mt. Washington area, a historic residential area, and past the Southwest Museum in the residential areas of Highland Park. The railroad is located immediately behind the small single-family dwellings which line the block behind Figueroa Street, a major neighborhood commercial strip. The line then passes through a corner of Highland Park Recreation Center, then crosses over the Arroyo Seco Park utilizing the existing railroad pier and girder bridge which is listed in the National Register of Historic Places. The alignment continues through the City of South Pasadena with multiple-family residential uses on one side and commercial uses on the other. This gives way to a segment lined with mostly single-family homes. As the line enters Pasadena, industrial and commercial properties abut the right-of-way. At this point, the line crosses the Old Town District, then enters in the center median of I-210 and is separated from adjacent land uses by freeway travel lanes and grade separations.

North Main: North Main Street is predominantly industrial, leaving downtown Los Angeles until I-5 where uses become more varied. The streetscape to this point is dominated by large warehouse structures with the exception of the Mead public housing project and Ann Street School at Ann Street.

East of I-5 there are varied commercial and residential buildings of indeterminate ages and styles. The character of the street changes at the intersection with Mission Street where there are a number of classical civic monuments on landscaped islands at the beginning of the Parque de Mexico. This strip is followed by the large expanse of Lincoln Park on the south side of the street (now Mission Road). The north side of the street slopes up and the uses are primarily residential and institutional. Past the park, commercial and industrial uses resume, with large parking lots and warehouses.

At the Soto Street bridge, the alignment will move onto Huntington Drive. West of Eastern Avenue, residences back onto Huntington Drive, with commercial establishments near Monterey Avenue. East of Eastern Avenue, Huntington Drive becomes a wide parkway with long, landscaped median islands planted with clusters of large palm trees. The avenue is lined with small commercial establishments at this point.

Environmental Impacts

Chinatown Downtown Alignment Option

The light rail will be in subway through the downtown and Chinatown portions of this alignment, portalling at-grade at the railyard on North Broadway. Until the portal, the main aesthetic impacts will result from station entrances and construction. The presence of station entrances will be compatible with the urban street scape at the following station locations in downtown Los Angeles and Chinatown: 7th and Flower; 4th and Flower; 1st and Hope; and Broadway and Alpine. Proposed station entrances and configurations are shown in Appendix F (Technical Appendices) under separate cover.

Construction impacts will be short-term. Block fronts and sidewalks will be affected by temporary construction structures, such as fences and coverings plus the presence of machinery and materials. Cut-and-cover construction will cause parts of the street above station locations to be closed. The impacts from this construction will last approximately 1 to 2 years at station locations.

Second Street Downtown Alignment Options

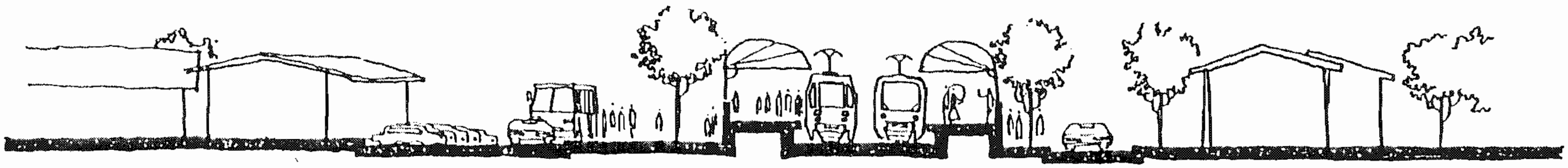
The light rail is in subway for most of this alignment. Aesthetic impacts could result from the presence of station entrances and construction at these station locations: 7th and Flower; 4th and Flower; Second and Grand; 1st and Los Angeles; and either Broadway and Alpine or Alameda and Macy. The Second Street-Union Station option would have an at-grade station north of College and Alameda. Cut-and-cover construction will also be used in Second Street, from Hill Street to Los Angeles Street, and at the 1st and Los Angeles Station.

Station configurations and entrances are shown in Appendix F (Technical Appendices) and prototypical station designs are illustrated in Exhibits 4-20, 4-21, 4-22, and 4-23. Entrances to stations will be compatible with the urban streetscape. Cut-and-cover construction will impact the block front along Second Street with temporary walkways and street coverings. Street trees along both sides of the street will be removed during construction. The landscaped corner plaza of the New Otani Hotel may be altered by construction of a station entrance as will other landscaping along Los Angeles Street.

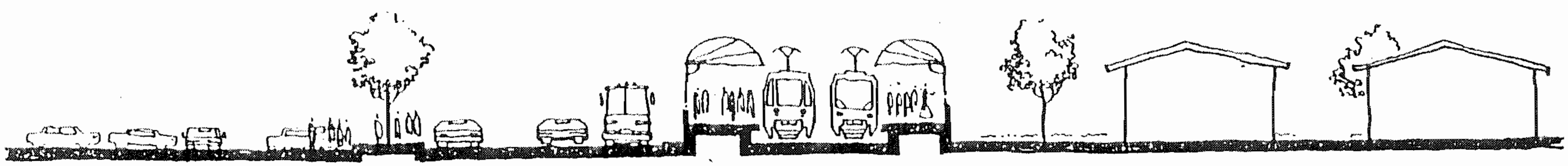
For the Second Street-Union Station option either connecting with the Highland Park or with the North Main alignment, a the final station is located at Alameda and Macy Streets. The potential for aesthetic impact at this station is greater due to its location between two landmarks: El Pueblo de Los Angeles State Historic Park and Union Station. Cut-and-cover construction will affect the streetscape temporarily on Alameda between Sunset Boulevard and Macy Street. The station entrance will be integrated with the existing parking area at Union Station and no aesthetic impact from this is anticipated (see Appendix F). An at-grade station is also proposed north of College and Alameda.

Highland Park Alignment

The Highland Park alignment will be entirely at-grade in the existing railroad right-of-way from the portal at the Southern Pacific rail yard to its terminus in Pasadena. Because there is a train currently utilizing the existing tracks, the main visual impact will result from the addition of a second track, stations, and parking lots along the routes. The visual impacts along the alignment will be intensified by increasing frequency of passing trains and the addition of the



AVENUE 51 STATION



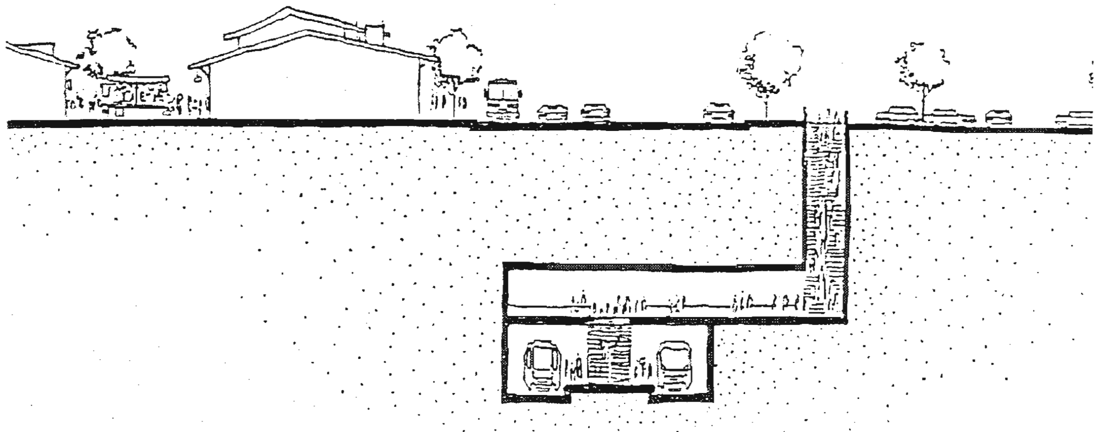
AVENUE 57 STATION

Conceptual North Main Alignment Aerial Structure

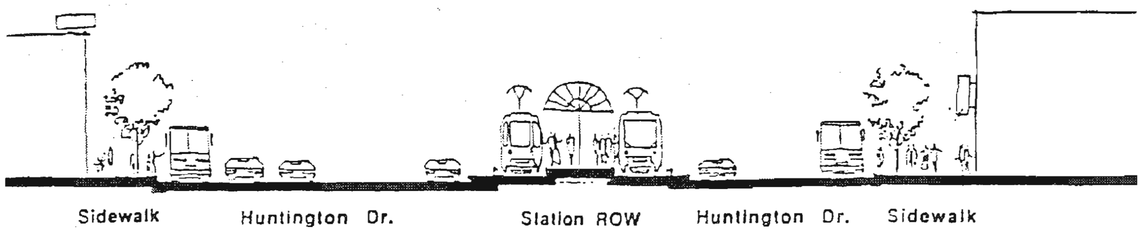
Pasadena-Los Angeles Light Rail Transit Project

Michael Brandman Associates

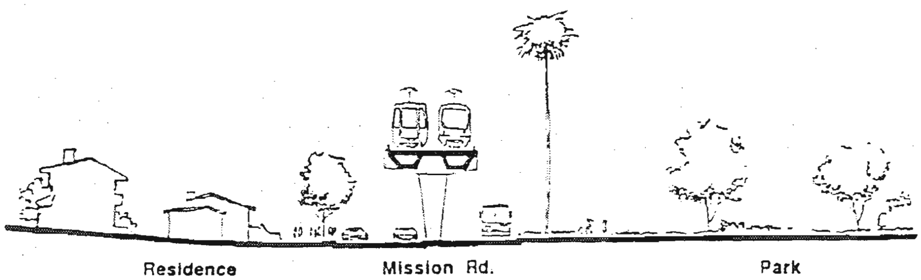
Exhibit 4 - 20

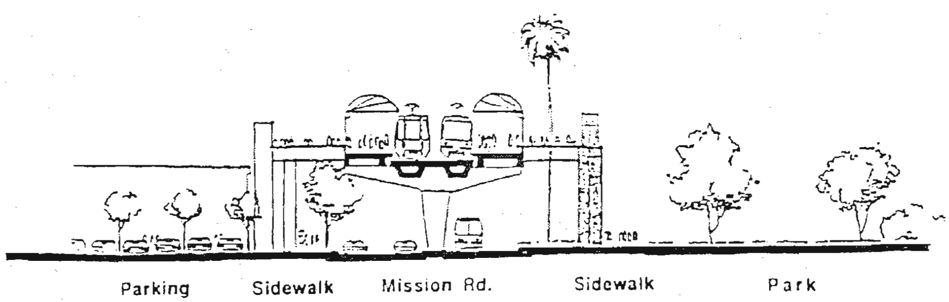


UNION STATION



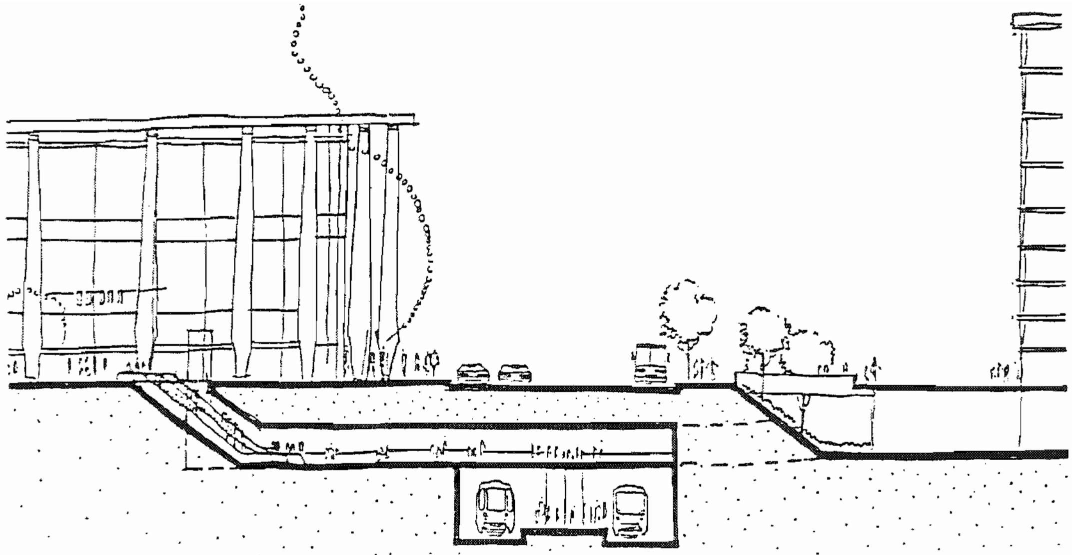
HUNTINGTON/EASTERN STATION



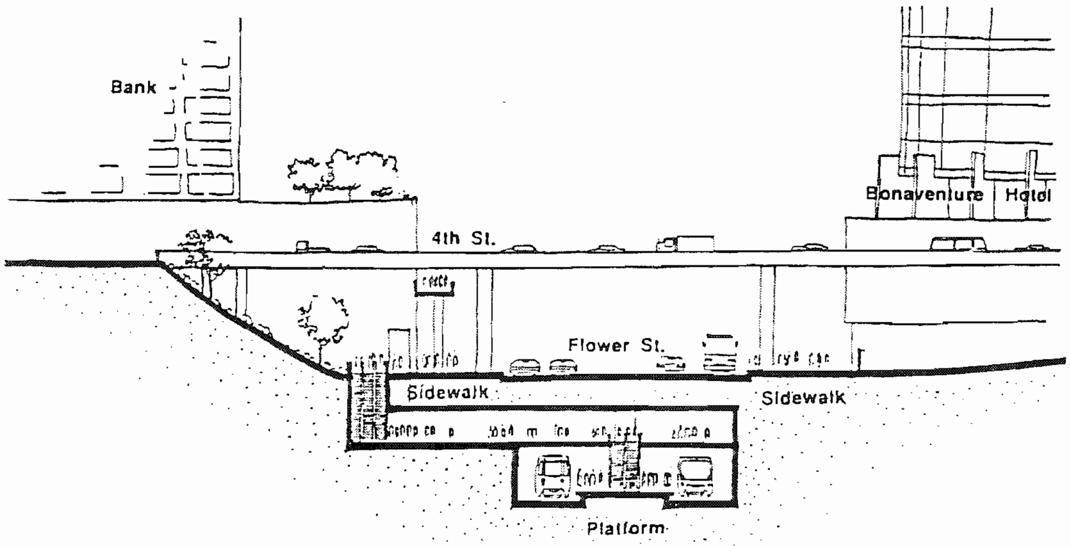


MISSION/LINCOLN STATION

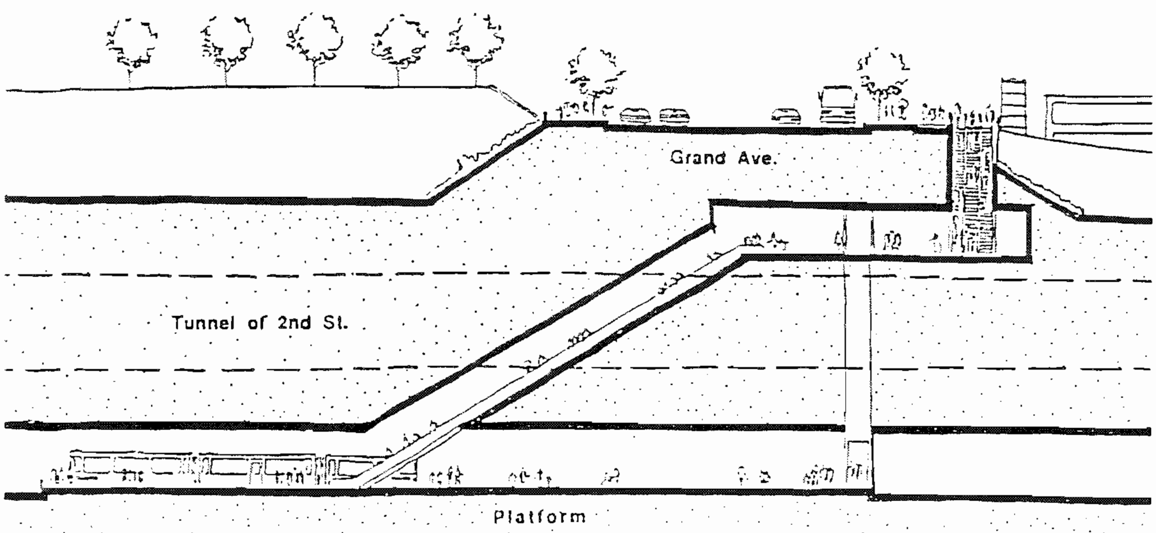
SOURCE: ANIL VERMA ASSOCIATES



FIRST AND HOPE STATION

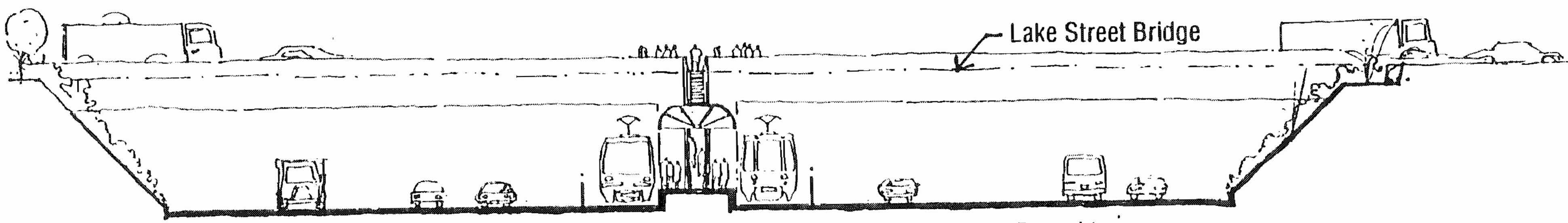


FOURTH AND FLOWER STATION



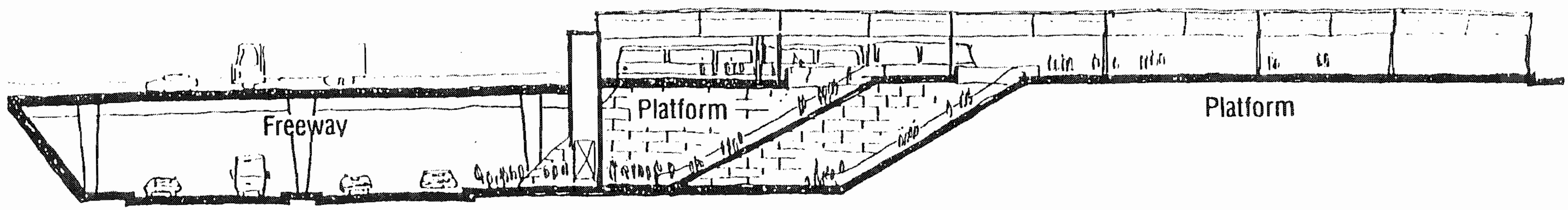
SECOND AND GRAND STATION

SOURCE: ANIL VERMA ASSOCIATES



Station at Lake or Los Robles

Foothill Freeway Alignment



Section of Freeway at-Grade Center Platform

Source: Anil Verma Associates 8/22/88

Conceptual Station Design Study

Pasadena-Los Angeles Light Rail Transit Project

Michael Brandman Associates

Exhibit 4-23

overhead catenary system for the length of the route. Existing utility lines will be buried in some places. Sound walls will be constructed along segments of the right-of-way. The proposed sound walls between Avenues 51 and 57 on Marmion Way will be particularly dominant given the character of the street.

At-grade stations will impact the character of the neighborhood by introducing 300-foot long platforms from which patrons would board the LRT. These platforms vary from 10 to 15 feet in width and are about 3 feet high. A canopy fare vending machine, a closed circuit television (CCTV) and phone are located on the platform. Aesthetic impacts may also occur at the Arroyo Seco railroad bridge due to retrofitting.

North Main Street Alignment

The North Main Street alignment leaves the Ord/Broadway station in a box structure, then portals at Augusta Street moving immediately into an aerial configuration. This aerial structure runs down the center of North Main Street, crossing over I-5, and following Mission Road until returning to grade before the intersection with Huntington Drive.

The aerial guideway structure represents a significant visual effect and will adversely impact views of the Parque de Mexico and Lincoln Park. Shadow or shade from the aerial guideway will also affect the character of the streets. The aesthetic quality of Huntington Drive with its landscaped center median and tall palms will be impacted, even if the palms are preserved. Exhibit 4-40 is a conceptual illustration of the proposed North Main Street guideway.

Appendix F shows the plans for the stations which will serve the alignment. Stations will be located at: Main and Griffin (aerial); Mission and Lincoln Park (aerial); Huntington and Monterey (at-grade); Huntington and Eastern (at-grade); and Poplar and Van Horne (at-grade). These stations will impact the visual character of the surrounding neighborhood. Temporary aesthetic impacts will also occur due to construction activities.

Exhibits 4-20, 4-21, 4-22, and 4-23 illustrate some conceptual designs for a number of station types. In addition, prototypical cross-sections of the LRT line are indicated in Exhibit 4-21.

Mitigation Measures

The following mitigation measures will be effective in reducing the adverse visual impacts of the proposed project.

1. Stations will be designed to be attractive and nonintrusive on surrounding areas. Station design and building materials used in their construction will emphasize low maintenance.

2. Community workshops will be performed to provide input during design of individual stations.

3. Landscaping will be used to shield or enhance stations, traction power substation sites, the yards, and the right-of-way. Low maintenance plants and ground cover that are compatible with the Southern California climate and the architecture of the surrounding area will be selected.

4. Additional shielding of track and station structures will be accomplished by the construction of sound walls and fencing at points along the rail way.

5. An arts program will commit 0.005 percent of the project's construction budget toward art projects related to LRT facilities.

Unavoidable Significant Adverse Effects

Significant adverse environmental impacts will result from the implementation of the North Main alignment in that the visual character of North Main and Mission Road will be altered due to the presence of the aerial guideway. The greatest visual impacts will occur in the vicinity of Parque de Mexico and Lincoln Park.

4.13 RECREATION

This section of the EIR is concerned with evaluating the proposed project's potential impacts on parks and recreational facilities located in the immediate vicinity of the alignment under consideration.

Environmental Setting

This section describes the existing park and recreational facilities located adjacent to the alternative alignments currently under consideration. Each park is described individually. The location of these parks in relation to the proposed alignment is included in the engineering drawings provided in Appendix F.

Memorial Park: This 4.7-acre public park is owned and maintained by the City of Pasadena Parks and Recreation Department. The park is located west and adjacent to the proposed Highland Park alignment and it is bounded on the north by Walnut Street, on the west by Raymond Avenue, and on the south by Holly Street.

Central Park: Central Park consists of 9.4 acres and is also owned and maintained by the City of Pasadena Parks and Recreation Department. The park is bounded on the west by Fair Oaks Avenue, on the east by Raymond Avenue, on the south by Del Mar Boulevard, and on the north by Dayton Street. The Highland Park alignment is located to the east of the park opposite of Raymond Avenue.

Highland Park Recreational Center: This facility is located on the northwest corner of Avenue 61 and Figueroa Street at 6150 Piedmont Avenue. The facility contains a community center and a swimming pool. The Highland Park alignment is located immediately adjacent to the park property.

Lummis El Alisal Home: The "Lummis Home" is located at 200 East Avenue 43 adjacent to the Highland Park alignment. Charles F. Lummis, an early Los Angeles pioneer and builder, constructed this structure from boulders and timbers collected in the Arroyo Seco between 1897 and 1910.

Arroyo Seco Park: The Arroyo Seco Park, a 279 acre facility, follows a natural drainage that extends from Devils Gate Reservoir in north Pasadena at the base of the San Gabriel Mountains to where the Arroyo ends at the Los Angeles River. Much of the Arroyo Seco has been preserved as a greenbelt through the cities of Pasadena and South Pasadena. The

Highland Park alignment will traverse a portion of the Arroyo Seco east of Avenue 64. At this point, the Arroyo is located within the City of Los Angeles.

Lincoln Park: Lincoln Park is a 46-acre community park located at 3501 Valley Boulevard near Huntington Drive. The facility is operated and maintained by the City of Los Angeles Department of Parks and Recreation. The Plaza de La Raza is located within the park and serves as a community and activity center for the surrounding community. The North Main Street alignment will be located on aerial structure in the center of Mission Road, with a station sited immediately adjacent to the park.

El Pueblo de Los Angeles State Park: This park includes the original settlement, founded in 1781, which would become the City of Los Angeles. The park is presently under the administration of the state but control is to be turned over to the City of Los Angeles at the end of this year. This park includes the oldest house and oldest church in Los Angeles: the Olivas Adobe constructed in 1818 and the Plaza Church constructed in 1822. The park also contains Olvera Street, a popular outdoor market frequented by visitors and residents alike. There are proposals for continued restoration and revitalization of the historic park. A recent plan, financed by local merchants, calls for additional commercial space to be added, the construction of a visitors center, redesign of the streetscape along Olvera Street, the realignment of Los Angeles Street, and the possible closure of Main Street on the weekends.

Environmental Impacts

Table 4-41 identifies those recreational facilities located immediately adjacent to the proposed rail alignments under consideration and summarizes the physical characteristics of the alignment as it passes near each facility.

Lincoln Park and Memorial Park are the only park facilities that will be directly impacted by the proposed project. Under the North Main Street alternative, a station is proposed at Lincoln Park Avenue and Mission Road and will require some right-of-way for the station entrance. The light rail is also on an elevated structure (located in the center of Mission Road) which will impact views in the vicinity of the park.

A station is also proposed at Memorial Park for the Highland Park alignment and minor land acquisition will be necessary. Both parks are likely to experience increased pedestrian traffic within the park due to the location of stations near the park.

TABLE 4-41

SUMMARY OF IMPACTS ON RECREATIONAL FACILITIES

Facility	Alternative	Physical Characteristics
Highland Park Recreation Center	Highland Park Alignment	Alignment is at grade immediately south of property
Lummis El Alisal House	Highland Park Alignment	Alignment is at-grade immediately adjacent to property
Arroyo Seco Park	Highland Park Alignment	Right-of-way crosses park and continues along periphery
Memorial Park	Highland Park Alignment	A station is proposed at the park. Alignment is adjacent to the park in a partial out section
Central Park	Highland Park Alignment	Station and park-and-ride facility is proposed on the opposite side of Raymond Avenue
Lincoln Park/ Plaza de La Raza	North Main Alignment	Right-of-way is located on an aerial structure along edge of park with an easement required for a station entrance
El Pueblo de Los Angeles State Park	North Main Alignment Highland Park Alignment	Right-of-way is underground at this location.

Source: Bechtel Civil, Inc., 1989.

Mitigation Measures

The LRT will improve accessibility to local parks which should be considered a beneficial impact. While proposed project does not negatively impact the use of recreational facilities in the vicinity, care will be taken to integrate effective station design. Input will be sought from the Parks and Recreation Department of the appropriate jurisdiction.

Unavoidable Significant Adverse Effects

The need for minor right-of-way at either Lincoln Park or Memorial Park is an unavoidable impact. This impact will be somewhat offset by the increased accessibility to the park provided by this station.

4.14 CULTURAL RESOURCES

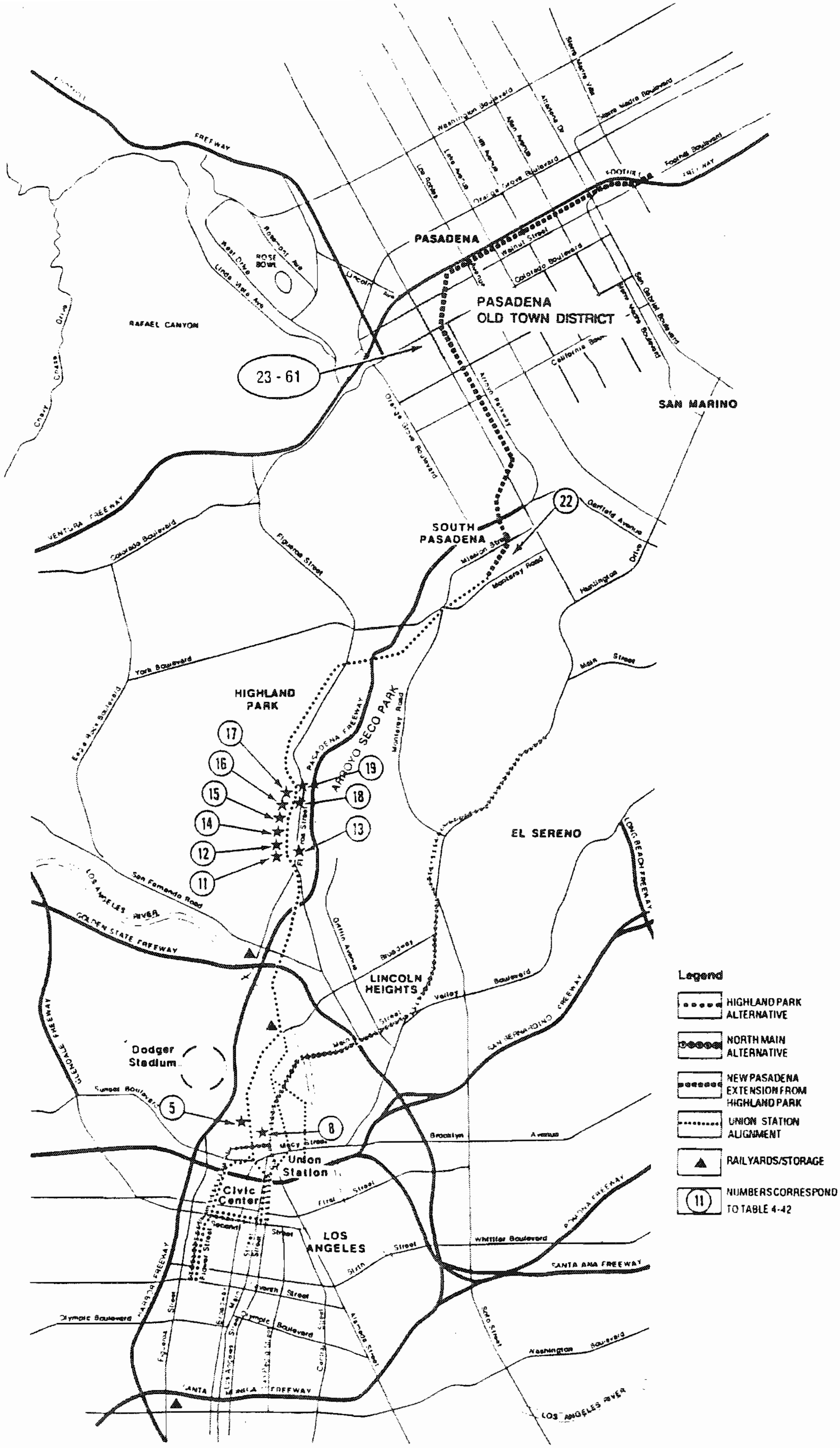
This section of the EIR is concerned with the proposed LRT's impacts on cultural resources in the project area. The analysis focuses on historic, cultural, and archaeological and cultural resources that may be affected by the construction of the proposed project.

A. HISTORIC RESOURCES

A survey of historic resources along all the alternative routes and options was conducted by Barrio Planners to determine the potential impacts of the project on historic resources in the area.

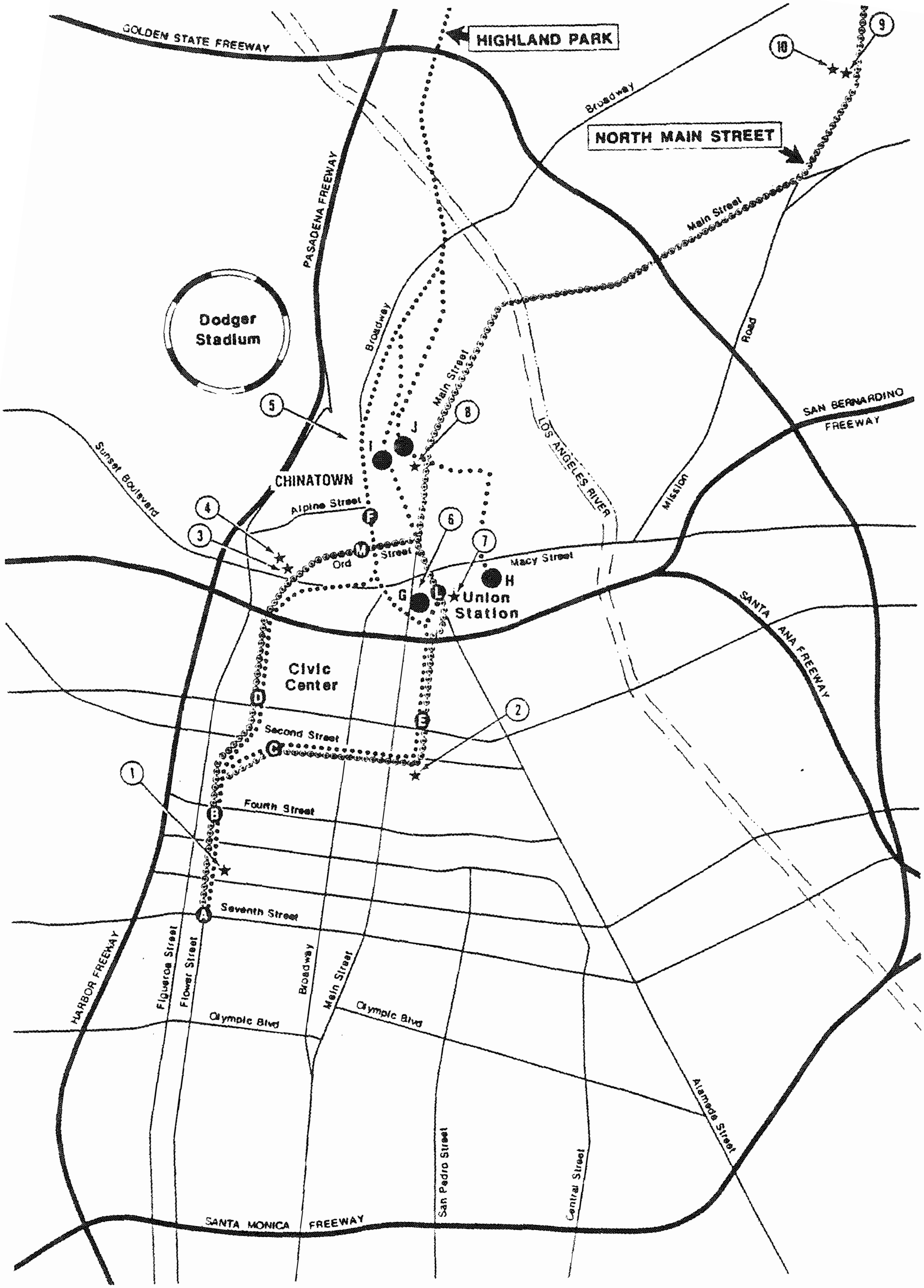
Environmental Setting

A number of sources were reviewed to identify all possible historic structures and sites in the vicinity of the project alignments. These sources included several historic-architectural surveys conducted for the City of Los Angeles Community Redevelopment Agency (CRA), the City of South Pasadena, a number of independent surveys of the Mount Washington and Highland Park areas, the City of Pasadena, and the list of historic-cultural monuments compiled for the City of Los Angeles Cultural Heritage Commission. Table 4-42 identifies the historic structures and sites in the project area and their locations are indicated in Exhibits 4-24 and 4-25.



Cultural Resources (Outside Downtown Area)
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-24



Legend

HIGHLAND PARK ALTERNATIVE

NORTH MAIN ALTERNATIVE

(12) NUMBERS CORRESPOND TO TABLE 4-42

Cultural Resources Downtown
Pasadena-Los Angeles Light Rail Transit Project

Exhibit 4-25

TABLE 4-42

INVENTORY OF HISTORIC RESOURCES

Map Ref. Number	Name/Address		Historic Significance[a]	Survey/ Source[b]
1	538 S. Flower St.	California Club	ENR, MS	2, 6
2	208 S. Main St.	St. Vibianas Cathedral	AENR, MS	2, 6
3	614 Bunker Hill Ave.	Residence	PE	3
4	618 Bunker Hill Ave.	Residence	PE	3
5	Chinatown District 925-957 N. Broadway Gin Ling Way Jung Jing Rd. Lei Min Way Mei Ling Way Sun Mun Way	(east of Hill St.)	ENR	3
6	El Pueblo de Los Angeles State Historic Park		NR	6, 7
	415 N. Los Angeles	Garnier Building		
	425 N. Los Angeles	Chinese Store		
	134 Paseo de la Plaza	Plaza Firehouse Plaza Area		
	125 Paseo de la Plaza	Biscailuz Building		
	115 Paseo de la Plaza	Plaza Methodist Church		
	10 E. Olivera	Avila Adobe		
	875 N. Alameda	Tononu Winery		
	121 Paseo de la Plaza	Simpson Building		
	100 W. Sunset	Plaza Church		
7	800 N. Alameda	Union Station Terminal and Landscaped Grounds	MS	6
8	Bruno Street	Granite Block Paving	MS	6
9	2101 Parkside Ave.	Nick Pxagenovich Auto Pk	ENR	4
10	2113-2126 Parkside	Villa Rafael	ENR, MS	4, 6
11	4201 Marmion Way	Residence	HS	5

TABLE 4-42 (continued)

Map Ref. Number	Name/Address		Historic Source[b]	Survey/
12	200 W. Avenue 43	Mt. Washington Cable Car Station Residence	MS, HS	5, 6
13	135 W. Avenue 43	Residence	HS	5
14	4521 Marmion Way	Residence	HS	5
15	4547 Marmion Way	Residence	HS	5
16	4563 Marmion Way	Residence	HS	5
17	234 Museum Dr.	Museum Drive Entrance	MS, HS	5
18	4601 N. Figueroa St.	Residence	HS	5, 6
19	4665 N. Figueroa St.	Residence	HS	5
20	4671 N. Figueroa St.	Residence	HS	5
21	162 S. Avenue 61	Santa Fe Arroyo Seco Railroad Bridge	MS	6
22	South Pasadena Historic Business District			
	913 Meridian Ave.	Meridian Iron Works	HS	8
		Watering Trough	HS	8
	950-966 Mission St.	Mission Arroyo Hotel	HS	8
	1000 Mission St.	Century House	HS	8
23	Santa Fe Railroad Baggage Room	130 S. Raymond	ND	9
24	McLaren Body Works	150 S. Raymond	ND	9
25	Hotel Green Heat and Light Plant and Laundry	164-170 S. Raymond	PE	9
26	Wilkinson Building	182 S. Raymond	PE	9
27	Santa Fe Station	222-250 S. Raymond	ND	9
28	Brookmore Apts.	189 N. Marengo	ND	9

TABLE 4-42 (continued)

Map Ref. Number	Name/Address		Historic Significance[a]	Survey/ Source[b]
29	Chapman Market	181 S. Marengo	PW	9
30	Colonial Court	291-301 N. Garfield	PE	9
31	Structure	221 E. Walnut	PE	9
32	American Legion Bldg.	125-137 N. Marengo	ND	9
33	First Baptist Church	75 N. Marengo	ND	9
34	Memorial Park	Arroyo Parkway	ND	9
35	San Pasqual Convent	140 Chestnut Street	ND	9
36	Smith House	164 Chestnut St.	ND	9
37	Hugus-Arnold House	145 Walnut St.	ND	9
38	Williams House	155 Chestnut	ND	9
39	Foote House	141 Chestnut St.	ND	9
40	Nanetta Spear House	161 Chestnut St.	ND	
41	Police Department Hall of Justice	142 N. Arroyo Parkway	ND	9
42	Crown Theater	129 N. Raymond	ND	9
43	Armory Building	145 N. Raymond	ND	9
44	Structure	118 E. Holly	ND	9
45	Structure	95 N. Arroyo Pkwy.	ND	9
46	Home Telephone Co.	70 N Raymond	ND	9
47	Structure	60-64 S. Raymond	ND	9
48	Structure	99 E. Union	ND	9
49	Broadway Building	35-45 N. Arroyo Pkwy.	ND	9

TABLE 4-42 (continued)

Map Ref. Number	Name/Address		Historic Significance[a]	Survey/ Source[b]
50	Union Savings Bank	85 E. Colorado	ND	9
51	Structure	87-89 E. Colorado	ND	9
52	Structure	95-99 E. Colorado	ND	9
53	Arroyo Seco Building	109-125 E. Colorado	ND	9
54	Stanton Building	80 E. Colorado	ND	9
55	Century Building	96-104 E. Colorado	ND	9
56	Vandervort Block	26-38 S. Raymond	ND	9
57	Mercantile Place	45 S. Raymond	ND	9
58	Central Building	26-30 N. Raymond	ND	9
59	Morgan Block	48-58 S. Raymond Ave.	PE	9
60	El Rey Hotel	87-93 E. Green St.	PE	9
61	Hotel Green/Castle Green Apts.	80-82 S. Raymond St.		9

a Historic Significance
NR Listed on the National Register
ENREligible for listing on the National Register
PE Potential Eligibility for listing on the National Register
MS Monument Status/City of Los Angeles
HS Historically Significant according to the City of Los Angeles
ND Not determined. The sites were identified in a citywide historic survey although eligibility has not net been determined.

b Sources
1 National Register
2 Architectural/Historical survey of the Central Business District, 1981
Los Angeles Community Redevelopment Agency
Prepared by Roger G. Hatheway and Associates
3 Architectural/Historical Survey of Chinatown, 1981
Los Angeles Community Redevelopment Agency
Prepared by Roger G. Hatheway and Associates

TABLE 4-42 (continued)

4	Architectural/Historical Survey of Lincoln Heights, 1982 Los Angeles Community Redevelopment Agency Prepared by Roger G. Hatheway and Associates
5	Highland Park and Mt. Washington Historic Resources Survey, 1981 Prepared by Community Research Group, the East Los Angeles Community Union
6	Historic-Cultural Monuments, 1988. Cultural Affairs Department, City of Los Angeles
7	General Plan-El Pueblo De Los Angeles State Historic Park, 1980 State Department of Parks and Recreation
8	Cultural Heritage Landmarks, 1988 City of South Pasadena Prepared by South Pasadena Cultural Heritage Commission and South Pasadena Preservation Foundation
9	City of Pasadena.

Note: Numbers 2 through 61 are located in the Old Town District of Pasadena.

Source: Barrio Planners, 1988.
Michael Brandman Associates, 1989.

Environmental Impacts

The potential impacts of the light rail system upon historic resources identified in this survey are based on the following criteria:

- The destruction or alteration of historic resources.
- The isolation of a historic resource from surrounding environment.
- Alteration of surrounding environment.
- Deterioration or destruction of a historic resource through neglect.
- The sale or transfer of a historic resource.
- The introduction of visual and noise elements that are out of character with the property.

As indicated in Table 4-43, the implementation of the downtown options will not adversely impact historic resources since the light rail system will be underground at depths ranging from 20 to 60 feet. A segment of the North Main Street alignment, east of I-5, will pass by two historic structures.

TABLE 4-43

SUMMARY OF IMPACTS ON HISTORIC RESOURCES

Ref. No.	Historic Resource Address/Name	Potential Impact	Alignment
1	538 S. Flower St. California Club	No adverse effect	2nd Street (HP)
2	208 S. Main St. St. Vibianas Cathedral	No adverse effect	2nd Street (HP)
3	614 Bunker Hill Avenue Residence	No adverse effect	Chinatown (N. Main)
4	618 Bunker Hill Avenue	No adverse effect	Chinatown (N. Main)
5	Chinatown District	No adverse effect Will provide improved accessibility	Chinatown
6	El Pueblo De Los Angeles State Historic Park	No adverse effect Will provide improved accessibility	2nd Street (HP)
7	Union Station and Grounds	Possible impacts Entrance to Alameda/Macy will encroach on Union Station grounds and parking area. Station will provide increased accessibility.	2nd Street (HP) 2nd Street-Union Station (HP)
8	Bruno Street	No adverse effect	2nd Street (HP)
9	2101 Parkside Avenue N. R. Auto Park	No significant adverse effect.	2nd Street (N. Main)
10	2113-2127 Parkside Villa Rafael	No adverse effect	2nd Street (N. Main)

TABLE 4-43 (continued)

Ref. No.	Historic Resource Address/Name	Potential Impact	Alignment
11	4201 Marmion Way Residence	No adverse effect	Highland Park
12	200 W. Avenue 43 Mt. Washington Cable Car Station	No adverse effect	Highland Park
13	135 W. Avenue 43 Residence	No significant adverse effect.	Highland Park
14	4521 Marmion Way Residence	No adverse effect	Highland Park
15	4547 Marmion Way Residence	No adverse effect	Highland Park
16	4563 Marmion Way Residence	No adverse effect	Highland Park
17	234 Museum Drive Museum Drive Entrance	No adverse effect	Highland Park
18	4601 N. Figueroa Street Residence	No significant adverse impact	Highland Park
19	4665 N. Figueroa St. Residence	No adverse effect	Highland Park
20	4671 N. Figueroa St. Residence	No adverse effect	Highland Park
21	162 S. Avenue 61 Arroyo Seco Bridge	If bridge is seismically sound, single line track will be converted to double line track requiring reconstruction of deck area and side railing above deck. Side railing could be reconstructed to match existing railing and mitigate physical alteration of the bridge. If bridge is not seismically sound (pending engineering studies) the steel girders and anchors may also have to be altered or reconstructed.	Highland Park

TABLE 4-43 (continued)

Ref. No.	Historic Resource Address/Name	Potential Impact	Alignment
22	South Pasadena Historic Business Park Meridian Iron Works	No significant adverse impact. Increase in noise level. Station will provide improved accessibility.	Highland Park
23	Santa Fe Station	No adverse effect. The development of the park-n-ride facility will not be on the parcel containing the structure.	Highland Park
24	Hotel Green Annex	No adverse impacts anticipated	Highland Park
25	Old Pasadena Historic District	No significant adverse impacts anticipated	Highland Park

The Highland Park alternative, east of Chinatown, would utilize the existing railroad track parallel to Marmion Way. In the Highland Park community, historical sites and structures for the most part are located west of the light rail route and are separated from the rail alignment by Marmion Way and elevation differences. A number of historic structures are located east of and immediately adjacent to the route. The Arroyo Seco Railroad Bridge along the Highland Park alignment will also be impacted by physical alterations to add a second track and to ensure the bridge meets seismic safety standards. The amount of retrofitting required to bring the structure up to current seismic safety standards will be determined through subsequent engineering studies if this alignment is selected. Alterations to the decking and side rails would be required to convert the bridge from a single line track to a double line track.

Mitigation Measures

The proposed project will directly impact the Arroyo Seco railroad bridge, which has monument status according to the City of Los Angeles Cultural Heritage Commission. The modification of this bridge, as described previously, is required to enable it to handle both inbound and outbound trains and to meet current seismic safety requirements. The degree of modification will not be known until additional engineering studies are completed.

Unavoidable Significant Adverse Effects

The modification of the Arroyo Seco bridge is due to the required widening of the deck and for potential reinforcement to meet seismic safety requirements. While the modification represents a significant adverse and unavoidable impact, it allows a positive benefit by bringing the bridge to seismic standards.

B. ARCHAEOLOGICAL RESOURCES

Environmental Setting

According to the archaeological record, the Los Angeles area was occupied by an indigenous Hokan-speaking people who had migrated into the area at a very early time. These people were slowly displaced to the south by a Takic-speaking Shoshonean people around 500 B.C., which are thought to have come from the Great Basin region. By A.D. 500, the Takic-speakers had become divided into several culturally different groups of tribelets. One of these tribelets, the Gabrielino, lived in the project area (Bean and Smith, 1978:540).

Recorded Sites

An archival records search was conducted on September 1988, and subsequently updated in September 1989, at the University of California at Los Angeles (UCLA) Archaeological Information Center, for this report. Four recorded archaeological sites were found to be located within the study area of this report. These four sites are located within the downtown area. The archival searches were conducted by Leslie Mouriquand Blodgett, consulting archaeologist.

The four recorded sites are all of the historic time period, and are designated by UCLA as site numbers CA-LAn-7H, CA-LAn-887H, CA-LAn-112H, and each of these sites, listed on Table 4-44, are briefly discussed in the following section. One of the sites may also contain a prehistoric component.

TABLE 4-44

RECORDED ARCHAEOLOGICAL SITES WITHIN THE STUDY AREA

Site Number	Site Description
CA-LAn-7H	Chinatown dump (1850 to 1870) near Union Station
CA-LAn-887H	Spanish structures (part of El Pueblo de Los Angeles)
CA-LAn-112H	Structures, cemetery, garden (Plaza area of El Pueblo de Los Angeles)
CA-LAn-1595H	Chinatown structures near Union Station

Site Number CA-LAn-7H was recorded in 1951 by C. Meighan. The site is described as a possible dump area for the Los Angeles Chinatown of 1850 to 1870. The site was located across the street from Union Station and covered approximately 1 square lock of area. Found at the site were broken pieces of Chinese pottery and stoneware from the mid-19th century. Also found at the site were the granite metate fragment, a mano, one sherd of brown mission ware, one piece of English stoneware, one piece of Chinese stoneware, and medicinal bottles. It is thought that the presence of the Indian artifacts may represent a prehistoric component in the site. The site was bulldozed for freeway construction. In 1980, the site was revisited by Huen and Romani, and said to have extensive surface disturbance.

Site Number CA-LAn-887H was recorded in 1978 by J. G. Costello. The site consists of artifact components and structural remains from the Spanish occupation through the 1950s. The site is a part of the El Pueblo de Los Angeles State Historic Park. Wall and building foundations from the 18th, 19th, and 20th centuries are found at the site, in addition to trash remains from all periods. Over 25,000 artifacts were recovered from the site. A parking lot was constructed over the site in the early 1960s. The site is rated by Costello as having a high scientific and interpretive potential.

The third historic site is numbered CA-LAn-112H. This site consists of structural remains, a cemetery, and garden area found within the El Pueblo State Historic Park. These remains are located under the paved parking and plaza areas located north of the Old Plaza Church.

Apparently many of the structures were rebuilt and used into the 1920s. Among those remains found in the survey were foundations for one or more buildings, including an early 19th century padre's house. The site area is approximately 30 by 60 meters. Artifacts found at the site include objects made of glass, metal, and ceramic. Bricks and assorted animal bones and teeth were also found at the site. The site was recorded by the Northridge Archaeological Research Center (NARC).

A fourth site, CA-LAn-1595H, is presently being excavated at part of the Metro Rail construction. The site includes historic remains of Old Chinatown and the Gabrelino village of Yangna. Yangna has been placed at the intersection of Aliso or Commercial and Alameda streets--but this may have been only a part or district of the entire settlement. Some artifacts were unearthed when Union Station was built in 1939--also in 1870 when the Bella Union Hotel was rebuilt--later this site was cleared in 1940 for a parking lot (between Main and Los Angeles streets north of Commercial). Yangna probably lay scattered along a wide zone along an arc (from the base of Fort Moore Hill to Union Station). Portola camped at Yangna on August 3, 1769.

Recorded Field Surveys

During the course of the records searches, it was noted that several field surveys and archival studies were recorded in the study area. Each survey is described in the following pages.

Field survey number L-110 was completed in 1974 by Clewlow of the UCLA Institute of Archaeology, for Ultrasystems, Inc. The survey was conducted on a parcel located between Beaudry Avenue, Temple Street, and I-110. No evidence of archaeological material was found. However, this survey has been rated as a partial survey by the UCLA Archaeological Information Center.

Survey number L-112 was conducted in 1974 by Terence N. D'Altroy of the UCLA Institute of Archaeology. Three linear miles were surveyed along the I-60, from 0.3 mile south of Avenue 43 to Fair Oaks Avenue. The route surveyed is located near the Highland Park alignment. No archaeological sites were observed during this survey. The area was said to be badly disturbed. The survey is rated as a partial survey.

Survey number L-292 was conducted in 1978, by Terence N. D'Altroy of the UCLA Institute of Archaeology, for the Los Angeles City Unified School District. The survey assessed the archaeological resources at a parcel located at the intersection of Sunset Boulevard and North Figueroa Street in Los Angeles. The report states the possibility of one historic site being present, but no evidence of prehistoric material was found. The property had been subjected to extreme disturbance. This survey is also rated as a partial survey.

Survey number L-982 was conducted in 1977 by F. J. Bove of the UCLA Institute of Archaeology, for the Public Building Administration Department of the General Services Administration in San Francisco. The parcel is located adjacent to the main post office between Temple Street, Los Angeles Street, and Alameda Street in downtown. No archaeological remains were discovered during the survey.

In 1983, a survey was conducted for two proposed disposal sites by Caltrans. This survey is designated as L-1319 by UCLA. No evidence of archaeological remains was found during the survey. The two parcels that were surveyed are located between the Highland Park and North Main Street alignments.

Survey number L-1609 was conducted in 1986 by LSA, for the United States Veterans Administration in Washington D.C. Approximately 1.85 acres were surveyed and tested during a Phase 2 investigation. Subsurface testing for adobe structures was conducted and no evidence of the structures was found.

Survey number L-1476 was conducted in 1985 by archaeologist Clay Singer, for Reimer Associates. The property surveyed is located northeast of downtown Los Angeles. No archaeological sites were observed by Mr. Singer.

Survey number L-1578 was conducted in 1983 by Westec Services, Inc., for the U.S. Department of Transportation, Urban Mass Transportation Administration, and the Southern California Rapid Transit District. This survey was conducted for the Metro Rail project in the downtown area. In this survey, sections of a linear route were surveyed on foot and by car. No archaeological sites were observed. This survey was preceded by an archival study designated as L-1577a.

Survey number L-115a was conducted in 1974 by Carl William Clewlow, Jr., for a proposed route extension of the I-710 north from Valley Boulevard to the I-60. The surveyed route transects both the Highland Park and North Main Street alignments in a north/south direction. No archaeological sites were found during the field survey.

Survey number L-115b was conducted in 1976 by Clewlow, to survey proposed alternate routes for the I-710 extension. No archaeological resources were found in the new areas.

Survey numbers L-1642 and L-1643 were conducted in 1980 by J. G. Costello and P. D. Friedman of Science Applications, Inc., for the City of Los Angeles Community Redevelopment Agency. This study provides historic profiles of streets and block maps of historic structures located within the Los Angeles downtown people mover program study area. No prehistoric archaeological resources were identified during the studies; however, a great many historic structures were identified.

Environmental Impacts

Four recorded archaeological sites are located within downtown Los Angeles. Two of these sites are located within the El Pueblo de Los Angeles State Historic Park. In the downtown area, several field surveys have been conducted, the majority of which were in the vicinity of the routes being considered for this project. There are no recorded sites within the Highland Park and North Main Street alignments.

The greatest potential for the destruction of archaeological sites and/or artifacts is in those areas where excavation activities will be undertaken. The majority of the excavations will occur in the downtown area along portions of the Chinatown and Second Street options. Additional excavation will occur at several station locations.

The most sensitive area is located in and around El Pueblo de Los Angeles State Historic Park. The proposed Second Street option will be in a subway tunnel below the surface and no artifacts are likely to be found at these depths.

Potential impacts may be likely in the vicinity of Union Station where historic resources (Old Chinatown) and prehistoric artifacts (from Yangna) may be found during excavation activities for the stations.

Mitigation Measures

Archaeological sites and/or artifacts may be discovered in the course of construction, especially where excavation will occur. The CEQA law and guidelines (Appendix K) addresses mitigation measures and strategies which may be followed to preserve or salvage artifacts and/or human remains. In the event that artifacts and/or remains are found in the course of construction of the proposed project, the lead agency will make the determination whether or not the resource is significant and requires salvage according to CEQA and/or city guidelines. Constructed activities may be halted for a reasonable amount of time while salvage activities are undertaken.

If the resource is found to be significant, proper and appropriate salvage of the resources will commence in a timely manner according to the provisions outlined in Section VII of Appendix K of the CEQA law and guidelines. In the event human remains are found, those procedures outlined in Section VIII of the Appendix K contained in the CEQA law and guidelines will be followed.

The downtown options that would impose the least adverse impacts upon the cultural resources include those options that would avoid Union Station. These options include those that would require minimal to no subsurface excavation during the earth-moving and construction phases.

Unavoidable Significant Adverse Effects

The implementation of the proposed project is likely to impact archaeological sites. In the event artifacts or sites are discovered during excavation, Appendix K of the CEQA law and guidelines will be followed. As a result, the proposed project does represent potentially significant adverse impacts on archaeological resources.

SECTION 5
CUMULATIVE IMPACTS

The CEQA guidelines define cumulative effects as "two or more individual effects that, when considered together, are considerable or which compound or increase other environmental impacts." The CEQA guidelines further note that the individual effects can be related to a single project or to the change involved in a number of closely related past, present, or reasonably foreseeable future projects (Section 15023.5).

Related projects include those projects located in the vicinity of the project being analyzed in the EIR that have been proposed, approved, or are under construction. In addition, related projects may also include developments or improvements that are closely related to the proposed project from an operational standpoint.

For purposes of this analysis, three types of related projects have been identified. The first category includes regional transit projects currently under construction, planned, or proposed. The second category of related projects includes major developments under construction, approved, or proposed in areas immediately adjacent to the alignments studied for the Pasadena-Los Angeles Rail Transit Project. Finally, major developments under construction, approved, or proposed within approximately one-half mile of the alignments are identified. The cumulative impact analysis focuses only on major developments within the affected area. For purposes of this EIR, major projects are defined as residential projects involving 50 or more housing units, commercial projects with over 50,000 square feet of gross floor area, and hotel projects with 50 or more rooms.

5.1 RELATED TRANSIT PROJECTS

The related transit projects described in the following paragraphs will have a direct bearing on the number of persons that will ultimately utilize this system. A substantial portion of the total ridership projected for the Pasadena-Los Angeles LRT will continue their commutes on the Long Beach-Los Angeles LRT which is currently under construction. The station at 7th Street and Flower, and possibly at the Union Station, will also provide a connection to Metro Rail.

As the regional mass transit system depicted in Exhibit 2-1 nears completion, ridership will increase over time. For example, the completion and operation of the Pasadena-Los Angeles LRT will have an impact on ridership on Metro Rail, the Long Beach-Los Angeles line, and the Norwalk-El Segundo line. This increased ridership will result in increased vehicle trips in the vicinity of stations, along with localized air quality and noise impacts. The localized environmental impacts will be outweighed by the benefits of reductions in traffic congestion and vehicle emissions on a regional scale.

The major mass transit projects proposed, under study, or under construction are described in the following paragraphs.

Metro Rail--"Red Line"

The Metro Rail Subway project consists of a 17.3-mile rail line designed to serve the core of the Los Angeles metropolitan region. The alignment begins at Union Station, where it turns southwest and runs through the central business district with stations located at 1st and 4th Streets along Hill Street and at 7th and Flower Streets. The route continues under I-110 along Wilshire Boulevard to Western Avenue. Stations will be located at Alvarado Street, Vermont, Normandie, and Western Avenues. The alignment turns north at Vermont toward the Hollywood community with stations located at Beverly, Santa Monica, and Sunset Boulevards. It turns west under Hollywood Boulevard, with stations at Western Avenue, Vine Street and Highland Avenue. The route then heads north at Highland Avenue proceeding under the Santa Monica Mountains to serve the San Fernando Valley with stations at Universal City and North Hollywood. The initial 4.4-mile section from Union Station to Wilshire and Alvarado is currently under construction and is scheduled to begin operations in 1993.

Long Beach-Los Angeles LRT--"Blue Line"

The Long Beach-Los Angeles rail transit project is another link in the regional transit development program for Los Angeles County. This project will provide residents living in the Long Beach-Los Angeles Corridor with a continuous mass transit link between Long Beach and downtown Los Angeles and will serve the residents of the communities located along the line.

The project will be a conventional light rail transit line located primarily in the existing Southern Pacific Transportation Company (SPTC) right-of-way (Wilmington and East Long Beach branches) which extends from downtown Los Angeles to downtown Long Beach. The line will pass through the cities of Compton and Carson and the unincorporated communities of Florence-Firestone, Willowbrook, and Dominguez Hills in Los Angeles County.

The total route will be approximately 22 miles in length, with about 18 miles located in the existing SPTC right-of-way. Much of the Long Beach-Los Angeles LRT route will follow the Pacific Electric Railway "red car" route which discontinued service in 1960. The Long Beach-Los Angeles Rail Transit project is currently under construction and is scheduled to begin operation in 1990.

Glendale Extension

A route planning study is underway to define alternatives branching from the Pasadena-Los Angeles line north of Chinatown and proceeding into Glendale. This study should be completed in 1990.

San Bernardino - Los Angeles Commuter Rail Service

Los Angeles County is considering the feasibility of establishing commuter rail service between San Bernardino and Los Angeles. Current proposals consider the utilization of the existing AT&SF second division, including that segment required for the Highland Park alignment, for this project. This commuter line would utilize existing tracks and conventional heavy rail technology. Coordination with this proposal is crucial in deciding the best way to serve the needs of the San Gabriel Valley.

Norwalk-El Segundo--"Green Line"

The Norwalk-El Segundo rail line will operate in the median of the Glen Anderson (I-105) Freeway presently under construction. The line begins in Norwalk at the intersection of I-105 and I-605, and ends at the intersection of Aviation Boulevard and Imperial Highway in the El Segundo employment area (refer to Exhibit 2-1). The line will turn south from the Aviation Boulevard station, providing four station stops before reaching a rail storage and maintenance yard located near Compton Boulevard. This line will provide connection with the Coastal Rail Line, the proposed I-110 busway, and the Long Beach-Los Angeles Rail Line. The Norwalk-El Segundo rail line will serve a number of communities, including Norwalk, Downey, Paramount, Lynwood, Compton, Gardena, Hawthorne, and El Segundo. Both the freeway and the rail transit project are anticipated to begin operation in 1993-1994.

Coastal Rail Line

The Coastal Rail Line will serve the coastal communities from Marina del Rey to Torrance (refer to Exhibit 2-1). No specific dates for construction and operation have been identified. An EIR has been completed for the northern segment of this line. The northern segment branches from the Norwalk-El Segundo rail line near El Segundo, running in a northwest direction for 5.7 miles until it ends near Culver and Lincoln Boulevards. This line can be constructed in phases to serve the Los Angeles International Airport (LAX), Westchester and Marina del Rey. The southern segment from Hawthorne to Rolling Hills Estates is currently undergoing a route refinement study, scheduled to be completed shortly. This segment begins where the current Green Line ends in the El Segundo area at the interim and extends southward, linking to and proceeding above Hawthorne Boulevard until terminating near the border of Torrance and Rolling Hills Estates.

San Fernando Valley Rail Line

The San Fernando Valley route has not been determined as of yet, though an environmental impact report is being prepared at this time. Two east/west route alternatives that cross the San Fernando Valley are being studied, with several profile variations. The EIR is scheduled for completion in early 1990.

El Monte Busway

Busways are special freeway lanes designed to accommodate buses, commuter vans, and carpools only. The El Monte busway is now in operation and will connect with Metro Rail at Union Station. The busway continues east along the San Bernardino (I-10) Freeway until it reaches the El Monte bus station. It serves commuters in the San Gabriel Valley traveling into downtown Los Angeles.

Harbor Freeway Busway

The I-110 busway is being constructed at this time. This busway will carry buses and high occupancy vehicles between downtown Los Angeles and San Pedro in the median of I-110. In addition to improved access between downtown and the peninsula cities, the busway would allow a transfer onto the Norwalk-El Segundo Rail Line (refer to Exhibit 2-1).

5.2 RELATED PROJECTS NEAR THE PROPOSED ALIGNMENTS

The survey of related projects identified a number of developments proposed, approved, or under construction along the alignments being considered in this analysis. Table 5-1 and Exhibit 5-1 identify those projects located within one block of the alignments being considered.

TABLE 5-1

RELATED PROJECTS IN PROJECT AREA
(ONE BLOCK RADIUS)

Map Key	Name/Description	Status	Alignment Location
1.	Hillside Villa-124 residential rental units	Complete May 1988	Highland
5.	Grand Plaza-358 residential units	Construction by 1989	Highland
6.	Bamboo Plaza and Garage-65,000 SF retail	Under Construction	Downtown
13.	Federal Center-800,000 SF office and 1,000 SF retail	Under Construction	North Main
17.	Library Square Phase I-1225,000 SF office and 75,000 SF retail	Under Construction	Downtown
21.	One Bunker Hill Building-90,000 SF office	Under construction	Downtown
22.	Mayflower Hotel-192 rooms	Under construction	Downtown

TABLE 5-1 (continued)

Map Key	Name/Description	Status	Alignment Location
27.	Grand Promenade Phase I-372 dwelling dwelling units 25,000 SF office and 1,000 SF retail	Under Construction	Downtown
32.	Wilshire/Figueroa Tower-896,000 SF office and 37,000 SF retail	Under Construction	Downtown
38.	Central Library-361,000 SF office	Under construction	Downtown
39.	Citicorp Plaza Phase II-1,000,000 SF office and 12,000 SF retail	Under construction	Downtown
41.	Figueroa Tower-444,500 SF office and 6,500 SF retail	Under construction	Downtown
42.	Gateway Centre-120 dwelling units, 224 hotel rooms, 416,000 SF office, and 35,000 SF retail	Under construction	Downtown
43.	Grand Place Tower-1,150,000 SF office and 50,000 SF retail	Under construction	Downtown
50.	Citicorp Plaza Phase III-800,000 SF office	Under construction	Downtown
54.	County Engineers Building-416,900 SF office and 52,000 SF commercial	Under construction	Downtown
55.	Figueroa Plaza Phase II-340,000 SF office	Under construction	Highland
57.	Five Fifty South Hope-495,000 SF office	Under construction	Downtown
59.	Grand Promenade Phase II- 300 dwelling units, 20,000 SF office, and 10,000 SF retail	Under construction	Downtown
60.	Million Dollar Theatre Building-70,000 SF office and 5,000 SF retail	Under construction	Downtown
66.	Grand Promenade Phase III-300 dwelling units, 15,000 SF office and 10,000 SF retail	Under Construction	Downtown

TABLE 5-1 (continued)

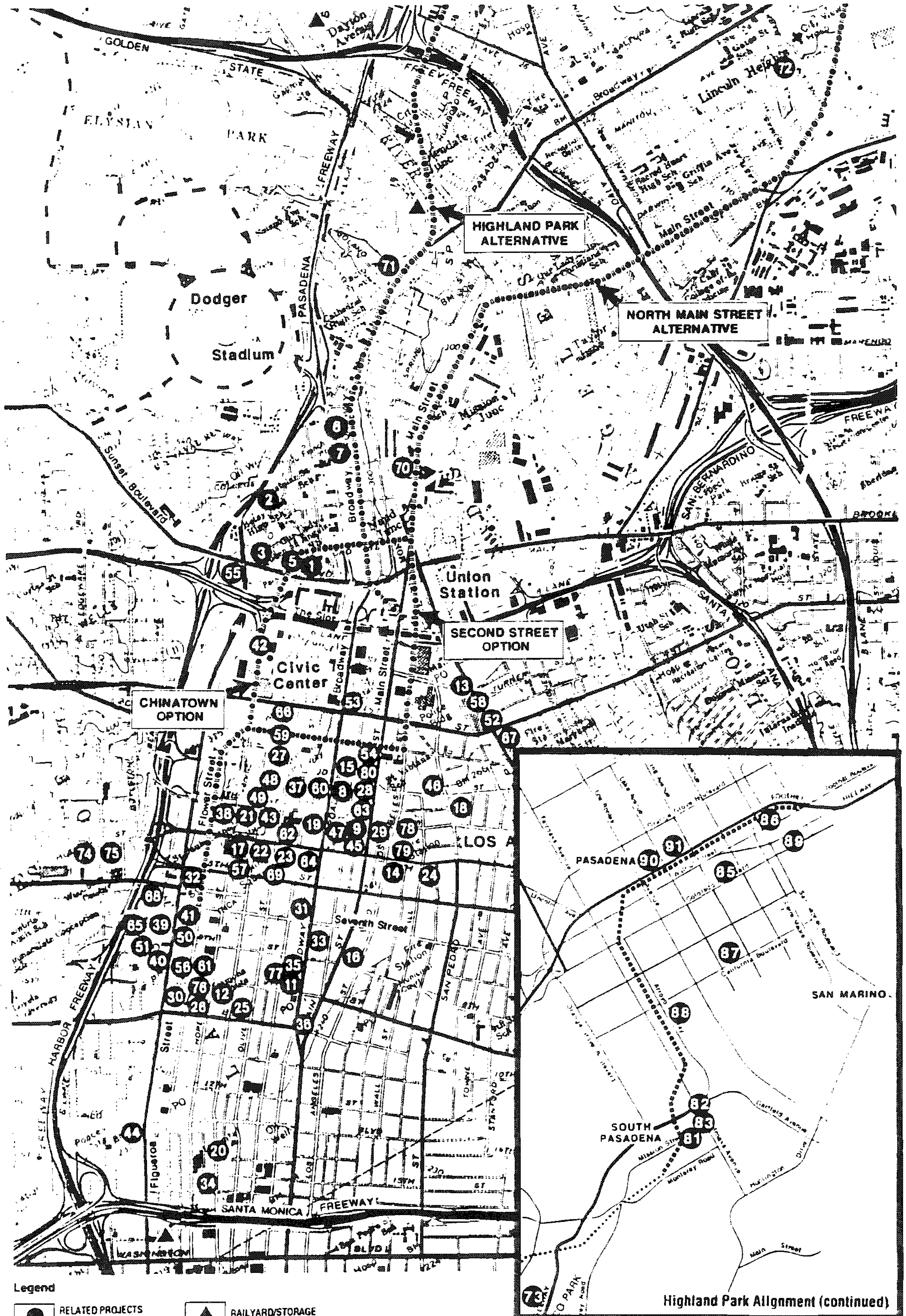
Map Key	Name/Description	Status	Alignment Location
70.	941-73 North Main Street-240-room hotel	Project approved	North Main
71.	Casanova Apartments-54 dwelling units	Approved 4/18/88 and appealed to Board of Zoning Administration	Highland
80.	South Spring Textile-90,720 SF office	Complete	Downtown
81.	El Centro Senior Citizens Complex-65 dwelling units	Occupied	Highland

Source: Michael Brandman Associates, Inc., 1988.

The implementation of the related projects located within a one-block radius of all proposed alignments would result in construction of 1,693 housing units, 359,000 square feet of commercial retail space, 8,655,000 square feet of office space and 656 hotel rooms. The majority of the related projects identified in Table 5-1 are located in downtown Los Angeles. The close proximity of these land uses to the alignments under consideration will encourage persons working in these projects to utilize the Pasadena-Los Angeles LRT, as well as other mass transit.

5.3 RELATED PROJECTS IN THE PROJECT AREA

There were an additional 63 related projects identified within one-half mile of all proposed alignments being considered for the Pasadena-Los Angeles LRT. These projects, when completed, will include 3,214 residential units, 1,771,639 square feet of retail commercial space, approximately 15,047,040 square feet of office space, and over 4,000 hotel rooms. These estimates do not include those projects discussed in the previous section which are located within one block of the alignments under consideration. The location of these projects are indicated in Exhibit 5-1 and described in Table 5-2.



Legend

RELATED PROJECTS (NUMBERS REFER TO TABLE 5-1 & 5-2)

RAILYARD/STORAGE

Related Projects
Pasadena-Los Angeles Light Rail Transit Project

North

Exhibit 5-1

TABLE 5-2

RELATED PROJECTS WITHIN ONE-HALF MILE OF THE PROPOSED PROJECT

Map Key	Name/Description	Status	Alignment Location
2.	Angelina Terrace-60 hotel rooms	Complete	Highland
3.	Bartlett Hill Manor-65 dwelling units	Complete	Highland
7.	French Hospital-42,960 SF expansion	Proposed	Highland
8.	Bradbury Building-86,000 SF office and 10,000 SF retail	Under construction	Downtown
9.	Continental Building-75,000 SF office and 75,000 SF retail	Under construction	Downtown
10.	DWP Distribution Station-42-45,000 SF office	Under construction	Downtown
11.	Eastern Columbia Building-72,000 SF office and 18,000 SF retail	Under construction	Downtown
12.	Fashon Institute-120,000 SF office and 30,000 SF retail	Under construction	Downtown
14.	Los Angeles Mart-5,000 SF office and 62,000 SF retail	Under construction	Downtown
15.	Grand Central Market-30,000 SF office and 40,000 SF retail	Under construction	Downtown
16.	Home Savings Tower-240,000 SF office and 2,000 SF retail	Under construction	Downtown
18.	Little Tokyo Professional Building-75,000 SF office and 44,000 SF retail	Under construction	Downtown
19.	Luby Building-315,000 SF office and 83,000 SF retail	Under construction	Downtown
20.	Medical Office Building-60,000 SF office	Under construction	Downtown
23.	Perching Square-60,000 SF retail	Under construction	Downtown

TABLE 5-2 (continued)

Map Key	Name/Description	Status	Location
24.	Priority Hotel Rehab Phase II-769 rooms in seven hotels	Under construction	Downtown
25.	Parkside Housing-200 dwelling units and 15,450 SF retail	Under construction	Downtown
26.	Del Prado Housing-192 dwelling units, 10,000 SF office and 28,500 SF retail	Under construction	Downtown
28.	Ronald Reagan State Building-825,000 SF office and 12,000 SF retail	Under construction	Downtown
29.	San Fernando Building-134,000 SF office and 12,000 SF retail	Under construction	Downtown
30.	Skyline Phase II-270 dwelling units and 32,000 SF retail	Under construction	Downtown
31.	Western Jewelry Mart-120,000 SF office and 60,000 SF retail	Under construction	Downtown
33.	Yorkshire Hotel-98 dwelling units, 37,000 SF office, and 7,000 SF retail	Under construction	Downtown
34.	Young Apartments-67 dwellings	Under construction	Downtown
35.	Broadway Trade Center-700,000 sf office and 250,000 SF retail	Construction by 1990	Downtown
36.	California Mart Expansion-48,000 SF retail and 1,400,000 SF office	Construction by 1990	Downtown
37.	California Plaza Phase IB and IIA-250 dwelling units and 24,000 SF retail	Construction by 1990	Downtown
40.	Eight Sixty Five South Figueroa-642,000 SF office and 10,000 retail	Construction by 1990	Downtown
44.	Los Angeles Convention Center-867,000 SF	Construction by 1990	Downtown
45.	Rowan Building-205,000 SF commercial and 15,000 SF retail	Construction by 1990	Downtown

TABLE 5-2 (continued)

Map Key	Name/Description	Status	Location
46.	Tiara Hotel and Condo-100 dwelling 400 hotel rooms	Construction by 1990	Downtown
47.	Broadway Spring Center Phase II-180,000 SF office and 10,000 SF retail	Construction by 1990	Downtown
48.	California Plaza Phase IIB and IIIB-500 dwelling units and 20,000 SF retail	Construction by 1990	Downtown
49.	California Plaza Phase IIIA-920,000 SF office and 20,000 SF retail	Construction by 1990	Downtown
51.	City Centre Phase I-400,000 SF office	Construction by 1990	Downtown
52.	1st Street City Development-150 dwelling units, 450 hotel rooms, 500,000 SF office and 100,000 SF retail	Construction by 1990	Downtown
53.	Civic Center Plaza-564,000 SF office and 36,000 SF retail	Construction by 1990	Downtown
56.	Figueroa Tower-104 dwelling units, 1,007,000 SF office, and 27,900 SF retail	Construction by 1990	Downtown
58.	Ginza Plaza-200 dwelling units and 35,000 SF retail	Construction by 1990	Downtown
61.	Pacific Lighting Block-300 dwelling units, 500 hotel rooms, 2,176,000 SF office and 50,000 SF retail	Construction by 1990	Downtown
62.	Perching Square Centre-540 hotel rooms, 837,000 SF office and 100,000 SF retail	Construction by 1990	Downtown
63.	Security Building-145,000 SF office and 15,000 SF retail	Construction by 1990	Downtown
65.	City Centre Phase II-200 dwelling units, 500 hotel rooms, 789,000 SF office, and 275,000 SF retail	Construction by 1990	Downtown

TABLE 5-2 (continued)

Map Key	Name/Description	Status	Location
67.	Merit Court Plaza-200 dwelling units and 200,000 SF office	Construction by 1990	Downtown
68.	Reliance Hilton Phase III-520,000 SF office and 20,000 SF retail	Construction by 1990	Downtown
69.	Biltmore Place-723 hotel rooms, 490,000 SF office, and 30,000 SF retail	Construction by 1990	Downtown
72.	Lincoln Park Nursing Home-87 to 300 beds and increase facility 54,560 SF	Construction by 1988	North Main
74.	Wilshire/Bixel Office-198,880 SF	Planned	Downtown
75.	Project deleted		
76.	Skyline Project Phase II-270 dwelling units and 40,000 SF office	Approved	Downtown
77.	Broadway Center Industrial-200,000 SF industrial	Zoning Board	Downtown
78.	Midnight Mission-add 175 beds.	Approved	Downtown
79.	Saint Vincent de Paul Shelter- 125 beds and health clinic	Approved	Downtown
82.	Fair Oaks Business Office-80,000 SF office	Open	Highland
83.	Fair Oaks Retail-18,000 SF retail	Open	Highland
84.	Monterey Hotel-150 rooms	Proposed	Highland
85.	1599 E. Colorado-28,310 SF motel	Plan Check	Highland
86.	2700 E. Foothill-45,400 SF office	Plan Check	Highland
87.	842 E. California-25,947 SF retail	Proposed	Highland
88.	707 Arroyo Parkway-3,640 SF office	Proposed	Highland
89.	2850 E. Colorado-13,982 SF hotel	Proposed	Highland

TABLE 5-2 (continued)

Map Key	Name/Description	Status	Location
90.	385 N. El Molino--20 residential units	Proposed	Highland
91.	449 N. Catalina-28 residential units	Proposed	Highland

Sources: Projects numbered 1 through 70, Community Redevelopment Ageney, (CRA), 1988.
Projects numbered 71 through 80, City of Los Angeles, 1988.
Projects numbered 81 through 84, City of South Pasadena, 1988.
Projects numbered 85 through 91, City of Pasadena, 1989.

Impacts

The proposed Pasadena-Los Angeles Rail Transit Project is not anticipated to result in any significant adverse cumulative impacts in conjunction with the related projects listed in Tables 5-1 and 5-2. This LRT project, along with other transit improvements, will be effective in reducing traffic and related impacts on mobility and air quality resulting from the implementation of the related development projects. People currently using automobiles to reach their destinations will shift onto transit leading to an overall reduction in vehicle miles traveled and related levels of pollution.

SECTION 6

ALTERNATIVES TO THE PROPOSED PROJECT

6.1 DESCRIPTION OF ALTERNATIVES

This section identifies alternatives to the alignments addressed in this EIR. First, a description of route alternatives that were explored in previous studies and ultimately rejected is provided. Next, the "expanded bus service alternative" and "no project alternative" are identified.

Route refinement studies completed in earlier phases of this project for the downtown, Highland Park, Lincoln Heights and Pasadena portions of the project area examined a number of alignments prior to those selected for further analysis in this EIR (LACTC 1987, 1988, 1989). These studies involved a generalized analysis which outlined the advantages and disadvantages of each route and the potential environmental effects. This environmental analysis examined land use, planned developments, potential displacement impacts, residential proximity, potential business disruption, and key community issues.

Highland Park, Lincoln Heights, and Downtown Route Alternatives

The following candidate alignments were examined in the initial phase of the route refinement studies completed for Highland Park, Lincoln Heights, and the downtown Los Angeles area:

- Four downtown route options referred to as the 1st Street, I-5, Stadium, and Chinatown route options.
- Highland Park alignment along the Santa Fe Railroad right-of-way which is one of the two alignments selected for further study in this EIR.
- North Main Street alignment which is the second alignment selected for study in this EIR.
- Mission Road alignment.
- Soto Street alignment (busway segment).
- North Broadway alignment.

Following these earlier route refinement phases, the Second Street downtown route option was identified as an additional downtown segment that should be evaluated in the EIR. Following release of the previous EIR, the Second Street-Union Station option and Union-Station "No Subway" alternative were added. This section of the EIR focuses on those alignments which were not selected during route refinement phases and includes the Mission Road alignment, the Soto Street alignment, the North Broadway alignment, and three downtown route options (1st Street, Santa Ana, and Stadium options). The route refinement study undertaken in Pasadena led to the omission of one north/south option (the I-710 extension) and four east/west options (Walnut Street, Union Street, Colorado Boulevard, and Green Street). In addition to those alternatives examined in the route refinement study, this analysis examines two other possible project alternatives. The first, referred to as the "no project" alternative, assumes the proposed Pasadena-Los Angeles LRT will not be constructed. The second alternative examines the feasibility of expanding existing bus service in the Pasadena-Los Angeles Corridor instead of implementing the Pasadena-Los Angeles LRT.

Downtown Options

Three other alternative route options were examined in the central business district in addition to the Chinatown, Second Street, and Union Station "No Subway" options ultimately selected for the proposed project. These included the 1st Street, I-5, and Dodger Stadium downtown route options. All downtown options share the Flower Street subway as a common segment. From 7th Street to 1st Street, the Flower Street subway runs beneath Flower and Hope Streets using a cut and cover method of construction. The locations of the downtown alignments are indicated in Exhibit 6-1.

1st Street Downtown Option: The First Street route would serve the Civic Center, Little Tokyo and Union Station in downtown Los Angeles. Near the Civic Center, the alignment is underground. The line would emerge from a portal located in front of the County Courthouse creating a barrier to pedestrians crossing 1st Street along with visual impacts near the courthouse's 1st Street entrance. Near Little Tokyo, the line would be on an aerial structure where it would pass the proposed 1st Street North redevelopment project creating a potential for design conflicts. Additional visual impacts would be anticipated from the aerial guideway structure as it passes El Pueblo State Historic Park/Olvera Street area and Union Station along Alameda Street.

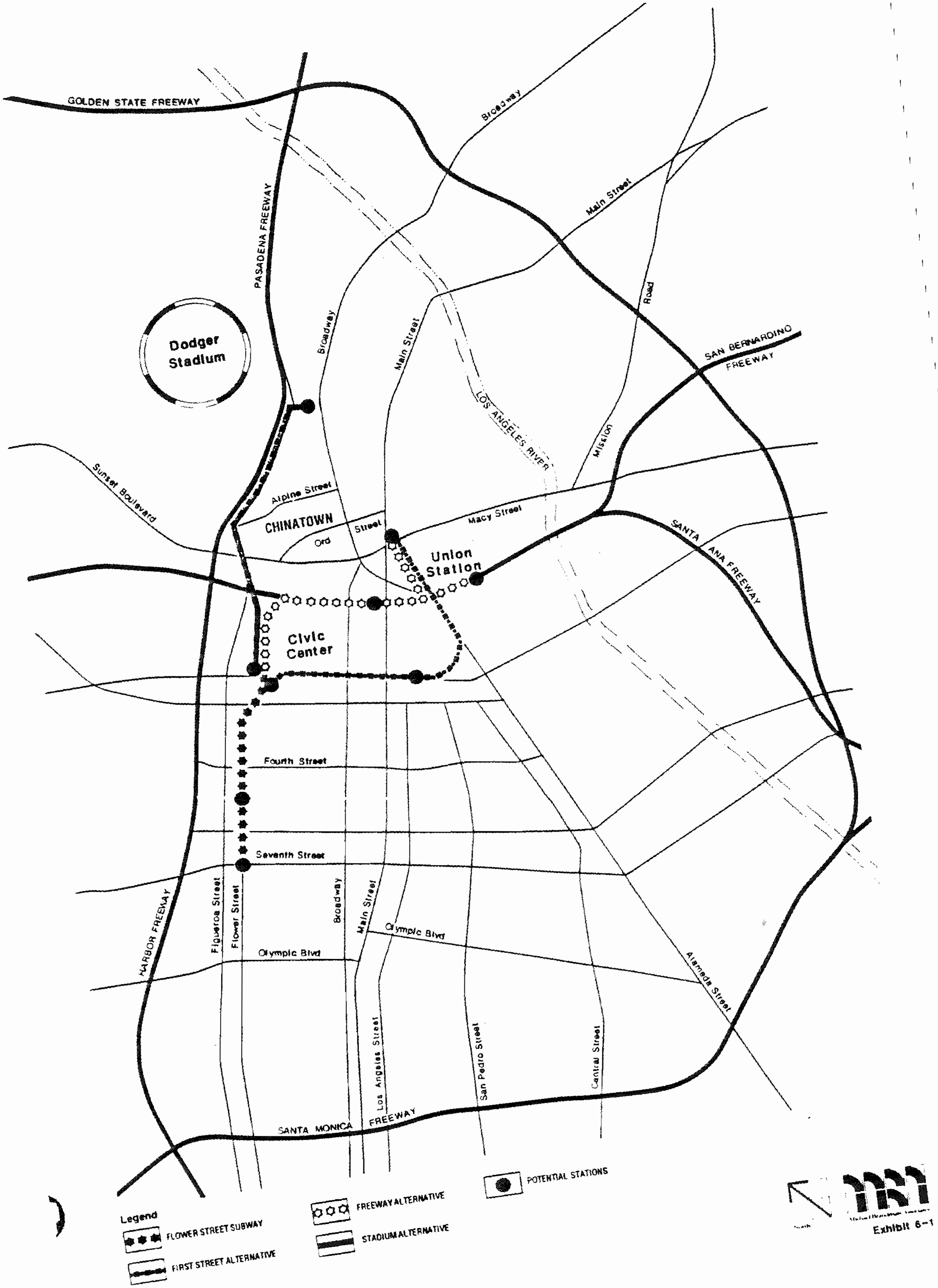


Exhibit 6-1

...lternative Alignments

...les Light Rail Transit Project

__Santa Ana Freeway (I-5) Downtown Option__: The freeway route would continue north from the Hope Street/1st Street intersection in a subway configuration beneath Hope Street and turn northeast, to an aerial structure which parallels the I-5 to the Union Station area. A number of impacts would occur on the north side of Arcadia Street north of the freeway. The aerial structure would encroach into a planned parking garage for the El Pueblo International Antique Block and onto state historic park property. The LRT at this location would also create visual impacts where an aerial guideway structure would be located adjacent to the historically significant Pico-Garnier block (currently undergoing rehabilitation) and Olvera Street revitalization project. The visual impacts of the elevated structure along Alameda Street near the historic Union Station building would also be similar to those anticipated for the 1st Street route.

__Dodger Stadium Downtown Option__: The LRT line proposed for the stadium route would continue north from Flower Street in a subway configuration beneath Hope Street and cross under I-5 continuing under Figueroa Street. The alignment would emerge from a portal on the south side of I-110, and continue on an aerial guideway where it would connect with Bernard Street in the north end of Chinatown. Key environmental issues which would be associated with this alignment include the displacement of an apartment building on Yale Street. The aerial guideway would require an elevated station over Bernard Street that would also result in the loss of on-street parking, disruption of access to businesses, conflict with a planned garage on the south side of Bernard Street and rerouting of traffic in the already congested north end of Chinatown.

Lincoln Heights Alternatives

Prior to initiating the EIR process, five alternatives serving the Lincoln Heights community were evaluated. Two of these options were selected for inclusion in the EIR, while the following the were dropped from further consideration.

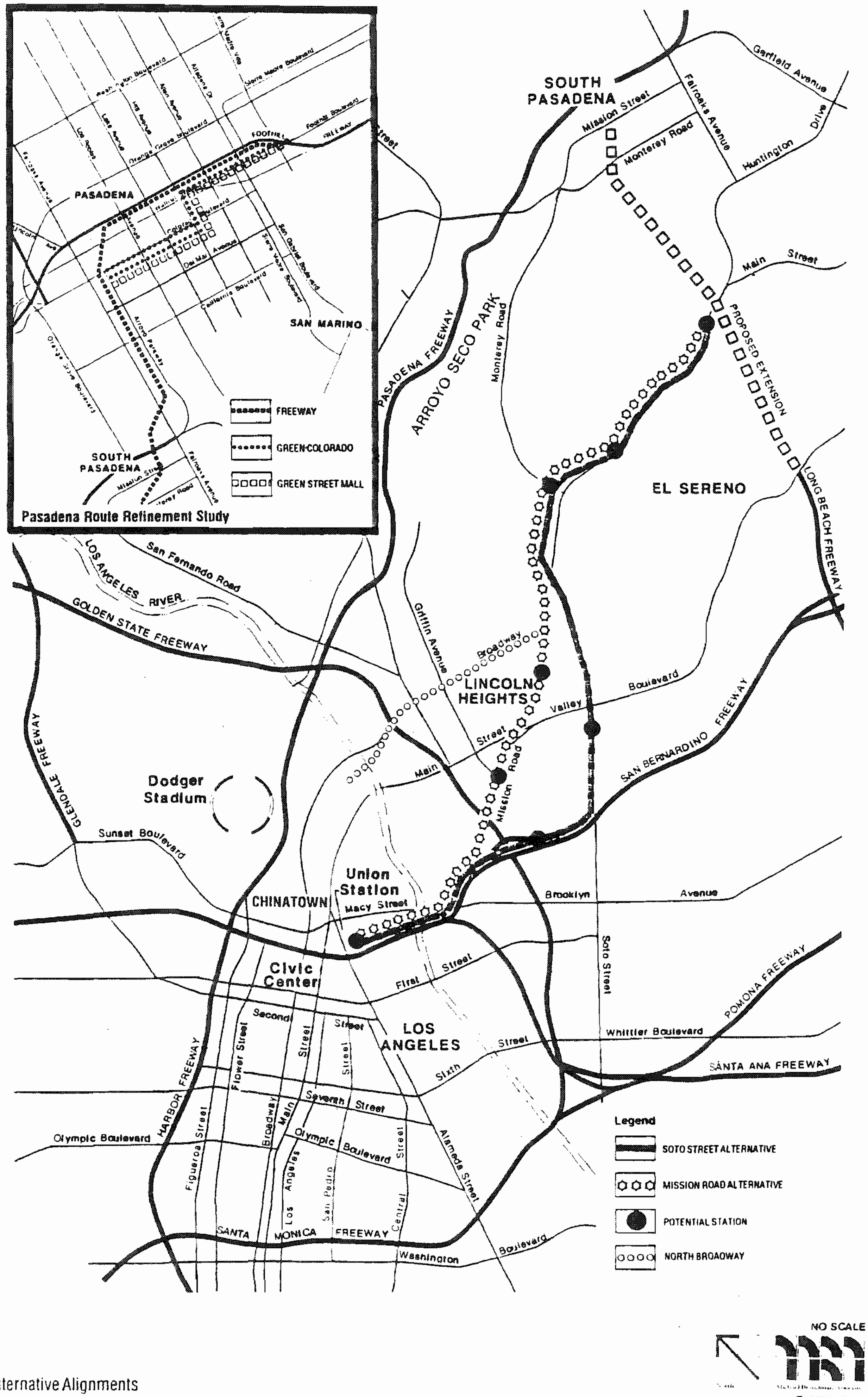
__Mission Road Alignment Alternative__: The Mission Road alignment would begin at Union Station and parallel the El Monte busway on an aerial guideway structure turning north and descending into Mission Road. The alignment would be at-grade in the Mission Road median as the road crosses under I-5. The alignment would then ascend on a retained fill structure to an aerial guideway just north of the Mission Road/Valley Boulevard grade separation next to the Parque de Mexico. It would continue north with the same Mission Road alignment and profile as the North Main Street alternative. Existing land uses are primarily public (e.g., Union Station, freeway, medical center) or industrial between Union Station and the Mission Road/Valley Boulevard grade separation. Lincoln Park, warehouses, and residences abut the alignment along Mission Road north of this point (similar to the North Main Street alternative). The implementation of this alignment would require substantial road widenings and result in significant problems related to engineering and design. The location of this alignment is shown in Exhibit 6-2.

Soto Street (busway segment) Alignment Alternative: The Soto Street alignment alternative would convert a portion of the El Monte Busway from Union Station to the USC Medical Center station for light rail use. Buses from the El Monte station would allow for the transfer of riders at the USC Medical Center station onto the light rail system. The alignment would then swing onto a Southern Pacific Railroad spur adjacent to Soto Street, turning onto Huntington Drive. This alignment was omitted because of the difficulties connecting to downtown Los Angeles and the resulting reduction of bus service elsewhere.

North Broadway Alignment Alternative: The North Broadway alignment alternative would leave the downtown/Chinatown area, then proceed along North Broadway, Mission Road and Huntington Drive. Two variations were explored along North Broadway: an aerial structure down the center of North Broadway, and an aerial structure parallel to North Broadway, proceeding mid-block to the south. Both of these variations were dropped from further study due to environmental impacts that were unacceptable to the community.

Pasadena Alternatives

The initial route refinement studies prepared for the Pasadena portion of the proposed project considered several alignment alternatives. A second stage of the route refinement study narrowed the number of candidate alignments to three. All three of the selected alignments would utilize the existing Santa Fe Railroad right-of-way which parallels the Arroyo Parkway. The terminal site at Sierra Madre Villa was used as an endpoint for these studies. One alignment, I-210, was selected by the City of Pasadena as the preferred route This route, which continues along the ATSF, is incorporated in this draft EIR. The other routes not selected are described below.



Alternative Alignments
Pasadena-Los Angeles Light Rail Transit Project

Green Street Mall Option: Turning east from the Santa Fe right-of-way, the double-track LRT line would run in the center of Green Street from west of Arroyo Parkway to the Hill Avenue "T" intersection. This would replace current one-way traffic with two-way lanes allowing local access only. The line would then turn north into the center of Hill Avenue, which would be widened in order to accommodate LRT. North of Walnut Street, the double-track LRT line would turn east and follow another railroad right-of-way. Beyond the San Gabriel Boulevard crossing, the line would turn north along Kinneola Avenue, go under I-210, and end west of Sierra Madre Villa Avenue.

Green Street/Colorado Boulevard Option: Turning east from the Santa Fe right-of-way, the double-track line would split into two single-track segments in downtown Pasadena. The inbound line would follow the north side of Green Street and would run contraflow with one-way eastbound traffic. The outbound line would follow the south side of Colorado Boulevard. The lines would join on Hill Avenue, north of Colorado Boulevard. Past Walnut Street, this LRT route would be identical to the Green Street Mall Option.

As does the Green Street-Colorado Boulevard Route, this segment connects to the Railroad Route Segment at Green Street and runs east to connect to the Hill Avenue-Railroad Connector Route Segment. This route, however, runs double track in the center of Green Street. The LRT tracks would be isolated from vehicular traffic by a curb which will be designed to permit vehicles to cross over the tracks when necessary.

Expanded Bus Service Alternative

The enhanced bus service alternative is similar to the no project alternative in that the Pasadena-Los Angeles Rail Transit Project would not be implemented if this alternative is selected. The major objective of this project alternative would be to increase the bus ridership and bus capacity along the Pasadena-Los Angeles Corridor. Possible strategies would include the use of larger buses (double deck and tandem), decreasing headways along existing routes, and adding new routes to the corridor.

No Project Alternative

The no project alternative assumes that the proposed Pasadena-Los Angeles LRT will not be implemented and that existing facilities and transit services will handle future transit demands in the Pasadena-Los Angeles Corridor. Existing freeways which serve the corridor would also be required to handle greater peak hour traffic loads resulting in corresponding increases in congestion and delays for motorists and a decrease in regional air quality.

6.2 ENVIRONMENTAL ANALYSIS OF ALTERNATIVES

Downtown, Lincoln Heights, Highland Park and Pasadena Alternatives

The potential environmental impacts that were anticipated to result from the implementation of the alternatives were assessed in the preliminary environmental analysis completed as part of the route refinement (LACTC, 1988).

The preliminary environmental analysis, summarized in Table 6-1, looked at a number of variables including engineering feasibility, projected cost, traffic impacts, displacement, and other environmental effects. In addition, the analysis considered the feasibility of a future connection with a Glendale LRT line. The rationale for selecting the Highland Park and North Main Street alignments also involved a number of other considerations including the cost of right-of-way acquisition, access, and potential ridership. For this reason, the Highland Park and North Main alignments were identified as environmentally superior alternatives over those considered in the route refinement study.

The Dodger Stadium and I-5 options were discarded early in the route refinement process because of difficulties anticipated with the engineering and construction of both lines. The 1st Street route was removed from further consideration due to an awkward portal configuration. Following the route refinement study, this option was replaced by the Second Street option.

Table 6-1

PRELIMINARY EVALUATION OF PASADENA-L.A. CORRIDOR ALTERNATIVES

ALTERNATIVE	ENGINEERING ASSESSMENT	EXPECTED COST/87$	GLENDALE LINK	TRAFFIC IMPACTS	DISPLACEMENT	ENVIRONMENTAL ISSUES	ADVERSE NOISE	OTHER COMMENTS	PRELIMINARY ASSESSMENT
HIGHLAND PARK Variations: [A] Chinatown-Broadway Route [B] 1st Street Route	GOOD (majority of line at-grade)	$450 to $500M	GOOD	LOW IMPACT -Install 9 new signals between Aves. 51-59 -1-way couplet on Marmion Way -Loss of 50 parking spaces -Parking/traffic impacts around Ave. 50 and Ave. 57 stations	LOW-MEDIUM IMPACT <10 residences, 1 business (additional displacement if greater buffer area desired)	-Pedestrian safety issues between Aves. 50 and 57 -Reconstruction of landmark Santa Fe bridge over freeway -[A] Chinatown business access during construction -[B] Visual impact and conflict w/ developments on 1st	HIGH (about 120 structures)	-Santa Fe abandonment proceedings -Amtrak service -[A]serves Chinatown while [B] serves government area	STUDY IN EIR w VARIATION [A] Provides good local service and simple con struction, though high cost and coordination w/ Santa Fe may render route unusable
N. MAIN STREET Variations: [A] Chinatown-Ord Route [B] 1st Street Route	FAIR	$350 to $400M	FAIR	HIGH IMPACT -Extensive use of street widenings, "straddle bents" or left turn prohibitions -Modify several intersections -1-way couplet on Huntington Drive -Loss of 650 parking spaces reduces access	LOW IMPACT 5-20 residences, 5 businesses	-Visual impact of elevated structure, esp. at Lincoln Park and along Mission -[A] Chinatown business access during construction -[B] Visual impact and conflict w/ developments on 1st	MEDIUM (about 40 structures)	-[A]serves Chinatown while [B] serves government area	STUDY IN EIR w, VARIATION [A] Provides some service to Lincoln Heights & Medical Center Though visual and parking impacts present, merits further study
MISSION ROAD	POOR (@ 1st St., Union Sta., Piper Tech. Center)	$325 to $350M	POOR	HIGH IMPACT -Unmitigatible at I-5 -Extensive street widenings -1-way couplet on Huntington Drive -Loss of 500 parking spaces reduces access	LOW IMPACT 5-20 residences, 5-10 businesses	-Visual impact of elevated structure on segment of Mission -Visual impact and conflict w/developments on 1st St.	LOW (about 10 structures)		DROP Impractical du to two major engineering problems and dependency on 1st Street route
SOTO STREET	POOR (@ 1st St., Union Sta., along busway)	$325 to $350M	POOR	LOW TO MEDIUM IMPACT -Single reversible carpool lane on busway -1-way couplet on Huntington Drive -Loss of 170 parking spaces	LOW IMPACT 5-20 residences, <5 businesses	-Visual impact and conflict w/developments on 1st St. -Route passes through Hazard Park	LOW (under 10 structures)	-Bus turnaround at Med Ctr decreases number of buses in downtown area	DROP Dependency on 1st St. route and usurping busway makes route undesirable
N. BROADWAY Variations: [A] Center-Street Aerial [B] Mid-Block Aerial	FAIR	$350 to $400M	GOOD	MEDIUM IMPACT -[A] Left turns become shared w/thru lane -[A] Loss of 350 parking spaces -[B] Loss of >150 parkin spaces -[A or B] 1-way couplet on Huntington Drive	[A] LOW IMPACT 5-20 residences, 6 businesses [B] HIGH IMPACT 45-60 residences 6 businesses	-Route passes Downey Recreation Center -Visual impacts of elevated structure (Downtown/Chinatown impacts same as Highland Park)	Not Available	-Community concerns raised during previous study	DROP[B], STUDY [A] Provides stron service to Lincoln Hts. [A] offers wid street width for line. Displacement impacts makes [B undesirable.

The engineering assessment rated the Mission Road alignment as "poor" compared to the Highland Park and North Main Street alignments. Reasons cited for eliminating this alignment included: the route's dependency on the 1st Street route, engineering difficulties near the Piper Technical Center, and resulting traffic problems near I-5.

The Soto Street alignment alternative was eliminated following the route refinement study because it would adversely impact the existing express bus service into the downtown. Similar to the Mission Road alignment, this alternative would also require the 1st Street route to be implemented.

The North Broadway alternative was dropped due to community opposition to the proposal and a number of significant engineering and land use impacts which could not be fully mitigated.

For the route refinement process in the City of Pasadena, alternatives using surface streets led to various negative environmental impacts such as loss of parking, street trees, and access to business. In some cases, acquisition of private right-of-way would have been necessary.

Table 6-2 presents a general overview of the key environmental impacts and issues that were considered in this assessment. The I-210 alignment was selected over the other alignments considered because the other alternatives would result in significant adverse displacement and traffic impacts.

TABLE 6-2

PASADENA ALIGNMENT OPTIONS
OVERVIEW OF ENVIRONMENTAL IMPACTS

Issue Area	Freeway Alignment	Green-Colorado Alignment	Green Street Mall Alignment
Land Use	Acquisition of AT&SF right-of-way Minor land acquisition near stations	Acquisition of AT&SF right-of-way Street widening on Colorado Boulevard Land acquisition along Hill Avenue for street widening Land acquisition near stations One side of on-street parking removed along Green and Colorado	Acquisition of AT&SF right-of-way Land acquisition near stations Land acquisition along Hill Avenue for street widening On-street parking removed along Green
Noise	Noise impacts restricted to existing AT&SF right-of-way	Noise impacts near residential neighborhood between Hill Avenue and Allen Avenue Noise impacts on existing residential area south of Green Street	Noise impacts near residential neighborhood between Hill Avenue and Allen Avenue Noise impacts on existing residences south of Green Street
Aesthetics	Minor aesthetic impacts; LRT will use existing AT&SF right-of-way	Aesthetic impacts in Old Town Aesthetic impacts in central business district	Aesthetic impacts in Old Town
Street Trees/ Open Space	LRT will be near Central Park and Memorial Park	LRT will be near Central Park Street tree removal on north side of Colorado Boulevard Street tree removal along Hill Avenue	LRT will be near Central Park Street tree removal along Hill Avenue Street tree removal along Green Street for street widening at station

TABLE 6-2 (continued)

Issue Area	Freeway Alignment	Green-Colorado Alignment	Green Street Mall Alignment
Public Safety	LRT will use existing AT&SF right-of-way, hazards at road crossings	Hazards at road crossings Hazards to vehicles crossing tracks into parking areas Hazards to pedestrians in downtown area	Hazards at road crossings Hazards to vehicles crossing tracked into parking areas Hazards to pedestrians in downtown area
Earth	No major grading or excavation	No major grading or excavation	No major grading or excavation
Air	Carbon monoxide concentrations near stations	Carbon monoxide concentrations near Green Street and Colorado Boulevard Carbon monoxide concentrations near stations	Carbon monoxide concentrations near stations and along Green Street
Light and Glare	Increased light and glare along Freeway Route	Light and glare along Colorado Boulevard, Green Street, and Hill Avenue	Light and glare along Colorado Boulevard, Green Street, and Hill Avenue
Natural Resources	Consumption of nonrenewable resources for construction and power generation	Consumption of nonrenewable resources for construction and power generation	Consumption of nonrenewable resources for construction and power generation
Risk of Upset	No significant risk of upset anticipated	No significant risk of upset anticipated	No significant risk of upset anticipated
Population/ Housing	No displacement of housing Growth-inducing impacts on housing and population	No displacement of housing Growth-inducing impacts on housing and population	No displacement of housing Growth-inducing impacts on housing and population

TABLE 6-2 (continued)

Issue Area	Freeway Alignment	Green-Colorado Alignment	Green Street Mall Alignment
Public Services	No significant adverse impacts on public services anticipated	No significant adverse impacts on public services anticipated	No significant adverse impacts on public services anticipated
Energy Consumption	LRT will consume electricity for power generation	LRT will consume electricity for power generation	LRT will consume electricity for power generation

Expanded Bus Service Alternative

The expanded bus service alternative considers the feasibility of expanding bus service in the study area instead of implementing a rail transit project, such as the one proposed. The Pasadena-Los Angeles Corridor is currently well served by buses operated by the RTD. Table 6-3 summarizes existing bus service for each alignment alternative.

As indicated in Table 6-3, most of the heavily patronized bus lines have peak hour headways of less than 15 minutes with a number of lines operating at 10 minute headways. With this existing frequency of service, it does not appear practical to upgrade the frequency of bus service in the corridor to match the LRT's level of capacity. Adding buses to this corridor would result in increased traffic congestion, and additional noise and air quality impacts. As buses share the same right-of-way as vehicular traffic, travel times would deteriorate with future traffic growth. In addition, the selection of the bus alternative would not comply with the directives of Proposition A to develop a rail transit system. As a result, this alternative is not considered to be environmentally superior to the North Main and Highland Park alignment alternatives.

TABLE 6-3

BUS SERVICE IN PROJECT AREA

Bus Line	Service Description	Total Daily Boardings	Peak Hour Headways
North Main Street Alignment			
483	Express bus from Los Angeles to Altadena via El Monte Boulevard	5,270	12 min.
485	Similar to 483		25 min.
76	Downtown Los Angeles to El Monte via North Main Street	4,783	12 min.
78	Downtown Los Angeles to Alhambra	7,091	9 min.
79	Downtown Los Angeles to Monrovia	7,091	24 min.
378	Same as 78 except limited stop service	7,091	20 min.
379	Same as 79 except limited stop service	7,091	20 min.
Highland Park Alternative			
401	Express bus from downtown Los Angeles to Pasadena	1,740	15 min.
402	Similar to 401, peak hour service only	1,740	30 min.
46	Downtown Los Angeles to Highland Park	1,560	25 min.
81	Downtown Los Angeles to Glendale	7,406	10 min.
83	Downtown Los Angeles to Highland Park	6,804	10 min.
176	El Monte to Highland Park	1,089	50 min.

Sources: Southern California Rapid Transit District, 1988.
Southern California Association of Governments, 1988.

To make the bus alternative competitive with the travel times and capacity of the LRT line, enhanced bus service would require reserving exclusive bus lanes along existing arterials such as Figueroa Street, North Main Street, or Mission Road, or to build an exclusive busway facility. Reserving lanes along existing arterials would result in significant adverse impacts that are unlikely to be superior to those anticipated to result from the implementation of the light rail line. The impacts associated with providing a busway facility would be similar to those of an elevated LRT structure.

No Project Alternative

The no project alternative would result in no new transit services or facilities for the Pasadena-Los Angeles Corridor. This represents the least desirable alternative due to increased traffic congestion, noise, vehicle emissions, and other impacts in an already impacted corridor. In addition, the substantial number of people who live and work in this corridor would not have direct access to the County-wide rail transit network. Finally, the no project alternative would directly conflict with the voter mandate to provide rail service in this corridor. As a result, this alternative is not considered to be environmentally superior to the North Main and Highland Park alignments.

6.3 ENVIRONMENTAL SUPERIOR ALTERNATIVE

Provision of transit has been identified as environmentally superior to the no project alternative based on the resulting reduction of total vehicle miles traveled and a corresponding improvement in regional mobility and air quality.

The proposed LRT project is also environmentally superior to the expanded bus service alternative due to operational advantages: the LRT allows for the movement of more people with a higher frequency. Buses currently serving the Pasadena-Los Angeles corridor have an average peak hour service of 20 minutes between buses. Bus headway times would be difficult to improve in a currently congested corridor. This LRT project will improve regional mobility by providing a 9-minute peak hour headway between vehicles. In addition, each electrically-powered two or three car LRT train on its own right-of-way would remove six to nine diesel-powered buses from the congested system resulting in improved traffic conditions and air quality.

While none of the alternatives considered in the earlier route refinement studies or in this EIR are completely free of adverse environmental impacts, the Highland Park alignment represents the best alternative in terms of traffic impacts (refer to Table 6-1) and in terms of structural displacement as it primarily uses its own separate right-of-way. In particular, the segment incorporated in the I-210 median represents the least impact in terms of traffic disruption and displacement. All of the other alternatives considered in the City of Pasadena involved considerable traffic and circulation impacts for those portions of the alignments that would be located within roadway rights-of-way. In addition, major dislocation was projected to occur at numerous locations. The alignments considered as the project candidates in this EIR, particularly the Highland Park alternative, represent the superior alternatives in terms of environmental impacts.

SECTION 7

UNAVOIDABLE SIGNIFICANT ENVIRONMENTAL EFFECTS

The CEQA law and State guidelines define a significant effect as a substantial adverse change to the physical environment. The physical factors that may be subject to such changes include land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. In situations where an EIR identifies significant effects, the government agency approving the project must make findings as to whether the significant effects have been reduced through mitigation to a level that is less than significant. Where an impact is unavoidably significant, specific reasons why mitigation is not successful or feasible must be identified.

This EIR identifies a number of significant environmental impacts anticipated to result from the implementation of the LRT. Mitigation measures are identified that will be effective in reducing the degree of overall impact, although certain environmental impacts are still anticipated to exceed to be significant as identified in this EIR. Findings with regard to each significant effect and a statement of overriding considerations must be prepared by LACTC, the lead agency, prior to project approval. The significant unavoidable adverse environmental effects are described in Section 4 of this EIR and are summarized below.

Parking Displacement: The loss of on-street parking is a significant effect which is unavoidable and cannot be mitigated. In this respect, the North Main Street alternative has a higher impact as all of the existing on-street parking spaces along North Main Street, most of the parking spaces along Mission Road and one side of parking along Huntington Drive South will have to be removed. In comparison, the Highland Park Route results in very little parking loss as it is located in the existing AT&SF railroad right-of-way.

Aesthetics: The implementation of the proposed North Main alignment would result in significant adverse aesthetics impacts along certain segments of the alignment. The major aesthetic impacts will occur in the vicinity of Parque de Mexico and Lincoln Park. Both of these sites are very important to the surrounding communities. The mitigation measures identified in Section 4.12 of this EIR will not be totally effective in reducing the anticipated visual impacts.

Cultural Resources: The AT&SF railroad bridge over the Arroyo Seco has been designated as a cultural monument by the City of Los Angeles. Widening of the surface decking of the bridge to accommodate the LRT's double tracks is a significant unavoidable effect required to ensure public safety. In addition, cultural resources may be discovered in the course of excavation activities in the vicinity of Union Station.

SECTION 8

LONG-TERM IMPLICATIONS OF THE PROPOSED PROJECT

8.1 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

CEQA and the state CEQA guidelines require EIRs to identify the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. Special attention must be given to those impacts which narrow the range of beneficial uses of the environment or present long-term risks to the public's health and safety. In addition, the EIR must also identify those reasons or justifications why the implementation of the proposed project should proceed now rather than in the future.

The proposed Pasadena-Los Angeles Rail Transit Project would result in a number of long-term impacts when the system becomes operational. The proposed project would provide residents living in the Pasadena-Los Angeles Corridor with an alternative to the private automobile as a means to get from home to work. The operation of a safe, convenient, and efficient mass transit line would also lessen regional dependence on the private automobile and the need for additional freeway capacity. Any significant reduction in the number of vehicles used in home-to-work commutes would also benefit local air quality, reduce fuel consumption, and improve roadway service levels throughout the corridor over that which would be expected in the absence of an operational mass transit system.

The operation of the proposed Pasadena-Los Angeles Rail Transit Project may represent a risk to persons within the LRT right-of-way. There is a potential that vehicles and pedestrians may be struck by LRT vehicles if certain precautions and warnings are not followed. Mitigation measures identified throughout Section 4 of the EIR focus on reducing potential risks to motorists and pedestrians.

The proposed LRT project should proceed now rather than in the future for the following reasons:

- The need for additional modes of transit into downtown Los Angeles will become greater as development intensifies. Increased commercial development and corresponding increases in employment generation underscore the need for alternatives to private automobiles as a means to get to work. The list of related projects discussed in Section 5 of this EIR includes 1,693 housing units, 360,000 square feet of commercial, and over 8.5 million square feet of office space within one block of the alignments being considered. In downtown Los Angeles, over 1.6 million square feet of commercial and 15 million square feet of office space developed is approved, planned, under construction, or recently completed.

- Freeway traffic volumes will continue to increase throughout the region leading to increased congestion and traffic delays.

- Increased development in the downtown and the absence of viable mass transit in the Pasadena-Los Angeles Corridor in Los Angeles will exacerbate parking problems in the future.

- Alternate modes of travel must be provided to reduce dependence on the private automobile which accounts for the majority of pollutant emission in South Coast Air Basin. This project, together with the other mass transit projects in the region, is a major component of a long-term strategy for improving air quality in the region.

- The timely implementation of the Pasadena-Los Angeles LRT will ease the system's integration into mass transit facilities presently under construction in the downtown area and surrounding region.

- The costs of land acquisition and construction is likely to increase over time. This is especially true of underground construction. Long-term delays in the route selection or approval of the project may result in significant increases in the system's construction costs.

8.2 IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD BE INVOLVED IN THE PROPOSED PROJECT IF IT WERE IMPLEMENTED

The implementation of the proposed Pasadena-Los Angeles LRT project will commit nonrenewable resources to the construction and operation of the project. These resources will include materials used in the project's construction, as well as nonrenewable fuels used to power the stations, and will involve a continued commitment of the site to urban land use. This commitment will also preclude other development options for land occupied by the Pasadena-Los Angeles Rail Transit Project over the life of the project and will preclude other types of rail service (such as freight and commuter service) in the corridor.

SECTION 9
GROWTH-INDUCING IMPACTS

The Pasadena-Los Angeles LRT is an important component of a regional transportation network planned and under construction in the greater Los Angeles area. This LRT project will provide a convenient link between Pasadena and other portions of the West San Gabriel Valley with downtown Los Angeles.

Although the LRT project will not induce growth in and of itself, the implementation of the Pasadena-Los Angeles LRT may result in a number of growth-inducing impacts. First, the project may allow responsible agencies to intensify zoning and/or development in the vicinity of the stations. A number of stations may attract commercial retail and other types of development oriented toward LRT passengers. Indirect growth-inducing impacts may result from the alteration of transportation patterns in the project vicinity which are difficult to identify at this time. In general, the implementation of any of the LRT route alternatives may increase development pressure in the vicinity of stations and at the beginning and terminus of the rail line. The advantages to employers of being located near the LRT may also provide impetus for businesses to relocate to areas permitting commercial and industrial development along the LRT route, especially near stations. This will be especially true for vacant or underutilized parcels.

9.1 GROWTH-INDUCING IMPACTS: LAND USE

Downtown Los Angeles is characterized by a concentration of numerous existing and approved planned developments in various stages of implementation. Although much redevelopment activity is presently occurring, development immediately adjacent to the proposed alignments generally corresponds to what is permitted by the general plan which is not controlled by the lead agency (LACTC). The downtown serves as the "hub" of several converging rail and busway transit systems conveying people in and out of the CBD. The Pasadena LRT, if implemented, will provide an east/west connection serving the Pasadena-Los Angeles Corridor.

The light rail project will permit an increase in two limits to growth in the downtown area: parking and freeway congestion. People utilizing rail transit will be free of commute traffic and downtown parking shortages. This will permit both a greater daily concentration of the workforce in the downtown area and provide opportunities for more intense land use around the rail stations, particularly commuter-related services. The Pasadena-Los Angeles LRT may also encourage commercial growth adjacent to the alignment by eliminating or reducing traffic and parking constraints.

Growth-inducing impacts of approved development and transportation projects, as well as future projects, will be evaluated in other EIRs. Although construction of the proposed light rail can affect the location, intensity and phasing of development, other systems and services, such as water, wastewater treatment, drainage, education, public protection, health, and utilities are necessary for urban development. If any of these services or systems cannot provide adequate capacity, development may be restricted by the responsible agency.

Exhibits 9-1, 9-2, and 9-3 indicate the general plan designation that applies to those properties located in the immediate vicinity of the stations which will serve the proposed project. Existing development surrounding some stations is less intense than that permitted by the general plan's land use policy. In these instances, there is a possibility that the proposed LRT project could encourage redevelopment to the higher densities permitted under the general plan.

9.2 GROWTH-INDUCING IMPACTS: POPULATION

An additional potential growth-inducing impact of the LRT is associated with the introduction of higher-density housing units in certain areas along the transit corridors. The market may support the development of higher density multiple-family housing in the corridor, especially in the vicinity of stations. An increase in residential development and an intensification of commercial activities in downtown Los Angeles will result in increased population growth in the region. Exhibits 9-2 and 9-3 indicates the general plan designation for those properties in the vicinity of the stations.

9.3 SUMMARY OF GROWTH-INDUCING IMPACTS

The potential changes in land use and population will occur over long periods of time and any immediate growth-inducing impacts will be minimal. Over the long run, however, the Pasadena-Los Angeles LRT, together with other mass transit systems in the region will contribute to a

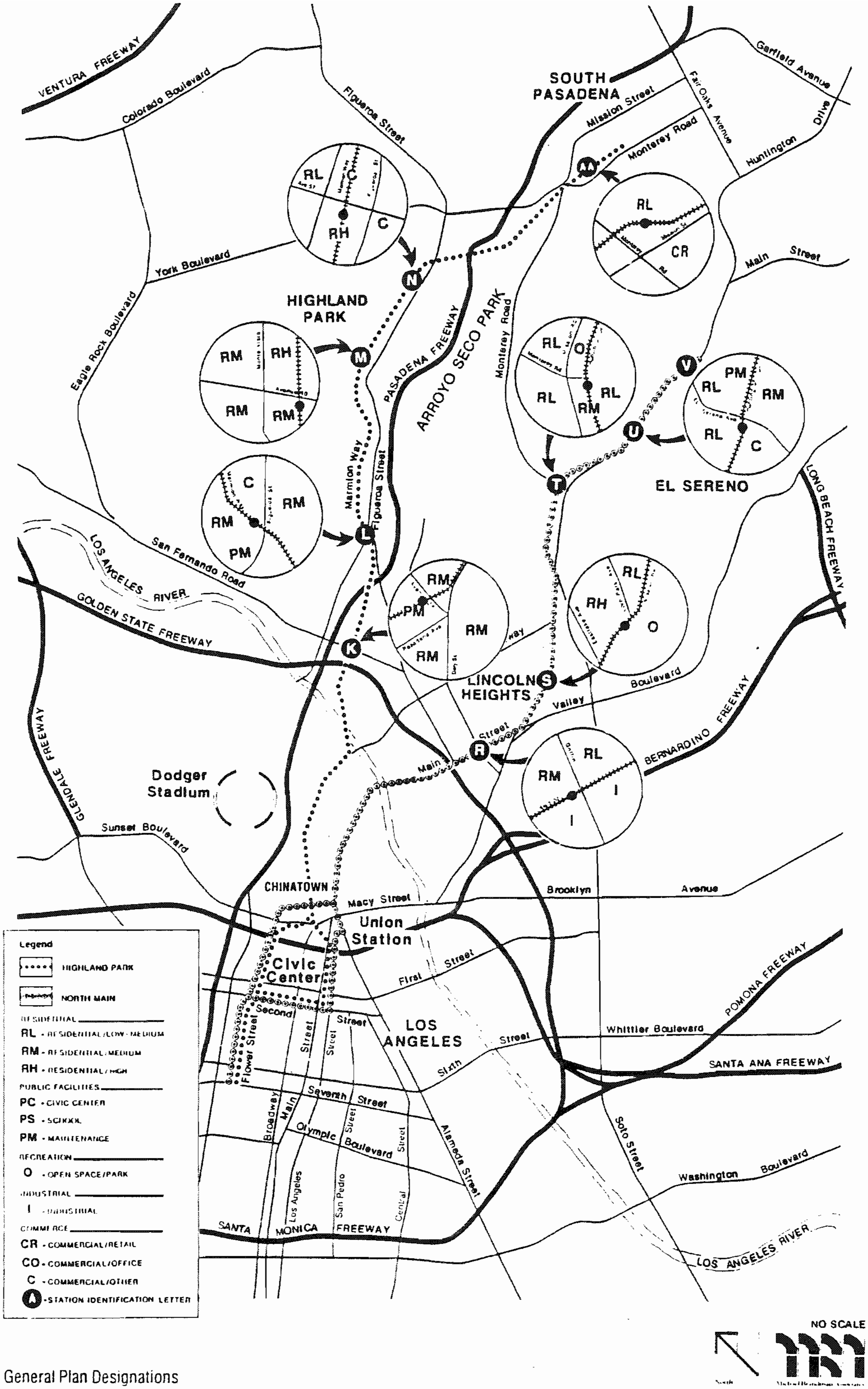
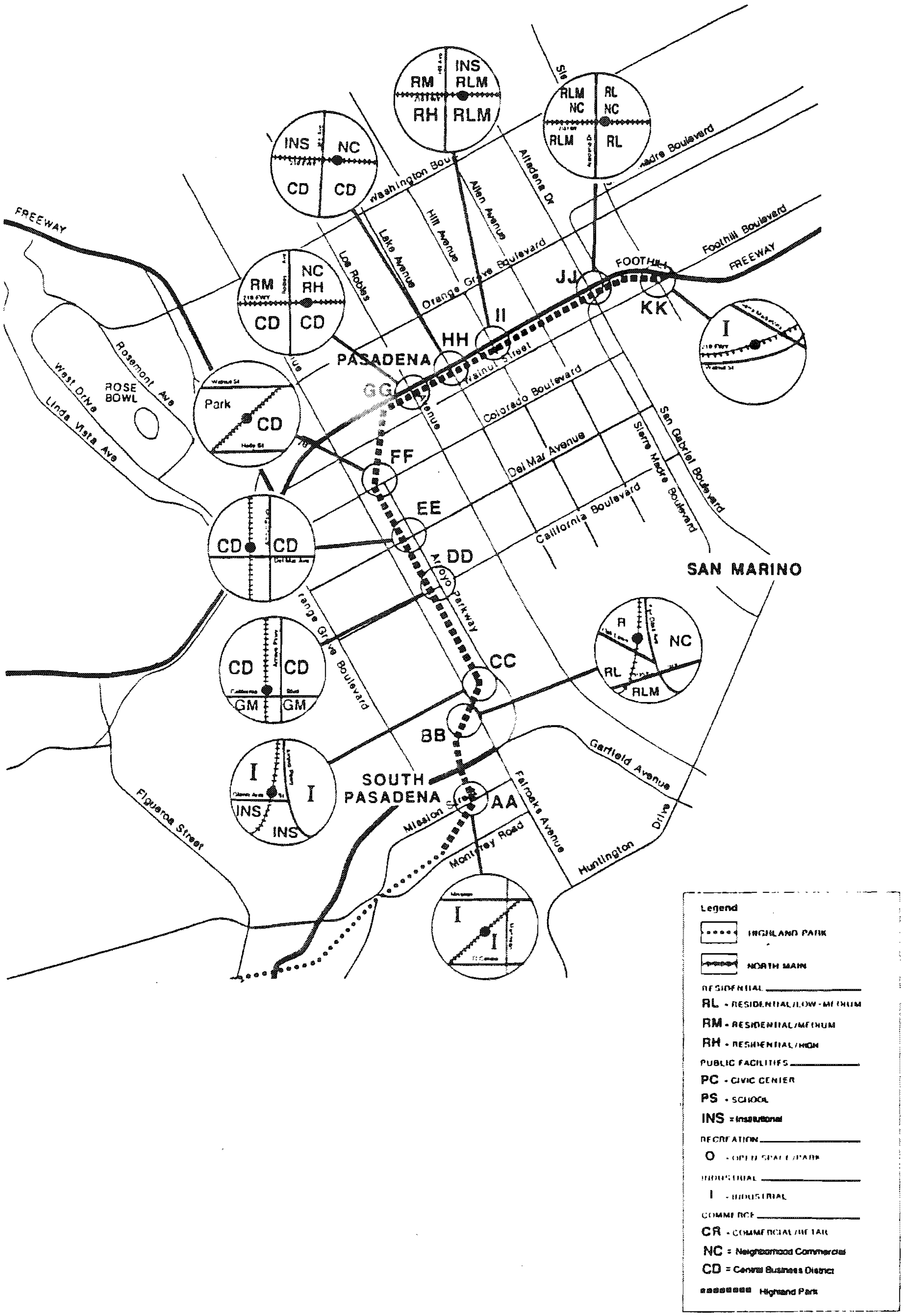


Exhibit 9-1

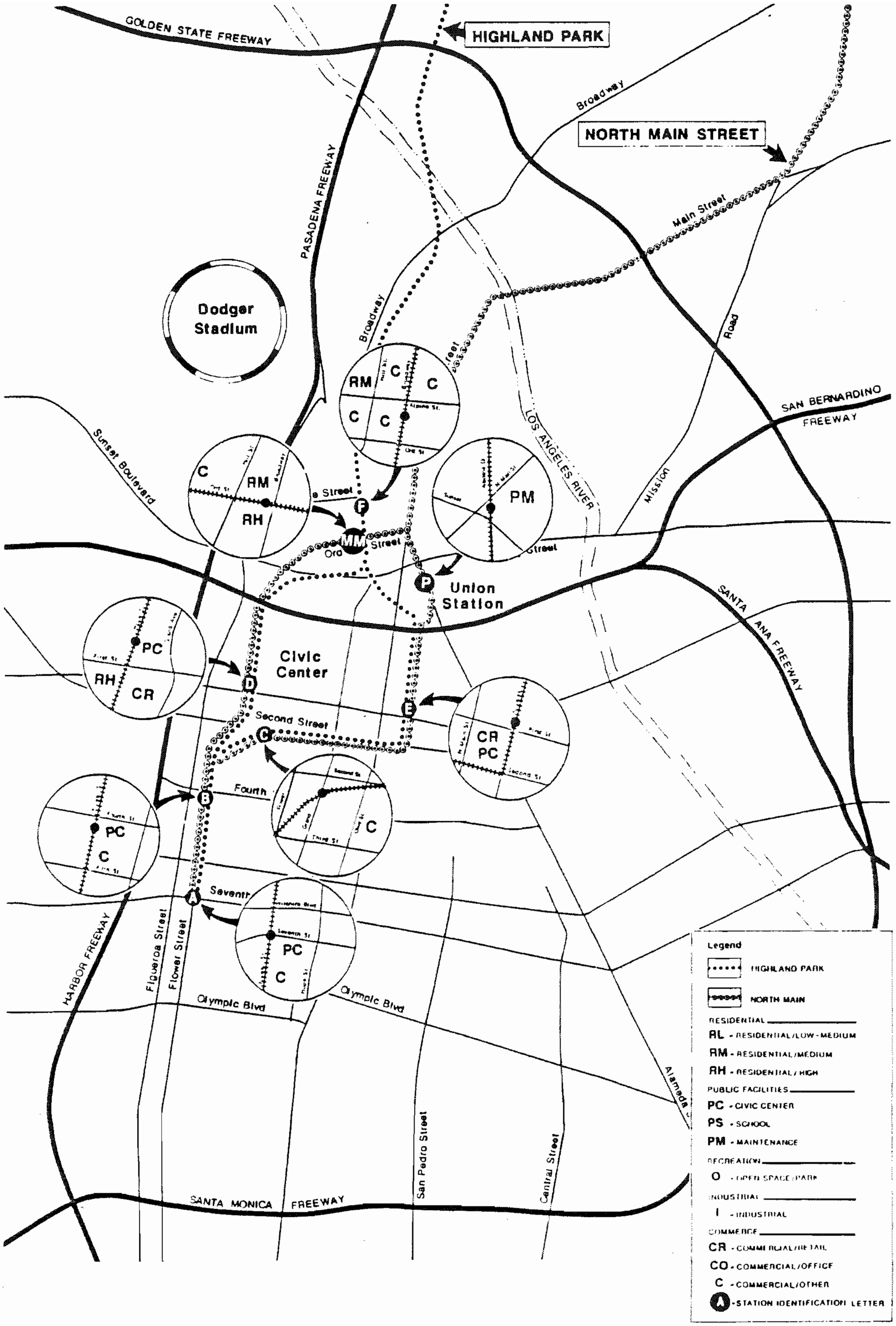
General Plan Designations
Pasadena-Los Angeles Light Rail Transit Project



Pasadena/General Plan Designations
Pasadena-Los Angeles Light Rail Transit Project

NO SCALE

Exhibit 9-2



Downtown/General Plan Designations

Pasadena-Los Angeles Light Rail Transit Project

Exhibit 9-3

change in land uses and a corresponding change in the distribution of population without a corresponding decline in mobility and air quality.

SECTION 10

REFERENCE AND RESOURCES

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