FINAL REPORT

PRELIMINARY PLANNING STUDY ALONG THE NORTHERN SAN GABRIEL/SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR

Submitted to:

Los Angeles County Transportation Commission

Submitted by:

Korve Engineering, Inc.

in association with:

R. L. Banks & Associates, Inc.
Manuel Padron & Associates
Patti Post & Associates
Myra L. Frank & Associates

August 3, 1992

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PRELIMINARY PLANNING STUDY ALONG THE

NORTHERN SAN GABRIEL/SAN BERNARDINO VALLEY

TRANSPORTATION CORRIDOR

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1. EXECUTIVE SUMMARY

1.0 Executive Summary

This Executive Summary provides an overview of the final report for the Northern San Gabriel/San Bernardino Valley Transportation Corridor Preliminary Planning Study.

1.1 Study Purpose and Process

This preliminary planning study is part of an effort to coordinate planning efforts for the rail transit programs in the Northern San Gabriel and San Bernardino Valleys.

The goal of this study is to examine and evaluate rail-related alternatives on four rights-of-way (ROW): the Atchison, Topeka & Santa Fe (ATSF) Pasadena Subdivision (formerly Second Subdivision) between Pasadena and Claremont, the Southern Pacific (SP) Azusa Branch between Baldwin Park and Irwindale, and the SP Baldwin Park Branch and Route 30 Freeway corridor between Claremont and San Bernardino. The location of these rights-of-way is illustrated in Figure 1.1.

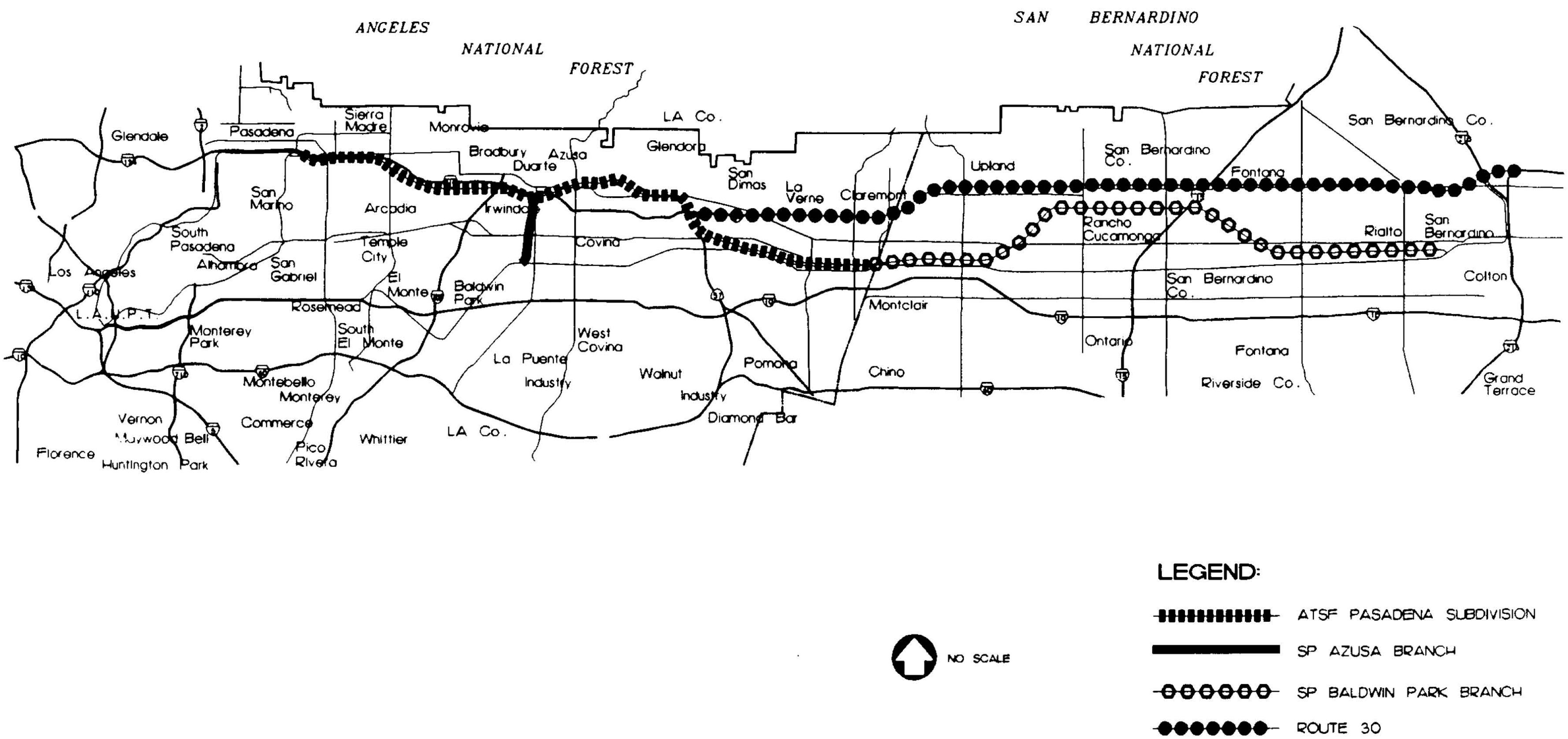
The intent of the preliminary planning study is to provide the LACTC, San Bernardino Associated Governments (SANBAG), and local jurisdictions with information to determine the most appropriate short- and long-term use for these rights-of-way to serve both local and regional transit needs in the corridor from Pasadena to San Bernardino, and to complement already planned Pasadena-LA light rail service and San Bernardino to LA Metrolink commuter rail service.

The study was conducted with a project management team (Task Force) involving all funding participants: LACTC, the San Bernardino Associated Governments (SANBAG), and the Cities of Arcadia, Azusa, Claremont, Duarte, Glendora, Irwindale, La Verne, Monrovia, Pasadena, Pomona, and San Dimas.

1.2 The Study Corridor

1.2.1 Regional Setting

The study area ranges roughly from the base of the San Gabriel Mountains on the north to the I-10 Freeway on the south, and from Pasadena on the west to San Bernardino on the east. This roughly 60 mile corridor encompasses two counties and seventeen cities. The alignments under study run through a combination of residential, commercial and industrial areas within these jurisdictions. The corridor also includes a wide range of activity centers, including employment centers, colleges, major entertainment facilities and recreational areas, and regional shopping centers.



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PRELIMINARY PLANNING STUDY

RIGHTS-OF-WAY UNDER STUDY

FIGURE 1.1

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Each of the right-of-way corridors under study is briefly described below.

1.2.2 Atchison, Topeka and Santa Fe Pasadena (Second) Subdivision

Recently acquired by the SCRRA, the former Santa Fe Pasadena Subdivision begins at the major Santa Fe yard facility in San Bernardino and runs west through Rialto, Fontana, Upland, and Claremont. In San Dimas, it turns to the northwest, continuing on to Glendora and Azusa, and then west to Pasadena. In Pasadena, the line turns south and southwest, passing through South Pasadena and Highland Park, crossing the Los Angeles River and joining the Third Subdivision at Mission Tower, near Union Station.

Current plans are for the Pasadena Blue Line to utilize the portion of the Pasadena Subdivision from Union Station to Pasadena. The portion from Claremont eastward is currently planned for San Bernardino to Los Angeles commuter rail in combination with the Los Angeles County portion of the SP Baldwin Park Branch. The segment from Pasadena eastward to Claremont is part of this study. The LACTC's 30-Year Integrated Transportation Plan includes the Blue Line Azusa Extension as a "candidate corridor" on this segment, and planning for the Tri-City Corridor (Burbank-Glendale-Pasadena) has also considered use of an eastern extension.

1.2.3 Southern Pacific Baldwin Park Branch

The Southern Pacific Baldwin Park Branch extends from the Southern Pacific Alhambra Line in the City of Industry northeast into Baldwin Park, and then turns east to run through the Los Angeles County cities of West Covina, Covina, San Dimas, La Verne, Pomona, and Claremont. East of Upland in San Bernardino County, the line jogs to the northeast through Rancho Cucamonga and Fontana before dropping back to the south east of I-15 and heading eastward through eastern Fontana and Rialto. It terminates east of Rialto, where the Baldwin Park Branch merges into the north/south SP Colton line. The ATSF Second Subdivision passes within several hundred yards of this junction, although the tracks do not intersect as the SP track is carried over the ATSF tracks in a grade separation.

SCRRA plans to run commuter rail service from San Bernardino to Los Angeles on the Los Angeles County segment of the Baldwin Park Branch and adjoining State Street line, continuing on the ATSF ROW in San Bernardino County. The segment of SP ROW east of Claremont through San Bernardino County is a subject of this study.

1.2.4 Southern Pacific Azusa Branch

The Southern Pacific Azusa Branch extends north from the Baldwin Park Branch at Azusa Canyon Road and Los Angeles Street, through Irwindale where it passes under the Santa Fe Pasadena Subdivision and the I-210 Freeway, then hooks west around gravel pits and curves back to the east to terminate near downtown Azusa.

1.2.5 Route 30 Freeway Alignment

The Route 30 Freeway alignment extends from just east of the I-210/Route 30 Freeway junction in San Dimas approximately 30 miles eastward to the I-215/Route 30 Freeway junction in San Bernardino. Between these points, the freeway has not yet been constructed, although considerable planning and preliminary design has been conducted and most of the right-of-way has been maintained for the past 30 years. Starting at the west end, the alignment runs parallel to and just south of Base Line Road. At the Los Angeles/San Bernardino County line, the alignment runs northeast to Mountain Avenue in Upland, at which point it runs directly eastward just north of 19th Street and Highland Avenue. The alignment drops down south of Highland in the City of San Bernardino before turning northeast again to meet the I-215/Route 30 junction.

A Draft EIR for the Route 30 alignment is currently in preparation. This document defines the freeway as a six-lane facility with one high-occupancy-vehicle (HOV) lane in each direction in the freeway median. Rail transit could also potentially be accommodated in the freeway median, and that possibility is a subject of this study.

1.2.6 Study Process

This preliminary planning study was initiated in November 1991 with a review of the study corridor, and three potential rail technology alternatives -- light commuter rail, and rail bus.

The next step in the study was to identify rail service options in the corridor for preliminary screening. A total of thirteen options in Los Angeles County and nine options in San Bernardino County were developed and screened. The preliminary screening reduced this number to five options in each county, which were then combined into six corridor-wide alternatives for further study.

Technical studies then proceeded on the six alternatives. Technical studies were prepared in the following areas:

- Conceptual Engineering
- Operations Planning
- Station Site Planning
- Patronage Forecasting
- Traffic Impact Assessment
- Environmental Impact Assessment
- Capital and Operating Costs

Throughout the process of screening options, defining study alternatives, and preparing the technical analyses, the consultant team met on a regular basis with a project task force which included representatives from the San Gabriel Valley cities, SANBAG, and LACTC. These task force meetings provided a forum for the consultant to report study progress and for the task force members to offer direction and comment. After the technical studies were completed, a comparison and evaluation of the six alternatives was conducted.

1.3 Rail Technology Alternatives

Three rail technologies were considered during the preliminary screening process--light rail, commuter rail, and rail bus. Each is summarized below.

1.3.1 Light Rail Transit

Light rail transit is a medium-capacity, urban/suburban rail mode. LRT systems typically provide frequent train service on dedicated, electrified rail lines mostly at-grade and often imbedded in streets or using existing rail rights-of-way. Vehicles draw power from overhead electric lines and operate at speeds up to 55 mph. Actual operating speeds vary depending on the right-of-way conditions. Street crossings are typically at-grade although grade separations are not uncommon on light rail systems. Peak hour service headways may be as low as 5 minutes and often average 10-15 minutes. Service is usually provided at longer headways during off-peak hours. Vehicles are operated singly or in pairs (with a maximum of three vehicle consists). Light rail vehicles in use on the Long Beach Blue Line (the first light rail line in operation in Los Angeles County) have 76 seats per car and can carry up to 175 passengers with standees. Station spacing for light rail generally ranges from one to two miles and stations have high platforms.

1.3.2 Commuter Rail

Commuter rail is a medium-capacity, inter-urban rail transit mode that typically focuses on providing peak-period service over relatively long distances. Commuter rail provides line-haul service from outlying suburban areas to downtowns. Ridership is usually heavily peaked and directional.

Trains are comprised of locomotive-hauled cars compatible with and sometimes sharing rail line with standard railroad freight equipment. Service is less frequent than light rail, with intervals of 30 to 60 minutes being common. The vehicles planned for use on the Metrolink system in Southern California are locomotive-hauled, 85-foot standard railroad equipment coaches with seating on two levels. The trains may be operated in either direction. Train consists will range from four to eight cars; each car has 152 seats and the intent is to provide seats for all passengers. Station spacing for commuter rail lines generally ranges from three to six miles between stations. Stations have low platforms.

1.3.3 Rail Bus

Rail bus is a low-medium capacity rail transit mode that is something of a hybrid between light rail and commuter rail. Rail bus comprises self-propelled diesel rail cars that may be operated as single cars or in two-three car combinations. These vehicles are adaptable to a range of transit needs. They can be used for feeder service to high density corridors or downtowns, as well as to commuter rail services, and also to provide suburban-suburban local transit connections where density and ridership do not justify higher capacity systems. Since they are self-propelled and operable on single track, they can be used to enhance commuter rail access and service frequency, or to extend light rail service to markets requiring less frequent service without the higher costs of electrification and double-track facilities connected with LRT.

Rail bus vehicles are available in configurations that are compatible with either commuter rail (wide body, low platform) or LRT (narrow body, high platform), but there are no current rail bus systems or manufacturers in the United States. Use of rail bus in this corridor would require the introduction of a new rail technology into Los Angeles County and would also require separate maintenance facilities, yards, etc.

Following an evaluation of these technologies, the rail bus option was dropped from further analysis. Rail bus is potentially less expensive than light rail because it can utilize single track and would not run as frequently as light rail. However, unless rail bus service were to utilize double track, it could not meet the service capacity of light rail. Rail bus would also require additional vehicles, separate yards and maintenance facilities. A similar service could be provided just as effectively with traditional commuter rail vehicles. As a result, rail bus service would lead to additional costs without significant advantages.

1.4 Alignment Options

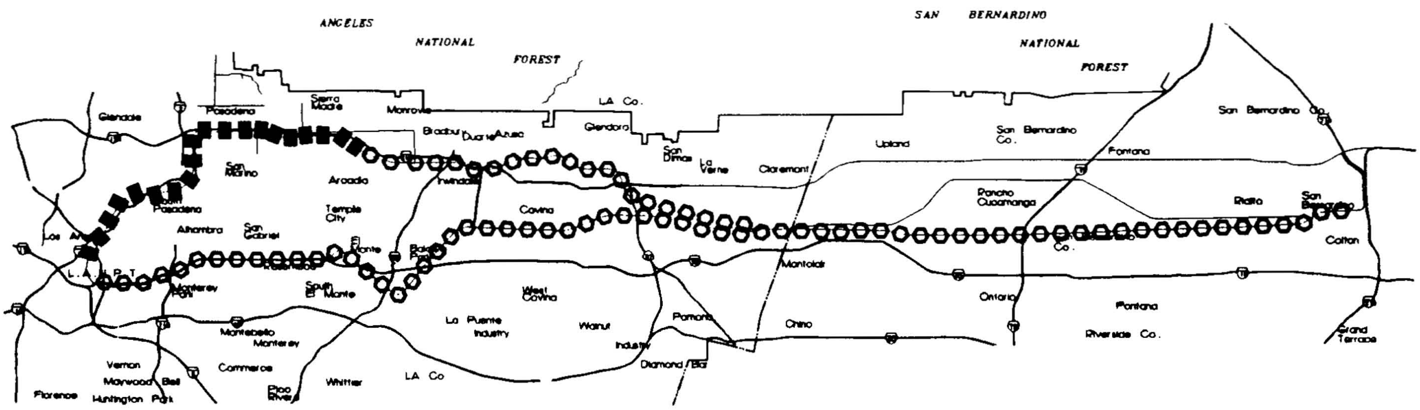
Each alignment segment was first reviewed to determine the general viability/feasibility of each rail mode on that segment. This review focused on physical and engineering parameters, rather than service parameters. Since physical and engineering constraints did not significantly limit the rail options on each segment, the segments were further reviewed with regard to how they would fit into a region-wide system of rail transit.

While there are many potential combinations, there were relatively few that formed logical service concepts for local and regional transit service in the corridor. A total of thirteen options in Los Angeles County and nine options in San Bernardino County were identified for preliminary evaluation.

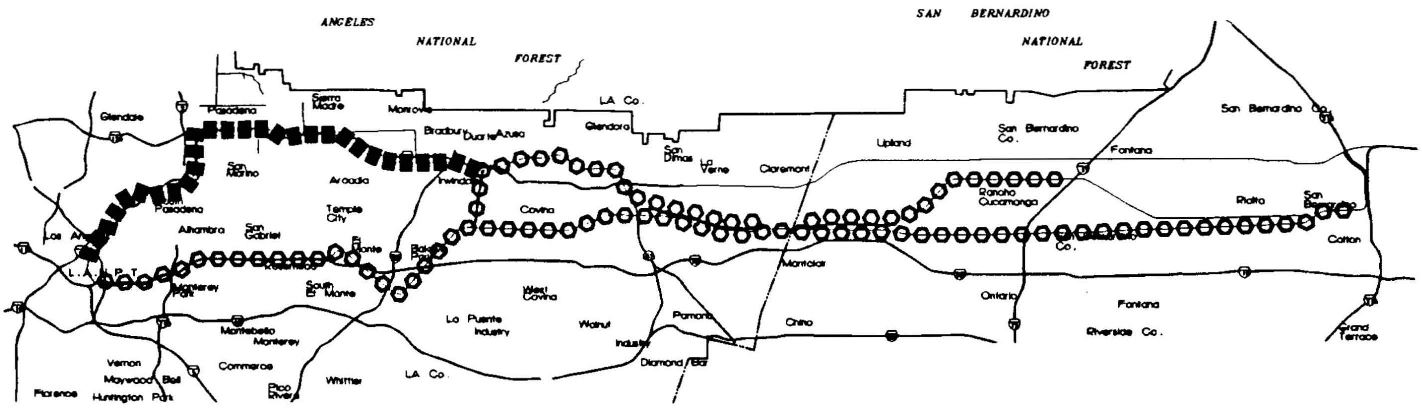
These options were reviewed to identify a range of alternative ways to provide good local transit service in both the San Gabriel and San Bernardino Valleys, while also providing good access to the regional transit facilities in the corridor.

1.5 Study Alternatives

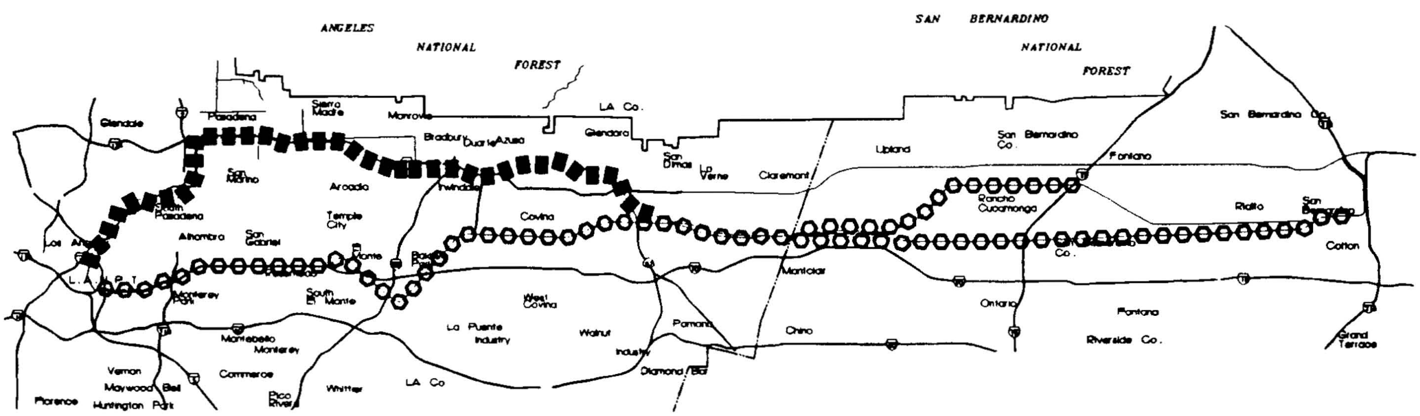
The preliminary options were screened down to six regional alternatives which combined options from both counties. The alternatives included a mix of rail options, with two alternatives having an emphasis on commuter rail service, one being almost equally balanced between commuter rail and light rail, and three having an emphasis on light rail service. The six alternatives are described briefly below and illustrated in Figure 1.2.



ALTERNATIVE 1 - LRT TO ARCADIA



ALTERNATIVE 2 - LRT TO IRWINDALE



ALTERNATIVE 3 - LRT TO SAN DIMAS

LEGEND:

-OOOOOO- COMMUTER RAIL

-■■■■■■■- LIGHT RAIL

NO SCALE

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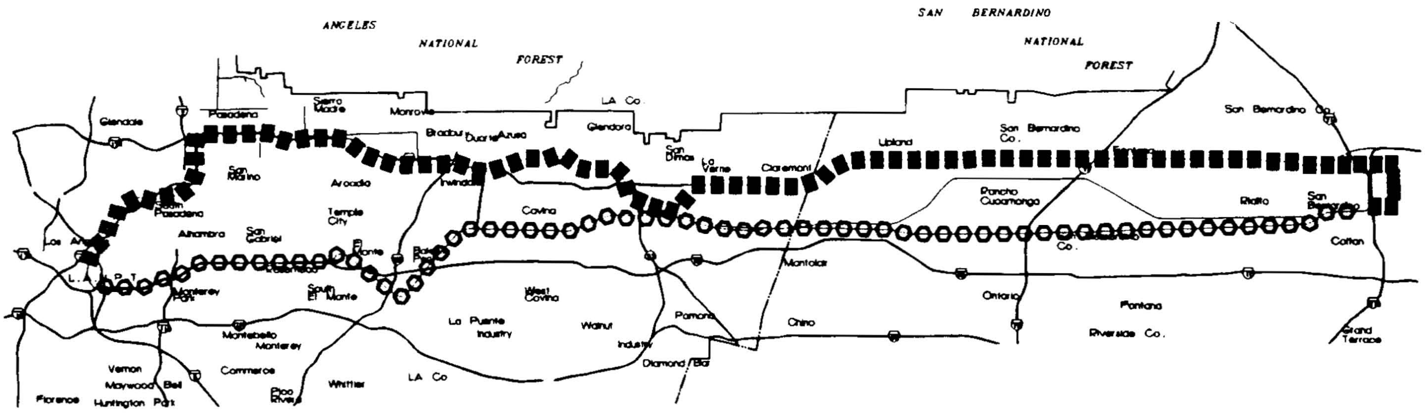
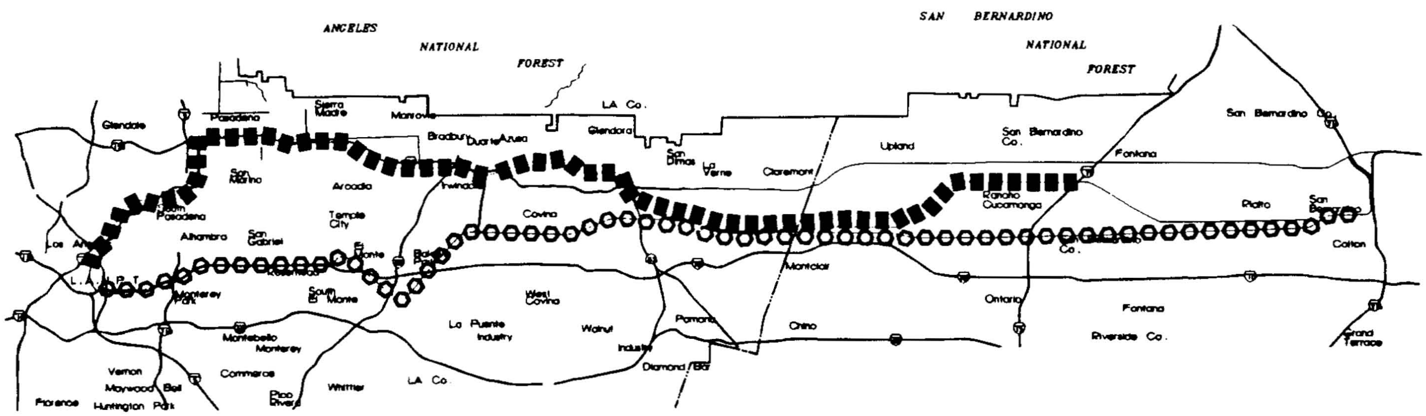
STUDY ALTERNATIVES

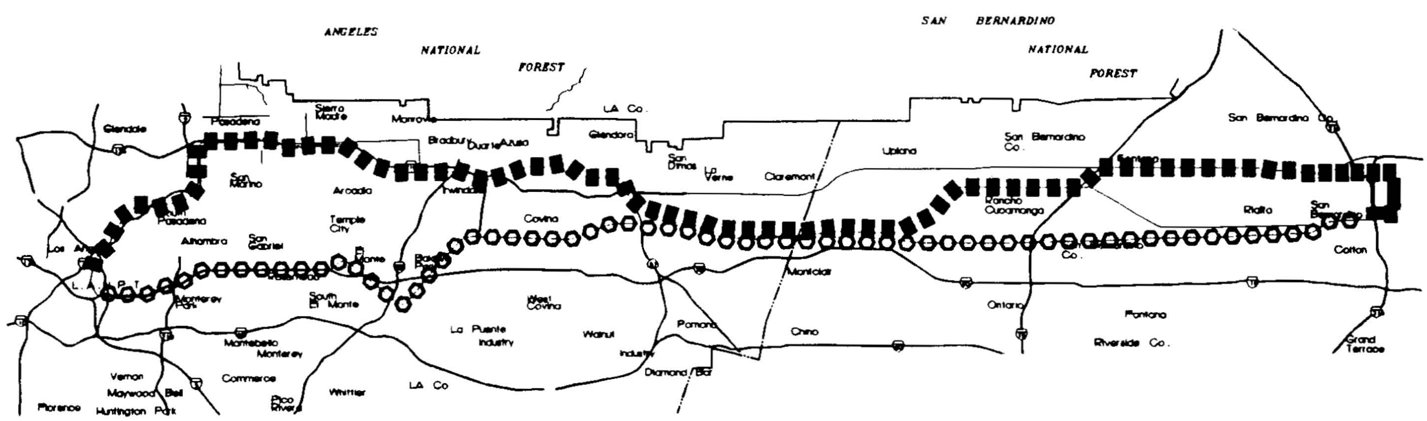
FIGURE 1.2



ALTERNATIVE 4 - LRT TO SAN BERNARDINO (VIA RTE 30)



ALTERNATIVE 5 - LRT TO FONTANA (VIA SP)



ALTERNATIVE 6 - LRT TO SAN BERNARDINO (VIA SP / RTE 30)

LEGEND:

-OOOOOO- COMMUTER RAIL ▬■■■■■■■▬ LIGHT RAIL

NO SCALE

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PRELIMINARY PLANNING STUDY

STUDY ALTERNATIVES

FIGURE 1.2

Under all these alternatives, it was assumed that commuter rail will operate from San Bernardino to Los Angeles as planned by SCRRA in the ATSF in San Bernardino County and the SP ROW in Los Angeles County as shown in Figure 1.2.

1.5.1 Alternative 1 - LRT to Arcadia

This alternative would extend the Pasadena Blue Line LRT only as far as Arcadia, but would add commuter rail service to the ATSF ROW from Arcadia to east of Pomona, and then to San Bernardino. This would create a commuter rail system with dual destinations: downtown Los Angeles along the SP ROW, and Pasadena along the ATSF ROW (with a transfer to light rail at Arcadia). This alternative emphasizes regional commuter rail service.

1.5.2 Alternative 2 - LRT to Irwindale

Alternative 2 would extend the Pasadena Blue Line to Irwindale. Commuter rail would run from Pomona west on the ATSF ROW through San Dimas, Glendora, Azusa, to a connection with LRT at Irwindale. The commuter rail would turn south along the SP Azusa Branch and reconnect to the main San Bernardino-Los Angeles commuter rail line into Los Angeles. An additional commuter rail feeder service would also be added on the SP ROW in San Bernardino County, to run to downtown Los Angeles. This alternative also emphasizes regional commuter rail service and provides local LRT service for the west San Gabriel Valley.

1.5.3 Alternative 3 - LRT to San Dimas

Alternative 3 would extend the Pasadena Blue Line to San Dimas, where it would connect to the San Bernardino-Los Angeles commuter rail line at a new San Dimas station. The commuter rail feeder service on the SP ROW in San Bernardino County would also be added in this alternative to serve downtown Los Angeles. This alternative places an almost equal emphasis on commuter rail and light rail service with the overall corridor, focusing on light rail in Los Angeles County and commuter rail in San Bernardino County.

1.5.4 Alternative 4 - LRT to San Bernardino (via Route 30)

Alternative 4 also extends the Pasadena Blue Line to San Dimas, but in addition provides light rail service on Route 30 from San Dimas to downtown San Bernardino. This alternative emphasizes light rail service. The two light rail lines would be operated separately, with each terminating at San Dimas, with connection to commuter rail at San Dimas and San Bernardino.

1.5.5 Alternative 5 - LRT to Fontana (via SP)

Alternative 5 would extend the Pasadena Blue Line all the way to Montclair, and a locally oriented light rail line would be introduced on the SP ROW in San Bernardino County between Montclair and I-15. A sub-option of both this alternative and Alternative 6 would be to terminate the Blue Line at Pomona instead and extend the San Bernardino service into Pomona rather than stop at Montclair. This alternative also emphasizes light rail service. The Montclair Transit Center could be significantly expanded as a transfer facility, with access to rail, light rail/light rail transfers, and commuter rail/light rail transfer.

1.5.6 Alternative 6 - LRT to San Bernardino (via SP/Route 30)

This alternative would also extend the Pasadena Blue Line all the way to Montclair. It would be met by a San Bernardino County LRT line running from Montclair to downtown San Bernardino utilizing the SP and Route 30 rights-of-way, with a connection between the two alongside the I-15 Freeway ROW. This alternative also emphasizes light rail service.

1.6 Conceptual Engineering Analysis

Conceptual engineering analysis was conducted to identify critical construction and engineering issues on each segment. In summary, most of the alignments are either within an existing railroad ROW or planned freeway corridor with few significant engineering problems for either light rail or commuter rail. Commuter rail could operate on existing trackage, but rehabilitation would be required in the near future and was therefore assumed prior to start-up. The ROW in each corridor is sufficient for double track, except at some station locations where additional ROW is needed for station access and parking facilities.

The principal areas of engineering concern are the following:

- A potential new commuter rail connection linking separate grades from the ATSF ROW to the SP Azusa Branch by the Miller Brewing Company property in Irwindale;

- Potential light rail connection from the ATSF ROW to the Route 30 ROW in San Dimas;

- Design of light rail in the median of the Route 30 Freeway;

- Potential light rail alignment through the I-15/SR-30 interchange (to be built); and

- Potential light rail alignment from the Route 30 ROW into downtown San Bernardino.

While conceptual solutions have been identified at these locations, further engineering studies will be necessary to more fully explore and resolve the technical issues in these areas of the alignment. Some issues are primarily related to high costs, where others require working within constrained locations with potential environmental concerns.

1.7 Station Site Planning

The station site planning effort began with an analysis to identify and evaluate potential station locations in the study corridor. Potential station locations in each segment were identified from a number of sources. Several public agencies, including local jurisdictions, LACTC, SANBAG and SCAG have evaluated station locations along each alignment, and all of these sites were included in the preliminary segment analysis.

After the six alternatives were developed, these potential station sites were narrowed down through discussions with cities along the corridor and through further field analysis. A final set of station sites was selected to be included in the evaluation of alternatives. A total of 34 station sites were identified: twelve on the ATSF ROW between Pasadena and Claremont, seven on the SP ROW between Claremont and Fontana, and fifteen in the Route 30 corridor. Specific station sites were not identified between the Route 30 corridor and downtown San Bernardino.

Some of the locations would be light rail stations only, some would be commuter rail only, and others would be potential transfer stations between modes. The station site planning effort produced a concept site plan for each station, which included parking space potential, bus access, and relation to adjacent land uses.

1.8 Concept Operating Plans

Concept rail operating plans were prepared for each of the six system alternatives under study. The operating plans define train frequencies, running times, and operating characteristics, and are used to estimate rail car needs (fleet size), ridership, and operating costs.

Commuter rail could operate on continuous direct service along the entire corridor between San Bernardino and Pasadena. Light rail, on the other hand, would not operate end-to-end through the corridor. The more frequent station stops and lower operating speed for light rail make such an operation inappropriate, particularly since light rail trains will travel beyond Pasadena to downtown Los Angeles and potentially to other lines.

For example, light rail from downtown Los Angeles to downtown San Bernardino would extend for a total distance of 67 miles, with a total running time of over two hours. Such long combined running times would adversely affect schedule reliability, and complicate the scheduling of peak service. In addition, light rail service in San Bernardino County may be administered and funded separately from rail service in Los Angeles County.

Montclair was considered to be the maximum easterly extent of viable continuous operations for the Pasadena Blue Line. Logical alternate terminating points for the Blue Line extension were identified at Arcadia, Irwindale, San Dimas and Montclair, primarily to allow for the possibility of transfers at these locations between commuter rail and light rail.

These assumptions do not necessarily preclude the possibility of other light rail terminus points, however, such as Duarte, Azusa, or Pomona.

For light rail alternatives in San Bernardino County, the western terminus of light rail service would logically coincide with the eastern terminus of Los Angeles County light rail service, i.e., San Dimas, Montclair, or possibly Pomona. Travel between the two counties would require a transfer between lines, at one of these locations.

For light rail alternatives in San Bernardino County, it would be possible for train services to overlap, rather than terminate at a common station. For example, it might be desirable for the San Bernardino trains to continue to Claremont and Pomona, since there will be some destinations there. Similarly, short line trains could operate between I-15 and San Dimas or Irwindale.

1.9 Patronage Forecasts

Preliminary patronage forecasts were developed for each of the six rail system alternatives. The ridership estimates indicate that an extension of the Pasadena Blue Line into the San Gabriel Valley would generate from 15,900 to 35,800 daily trips depending on the terminus point. Forecasts indicate daily ridership of 15,900 to Arcadia (Alternative 1), 19,600 to Irwindale (Alternative 2), about 30,000 to San Dimas (Alternatives 3 & 4), and up to 35,800 to Montclair (Alternatives 5 & 6).

For commuter rail service on the former ATSF ROW, daily ridership was estimated at 8,100 trips for commuter rail between Pomona and Arcadia (Alternative 1), and 6,600 trips for the commuter rail connection through Glendale/Azusa/Irwindale to downtown Los Angeles (Alternative 2). The majority of the 8,100 trips forecast in Alternative 1 would transfer to light rail at Arcadia and continue on to either Pasadena or Los Angeles.

Light rail forecasts in Alternatives 1 and 2 would be somewhat lower without the commuter rail connection in those alternatives. Without a commuter rail connection, light rail ridership to Arcadia in Alternative 1 would total about 10,800 daily riders. In Alternative 2, about 40% of added commuter rail riders would utilize the new commuter rail link to downtown Los Angeles along the Azusa Branch, although many of these would probably be diverted from the SP Line commuter service and would not represent new riders to the system. Without a commuter rail connection, most of these trips would utilize the Blue Line to reach downtown. Therefore the light rail forecasts in Alternative 2 would be only slightly lower without commuter rail (about 19,000 daily riders).

In San Bernardino County, ridership on the SP Baldwin Park Branch between Montclair and Fontana would range from a low of 2,400 daily riders with commuter rail in Alternative 3 to a high of about 5,000 daily riders with light rail in Alternatives 5 and 6. Much of this ridership, however, would be diverted from the San Bernardino-Los Angeles commuter rail line to the south and would not represent new ridership. Light rail on Route 30 could generate about 14,000 daily riders in Alternative 4, and about 12,200 daily riders when combined with the SP Branch in Alternative 6. Most of the Route 30 ridership would take place at the far east end of the Route 30 right-of-way heading into downtown San Bernardino.

1.10 Environmental Assessment

A preliminary analysis of environmental issues or constraints was conducted to identify potentially significant environmental issues associated with the alternative alignments and station locations and to determine whether those issues affect the viability of the transit alternatives.

The following impact categories were investigated for potentially significant impacts or constraints:

- Noise
- Parklands, Historic and Recreation Areas
- Floodplains and Drainage
- Biological Resources
- Hazardous Waste
- Seismicity
- Air Quality
- Land Use

The key conclusions of the assessment are summarized below. It should be recognized, however, that these issues have been identified based on the results of a preliminary review. As the project and environmental process proceeds, additional analysis would be required to determine the areas of potential effect and the precise extent and significance of potential impacts.

- There appear to be no significant environmental issues in the areas of land use compatibility, parks and recreation areas, floodplains, hazardous waste and safety, air quality or seismicity.

- There are likely to be noise impacts from frequent train operations in a number of residential areas bordering the alignments. These noise impacts would be greater for light rail than for commuter rail because of the frequency of light rail operations over the course of the day.

- Two endangered species--one plant and one animal--may be present in specific locations in the corridor and could be threatened by the project, especially during the construction period. The presence or absence of these of these species would need to be confirmed in further environmental analysis.

- Several historic structures are located at or near proposed rail stations. These structures would prevent the construction of a station at Euclid Avenue and the Route 30 ROW, and may require altered site plans for stations in two other areas.

1.11 Capital Costs

Preliminary order-of-magnitude capital cost estimates were prepared for each of the six alternatives. These costs estimates were based on the line characteristics defined in each alternative.

Capital cost estimates are summarized in Table 1.1. The capital cost estimates are through the start-up period, and included testing and pre-operations, insurance, master agreements, professional services and contingencies. They include right-of-way costs. The ROW is generally sufficient for construction of the track, although additional land may be required at station locations, depending on the property included in the recent ATSF ROW purchase and ultimate station site configurations.

Capital costs were estimated separately for light rail and commuter rail segments, and then combined for each alternative. The capital costs by alternative range from $317 million for Alternative 1 (light rail and commuter rail to Arcadia) to $1,948 million for Alternative 6 (light rail between Pasadena and San Bernardino). Light rail costs range from $33 to $39 million per mile. This is somewhat lower than other corridors in the county, and reflects the good condition of the railroad ROW and the relatively simple engineering of the line with limited need for aerial structure.

Capital costs estimates for extension of the Blue Line are estimated at $124 million to Arcadia, $351 million to Irwindale, $682 million to San Dimas, and $841 million to Montclair. Light rail costs in San Bernardino would total $1,267 million from San Dimas to downtown San Bernardino in the Route 30 corridor (although part of these costs would be incurred in Los Angeles County).

Commuter rail costs are considerably lower, ranging from $11 to $15 million per mile. Capital costs of providing commuter rail service from Arcadia to Pomona would total $192 million, and between I-15 and Baldwin Park using the SP line in San Bernardino County, the ATSF through Glendora/Azusa, and the SP Azusa Branch, would total $296 million. The capital cost of commuter rail on the SP Branch between I-15 and Montclair would total $182 million.

Table 1.2
Evaluation Criteria by ROW Corridor

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Right-of-Way Segment	Rail Mode Distance	Transportation Service: Frequency of Service	Transportation Service: Travel Time to Pasadena (includes transfers)	Transportation Service: Local Service	Transportation Service: Regional System Orientation & Linkage	Transportation Service: Highest Daily Riders	Environmental: Sensitive/ Compatible Land Uses	Environmental: Natural Environment	Engineering: Alignment Feasibility	Engineering: Traffic Impact	Costs: Capital Costs
Santa Fe Pasadena Subdivision Pasadena to Montclair	Light Rail 23.9 miles	10 minutes	44 minutes	Yes	Pasadena: CR/LRT transfer	35,500	Some. Residential	Potential Impact	Good. Upgrade to double track & replace some structures.	Low to Moderate	$841
	Commuter Rail 17.2 miles	30 minutes	55 minutes	No	Pasadena: CR/LRT transfer	8,100	Some. Residential	Potential Impact	Very good. Requires minimal upgrade.	Low	$192
Southern Pacific Azusa Branch Irwindale to Baldwin Pk. Branch	Commuter Rail 2.6 miles	30 minutes	7 minutes	No	Pasadena: CR/LRT transfer. D/T LA: CR direct.	2,700	Low. Industrial	No/negligible Impact	Poor. Complete track rebuild. New connections at SF & SP.	Low	$ 61
Southern Pacific Baldwin Park Branch - S.B. Co. Montclair to I-15	Light Rail 12.3 miles	10 minutes	18 minutes	Yes	Pasadena: LRT direct. D/T LA: LRT/CR transfer.	5,000	High. Residential	No/negligible Impact	Fair. Upgrade to double track and replace some structures.	Low to Moderate	$376
	Commuter Rail 12.3 miles	30 minutes	19 minutes	No	D/T LA: CR direct. Pasadena: CR/LRT transfer.	2,400	High. Residential	No/negligible Impact	Good. Replace single track.	Low	$182
Route 30 San Dimas to San Bernardino	Light Rail 34.2 miles	10 minutes	63 minutes	Yes	Pasadena: LRT direct. D/T LA: LRT/CR transfer.	14,000	Low. Residential in San Bernardino.	Potential Impact	Fair. In freeway median. Difficult connections to SF ROW and to D/T San Bernardino.	Low	$1,267

1.12 Evaluation Summary

An evaluation summary matrix, broken down by each of the four rights-of-way under study, is shown in Table 1.2. The matrix summarizes key criteria in both qualitative and quantitative fashion, including transportation service, environmental impacts, engineering feasibility and cost parameters.

1.13 Principal Conclusions by Right-of-Way

1.13.1 ATSF Pasadena Subdivision - Pasadena to Montclair

- This railroad ROW provides a good physical corridor for rail transit. The ROW is sufficient for double track LRT, and the current trackage is in good condition for commuter rail. No significant engineering problems were identified along the ROW, although improvements and/or additions to two major bridge structures (Huntington Drive and San Gabriel River) would be needed for light rail double track.

- The corridor serves downtown Pasadena and downtown Los Angeles (via connection to the Pasadena Blue Line). It also serves central employment centers in Arcadia, Monrovia, duarte, Irwindale, Azusa, Glendora, San Dimas, and Claremont. A variety of special generators are served, including Santa Anita racetrack, Santa Anita Fashion Park, Arcadia/Monrovia "Hotel Circle," City of Hope, the planned San Dimas Train Museum, Pomona Fairgrounds, Pomona Transit Center, and the Montclair Transit Center.

- Light rail service would provide frequent local service to communities, and regional connections to Pasadena, downtown Los Angeles and the rest of the region. Viable station sites were identified in each of the local communities.

- Light rail would carry significant ridership of up to 35,500 riders per day, by far the highest of the four ROWs studied. Light rail in this corridor would also have the highest riders per mile and lowest costs per rider of all the alternatives studied.

- Light rail has strong community support in the San Gabriel Valley.

- Commuter rail on this ROW is certainly viable, and at a much lower cost that light rail, but appears to be less appropriate than light rail in this corridor, however, for several reasons.

  - Although commuter rail would provide regional connections to Pasadena, it would require an awkward commuter rail/light rail transfer just east of Pasadena.

  - The travel analysis based on SCAG data indicated less demand for regional travel from San Bernardino County into the San Gabriel Valley and Pasadena

Table 1.2
Evaluation Criteria by ROW Corridor

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Right-of-Way Segment	Rail Mode Distance	Transportation Service					Environmental		Engineering		Costs
		Frequency of Service	Travel Time to Pasadena (includes transfers)	Local Service	Regional System Orientation & Linkage	Highest Daily Riders	Sensitive/ Compatible Land Uses	Natural Environment	Alignment Feasibility	Traffic Impact	Capital Costs
Santa Fe Pasadena Subdivision Pasadena to Montclair	Light Rail 23.9 miles	10 minutes	44 minutes	Yes	Pasadena: CR/LRT transfer	35,500	Some. Residential	Potential Impact	Good. Upgrade to double track & replace some structures.	Low to Moderate	$841
	Commuter Rail 17.2 miles	30 minutes	55 minutes	No	Pasadena: CR/LRT transfer	8,100	Some. Residential	Potential Impact	Very good. Requires minimal upgrade.	Low	$192
Southern Pacific Azusa Branch Irwindale to Baldwin Pk. Branch	Commuter Rail 2.6 miles	30 minutes	7 minutes	No	Pasadena: CR/LRT transfer. D/T LA: CR direct.	2,700	Low. Industrial	No/negligible impact	Poor. Complete track rebuild. New connec-tions at SF & SP.	Low	$ 61
Southern Pacific Baldwin Park Branch - S.B. Co. Montclair to I-15	Light Rail 12.3 miles	10 minutes	18 minutes	Yes	Pasadena: LRT direct. D/T LA: LRT/CR transfer.	5,000	High. Residential	No/negligible Impact	Fair. Upgrade to double track and replace some structures.	Low to Moderate	$376
	Commuter Rail 12.3 miles	30 minutes	19 minutes	No	D/T LA: CR direct. Pasadena: CR/LRT transfer.	2,400	High. Residential	No/negligible Impact	Good. Replace single track.	Low	$182
Route 30 San Dimas to San Bernardino	Light Rail 34.2 miles	10 minutes	63 minutes	Yes	Pasadena: LRT direct. D/T LA: LRT/CR transfer.	14,000	Low. Residential in San Bernardino.	Potential Impact	Fair. In freeway median. Difficult connections to SF ROW and to D/T San Bernardino.	Low	$1,267

than for more local travel within the San Gabriel Valley or from the Valley west into Pasadena and downtown Los Angeles. (As more recent data becomes available from SCAG to reflect development activity in San Bernardino County, this analysis should be reviewed and updated.)

- Commuter rail does not really provide local service, with lower operating frequencies and fewer stations than commuter rail.

- The long distance nature of commuter rail is therefore not appropriate for the San Gabriel Valley, particularly with SCRRA plans for commuter rail service on the SP ROW to the south.

1.13.2 SP Azusa Branch - Irwindale to Baldwin Park

- The preliminary analysis concluded that light rail was not an appropriate mode for this corridor due to high costs, low potential ridership, and lack of system connectivity for LRT. Therefore, only commuter rail was studied on this corridor.

- The ROW is narrow and in very poor condition. Complete track and facility replacement would be needed for commuter rail service.

- Potential engineering problems were identified connecting this ROW to the corridors at each end. Solutions were identified, but would be expensive and potentially problematical (connection at Irwindale from ATSF to SP, and connector at south end up to Baldwin Park Branch). These solutions would also require restricted speeds around sharp curves.

- This ROW would provide good regional commuter rail connections, although there appears to be low demand for such connections. The segment would primarily provide a commuter rail connection from Glendora and Azusa to downtown Los Angeles.

- The segment appears to have very low new patronage potential. The majority of commuter rail ridership on this segment would be diverted from the San Bernardino to Los Angeles commuter rail line on the SP ROW to the south.

1.13.3 SP Baldwin Park Branch - Montclair to I-15

- This railroad ROW provides a good physical corridor for rail transit. The ROW is sufficient for double track LRT. The current trackage is in poor condition and would need to be totally replaced. No significant engineering problems were identified.

- The corridor runs through some medium-density residential communities (e.g. Rancho Cucamonga) and serves no existing special generators. Viable station sites have been identified along the segment.

- Rail service could have a significant noise impact in this corridor on adjacent residential land uses.

- Light rail patronage would be about twice that of commuter rail patronage, but still very low for a light rail line. The ridership per mile would be about one-fourth the level of light rail ridership on the ATSF ROW in Los Angeles County. The single (residential) land use along this segment limits patronage because there are no major employment destinations. Patronage may be underestimated and should be re-evaluated after SCAG's update of regional travel patterns.

- Commuter rail on this ROW was projected to have the lowest ridership of all mode/corridor combinations studied. Commuter rail on this ROW is also duplicative of the commuter rail on the ATSF ROW to the south.

- Neither light rail nor commuter rail are likely near-term proportion considering the high cost of implementation and low ridership potential.

- The SP ROW could be utilized for recreational purposes (bike path, jogging rails, etc.) as part of a local and regional open space network. This would gain immediate community use of the ROW while also preserving it for potential future transit use if conditions change. Changes in land use policies could make transit use of this ROW more effective.

1.13.4 Route 30 Freeway ROW - San Dimas to San Bernardino

- New freeway construction will provide the potential opportunity for rail transit in the median of the freeway.

- The preliminary evaluation determined that commuter rail was inappropriate in this corridor.

- The freeway ROW is sufficient for light rail and stations in the median, although parking and vehicular access at stations would have to be provided outside the freeway right-of-way. There are a few points where ROW is restricted, but these should not prevent implementation of light rail service.

- There are significant engineering concerns at each end of the corridor, that will require further study and resolution.

- Light rail ridership would be as high as 14,000 daily riders, which is low for light rail systems. The majority of this ridership would be focused at the east end of the corridor into the City of San Bernardino.

- Light rail service is an unlikely near-term proposition in this corridor, due to high costs, low potential patronage and relatively low density of existing and planned development.

- The ROW in the median could be preserved for longer-term transit use in conjunction with modified land use policies to increase densities around the corridor, particularly east of I-15.

1.14 Principal Conclusions by Study Alternatives

The study conclusions indicate that light rail transit is the most appropriate rail transit mode in the northern San Gabriel and San Bernardino Valley Corridor. Commuter rail is not an appropriate rail transit mode because of the projected low level of regional travel demand in this corridor between San Bernardino and Pasadena, and because of potential duplication with the planned commuter rail line to the south which will more appropriately serve long distance travel from San Bernardino into downtown Los Angeles.

While the SP Azusa branch and SP Line in San Bernardino County provide the opportunity for commuter rail feeder connections to the regional commuter rail line, the analysis indicates a relatively low level of demand for such a service in the near to mid-term future.

The study has found light rail transit to be feasible in Los Angeles County, from an engineering, operational, and patronage perspective. It is viable to extend the Blue Line Light Rail out to the Los Angeles County Line in the vicinity of Pomona/Claremont/Montclair. Such an extension would serve a large number of cities, with both population and employment concentrations; a variety of activity centers, including Santa Anita, City of Hope and the Pomona Fairgrounds; and provide good regional system-wide connections to the commuter rail system in the area between San Dimas and Montclair.

Within Los Angeles County there is no significant difference in light rail configuration between Alternatives 4, 5 and 6. A variety of feasible end of line locations for light rail have been identified, principally Irwindale, San Dimas, Pomona and Montclair. Being close to major freeway interchanges, both Irwindale and San Dimas provide good potential for regional park and ride lots to service an end of the line location. Montclair provides a good opportunity to link bus feeder service and regional park-and-ride in San Bernardino County into an end of the line light rail station at the Montclair Transit Center.

Within Los Angeles County, if implementation of a light rail extension were to be phased, then the Irwindale area may be considered an appropriate end point for the first phase, and San Dimas for the second phase. Extending light rail to Irwindale would offer the potential to serve five cities in the San Gabriel Valley, access regional park-and-ride facilities at the interchange of the I-210 and the I-605 freeways, and relieve the most severely congested section of I-210 (the Foothill Freeway) between Azusa and Pasadena. There is local interest and support for an end-of-line station in the general location of Irwindale. It would also be possible to operate a simple commuter rail shuttle between Irwindale and Pomona/Montclair to provide initial system connectivity in the corridor. This shuttle could be provided for only minimal capital costs as the current track is in good condition, and only minimal infrastructure improvements would be necessary (for example, simple stations and basic signal upgrades). Phase II of the light rail extension would then be implemented to San

Dimas, and a comprehensive transit system linkage provided by a commuter rail/light rail transfer station in San Dimas. As the right-of-way east of Irwindale is wider than to the west of Irwindale, light rail should be able to be constructed in the future within the ROW without disrupting the commuter rail shuttle service that it would replace, thus maintaining rail service at all times. Although it may be necessary to first relocate parts of the single commuter rail track, this should be a relatively low-cost item.

The study has also concluded that light rail transit in San Bernardino is an unlikely proposition in the near-term future. In this segment of the corridor, relatively low development densities and relatively long station spacing indicate a low patronage potential focused primarily in the east end of the corridor toward downtown San Bernardino. Patronage potential for rail transit use in the corridor in San Bernardino County could be significantly enhanced by changes in land use policies to encourage densification around the transit rights-of-way, and by the identification of additional station locations to provide better transit access to local communities. The study has identified significant engineering problems with the Route 30 alignment at both the west and east ends. At the west end, engineering issues are less complex for the alignment in Alternative 6, through San Dimas along Wheeler Avenue, than for Alternative 4, through the I-210/SR-30 interchange. The analysis indicates little difference in patronage potential between the two LRT alignments studied in San Bernardino County (Route 30 from San Dimas to San Bernardino versus SP right of way from San Dimas to I-15 and Route 30 for I-15 to San Bernardino.) Patronage potential for rail transit use in the corridor in San Bernardino County could be significantly enhanced by changes in land use policies to encourage densification around the transit rights-of-way, and by the identification of additional station locations to provide better transit access to local communities. In the future, before any further expansion of the Route 30 Freeway into the median is considered, the potential for rail transit compared to additional freeway capacity should be evaluated in further detail.

An important conclusion of the study, therefore, is that planning and implementation of light rail transit does not need to progress simultaneously in both the northern San Gabriel and San Bernardino Valleys. This study has shown potential alignments and station locations for light rail connections between Los Angeles and San Bernardino County, as well as a variety of system operating alternatives. Implementation of light rail in Los Angeles County could proceed independently of light rail consideration in San Bernardino County, while still retaining the potential for future system-wide compatibility.

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2. STUDY PURPOSE

2.0 Study Purpose

2.1 Introduction

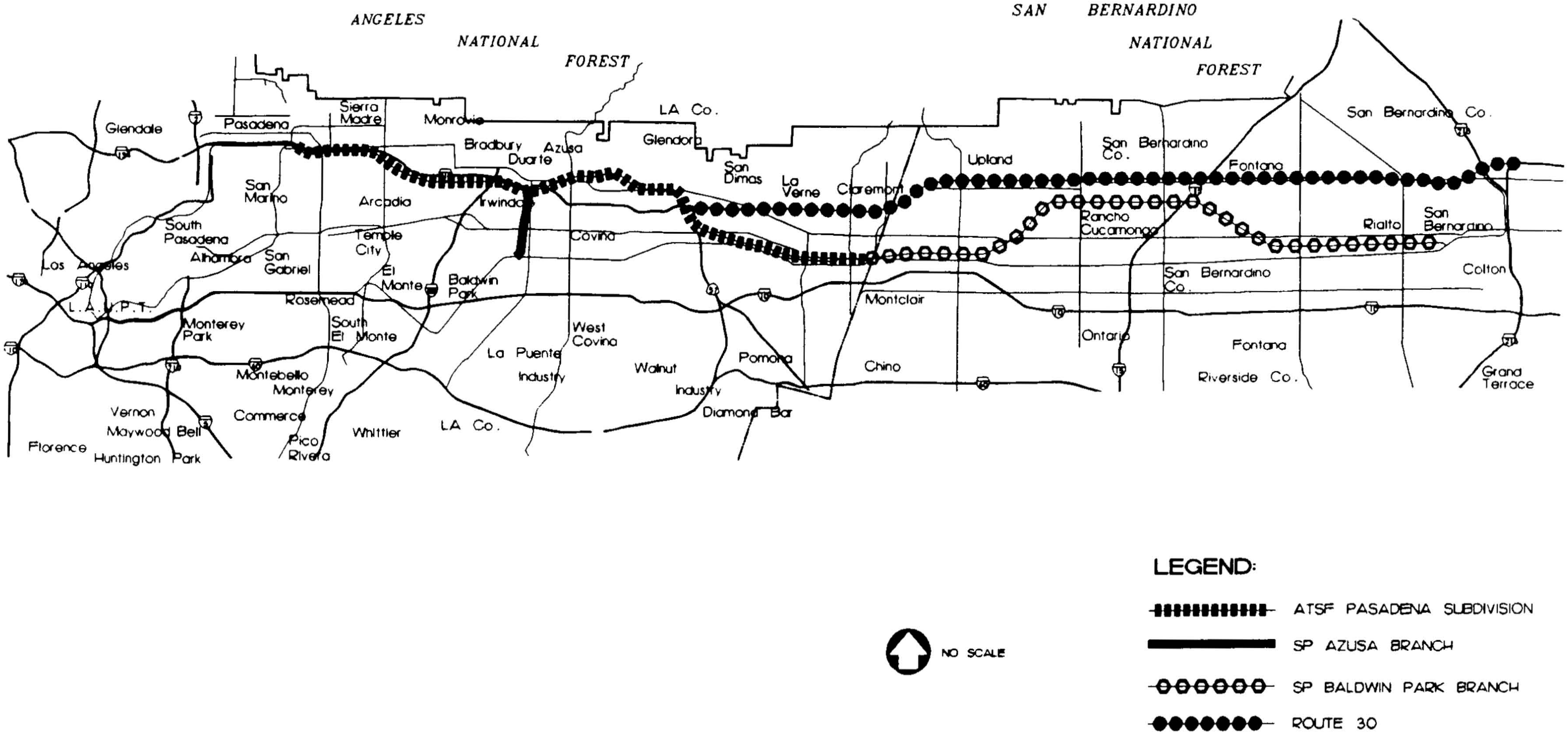
A number of public agencies throughout Southern California are currently involved in developing a rail transit system for the region. The Los Angeles County Transportation Commission (LACTC) is building and planning the Metro Rail system, which consists of a network of underground subway and light rail transit lines. The Southern California Rapid Transit District (SCRTD), soon to merge with LACTC, will operate these lines. The Southern California Regional Rail Authority (SCRRA) has embarked on an ambitious program to develop a commuter rail network throughout the five Southern California counties of Los Angeles, Orange, Riverside, San Bernardino and Ventura. This preliminary planning study is part of an effort to coordinate planning efforts for these rail transit programs in the Northern San Gabriel and San Bernardino Valleys.

The goal of this study is to examine and evaluate rail-related alternatives on four rights-of-way: the Atchison, Topeka & Santa Fe (ATSF) Pasadena Subdivision (formerly Second Subdivision) between Pasadena and Claremont, the Southern Pacific (SP) Azusa Branch between Baldwin Park and Irwindale, and the SP Baldwin Park Branch and Route 30 Freeway corridor between Claremont and San Bernardino. The location of these rights-of-way is illustrated in Figure 2.1. The intent of the preliminary planning study is to provide the LACTC, the San Bernardino Associated Governments (SANBAG), and local jurisdictions with information to determine the most appropriate short- and long-term use for these rights-of-way to serve both local and regional transit needs in the corridor from Pasadena to San Bernardino.

2.2 The Study Corridor

2.2.1 Regional Setting

The study area ranges roughly from the base of the San Gabriel Mountains on the north to the I-10 Freeway on the south, and from Pasadena on the west to San Bernardino on the east. This roughly 60 mile corridor encompasses two counties and seventeen cities. The alignments under study run through a combination of residential, commercial and industrial areas within these jurisdictions. The corridor also includes a wide range of activity centers, including employment centers, colleges, major entertainment facilities and recreational areas, and regional shopping centers.



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N. SAN GABRIEL / SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR
PRELIMINARY PLANNING STUDY

RIGHTS-OF-WAY UNDER STUDY

FIGURE 2.1

2.2.2 Corridor Transportation Facilities

The study area is currently served by a freeway system, including the I-210, Rte. 30 and I-10 freeways in an east-west direction, and the I-605, SR-57, I-15 and I-215 freeways in a north-south direction. These facilities are described briefly below.

I-210 Freeway

The I-210 (Foothill) Freeway is a major east-west route used for interstate, inter-regional, and intra-regional travel, and commuting through urbanized parts of the northern San Gabriel Valley. In the study area, the I-210 Freeway runs from Pasadena east to SR-57 near the Los Angeles County line.

Between Pasadena and the Route 30 junction, the I-210 Freeway is very congested in the peak direction during the AM and PM peak periods, particularly west of I-605. In the morning, the heaviest traffic flows are to the west. This situation is reversed in the evening. Commute trips (home-work and work-home trips) are major contributors to this trip pattern.

Route 30

Route 30 is an east/west state highway connecting the eastern San Gabriel Valley to San Bernardino. Route 30 begins as a freeway in San Dimas, but this freeway portion ends in La Verne. From La Verne to San Bernardino, Route 30 comprises the arterial streets Base Line Road, 16th Street, 19th Street, and Highland Avenue. An EIR evaluating a proposed freeway in the Route 30 Corridor is currently in preparation.

I-10 Freeway

The I-10 (San Bernardino) Freeway is a major east-west route, which is used for interstate, regional and inter-regional travel, and local and regional commuting. Located south of the study corridor, the facility runs from Santa Monica to beyond San Bernardino and eastward across the country. The San Bernardino Freeway is heavily congested throughout the day, with many segments reaching LOS F in both directions during peak periods. Although this facility is outside the study area, the extreme congestion on I-10 probably contributes to heavy traffic congestion on facilities within the study corridor.

I-605 Freeway

The I-605 (San Gabriel River) Freeway runs south from I-210 at Irwindale, within the urbanized area to the east of the Los Angeles and Pasadena CBDs. This route provides commuter access from the City of Long Beach to the San Gabriel Valley. This freeway suffers moderate congestion in the peak periods, reaching Los D in the AM peak and LOS E in the PM peak period.

I-15 Freeway

The I-15 (Devore) Freeway runs north-south through the study area in San Bernardino County. Linking San Diego to Las Vegas and beyond, this freeway passes through Ontario, Rancho Cucamonga and Fontana in the study area.

I-215 Freeway

The I-215 Freeway also runs north-south through San Bernardino County. This freeway runs to the east of I-15 to serve the urbanized areas of Riverside and San Bernardino.

Bus Transit

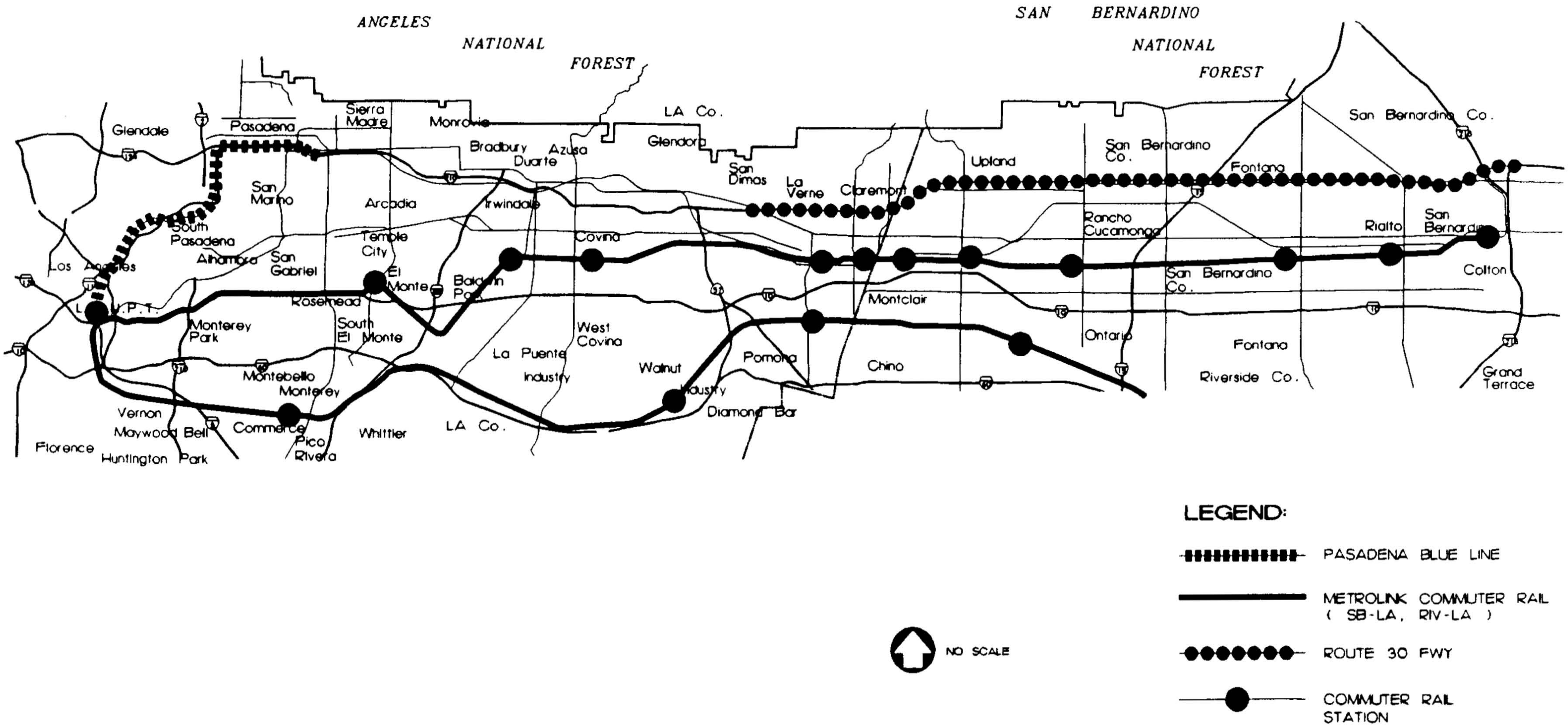
Local and regional bus service is provided within the study area by a number of transit operators including SCRTD and Foothill Transit in Los Angeles County and Omnitrans in San Bernardino County.

Rail Transit

Railroad rights-of-way in the study include the Atchison, Topeka, and Santa Fe Pasadena (Second) Subdivision and the Southern Pacific Baldwin Park Branch, both of which run east-west along the corridor, and the Southern Pacific Azusa Branch which runs north-south connecting the two between Irwindale and Baldwin Park. These are the subject of this study and are discussed further in the following section. The Union Pacific corridor runs along the southern edge of the study corridor between Riverside and downtown Los Angeles.

2.2.3 Planned Major Transportation Improvements

Several major transportation improvements are currently being designed or implemented within the study corridor. These include the Pasadena Blue Line light rail system, the San Bernardino to Los Angeles commuter rail line, the Route 30 Freeway, and new HOV lanes on the I-210 and I-215 freeways. The Pasadena Blue Line is in preliminary engineering. This light rail line, which will utilize the recently acquired ATSF ROW between downtown Los Angeles and Pasadena, is scheduled to be completed in 1997. The San Bernardino to Los Angeles commuter rail line, part of a five-county commuter rail system being planned by SCRRA, will begin operations from Pomona in October of 1992. By 1994, this line will be extended to San Bernardino using a second portion of the ATSF ROW. The Riverside-Los Angeles commuter line will start service in 1993, providing a second commuter rail line serving the San Gabriel Valley. The HOV lane improvements to the I-210 freeway are currently under construction and scheduled to completed by the end of 1993, while the I-215 freeway HOV lanes are in design. These improvements are illustrated in Figure 2.2.



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PRELIMINARY PLANNING STUDY

PLANNED MAJOR TRANSPORTATION IMPROVEMENTS IN STUDY AREA

FIGURE 2.2

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2.3 Focus of the Study

This study focuses on rail transit opportunities on four rights-of-way, the locations of which are shown in Figure 2.1. Each of these ROW corridors is described briefly below.

2.3.1 Atchison, Topeka and Santa Fe Pasadena (Second) Subdivision

Recently acquired by the SCRRA, the former Santa Fe Pasadena Subdivision begins at the major Santa Fe yard facility in San Bernardino and runs west through Rialto, Fontana, Upland, and Claremont. In San Dimas, it turns to the northwest, continuing on to Glendora and Azusa, and then west to Pasadena. In Pasadena, the line turns south and southwest, passing through South Pasadena and Highland Park, crossing the Los Angeles River and joining the Third Subdivision at Mission Tower, near Union Station.

The Pasadena Subdivision hosts four to five daily westbound freight trains as well as AMTRAK service. ATSF provides daily local freight service regularly as far west as Irwindale with limited service to Arcadia. Since the San Bernardino Subdivision (parallel but to the south) has easier gradients and curvature than this route, most of ATSF's approximately thirty freights each day between San Bernardino and Los Angeles traverse that subdivision. The recently completed purchase agreement calls for ATSF to reroute its through freights to the San Bernardino Subdivision.

Current plans are for the Pasadena Blue Line to utilize the portion of the Pasadena Subdivision from Union Station to Pasadena. The portion from Claremont eastward is currently planned for San Bernardino to Los Angeles commuter rail in combination with the Los Angeles County portion of the SP Baldwin Park Branch. The segment from Pasadena eastward to Claremont is part of this study. The 30-Year Plan includes an extension of the Blue Line to Azusa as a "candidate corridor" on this segment, and planning for the Tri-City Corridor (Burbank-Glendale-Pasadena) has also considered use of the segment.

2.3.2 Southern Pacific Baldwin Park Branch

The Southern Pacific Baldwin Park Branch extends from the Southern Pacific Alhambra Line in the City of Industry northeast into Baldwin Park, and then turns east to run through the Los Angeles County cities of West Covina, Covina, San Dimas, La Verne, Pomona, and Claremont. East of Upland in San Bernardino County, the line jogs to the northeast through Rancho Cucamonga and Fontana before dropping back to the south east of I-15 and heading eastward through eastern Fontana and Rialto. It terminates east of Rialto, where the Baldwin Park Branch merges into the north/south SP Colton line. The ATSF Second Subdivision passes within several hundred yards of this junction, although the tracks do not intersect as the SP track is carried over the ATSF tracks in a grade separation.

The SP Baldwin Park Branch was part of the recent purchase of SP trackage by LACTC. There had been very little service on the branch in the years before the purchase, and the eastern end has little freight traffic, primarily inbound lumber.

SCRRA plans to run commuter rail service proceeding from downtown Los Angeles on the former State Street line, which then connects with the Baldwin Park Branch through Los Angeles County, continuing on the SF ROW in San Bernardino County. The remaining Baldwin Park Branch segment of SP ROW east of Claremont through San Bernardino County is a subject of this study.

2.3.3 Southern Pacific Azusa Branch

The Southern Pacific Azusa Branch extends north from the Baldwin Park Branch at Azusa Canyon Road and Los Angeles Street, through Irwindale where it passes under the Santa Fe Pasadena Subdivision and the I-210 Freeway, then hooks west around gravel pits and curves back to the east to terminate near downtown Azusa.

There is currently no through freight or inter-city passenger service on this single-track branch, although it does serve local freight movements to adjacent customers. The SP Azusa Branch was acquired recently by LACTC on behalf of SCRRA as part of the SP purchase, and is a subject of this study.

2.3.4 Route 30 Freeway Alignment

The Route 30 Freeway alignment extends from just east of the I-210/Route 30 Freeway junction in San Dimas approximately 30 miles eastward to the I-215/Route 30 Freeway junction in San Bernardino. Between these points, the freeway has not yet been constructed, although considerable planning and preliminary design has been conducted and most of the right-of-way has been maintained for the past 30 years. Starting at the west end at the City of LaVerne, the alignment runs parallel to and just south of Base Line Road. At the Los Angeles/San Bernardino County line, the alignment runs northeast to Mountain Avenue in Upland, at which point it runs directly eastward just north of 19th Street and Highland Avenue. The alignment drops down south of Highland in the City of San Bernardino before turning northeast again to meet the I-215/Route 30 junction.

A Draft EIR for the Route 30 alignment is currently in preparation. This document defines the freeway as a six-lane facility with one high-occupancy-vehicle (HOV) lane in each direction in the freeway median. Rail transit could also potentially be accommodated in the freeway median, and that possibility is a subject of this study.

2.4 Study Purpose

This study evaluated potential uses of the rights-of-way to form a coordinated transit network in the corridor that complements the planned light rail transit service from Pasadena to Los Angeles and the planned Metrolink commuter rail service from San Bernardino to Los Angeles. The study examined the use of three rail modes--light rail transit (LRT), commuter rail and rail bus--to determine the best way to serve both local and regional transit needs. The analysis addressed the following questions:

- Should the Pasadena Blue Line be extended east, and if so, how far?
- Should commuter rail be extended west to Pasadena instead?
- Should light rail or commuter rail service extend into San Bernardino on the rights-of-way under study?
- Is rail bus a feasible rail transit mode in these corridors?
- How might rail lines in these corridors be connected to form a regional transit system?

2.5 Study Process

This preliminary planning study was initiated in November 1991 with a review of the study corridor. This review included comprehensive field reconnaissance by the consultant team, in which each of the rights-of-way under study was examined. This field reconnaissance also helped in identifying potential station sites. A review of the three technology alternatives followed.

The next step in the study was to identify rail service options in the corridor for preliminary screening. A total of thirteen options in Los Angeles County and nine options in San Bernardino County were developed and screened. The preliminary screening reduced this number to five options in each county, which were then combined into six corridor-wide alternatives for further study.

Technical studies then proceeded on the six alternatives. Technical studies were prepared in the following areas:

- Conceptual Engineering
- Operations Planning
- Station Site Planning
- Patronage Forecasting
- Traffic Impact Assessment
- Environmental Impact Assessment
- Capital and Operating Costs

Throughout the process of screening options, defining study alternatives, and preparing the technical analyses, the consultant team met on a regular basis with a project task force which included representatives from the San Gabriel Valley cities, SANBAG, and LACTC. These task force meetings provided a forum for the consultant to report study progress and for the task force members to offer direction and comment. Additional meetings were scheduled as needed with LACTC, SANBAG, and cities' staff to discuss more detailed study issues.

After the technical studies were completed, a comparison and evaluation of the six alternatives was conducted. The intent was to provide LACTC, SANBAG, and local jurisdictions with enough information to select the most appropriate project for the immediate future. A detailed set of principal conclusions was offered to the task force, which appear in the last chapter of this report.

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3. DESCRIPTION OF THE CORRIDOR & RAIL TRANSIT OPTIONS

3.0 Description of the Corridor & Rail Transit Options

3.1 Corridor Characteristics

3.1.1 Jurisdictions

The study area includes 21 separate political jurisdictions. There are 19 cities as well as both Los Angeles and San Bernardino Counties. A complete list of political jurisdictions that the corridor passes through or borders on is shown below.

Los Angeles County
- Pasadena
- Sierra Madre+
- Arcadia
- Monrovia
- Duarte
- Irwindale
- Azusa
- Glendora
- San Dimas
- La Verne
- Pomona
- Claremont

San Bernardino County
- Montclair
- Upland
- Rancho Cucamonga
- Ontario+
- Fontana
- Rialto
- San Bernardino

\+ Within study area, but none of the alignments pass directly through city.

3.1.2 Socioeconomic Characteristics

Most cities in Los Angeles County had populations ranging from 30,000 to 50,000 in 1990. Irwindale and Pomona represent the population extremes in Los Angeles County. Irwindale had only 1,050 residents while Pomona, with 131,723 residents, had more than double any other city's population except Pasadena with about 120,000. The six cities in San Bernardino County are generally more populous than the Los Angeles County Cities, with only Montclair falling below 65,000. Two San Bernardino County cities along the corridor had populations above 100,000 – Rancho Cucamonga at 114,954 and San Bernardino at 159,923, although population densities are generally lower in San Bernardino County cities than in Los Angeles County.

In Los Angeles County, total employment ranges from about 7,000 in Duarte to over 51,000 in Pomona. In general the ratio of population to employment is about 3 to 1 in the Los Angeles County cities along the corridor. This situation is similar and more pronounced in San Bernardino County. Within San Bernardino County, only the City of San Bernardino shows a large current employment concentration.

SCAG forecasts for the year 2010 project substantial growth in several parts of the corridor. A recent SCAG study entitled *Joint Development Potential Along the Santa Fe ROW in the San Gabriel Valley* indicated that population along the corridor in Los Angeles County would increase by 26% by 2010, while employment would increase by 64%. Particularly strong increases in population density are projected in Arcadia, Glendora and San Dimas.

SCAG forecasts for San Bernardino County project continued strong population growth in Rancho Cucamonga. The San Bernardino County forecasts also project that much of the area along the Route 30 corridor will remain relatively low density in 2010.

3.1.3 Activity Centers

A large number of activity centers are located throughout the corridor. These include business districts, colleges, medical facilities, recreational areas and transit and other transportation facilities. Each of these activity centers may produce trips which could utilize rail transit in the corridor. The list below includes the major activity centers in the corridor, divided by county.

Activity Centers - LA County

- Downtown Pasadena
- East Colorado Boulevard
- LA County Arboretum
- Santa Anita Race Track
- Santa Anita Fashion Park
- Downtown Arcadia
- Arcadia/Monrovia Hotel Circle
- Central Monrovia
- Central Duarte
- City of Hope National Medical Center
- Potential Regional Park-and-Ride at I-605/I-210
- Miller Brewing Irwindale Plant
- Central Azusa
- Citrus College
- Central Glendora
- Potential Regional Park-and-Ride at I-210/SR-30
- Central San Dimas
- Proposed San Dimas Train Museum
- Raging Waters Theme Park
- Frank G. Bonelli Regional County Park
- Pomona Transit Center
- LA County Fairgrounds
- Downtown Claremont
- Claremont Colleges

Activity Centers - SB County

- Montclair Transit Center
- Montclair Plaza
- Central Upland
- Central Rancho Cucamonga
- Potential I-15 Regional Park-and-Ride Lots
- Downtown San Bernardino
- San Bernardino Civic Center
- San Bernardino Central City Mall
- San Bernardino AMTRAK Station

3.1.4 Transit Providers and Service

Existing transit service through the corridor is provided by three public transit agencies and numerous paratransit or demand responsive services. Service provided by the public transit agencies is reviewed below.

Southern California Rapid Transit Agency

The Southern California Rapid Transit District (RTD) operates local and express service in the western portion of the corridor (mostly west of I-605) and long distance express lines that travel through the area (Line 484 from Ontario Airport, Line 497 from Montclair Plaza, and Line 490 from Fullerton). Two of RTD's lines in the eastern part of its service area (Lines 486 and 488) were transferred to Foothill Transit Zone in June 1992.

Foothill Transit Zone

Foothill Transit Zone operates all of the local service between I-605 and the Los Angeles/San Bernardino County Line plus some local service into Pasadena. Foothill operates many express lines into downtown Los Angeles which travel on the San Bernardino Freeway (I-10) and the El Monte Busway. Foothill also operates the only bus service parallel to the ATSF alignment in Los Angeles County: express Line 690 from Claremont to Pasadena and local Line 187, from Pomona via Claremont to Pasadena.

Omnitrans

Omnitrans operates local fixed-route and paratransit service within western San Bernardino County. Omnitrans and the Riverside Transit Agency jointly sponsor the Inland Empire Connection which operates express bus service on two lines: Line 110, which connects the cities of Riverside, San Bernardino and Los Angeles with stops at major points in the I-10 corridor; and Line 496, which operates between Riverside and Los Angeles, bypassing the City of San Bernardino.

Other Transit Services

In addition to the three major public transit agencies, there are many municipal fixed-route shuttles and dial-a-ride systems which generally stay within or close to city boundaries. In Los Angeles County, the cities of Pasadena, Arcadia, Monrovia, Duarte, Azusa, and Glendora all operate dial-a-ride systems or fixed-route shuttles. The cities of San Dimas, La Verne, Pomona and Claremont receive demand response service from the Pomona Valley Transit Authority. In San Bernardino County, Omnitrans operates two dial-a-ride systems, one for the elderly and handicapped and one for the general public.

3.2 Corridor Segments

In the preliminary screening analysis, the rights-of-way under study were divided into eleven segments. These corridor segments are illustrated in Figure 3.1. The segments comprising each ROW are grouped together and described briefly below.

3.2.1 ATSF Pasadena Subdivision - Pasadena to Claremont

Segment 1 comprises the ATSF ROW, beginning at the planned terminus of the Pasadena Blue Line at Sierra Madre Villa Boulevard. The 8.8 mile segment continues eastward in the median of the I-210 Freeway and then along the ATSF ROW through Arcadia, Monrovia and Duarte, with the segment ending at Irwindale Avenue in Irwindale. The generally 50-foot-wide right-of-way could accommodate two tracks but only one has been built, in the center of the right-of-way. ATSF maintains the track to support maximum authorized speeds of 65 and 55 miles per hour for passenger and freight trains, respectively. The track is generally in good condition; however, significant tie and rail replacement will be necessary in the near future to replace worn-out assets.

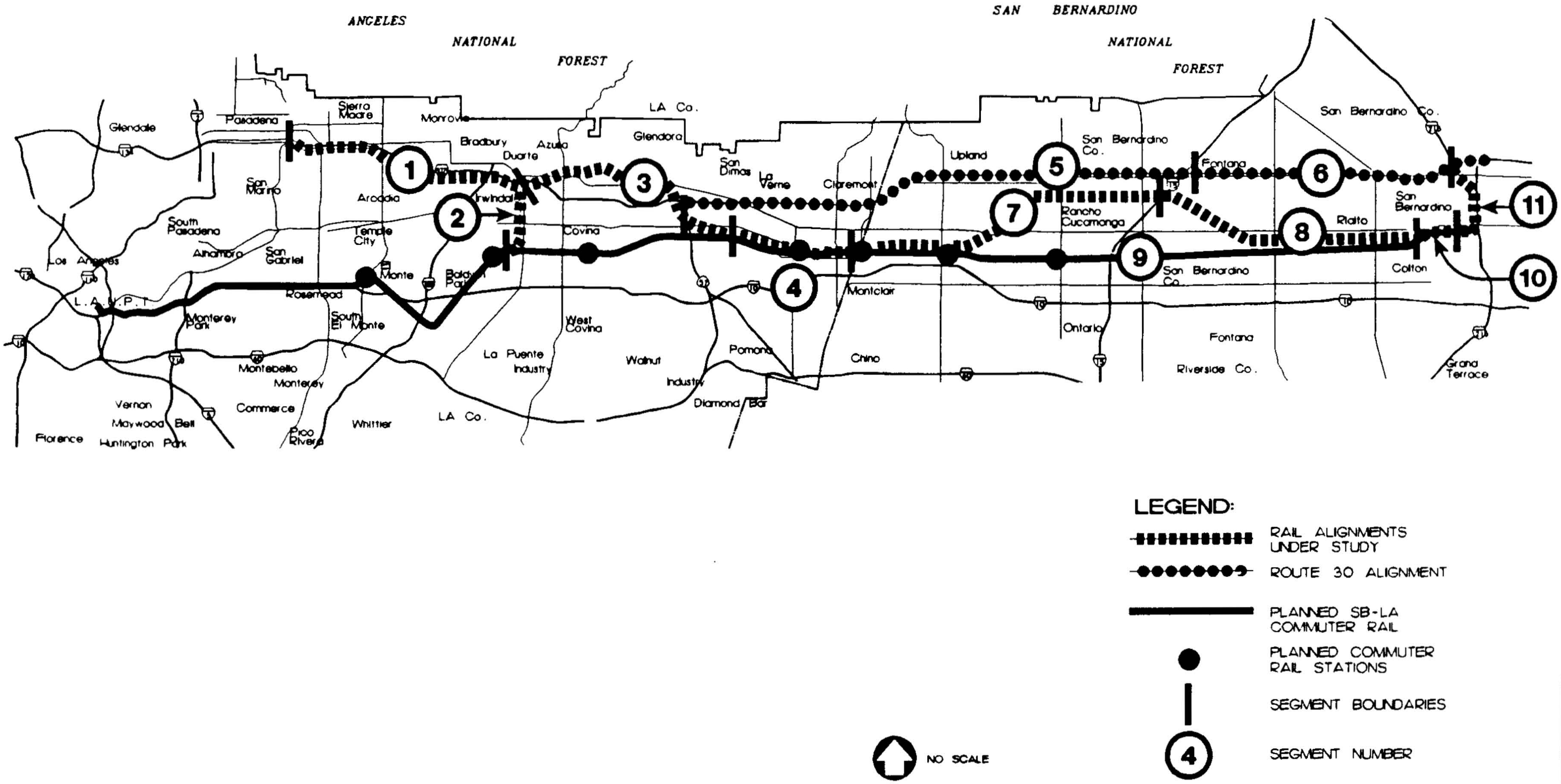
Segment 3 comprises the ATSF ROW from Irwindale Avenue eastward to the point where the ATSF and SP rights-of-way begin to converge, near Walnut Street/Arrow Highway in San Dimas. The characteristics of this ATSF Pasadena Subdivision segment are similar to those of the first segment, except that the right-of-way is typically 100 feet wide. In addition to Amtrak inter-city and through freight traffic, this segment hosts two low-volume but active rail freight customers at Azusa and infrequent shipments to/from other freight customers. There are a total of 22 grade crossings over this 9.4-mile segment.

Segment 4 continues eastward from the point of the SP/ATSF confluence (Walnut Street & Arrow Highway) to the Los Angeles County line. In this corridor segment, the SP and ATSF alignments run parallel to each other. Just west of Claremont the two tracks merge and both railroads run service on the ATSF track. After running concurrently for about a mile, the tracks separate again just east of Claremont. The ROW along this 5-mile-long segment is typically 70 to 100 feet wide. While there are six spurs which connect the line with past, present and potential customers, only one active customer, located in Pomona, provides over 80 percent of carloadings in and out of the segment.

3.2.2 SP Azusa Branch

Segment 2 comprises the Southern Pacific ROW from the ATSF right-of-way near Irwindale Avenue and the I-210 Freeway south along the SP Azusa Branch to the Baldwin Park Branch at Azusa Canyon Road and Los Angeles Street. The segment also includes a hook-shaped section of track north of the I-210 Freeway which loops around one of the gravel pits and terminates near downtown Azusa.

A 40-foot-wide right-of-way is typical through most of this 5-mile segment, which would barely accommodate two tracks. The sharp curvature at each segment end would reduce train speeds and increase running time. The current operating speed is restricted to 10



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PRELIMINARY PLANNING STUDY

RIGHT-OF-WAY SEGMENTS

FIGURE 3.1

miles per hour over the entire segment due to consistently poor rail and tie condition. SPTC continues to provide freight service about three times a week to Miller Brewing at Irwindale and seven other active customers. No through freight or inter-city passenger trains operate over this branch line. The track would have to be replaced in its entirety and a signal system installed before passenger service could be initiated.

3.2.3 Route 30 Freeway - La Verne to San Bernardino

Segments 5 and 6 comprise the Route 30 Freeway ROW, which has been reserved through most of this 30 mile corridor for an unbuilt and largely undesigned freeway. The reserved ROW varies, but is generally between 250 and 300 feet wide. The planned facility is a six-lane freeway with two HOV lanes in a 178 foot section and a 54-foot median. Rail service could potentially be placed in the median.

3.2.4 SP Baldwin Park Branch - Claremont to Rialto

Segment 7 comprises the SP ROW from the divergence of the SP and ATSF lines just east of the Claremont Station eastward along the SP right-of-way to the I-15 Freeway. This 11.9-mile, single track, unsignaled, SCRRA-owned segment is generally 80 feet wide, but only 60 feet through Montclair. The current speed is limited to 10 miles per hour by poor track condition, which must be remedied through total track replacement in the event rail passenger service is to be initiated. SPTC continues to provide infrequent through and local freight operations as necessary to serve this segment.

Segment 8 also comprises the SP ROW and continues eastward along the SP right-of-way from I-15 to just east of Rialto, where the Baldwin Park Branch merges into the north/south SP Colton Line Branch. The ATSF Pasadena Subdivision passes within several hundred yards of this junction, although the tracks do not intersect--the SP travels over the ATSF tracks in a grade separation. To enter San Bernardino, a new connection to the ATSF would need to be constructed and interlocking with ATSF. This 10.2-mile segment shares many characteristics with Segment 7 and hosts several lumber yards at Rialto which generate the need for local rail service several times a week.

3.2.5 I-215 Corridor - Route 30 to Downtown San Bernardino

Although not included in the scope of work, both the freeway and the ATSF Cajon Subdivision in this corridor were considered as possible ways to connect rail in the Route 30 corridor into downtown San Bernardino. The right-of-way on the ATSF line is about 60 feet with good rail and tie condition and Centralized Traffic Control (CTC) signalling. Maximum speeds are 79 mph for passenger and 55 mph for freight. Provision for a future track on each side is available under each overhead highway bridge. However, since this is one of ATSF's busiest lines (it is the entrance to the Los Angeles basin for Union Pacific, ATSF's tenant as well), the railroad would probably reserve one track for future expansion.

3.3 Technology Alternatives

Three rail technologies were considered during the preliminary screening process--light rail, commuter rail, and rail bus. Each is summarized below, while planning parameters of the three rail modes are summarized in Tables 3.1 and 3.2.

3.3.1 Light Rail Transit

Light rail transit is a medium-capacity, urban/suburban rail mode. LRT systems typically provide frequent train service on dedicated, electrified rail lines mostly at-grade and often imbedded in streets. Vehicles draw power from overhead electric lines and operate at speeds up to 55 mph. Actual operating speeds vary depending on the right-of-way conditions. Street crossings are typically at-grade although grade separations are also common on light rail systems. Peak hour service headways may be as low as 5 minutes and often average 10-15 minutes. Service is usually provided at longer headways during off-peak hours. Vehicles are operated singly or in pairs (with a maximum of three vehicle consists). Light rail vehicles in use on the Long Beach Blue Line (the first light rail line in operation in Los Angeles County) have 76 seats per car and can carry up to 175 passengers with standees. Station spacing for light rail generally ranges from one to two miles and stations have high platforms.

3.3.2 Commuter Rail

Commuter rail is a medium-capacity, inter-urban rail transit mode that typically focuses on providing peak-period service over relatively long distances. Commuter rail provides line-haul service from outlying suburban areas to downtowns. Ridership is usually heavily peaked and directional.

Trains are comprised of locomotive-hauled cars compatible with and sometimes sharing rail line with standard railroad freight equipment. Service is less frequent than light rail, with intervals of 30 to 60 minutes being common. The vehicles planned for use on the Metrolink system in Southern California are locomotive-hauled, 85-foot standard railroad equipment coaches with seating on two levels. The trains may be operated in either direction. Train consists will range from four to eight cars; each car has 152 seats and the intent is to provide seats for all passengers. Station spacing for commuter rail lines generally ranges from three to six miles between stations. Stations have low platforms.

3.3.3 Rail Bus

Rail bus is a low-medium capacity rail transit mode that is something of a hybrid between light rail and commuter rail. Rail bus comprises self-propelled diesel rail cars that may be operated as single cars or in two-three car combinations. These vehicles are adaptable to a range of transit needs. They can be used for feeder service to high density corridors or downtowns, as well as to commuter rail services, and also to provide suburban-suburban local transit connections where density and ridership do not justify higher capacity systems. Since they are self-propelled and operable on single track, they can be used to enhance

Table 3.1
Service Planning Parameters

	Light Rail	Rail Bus	Commuter Rail
Nature of Service	Medium capacity/speed/ distance	Low/medium capacity, medium speed/distance	Medium capacity/high speed/long distance
Typical Route Distance	20-30 miles	10-20 miles	60-70 miles
Right-of-Way	Exclusive/shared/in-street	Railroad	Railroad, shared with freight
Highway Crossings	Partially grade separated	Partially grade separated	Partially grade separated
Typical Station Spacing	1 - 2 miles	2-4 miles	4 - 6 miles
Tracks	Double	Single with passing tracks, or double	Single with passing tracks, or double
Stations	High-level platform	Low/high-level platform	Low-level platform
Speed	Up to 55 mph	Up to 70 mph	Up to 70 mph
Propulsion	Electric Overhead Power; Self-propelled cars.	Self-propelled diesel rail car	Diesel Locomotive; Push-Pull
Passenger Coaches	Single-level; 107 seats & 54 standing	Single level: 80 seats	Bi-Level; 152 seats
Consists	2 cars initially; 3 maximum	1-car to 3-car	4-passenger coaches; upto 8-10 maximum
Typical Peak-Hour Headways	5 - 15 minutes	15-30 minutes	30-60 minutes
Service Hours	All day	All day	Peak period initially, then some off-peak.
Passenger Capacity Per Hour	1,200 - 6,000	200-1,000	600-2,400
Parking	Most stations	Some stations	Every station outside CBD

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Source: LACTC, RLBA, Korve Engineering

Table 3.2
Rail Vehicle Planning Parameters

	Light Rail[a]	Rail Bus	Commuter Rail
Vehicle			
Length (feet)	90	85	85
Width (feet)	8.7	9.8[b]	9.8
Height (feet)	12.0	12-16	15.9
Weight (tons)	47	55-70	55
Vehicle Capacity			
Design	107	80	152
Maximum	161	120[c]	192[c]
Train Size			
Minimum (cars)	1	1	3
Maximum (cars)	3	3	10
Minimum (feet)	90	85	340
Maximum (feet)	270	255	920
Maximum Speed			
Speed (mph)	60	70	80
Acceleration (ft/sec/sec)	3	2	2
Deceleration (ft/sec/sec)	3	2	2
Gradient (percent)	6	3	3
Power	Electric 600-Volt Overhead	Diesel Self-propelled	Diesel Locomotive
Noise Levels			
Exterior (dBA)	75	90	90
Interior (dBA)	70	70	70

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[a]LACTC Blue Line.
[b]Narrower if using Light Rail platforms.
[c]Commuter rail and rail bus should use design load in regular service.
Source: LACTC, RLBA, Korve Engineering.

commuter rail access and service frequency, or to extend light rail service to markets requiring less frequent service without the higher costs of electrification and double-track facilities connected with LRT.

Rail bus vehicles are available in configurations that are compatible with either commuter rail (wide body, low platform) or LRT (narrow body, high platform), but there are no current rail bus systems or manufacturers in the United States. Use of rail bus in this corridor would require the introduction of a new rail technology into Los Angeles County and would also require separate maintenance facilities, yards, etc.

3.3.4 Compatibility With Existing Railroad Operations

Light rail, commuter rail, rail bus, Amtrak intercity and freight trains can all physically use standard gauge track. For example, current Amtrak operations over the Pasadena Subdivision could operate over track meeting commuter rail standards. However, regulatory differences, in addition to design criteria and platform dimensions, may limit other commingling of services. The Federal Railroad Administration (FRA) regulates and administers freight and commuter railroads, while the Federal Transit Administration (FTA), formerly the Urban Mass Transit Administration (UMTA), governs rapid transit lines. Within the State of California, the Public Utilities Commission (PUC) also regulates the design and operation of rail transit systems.

LACTC light rail cars do not conform to FRA regulations in many areas, but only one of significance: body structure strength. These requirements relate to the large forces developed in long freight trains and to a belief that resisting large forces improves crash worthiness. FRA is willing to examine and possibly modify its requirements based on demonstrated crashworthiness of other rail vehicles, but it is unlikely that existing light rail equipment could be qualified to commingle with freight and commuter equipment. Similarly, commuter trains operated over light rail trackage could subject that trackage to FRA jurisdiction, limiting the use of light rail cars.

A further concern is the potential need to provide rail freight service on segments of right-of-way converted to light rail use. However, we believe that non-concurrent operation of freight and light rail systems (daytime light rail and night time freight operations) is practical and, at low volumes of local freight, is far more economical than constructing parallel exclusive freight and passenger tracks. Nevertheless, any such sharing is under the purview of the FRA which can refuse to countenance such a shared usage even though, for example, it is practiced in San Diego. Equipment compatibility is shown in Table 3.3. With respect to rail bus, cars may be available from overseas manufacturers, that theoretically would be compatible with either light rail (rail bus transit) or with commuter rail (rail bus commuter), but not both. However, some changes in current FRA regulations would probably be necessary for rail bus cars to be considered operationally compatible with light rail transit vehicles.

Table 3.3
Equipment Compatibility

	Light Rail	Rail Bus Transit	Rail Bus Commuter	Commuter Rail	Amtrak	Local Freight	Through Freight
Light Rail		Y	N	N	N	P	N
Rail Bus Transit	Y		N	N	N	P	N
Rail Bus Commuter	N	N		Y	Y	Y	Y
Commuter Rail	N	N	Y		Y	Y	Y
Amtrak	N	N	Y	Y		Y	Y
Local Freight	P	P	Y	Y	Y		Y
Through Freight	N	N	Y	Y	Y	Y	

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Y = Equipment sets may share the same trackage.

N = Equipment is incompatible.

P = Local freight operation at night might be possible subject to FRA approval.

Source: RLBA.

3.4 Screening of Preliminary Options

Each segment was first reviewed to determine the general viability/feasibility of each rail mode on that segment. This review focused on physical and engineering parameters, rather than service parameters. From the physical perspective, it was concluded that each of the three rail modes is conceptually feasible on all segments, with the following exceptions:

- On Segment 2, the SP Azusa Branch, operation of light rail would be difficult because of the constrained ROW in many places.

- On Segment 11, the ATSF First Subdivision along I-215, light rail operation would not be possible because of ROW limitations. This segment is heavily used for freight traffic and future expansion of freight tracks would preclude double-track, light rail operation on this segment.

Since physical and engineering constraints did not significantly limit the rail options on each segment, the segments were further reviewed with regard to how they would fit into a region-wide system of rail transit. The following principle conclusions served as guidelines for evaluating rail options on each segment.

- The corridor under study is relatively long, approximately 60 miles from end to end.

- Serving this end-to-end distance would be beyond the operating capabilities of rail bus and light rail transit. These two modes would involve frequent stops, creating long travel times. Schedule adherence would also be difficult over such long distances. Rail bus is a locally oriented service and not a regional service.

- Commuter rail is the most appropriate rail mode for end-to-end service in this corridor. With fewer stops and lower service frequencies, commuter rail would not suffer from the same operational difficulties as rail bus or LRT in a 60-mile corridor.

- Commuter rail is currently being planned on the SP ROW in Los Angeles County and the ATSF ROW in San Bernardino County.

- Parallel commuter rail lines in the corridor would be duplicative because they would be too close together. With commuter rail being planned on the ATSF ROW in San Bernardino County, commuter rail is not an appropriate rail mode to consider in the Route 30 Corridor.

- LRT service could be established on all segments in both counties. LRT service, however, would not be oriented to the long-distance, end-to-end commute, but would be more locally oriented in each county. LRT in Los

Angeles County would primarily serve Los Angeles destinations and LRT in San Bernardino County would primarily serve San Bernardino destinations.

- Rail bus service would be most appropriate if used as a feeder service to major destinations in the corridor or as a shuttle between rail modes not connecting those destinations.

Based on the above principles, numerous combinations of the rail modes on all the segments were considered. While there are many potential combinations, there were relatively few that formed logical service concepts for local and regional transit service in the corridor. A total of thirteen options in Los Angeles County and nine options in San Bernardino County were identified for preliminary evaluation.

This evaluation was documented in Technical Memorandum #1, prepared for the study, and so is not discussed here in detail. The evaluation of these options resulted in the following conclusions:

- The western limit of potential commuter rail service is Sierra Madre Villa. The narrow median of I-210 prevents joint running of light rail and commuter rail into downtown Pasadena.

- The Santa Fe Second Subdivision generally appears feasible for light rail, commuter rail and rail bus. The existing track is in fair to good condition.

- The SP Azusa Branch is in poor condition, particularly north of I-210. There appears to be little patronage potential. It was recommended that no passenger rail options be considered on the SP Azusa Branch north of I-210.

- The maximum range of light rail transit is generally considered to be in the 25-30 mile range. Light rail is thus not an appropriate mode for long-distance inter-county travel. The eastern limit of the Blue Line for viable operations is around the Los Angeles County line, which itself would represent a very long line from Union Station (about 37 miles to Montclair).

- Light rail would, however, be an effective rail mode to serve local cities in the San Gabriel Valley, provide connections west to downtown Los Angeles and the rest of the urban rail system and potentially provide connections to the regional commuter rail lines.

- In San Bernardino County, light rail could potentially serve local cities, and provide westerly connections to commuter rail and/or light rail and easterly connections to San Bernardino.

- The rail bus options seem to suffer from fatal flaws. Rail bus is potentially less expensive than light rail because it can utilize single track and would not run as frequently as light rail. However, unless rail bus service were to utilize double track, it could not meet the service capacity of light rail. Rail bus would also require additional vehicles, separate yards and maintenance facilities. A similar service could be provided just as effectively with traditional commuter rail vehicles. As a result, rail bus service would lead to additional costs without significant advantages.

Another fatal flaw is that although rail bus could run on the same tracks as commuter rail, it could not utilize the same tracks as light rail vehicles (due to current Federal Railroad Administration regulations). Because of this, rail bus options would also require more transfers than options utilizing only light rail and commuter rail.

It was concluded that there were too many disadvantages to introducing a third rail technology into the regional rail system, and that it should not be studied further. Commuter rail can provide service equally effective to rail bus at a lower cost, and light rail provides greater future service flexibility and capacity expansion.

- In San Bernardino County, commuter rail, light rail, and rail bus all appear technically feasible in concept on the ATSF and SP rights-of-way and on Route 30.

- Using both the SP and ATSF rights-of-way east of I-15 through Rialto and Fontana would be duplicative. The two rights-of-way run on a very close parallel to each other and service on both lines would lead to duplicate stations, crossing controls, etc. Use of the SP ROW in San Bernardino County was therefore recommended only west of I-15; no further study of the SP ROW east of I-15 was recommended.

- The regional significance of the AFTS's Cajon subdivision right-of-way adjacent to I-215 (as the entrance to the Los Angeles basin for both ATSF and Union Pacific) probably precludes potential joint use of this right-of-way for light rail operation, although commuter rail would be possible. Use of the I-215 corridor was also explored in conjunction with future widening but determined to be infeasible due to limited right-of-way availability.

Narrowing of Options

In narrowing the thirteen options down to a more manageable set of alternatives for more detailed analysis, a number of system-wide issues were considered, as follows.

First, commuter rail is a given along the south part of the corridor in both Los Angeles and San Bernardino Counties. This will provide for the long-distance commutes in the corridor into both downtown Los Angeles and Pasadena, as well as eastbound commuting to San Bernardino.

Second, although light rail service does not seem practical between Pasadena and San Bernardino for continuous operation, the opportunity to provide light rail on Route 30 warranted its further analysis. This analysis should focus on service oriented within each county to provide primarily local service. The west end of such service could feed into the Los Angeles County rail system, and the east end could provide service to San Bernardino as well as an opportunity to influence future land use decisions adjacent to the rail corridor.

A logical transit concept for the San Gabriel Valley and San Bernardino Valley corridor should develop around a continuous commuter rail corridor to the South (along the SP in Los Angeles County and the ATSF in San Bernardino County, as well as service along the UP corridor further south), and additional service to the north to feed commuter rail or provide more localized service.

The recommendation of alternatives for further analysis was guided by the above conclusions and principles, to identify a range of alternative ways to provide good local transit service in both the San Gabriel and San Bernardino Valleys, while also providing good access to the regional transit facilities in the corridor.

The Los Angeles County options recommended for the alternatives analysis thus tend to focus on rail connections to the SP Baldwin Park Branch in the San Dimas-Montclair area. Similarly, the options recommended for further study in San Bernardino County focus on providing connections to regional commuter rail service in the south of the corridor, while also providing a system to serve local inter-Valley transit needs and commuter service to San Bernardino.

3.5 Definition of Alternatives for Further Study

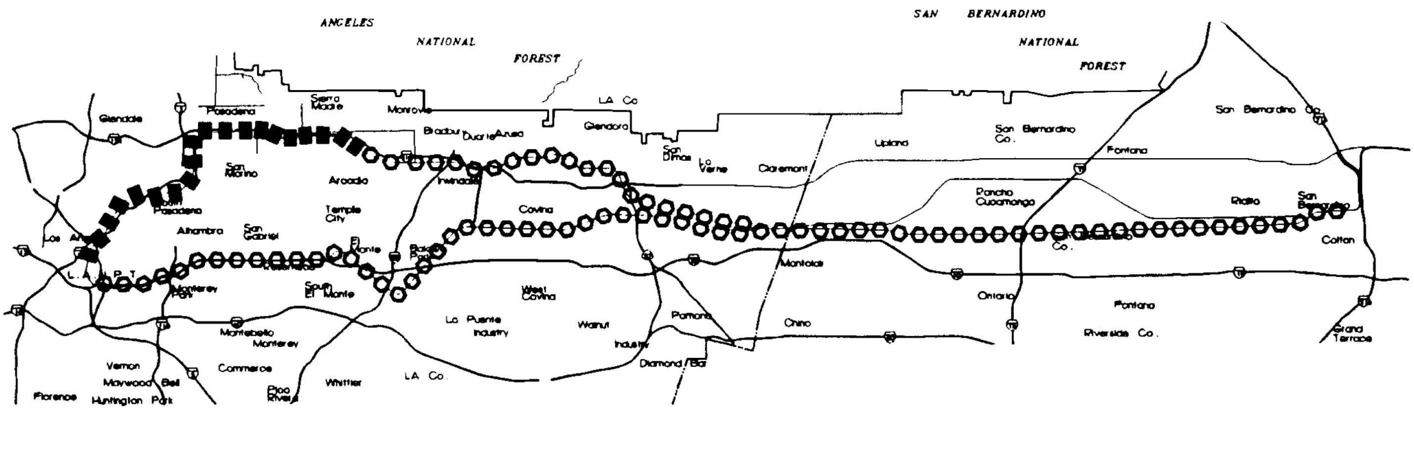
The preliminary options were screened down to six regional alternatives which combined options from both counties. The alternatives included a mix of rail options, with two alternatives having an emphasis on commuter rail service, one being almost equally balanced between commuter rail and light rail, and three having an emphasis on light rail service. The six alternatives are described briefly below and illustrated in Figure 3.2.

3.5.1 Alternative 1 - LRT to Arcadia

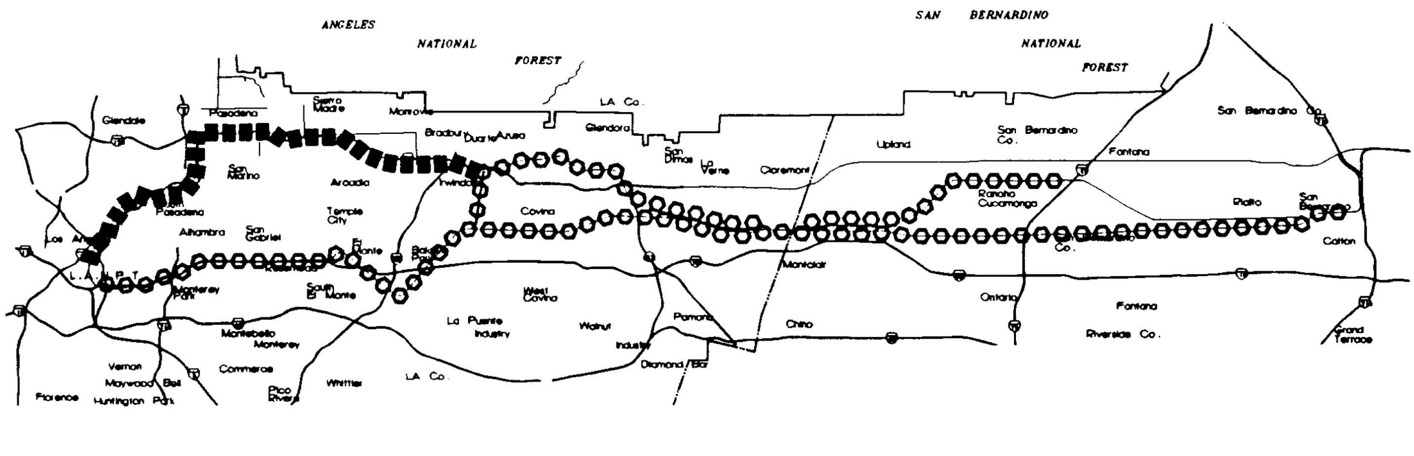
This alternative would extend the Pasadena Blue Line LRT only as far as Arcadia, but would add commuter rail service to the ATSF ROW from Arcadia east of Pomona, and then to San Bernardino. This would create a commuter rail system with dual destinations: downtown Los Angeles along the SP ROW, and Pasadena along the ATSF ROW (with a transfer to light rail at Arcadia). This alternative emphasizes regional commuter rail service.

3.5.2 Alternative 2 - LRT to Irwindale

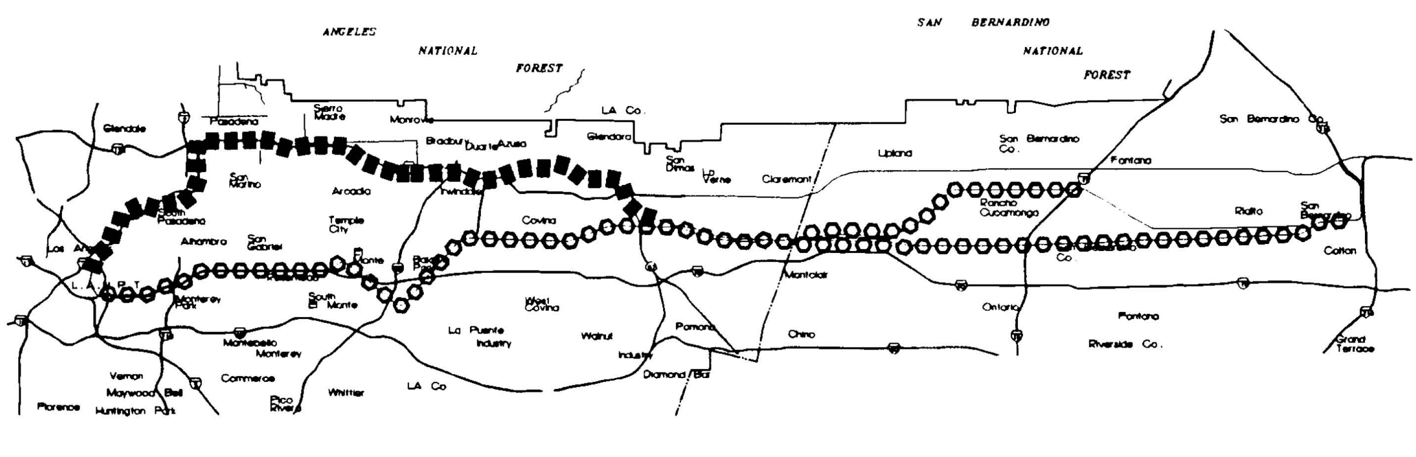
Alternative 2 would extend the Pasadena Blue Line to Irwindale. Commuter rail would run from Pomona west on the ATSF ROW through San Dimas, Glendora, Azusa, to a



ALTERNATIVE 1 - LRT TO ARCADIA



ALTERNATIVE 2 - LRT TO IRWINDALE



ALTERNATIVE 3 - LRT TO SAN DIMAS

LEGEND :

-OOOOOO- COMMUTER RAIL

-■■■■■■■- LIGHT RAIL

NO SCALE

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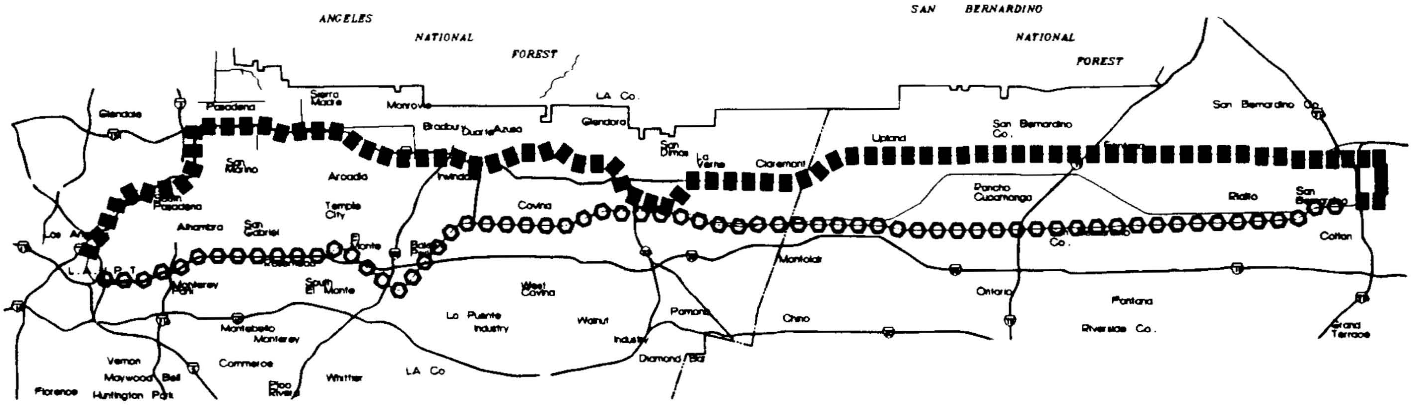
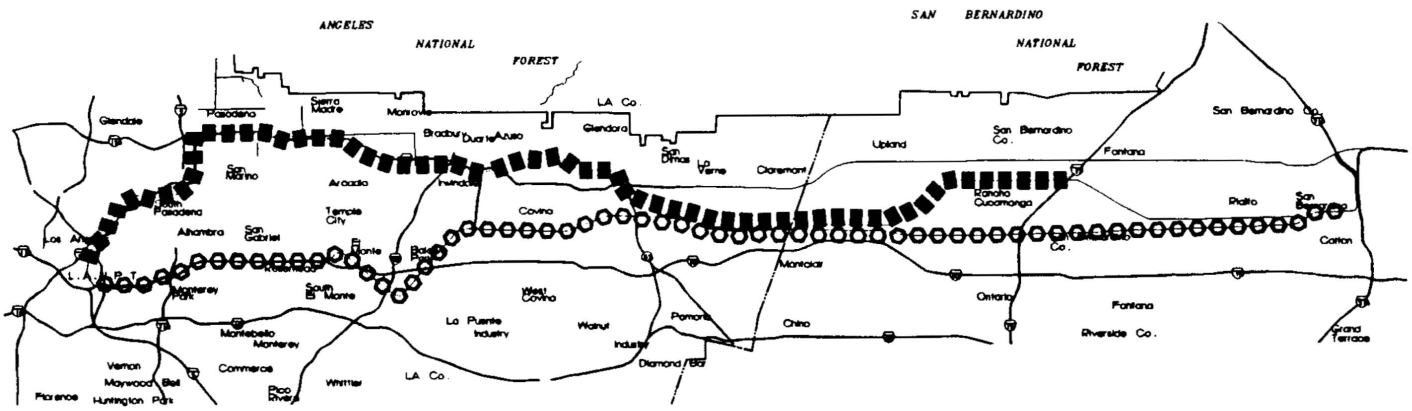
PRELIMINARY PLANNING STUDY

STUDY ALTERNATIVES

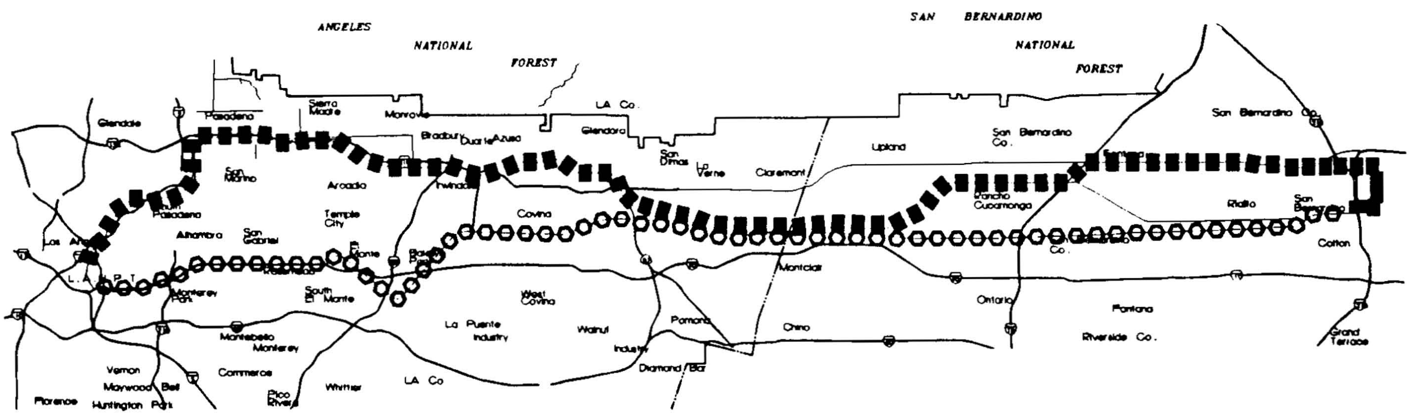
FIGURE 3.2



ALTERNATIVE 4 - LRT TO SAN BERNARDINO (VIA RTE 30)



ALTERNATIVE 5 - LRT TO FONTANA (VIA SP)



ALTERNATIVE 6 - LRT TO SAN BERNARDINO (VIA SP / RTE 30)

LEGEND :

-OOOOOO- COMMUTER RAIL

-■■■■■■■ LIGHT RAIL

NO SCALE

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	STUDY ALTERNATIVES	3.2

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connection with LRT at Irwindale. The commuter rail would turn south along the SP Azusa Branch and reconnect to the main San Bernardino-Los Angeles commuter rail line into Los Angeles. An additional commuter rail feeder service would also be added on the SP ROW in San Bernardino County, to run to downtown Los Angeles. This alternative also emphasizes regional commuter rail service and provides local LRT service for the west San Gabriel Valley.

3.5.3 Alternative 3 - LRT to San Dimas

Alternative 3 would extend the Pasadena Blue Line to San Dimas, where it would connect to the San Bernardino-Los Angeles commuter rail line at a new San Dimas station. The commuter rail feeder service on the SP ROW in San Bernardino County would also be added in this alternative to serve downtown Los Angeles. This alternative places an almost equal emphasis on commuter rail and light rail service within the overall corridor, focusing on light rail in Los Angeles County and commuter rail in San Bernadino County.

3.5.4 Alternative 4 - LRT to San Bernardino (via Route 30)

Alternative 4 also extends the Pasadena Blue Line to San Dimas, but in addition provides light rail service on Route 30 from San Dimas to downtown San Bernardino. This alternative emphasizes light rail service. The two light rail lines would be operated separately, with each terminating at San Dimas.

3.5.5 Alternative 5 - LRT to Fontana (via SP)

Alternative 5 would extend the Pasadena Blue Line all the way to Montclair, and a locally oriented light rail line would be introduced on the SP ROW in San Bernardino County between Montclair and I-15. A sub-option of both this alternative and Alternative 6 would be to terminate the Blue Line at Pomona instead and extend the San Bernardino service into Pomona rather than stop at Montclair. This alternative also emphasizes light rail service.

3.5.6 Alternative 6 - LRT to San Bernardino (via SP/Route 30)

This alternative would also extend the Pasadena Blue Line all the way to Montclair. It would be met by a San Bernardino County LRT line running from Montclair to downtown San Bernardino utilizing the SP and Route 30 rights-of-way, with a connection between the two alongside the I-15 Freeway ROW. This alternative also emphasizes light rail service.

Under all these alternatives, it was assumed that commuter rail will operate from San Bernardino to Los Angeles as planned by SCRRA in the ATSF in San Bernadino County and the SP ROW in Los Angeles County as shown in Figure 3.2.

3.6 Potential Station Locations

Potential station locations in each segment were identified from a number of sources. Several public agencies, including LACTC, SANBAG and SCAG have evaluated station locations along each alignment, and all of these sites were included in the preliminary segment analysis. Many of the cities throughout the corridor had identified additional potential sites; these were also included. Finally, the consultant team's observations in the field were used to develop additional potential sites, especially along the SP ROW and Route 30 alignment in San Bernardino County.

3.6.1 Station Requirements

Although planning for each station site will differ based on the physical constraints and modes serving the site, stations for all modes will typically require the following:

- off-street parking for rail patrons;
- an area for kiss-and-ride pick-up and drop-off; and
- an area for bus loading and unloading.

Stations where an interface between two rail modes is planned (e.g., LRT and commuter rail) will require a larger area to provide platforms for each mode. The preferred configuration is cross platform access, where commuter rail and LRT platforms are adjacent and patrons can walk freely from one to the other. An alternative configuration is end-to-end, although this configuration involves a longer walk for transferring patrons.

Terminus stations will require larger areas as well. Because end-of-line stations tend to have higher patronage, more area would be needed for parking, bus circulation and bus loading and unloading. Terminus stations will also normally require space for at least two or three storage tracks to store trains overnight or mid-day.

All stations will need good access to and from the arterial roadway system. More than one access point is generally preferred to avoid potential circulation problems. Ideal locations from a patronage perspective are areas of high residential or commercial density.

Stations also provide good economic opportunities for joint development, particularly in commercial areas. When strategically located, rail stations can provide economic benefits to the community in which they are placed.

3.6.2 Recommended Station Locations

Technical Memorandum #1 contains a full discussion of all potential station locations identified, the preliminary evaluation, and the selection of recommended station locations. Based on the recommended alternatives, a review of all the potential stations sites, and local and regional considerations, a set of recommended station locations was developed for each of the alternatives. The choice of station sites also took into account optimal station spacing and other operational considerations. The recommended station sites are identified in Chapter 4 and discussed further in Chapter 5 of this report.

Seven station locations were recommended as possible terminus locations for either light rail or commuter rail service. These seven locations were:

- Sierra Madre Villa (Pasadena)
- First/Santa Clara (Arcadia)
- Irwindale Avenue (Irwindale)
- San Dimas Avenue (San Dimas)
- Montclair Transit Center (Montclair)
- I-15/East Avenue (Rancho Cucamonga)
- Downtown San Bernardino

The recommendation of possible terminus locations was based on several considerations. These included service considerations, such as whether the station was a logical transfer point between two modes or a logical end-of-line; and physical considerations, such as the availability of land for extra storage tracks, multiple or enlarged platforms, and additional parking.

For example, the Duarte station at Mountain Avenue was not recommended as a terminus because it was not a logical end-of-line for light rail from a system connectivity standpoint, since it would preclude making a useful connection to commuter rail along the Azusa Branch. Similarly, the Azusa station site, while potentially offering available land and redevelopment opportunities, was also not ideal as a light rail terminus because it also would preclude use of the Azusa Branch to make a commuter rail connection.

Therefore, Irwindale was recommended as a potential light rail terminus for further study because it offered the best combination of system connectivity (allowing use of the Azusa Branch) and available land for parking, platforms and additional tracks.

Similarly, concerns over right-of-way constraints at Sierra Madre Villa in Pasadena led to the recommendation that the Arcadia site be considered as a terminus of the Pasadena Blue Line. The other recommended terminus stations represented logical end-points or transfer locations between elements of the regional rail system.

However, it should be noted that these considerations do <u>not</u> preclude the possibility of other station locations also being considered for terminus locations, following evaluation of the system-wide alternatives.

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4. CONCEPTUAL ENGINEERING ANALYSIS

4.0 Conceptual Engineering Analysis

Conceptual engineering analysis was conducted to identify critical construction and engineering issues on each segment.

4.1 Engineering Guidelines

The standards identified for light rail and commuter rail are based on LACTC system prototypes which are either operational (Blue Line light rail system) or nearing implementation (the first phase of Southern California Regional Rail Authority's Metrolink commuter service connecting Los Angeles with San Bernardino, Moorpark and Santa Clarita).

4.1.1 Vehicle Design Parameters

All vehicles were assumed to operate over similar, conventional, continuously welded rail of the same 4 feet, 8½-inch gauge, although vehicle characteristics are different for the different technologies.

- Light rail (Blue Line) vehicles are electrically powered, articulated 90-foot cars with operator controls on both ends. They operate singly or in pairs and three units may be linked together if station platforms are 300 feet in length. Each car has 76 seats and a maximum seated and standing capacity of 152 riders.

- Commuter rail (METROLINK) cars are locomotive-hauled, 85-foot standard railroad equipment coaches with seating on two levels. Any car placed at the rear of the train is equipped with a small, fully enclosed room with controls (cab) so that the train may be operated in either direction without having to reposition the equipment at every terminal. Initially, up to four cars will be coupled in each set, but up to ten cars may be operated together. Each car has 152 seats and the intent is to provide seats for all passengers.

4.1.2 Alignment Parameters

Horizontal Alignment

With respect to both modes under consideration, the minimum curve radius which should be incorporated into the engineering design of the track structure should be a function of maximum operating speeds which, in turn, are related to station spacing. Light rail systems usually average about one station every mile or mile and one-half. As a result, even though the vehicles are of light weight, the power-to-weight ratio is high, and electrical power facilitates fast starts, it is difficult for light rail vehicles to accelerate to 60 miles per hour before they must begin slowing to stop at the next station. In contrast, commuter rail vehicles weighing more than their light rail counterparts and assembled in longer trains may attain speeds of 70 miles per hour or more between stations which, typically, are spaced every four to six miles.

Furthermore, commuter rail vehicles are designed to operate on freight railroad trackage with broad curves engineered to facilitate smooth rides at high speeds. Conversely, light rail equipment is designed to traverse the sharp track curvature frequently found in the urban areas through which it operates.

Horizontal alignment parameters are summarized in Table 4.1 and described below.

- *Light Rail:* A 2,292-foot radius (2.5-degree) curve is the sharpest which should be engineered in conjunction with 60-mile-per-hour operations. On the other hand, at slow speed, a 300-foot radius (19-degree curvature) is the recommended minimum engineering parameter on standard track, though 82-foot radius (70-degree curvature) may be provided if light rail trackage is imbedded in pavement.

- *Commuter Rail:* A 3,820-foot radius (1.5-degree) curve is the appropriate engineering design parameter to accommodate 79-mile-per-hour operations. A minimum speed curvature standard is a 573-foot radius (10 degrees), though existing daily inter-city passenger movements in the eastern United States are operated around as sharp as 382-foot radius (15-degree) curves.

<u>Vertical Alignment</u>

Vertical alignment or curvature is the engineering parameter that describes the manner in which railroad lines change elevations or run at varying grades. Stations should be constructed on level (and straight) trackage where possible. Vertical alignment parameters are also summarized in Table 4.1.

- *Light Rail:* The desirable maximum gradient is 4 percent (4 feet per hundred feet) though 6 percent can be operated. However, even small changes in grade should be designed with vertical curvature of no less than 300 feet. The maximum allowable grade at stations is 1%.

- *Commuter Rail:* A maximum gradient of 1.4 percent, the current ruling grade on ATSF's Pasadena Subdivision was used for planning purposes. Commuter-only trackage could, but should not, exceed two percent. Conventional passenger equipment operates daily over as much as a 3.5 percent gradient in New Mexico but incurs a substantial running time penalty. Recommended American Railway Engineering Association (AREA) practice is 0.1 percent per hundred feet maximum rate of change on crests and 0.05 percent per hundred feet maximum rate of change in sags. In practice, however, quicker rates of change are used as, for example, on the crest over Foothill Boulevard in Azusa.

Table 4.1
Alignment Planning Parameters

	Light Rail	Rail Bus	Commuter Rail
Maximum Design Speed (mph)	60	70	80
Maximum Superelevation (feet)			
In Track	4	5	5
Unbalanced	3	2	2
Horizontal Curvature Radius			
Design (feet)	300	2,865	3,820
Minimum (feet)	82[a]	573	573
Maximum Gradient (percent)	6.0	2.0	1.4
Vertical Curvature			
Minimum curve length (feet)	300	300	300
Change of Grade (percent per 100 feet)	.66	.66	.1
Track Centers (feet)	14[c]	14[c]	15
Right-of-Way Width (feet)			
Double Track			
At grade	50	70	70
Minimum	30	35[b]	35[b]
Above/below grade	24.6/35	NA	NA
Station	40	40	40 - 100
Single Track	NA	35 - 55[b]	35 - 55[b]

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[a]LACTC standards allow 82-foot radius if track is embedded in pavement.
[b]Wider ROW width may reduce construction costs.
[c]Minimum of 13 feet on tangent section.

Source: LACTC, RLBA, Korve Engineering.

4.1.3 Right-of-Way Width

Theoretically, a double-track line to carry any of the rail modes under consideration in this study could be constructed within a 35-foot right-of-way. Usually, this would entail additional drainage measures and retaining walls that would add significantly to construction costs as well as restricting maintenance access. These cost burdens are justified more easily on light-rail systems than by commuter rail services because of the former's generally higher patronage and the higher cost of urban versus suburban land.

Commuter rail design parameters generally incorporate wider rights-of-way than light rail because they use existing rights-of-way largely in suburban locations instead of operating over newly constructed urban alignments.

Right-of-way information is summarized in Table 4.1. Typical right-of-way cross sections used in conceptual engineering are displayed in Figure 4.1 for light rail and Figure 4.2 for commuter rail.

- *Light Rail:* A 50-foot right-of-way is preferred with a minimum acceptable right-of-way of 30-35 feet. A double-track alignment is usually necessary because service is frequent in both directions. Even if a single track line is constructed to initiate service, room for a second track should be a primary planning consideration so that service can be increased later to provide typical light-rail service levels.

- *Commuter Rail:* Single-track operations generally require a 55-foot right-of-way. The preferred width to accommodate double-track operations is a 70-foot right-of-way. However, these sections may be reduced as low as about 30 feet and 35 feet, respectively, by eliminating the access road and providing closed drainage.

4.1.4 Stations

Station criteria reflect differing train length, width and vehicle floor heights. Typical station dimensions are shown in Figures 4.1 and 4.2 and summarized in Table 4.2.

- *Light Rail:* Center platforms are 39 inches above the top of the rail to match the car floor level, so no steps are required and disabled access is inconvenient. Length is typically 200 feet, expandable to 300 feet. Platform edge is 4 feet, 7-1/2 inches from the center line of the track to accommodate an 8-foot, 10-inch-wide car. Commuter railcars (9 feet, 10 inches wide) cannot share light-rail platforms.

- *Commuter Rail:* Side platforms are 8 inches above the top of the rail at 5 feet, 1 inch from the center line of the track to allow freight train clearance. Initial platform length typically is 425 feet, expandable to 850 feet. Passengers climb two 10-inch steps to enter each car. Disabled access is provided by a short, high platform set back from the track to clear freight trains. This platform is matched to a vehicle door with a moveable bridge plate. A 20-foot width is preferable to serve as an island between trains and other, adjacent transportation modes.

Table 4.2
Station Planning Parameters

	Light Rail	Rail Bus	Commuter Rail
Platform Length (feet)	200	300	425
With Future Expansion (feet)	300	NA	850
Platform Width Minimum (feet)	15	15	20
Minimum Right-of-Way			
Single Track	NA	40	40 - 64
Double Track	40	40 - 100	76 - 100
Maximum Superelevation	0	0	0
Maximum Grade	1%	0	0

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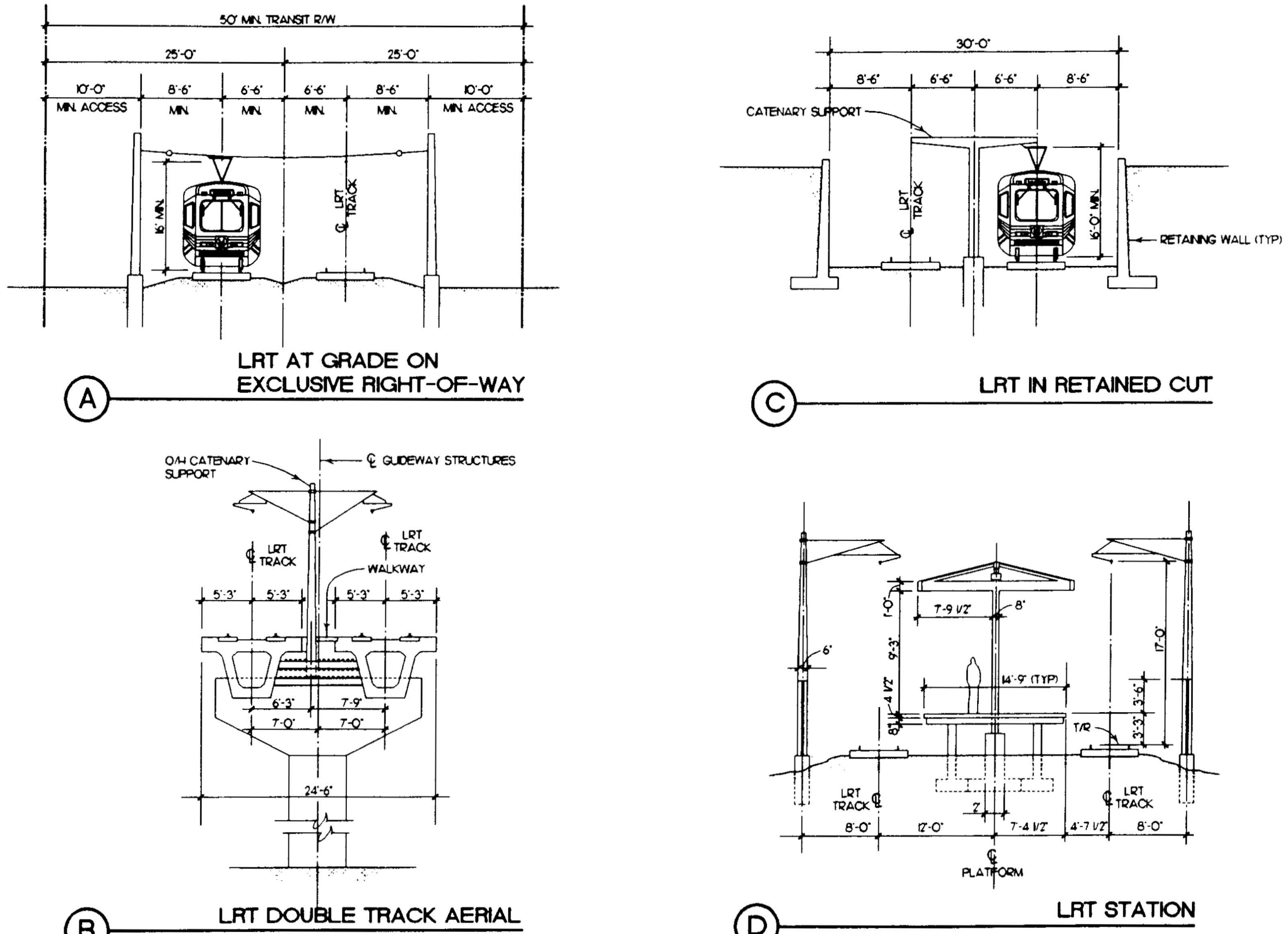
Source: LACTC, RLBA.



SOURCE: L.A.C.T.C., RL BANKS & ASSOCIATES, KORVE ENGINEERING

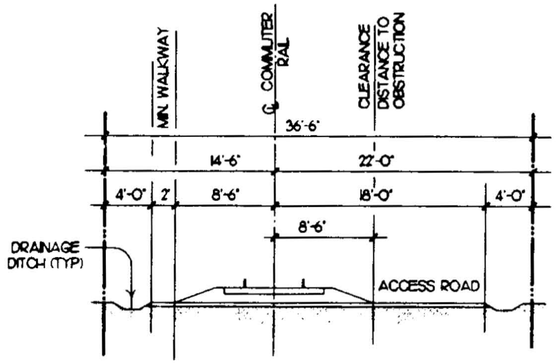
Korve Engineering
R. L. Banks and Associates

NORTHERN SAN GABRIEL/SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR
PRELIMINARY PLANNING STUDY

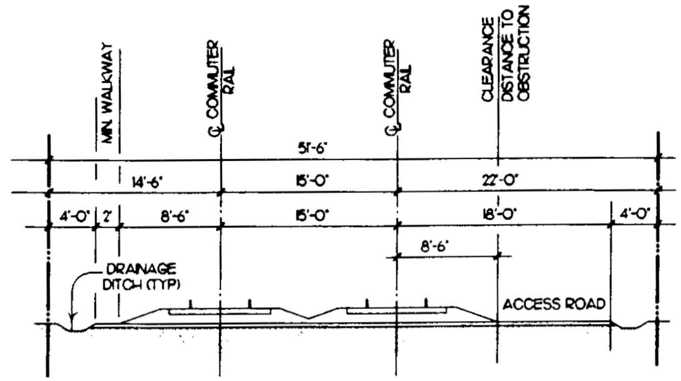
TYPICAL LIGHT RAIL SECTIONS

FIGURE 4.1

SCTNLRT.DWG



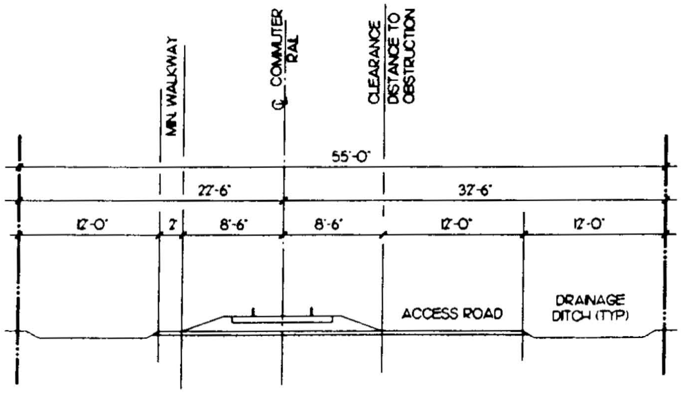
A SINGLE TRACK MINIMUM



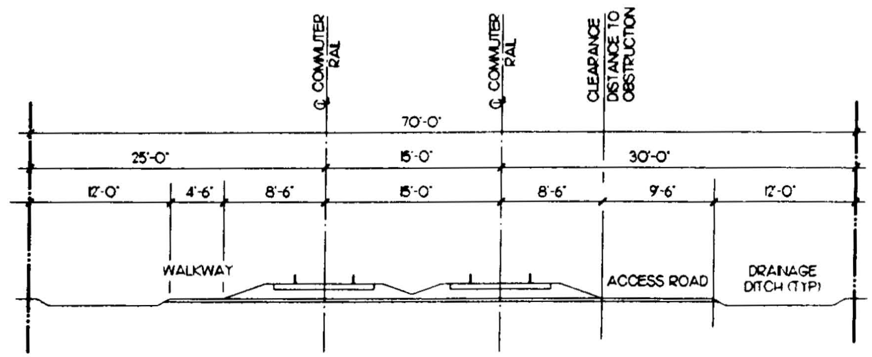
C DOUBLE TRACK MINIMUM

NOTE:

WIDENING DRAINAGE DITCH (UP TO 12') MAY REDUCE CONSTRUCTION COSTS.
ACCESS ROAD MAY BE ELIMINATED IF RIGHT OF WAY IS NARROW.



B SINGLE TRACK TYPICAL



D DOUBLE TRACK TYPICAL

SOURCE: L.A.C.T.C., RL BANKS & ASSOCIATES, KORVE ENGINEERING

Korve Engineering
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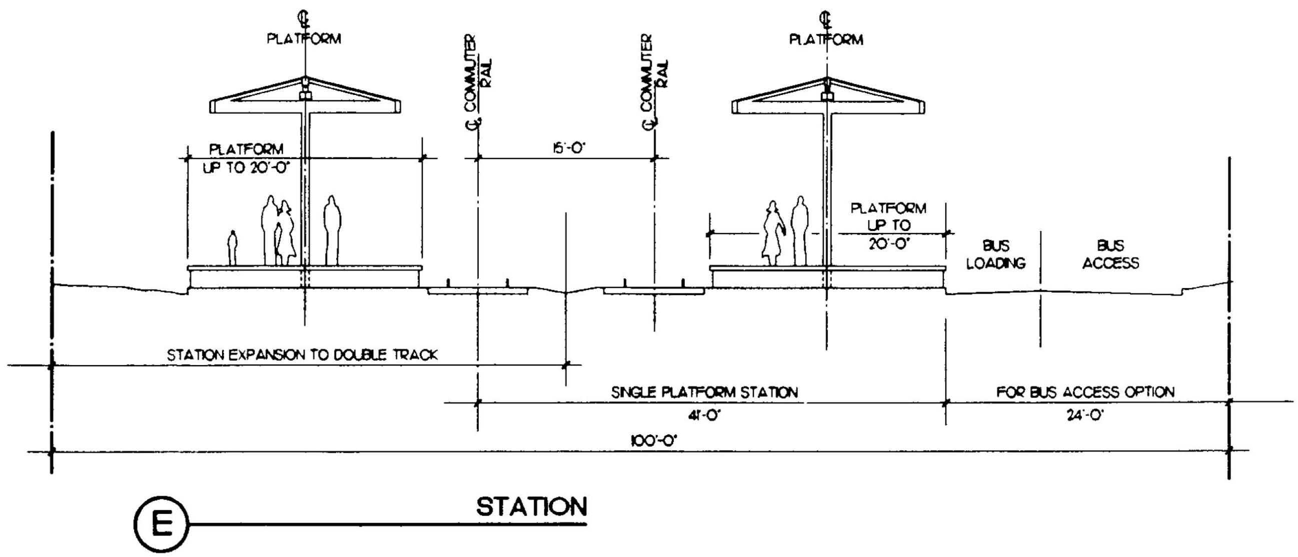
NORTHERN SAN GABRIEL/SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR
PRELIMINARY PLANNING STUDY

TYPICAL COMMUTER RAIL SECTIONS

FIGURE 4.2

SCTNCRLDWG



SOURCE: L.A.C.T.C., RL BANKS & ASSOCIATES, KORVE ENGINEERING

Korve Engineering
R. L. Banks and Associates
SCTNCR2.DWG

NORTHERN SAN GABRIEL/SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR
PRELIMINARY PLANNING STUDY

TYPICAL COMMUTER RAIL SECTIONS

FIGURE 4.2

4.2 Alignment Descriptions by Segment

This section describes the conceptual light rail and commuter rail alignments from Pasadena in the west to San Bernardino in the east, for each of the four rights-of-way under study. The alignment locations are illustrated in Figures 4.3 through 4.24, including conceptual plan and profiles and typical sections at selected locations. These figures appear at the end of this chapter.

Unless otherwise indicated, commuter rail service was assumed to need only a single main track with appropriately spaced sidings, while light rail service was assumed to require double-track construction, a capacity enhancement consistent with that mode's more frequent service patterns.

In order to operate bi-directional commuter rail service, it was assumed that railroad signals would be upgraded to a centralized traffic control (CTC) system. Service could be initiated using existing automatic block signals (ABS) if additional running time were added to the schedule to allow for safe train meets or if initial service were predominantly in one direction during peak periods. For any light rail installation, an entirely new signal system would need to be installed.

Existing Santa Fe line rail bridges would be adequate to support one track of a light rail. However, needed future maintenance and rehabilitation activities (including periods of line closure) would disrupt light rail operations in the near term, so all steel bridges were assumed to be rehabilitated and all timber trestles replaced prior to initiation of operations. Construction of parallel bridges would be required to support a second track in all light rail alternatives.

<u>1. ATSF Pasadena Subdivision - Pasadena to Irwindale</u>

The ATSF Pasadena Subdivision generally provides a good quality and well maintained railroad right-of-way. The section of right-of-way under study begins in Pasadena at Sierra Madre Villa, in the median of the I-210 Freeway. This is the planned easterly terminus of the Pasadena Blue Line extension, which will utilize the ATSF right-of-way to the west to connect to downtown Los Angeles.

Sierra Madre Villa would have to be the westernmost point of commuter rail service in the San Gabriel Valley because there is insufficient right-of-way within the I-210 Freeway median to accommodate both light rail and commuter rail. The planned light rail station at Sierra Madre Villa could operate as a transfer station with commuter rail service to the east. However, there is no room for a side-by-side station to allow direct cross-platform transfers, and an end-to-end platform configuration would be required, which would increase walk distances and restrict train operating options at the terminal station.

The alignment proceeds east of Sierra Madre Villa in the median of the I-210 Freeway, as shown in Figures 4.3 and 4.4. A typical section illustrating a light rail and commuter rail configuration is shown in Figure 4.21. A station location was considered at Baldwin

Avenue, but determined to be infeasible due to the lack of available right-of-way for access and parking. East of Baldwin Avenue, the alignment turns out of the freeway median, across the eastbound lanes, onto a raised embankment in the City of Arcadia. The alignment crosses Colorado Boulevard on structure then returns to grade to cross Santa Anita Avenue and enters downtown Arcadia.

The Arcadia Station would be located between Santa Anita Avenue and First Avenue. As there is sufficient room here for a side-by-side platform configuration, this location is preferred to Sierra Madre Villa as a potential light rail/commuter rail transfer station.

Proceeding southeasterly, the alignment returns to raised embankment, with a single-track overcrossing at Huntington Drive/Second Avenue. For a second light rail track, a new parallel bridge would have to be constructed, substantially longer than the current bridge to accommodate the intersection underneath. Both east and west rail approaches to Huntington Drive are on fill, and upon widening the subgrade to accommodate light rail double track, would require low retaining walls to remain within the rail right-of-way (typical section shown in Figure 4.21).

The alignment returns to grade before the next station site in Monrovia, west of Myrtle Avenue. Continuing eastward, the railroad right-of-way runs at grade adjacent to and north of Duarte Road (see typical section in Figure 4.22), with a station in Duarte east of Mountain Avenue. East of Duarte, the alignment passes over the San Gabriel River on a single track structure, then runs at-grade south of the I-210 Freeway and north of the Miller Brewing plant to Irwindale Avenue. At this location, the ATSF alignment passes under Irwindale Avenue and over the SP right-of-way, which runs in a north-south direction under the I-210 Freeway.

A new 705-foot-long parallel bridge would have to be constructed over the San Gabriel River for a second light rail track.

A station location west of Irwindale Avenue could function as a light rail/commuter rail transfer station if the SP Azusa Branch were also utilized, although this station site to the west of Irwindale Avenue will require the use of land currently owned by Miller Brewing at their Irwindale plant. An alternate station location would be east of Irwindale Avenue and north of the ATSF tracks, in the Caltrans right-of-way.

In summary for this segment, commuter rail could be initiated with existing trackage and equipment. However, as rehabilitation would be required in the near future, rail, tie and signal replacement should probably occur prior to commencement of service.

For light rail, in addition to new rail and signals, structures would need to be supplemented at the I-210 Freeway, Colorado Boulevard, Huntington Drive, and the San Gabriel River for double-track operation. Three short timber trestles would also need replacement. Six at-grade crossings would remain along this segment.

2. SP Azusa Branch - Irwindale to Baldwin Park

This former Southern Pacific right-of-way, recently purchased by SCRRA, runs from the former SP Baldwin Park Branch in the vicinity of Azusa Canyon Road and Los Angeles Street, north through industrial areas of Irwindale, east of Miller Brewing, under the I-210 Freeway at Irwindale Avenue, then loops eastward through gravel pits into Azusa near Crescent Drive (see Figures 4.5 and 4.6).

Use of this right-of-way for light rail was ruled out due to high cost, low ridership potential, and poor system connectivity. The alignment could, however, be used for commuter rail in a configuration that would operate service from the east on the ATSF, then south on the SP Azusa Branch to Baldwin Park, with a station at Irwindale Avenue and the I-210 Freeway.

A key engineering issue would be the need for a new connection from the ATSF to SP right-of-way at Irwindale, to allow through commuter rail service between Montclair and Los Angeles via Glendora, Azusa and Irwindale. This construction would require use of some of the land owned by the Miller Brewing Company. A concept alignment and station location is shown in Figure 4.7. This alignment station location would probably necessitate filling in the current cut on the SP right-of-way and abandoning the SP tracks to the north of the freeway. In order to maintain freight access to SP customers in Azusa, a new connection to the ATSF tracks, as shown conceptually in Figures 4.5 and 4.8 could be explored. South of Miller Brewing, track would need complete replacement, two short bridges would need to be rehabilitated, and a new signal system installed. At the south end where the track ties into the SP Baldwin Park Branch, track would need realignment to accommodate a busy private crossing. The sharp curves at both the north and south ends of this segment to connect to the ATSF and SP Baldwin park rights-of-way, respectively, would limit operating speeds of commuter rail service.

3. ATSF Pasadena Subdivision - Irwindale to San Dimas

The railroad ROW in this segment generally runs mid-block with some embankment sections but mostly at-grade. There are 22 at-grade crossings (seven of which are in downtown Azusa) and two grade-separated crossings (at Foothill Boulevard in Azusa and Alosta Boulevard in Glendora).

From Irwindale, the alignment proceeds eastward over the I-210 Freeway on a double track structure, over Foothill Boulevard on a single-track bridge, then drops to grade before entering downtown Azusa (Figure 4.5). A station site would be located east of Azusa Avenue. The alignment then runs mid-block at-grade through Azusa, north of Citrus College, and to the south of downtown Glendora with a potential station at Glendora Avenue (Figure 4.9).

Continuing eastward, the alignment runs at-grade a half block north of Alosta Avenue, before turning south over Foothill Boulevard, and under the I-210 Freeway to an at-grade crossing of Lone Hill Avenue by the Glendora Auto Centre. A potential station site is located east of Lone Hill Avenue and south of Auto Centre Drive, on currently undeveloped land, but would require land purchase from the planned Auto Centre site.

Continuing south-eastward, the alignment passes under the I-210 Freeway and through downtown San Dimas, with a station site at the northeast corner of Cataract Avenue and Bonita Avenue, then at Arrow Highway becomes adjacent and parallel to the SP Baldwin Park Branch.

Commuter rail service would require rail and tie replacement and some bridge rehabilitation.

Light rail service would require adding two significant structures, bridges paralleling the existing structures over Foothill Boulevard in Azusa and Alosta Boulevard in Glendora. Two short timber trestles must also be replaced and one steel structure over San Dimas Wash supplemented.

Three alternatives were identified for light rail terminating at a commuter rail station in San Dimas on the SP Baldwin Park branch (shown in Figure 4.11). These were:

1. Follow the west side of I-210 Freeway south to a new junction station with SCRRA's Baldwin Park commuter line just west of I-210, with auto/bus access from Covina Boulevard;

2. Turn south at San Dimas Avenue and operate within or adjacent to the street one-third mile to a new station with the commuter line at San Dimas Avenue;

3. Turn south across Arrow Highway west of Gaffney Avenue to a new station with the commuter line south of Arrow Highway.

While all three alignments appear feasible from an engineering perspective, the first was dropped because of the need for significant aerial structures and the associated high costs. The first and second alternatives were also dropped due to concerns from the City of San Dimas. The preferred alignment for a termination of light rail at San Dimas with connection to commuter rail is thus the third alternative (Figure 4.10). This alignment will require an at-grade crossing of Arrow Highway, however.

If light rail were not to terminate at San Dimas, a potential station site would be at San Dimas Canyon, north of Arrow Highway.

<u>4.</u> <u>ATSF/SP ROW - San Dimas to Claremont</u>

From San Dimas, the alignment continues eastward at-grade on the north side of Arrow Highway. At White Avenue, it is joined by the SP Baldwin Park Branch in a joint right-of-way of about 185 feet, as shown in Figure 4.11. Light rail would run on the north side of the right-of-way and SCRRA San Bernardino-Los Angeles commuter rail to the south as shown in the typical section in Figure 4.22. The next station site is in Pomona, west of Garey Avenue, which could be a light rail/commuter rail transfer station.

At Cambridge Avenue, the ATSF and SP trackage join together and run through Claremont as the ATSF tracks, before diverging again east of College Avenue. Light rail and commuter rail would share this right-of-way, both with double-track service. A commuter rail station (skip stop) is already planned in Claremont, between Indian Hill Boulevard and College Avenue. There is insufficient right-of-way for both a commuter rail and light rail station at Claremont. If light rail were constructed without additional right-of-way, it is suggested that Claremont become a light rail station rather than a commuter rail station (higher patronage potential and close commuter rail spacing). A conceptual cross section is shown in Figure 4.23.

Commuter rail service would require rail and tie replacement and a new junction with SCRRA's Baldwin Park line.

Light rail construction would also require replacement of one timber trestle. There are ten at-grade crossings along this segment. A major electrical transmission line crosses over part of this segment and may need to be raised for LRT service.

5. SP ROW - Claremont to Fontana

East of Claremont, the SP right-of-way diverges north from the ATSF (Figure 4.12). A station location in Montclair east of Monte Vista Avenue could be linked to the Montclair Transit Centre and the proposed commuter rail station on the ATSF line. The alignment continues eastward at-grade through Upland one block south of Arrow Highway, with a station location between Third and Sixth Avenues.

East of Campus Avenue, the alignment turns northeast into Rancho Cucamonga, and east of Grove Avenue is on raised embankment with overcrossings of Foothill Boulevard and Carnelian Street (Figures 4.12 and 4.13). The next station stop is located west of Carnelian Street, just north of Foothill. The alignment continues northeast and east through residential areas of Rancho Cucamonga, returning to grade at Hellman Avenue, with a station at Base Line Road and Amethyst Avenue. Turning east, the alignment continues at grade north of Base Line Road, with stations west of Haven Avenue and east of Rochester Avenue. Typical sections for this stretch of alignment are shown in Figure 4.23. A potential end-of-the-line station would be located at East Avenue near the I-15 Freeway (Figure 4.17).

Existing track and facilities along this segment are in poor condition. There are 30 at-grade crossings in this segment, half of which occur in Upland.

Commuter rail service on this segment would require complete track replacement with CTC signaling installation. In addition, two bridges (Foothill Boulevard and Day Canyon) would need to be replaced and the old underpass at Carnelian Street filled in.

Light rail service would require replacement of the same bridges and construction of new bridges parallel to the two existing bridges at Foothill Boulevard and Day Canyon.

6. Route 30 - San Dimas (Glendora) to Fontana

This segment comprises the Route 30 Freeway Corridor from the I-210 Freeway in San Dimas to I-15 in Fontana. Commuter rail was excluded from further consideration in the preliminary analysis. Light rail could operate in the median of the planned new freeway facility east of Foothill Boulevard.

A key engineering issue in this segment is how to make the connection from the ATSF ROW in San Dimas to the Route 30 corridor. Three alternatives were considered (as shown in Figure 4.14).

Alternative 1 would leave the freeway ROW at Foothill Boulevard and follow Foothill eastward to Damien Avenue and the new freeway. Since Foothill Boulevard is not wide enough to accommodate both light rail and the current roadway, this alignment would entail an elevated structure for approximately three miles.

Alternative 2 would make a connection through the existing I-210/SR-30 interchange. A conceptual plan and profile is shown in Figure 4.15. While an alignment appears feasible, more detailed engineering study will be necessary. The light rail would turn out of the ATSF right-of-way, run adjacent to the San Dimas Wash, cross Lone Hill Avenue at grade, then weave through the interchange, rise over the eastbound freeway lanes into the center of the freeway. Grades could approach four percent in places, and the freeway would need to be widened to accommodate light rail, also necessitating reconfiguration of the existing interchange at San Dimas Avenue. The bridge abutment for Freeway Connector A on the south side of the freeway also needs to be reconstructed to accommodate this alignment.

Alternative 3 would continue east on the ATSF through San Dimas, then use an existing railroad spur on Metropolitan Water District property west of Wheeler Avenue. The alignment would continue north with a short elevated section over Foothill Boulevard and enter the new Route 30 Freeway by passing under the eastbound lanes.

A conceptual plan and profile is shown in Figure 4.16. This solution would probably require relocation of a 72-inch waterline parallel to Wheeler Avenue, minor engineering such as track and MWD lead relocation, and about one-half mile of aerial structure including an elevated station at Foothill Boulevard.

The third concept, use of the railroad spur west of Wheeler Avenue, is recommended as the preferred concept for further study. Capital costs will probably be less than the other alternatives due to the use of existing railroad rights-of-way, less aerial structure than other alternatives, and potentially more feasible engineering. Considerably more detailed engineering studies should be conducted to confirm these preliminary conclusions.

The planned Route 30 Freeway is proposed to have three mixed-flow lanes and a high occupancy vehicle lane in both directions, with a median. The typical cross section will be 178 feet wide with an 44-foot median (54-foot including two 5-foot shoulders). This would provide sufficient room in the median for light rail, including stations, as illustrated in the typical section shown in Figure 4.24.

While the freeway median provides a "convenient" location for the light rail train, a significant problem is caused by the barrier effect of the freeway itself. This problem is particularly pertinent at station locations where often the station site is "marooned" within a freeway interchange of on/off ramps. The width of the freeway, large ramp intersections with arterial roadways, and the traffic congestion that often occurs at freeway interchanges, typically makes access to the station difficult for pedestrians and buses. Parking areas usually cannot be provided adjacent to the station, requiring longer walk distances for park- and-ride patrons.

The proposed Route 30 Freeway alignment runs due east from Foothill Boulevard, through Claremont, Upland, and Rancho Cucamonga. Since engineering designs have not yet been prepared for the freeway or interchanges, only tentative station locations have been identified for purposes of this analysis. Following discussion with local agencies, and review of available information, station sites along the Route 30 corridor were identified at Town Avenue, Mountain Avenue, Euclid Avenue, Amethyst Avenue, Haven Avenue, Rochester Avenue, and East Avenue, as shown in Figures 4.11, 4.12, 4.13, and 4.17.

7. Route 30 - Fontana to San Bernardino

This segment would make use of the planned Route 30 Freeway east of I-15 for light rail in the median.

A light rail alignment could also connect from the SP right-of-way eastward from the East Avenue Station, then along the east side of the I-15 Freeway, and the south side of the I-15/ Route 30 interchange, over the eastbound lanes into the freeway median east of San Sevanie Road, as shown in Figures 4.17 and 4.18. This alignment would require coordination and cooperation with the owners of undeveloped land adjacent to the freeways.

Station locations were identified at Cherry Avenue, Citrus Avenue, Sierra Avenue, Ayala Drive and Riverside Avenue (as shown in Figures 4.17 and 4.19). An engineering constraint exists at Lytle Creek where an existing railroad bridge will limit the Route 30 Freeway to a 73-foot half section. This may require a short section of single-track light rail, although this would not be expected to cause significant operational problems.

8. San Bernardino - I-215 to Downtown San Bernardino

East of Lytle Creek, the proposed Route 30 Freeway corridor swings northeast from Highland Avenue to 30th Street. A potential alignment was explored from Route 30/Highland Avenue into downtown San Bernardino. The alignment in this corridor is more conceptual than in other corridors because a full evaluation of the possibilities was beyond the scope of this study. Use of the ATSF Colton Subdivision and I-215 Freeway for light rail was ruled out due to insufficient available ROW. Two possible alignments for connecting to downtown San Bernardino were conceptually identified with City of San Bernardino and SANBAG Staff (see Figure 4.20):

1. Light rail would leave the freeway at Highland Avenue, then travel south along Mt. Vernon Avenue to the AMTRAK station at 3rd Street. There are potentially significant engineering problems at the Highland/Mt. Vernon intersection and at Mt. Vernon leading into the AMTRAK station that would need more detailed study to resolve. This alignment could be particularly problematical approaching the AMTRAK station due to the tracks and facilities associated with the ATSF rail yards.

2. Light rail would leave the freeway at Highland Avenue, continue east along Highland before turning south to access the CBD. The alignment could utilize any of the streets in a corridor bounded by E Street and Sierra Way, either at-grade, aerial, or even in subway. This alignment could serve downtown Civic Center buildings, the Central City Mall, the commercial area and the AMTRAK station (with a connection across the I-215 freeway). Operation downtown could be in a one-way loop, similar to operations in downtown Long Beach. Significant engineering issues include street width/configuration for at-grade accommodation of LRT, need for relocation of overhead utilities at some locations, compatibility with adjacent land uses, and traffic operations for at-grade LRT. Potential significant engineering problems were identified where Highland crosses over I-215 and under SR-259; these may require a significant aerial structure or rebuilding of two ramps at the SR-259 interchange.

4.3 Key Engineering Conclusions & Issues

In summary, the conceptual engineering task led to the following key engineering conclusions:

- Most of the alignments are either within an existing railroad ROW or planned freeway corridor with few significant engineering problems for either light rail or commuter rail.

- Commuter rail would operate on single track, with upgrades from ABS to CTC signalling.

- Commuter rail could operate on existing trackage, but rehabilitation would be required in the near future and was therefore assumed prior to start-up.

- Light rail would need double track with new signalling.

- The ROW in each corridor is sufficient for double track, except at some station locations where additional ROW is needed for station access and parking facilities.

- Rehabilitation of steel bridges and replacement of timber trestles would be required throughout the corridor.

- Parallel new bridges will be required in numerous locations to accommodate double track LRT.

The principal areas of engineering concern are the following:

- The potential new commuter rail connection from the ATSF ROW to the SP Azusa Branch by the Miller Brewing Company property in Irwindale;

- The light rail connection from the ATSF ROW to the Route 30 ROW in San Dimas;

- Design of light rail in the median of the Route 30 Freeway;

- Light rail alignment through the I-15/SR-30 interchange (to be built); and

- Light rail alignment from the Route 30 ROW into downtown San Bernardino.

While conceptual solutions have been identified at these locations, further engineering studies will be necessary to more fully explore and resolve the technical issues in these areas of the alignment.

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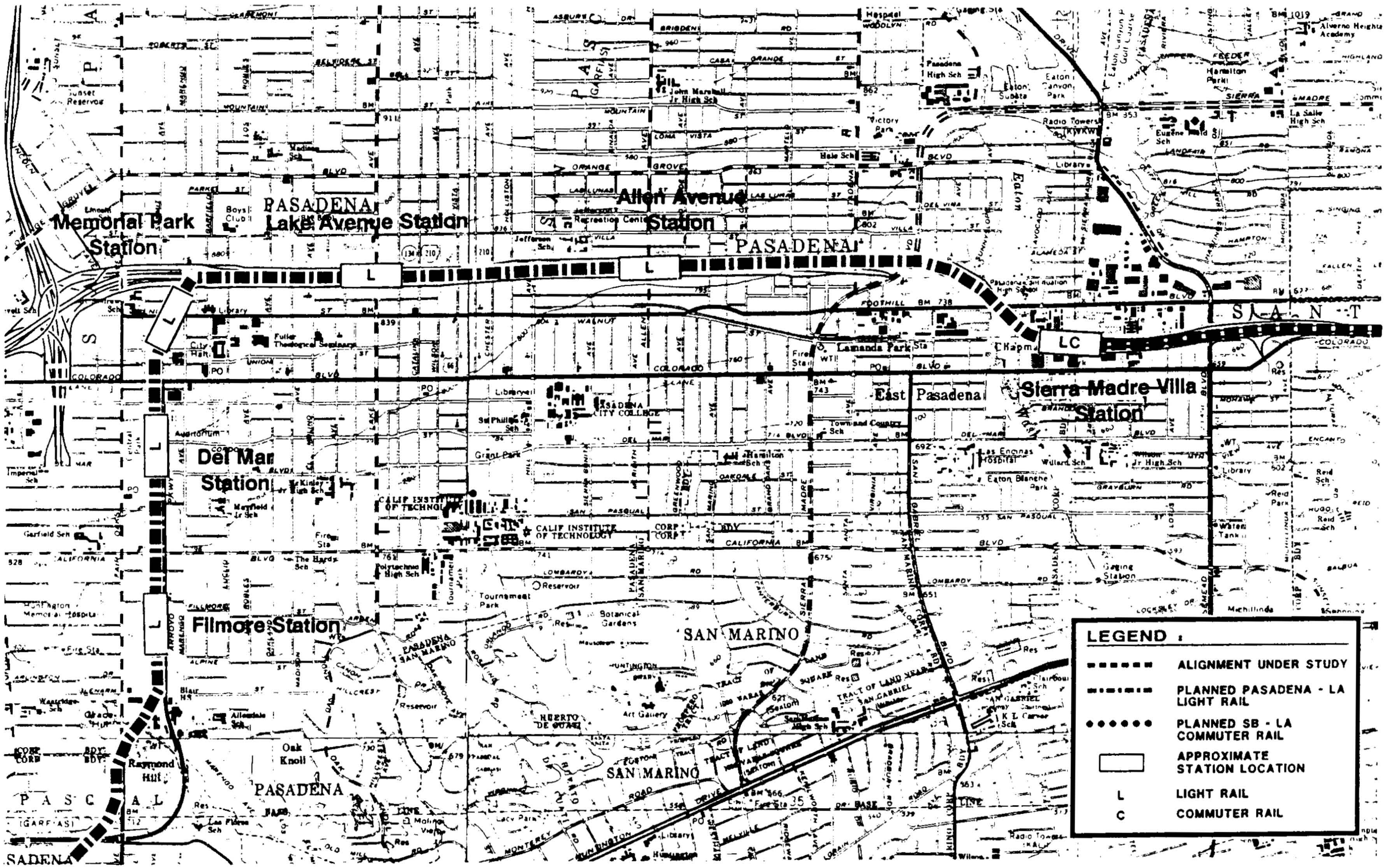

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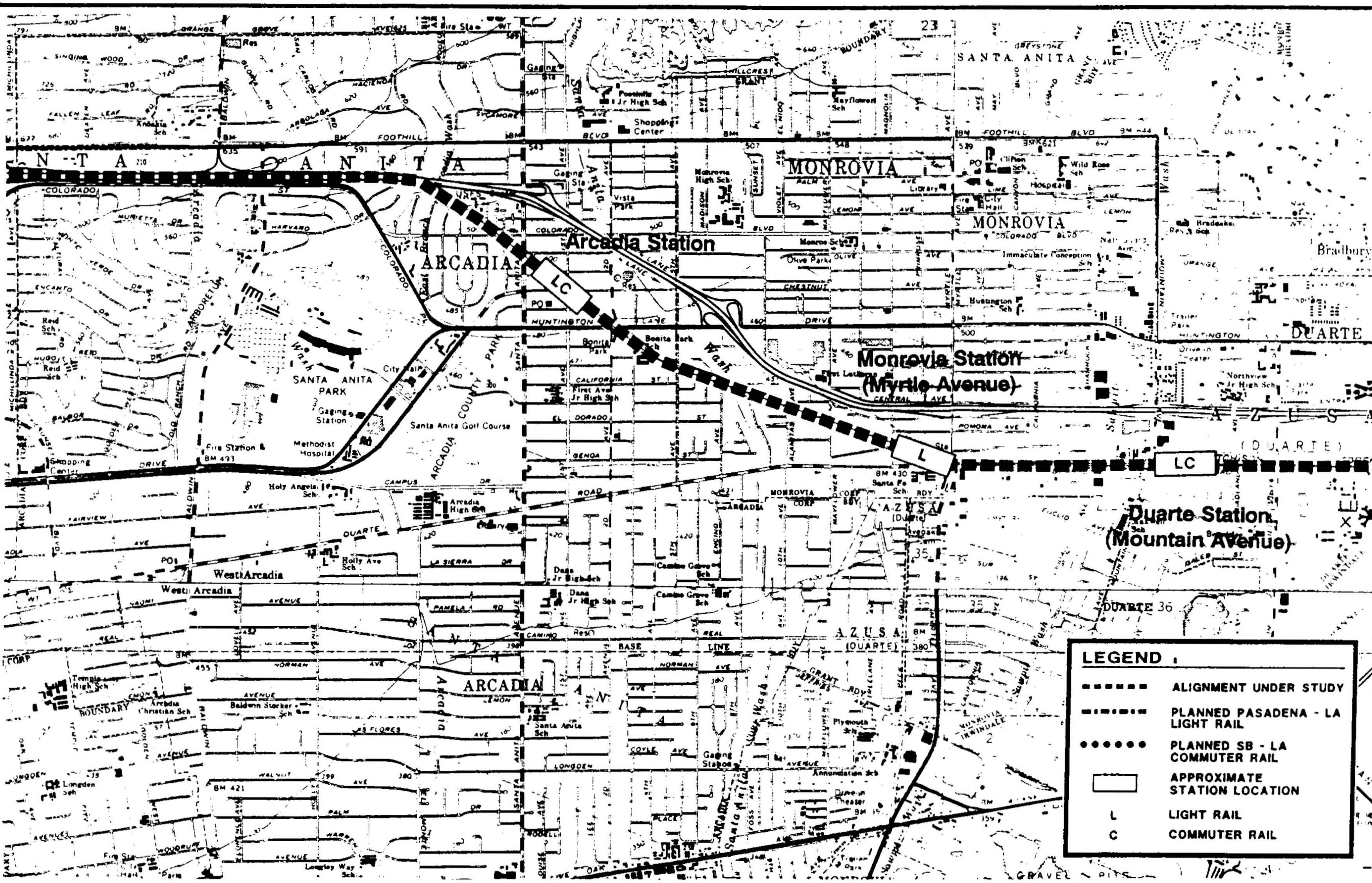
N. SAN GABRIEL / SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR PRELIMINARY PLANNING STUDY

GENERAL ALIGNMENT AND STATION LOCATIONS

FIGURE 4.3



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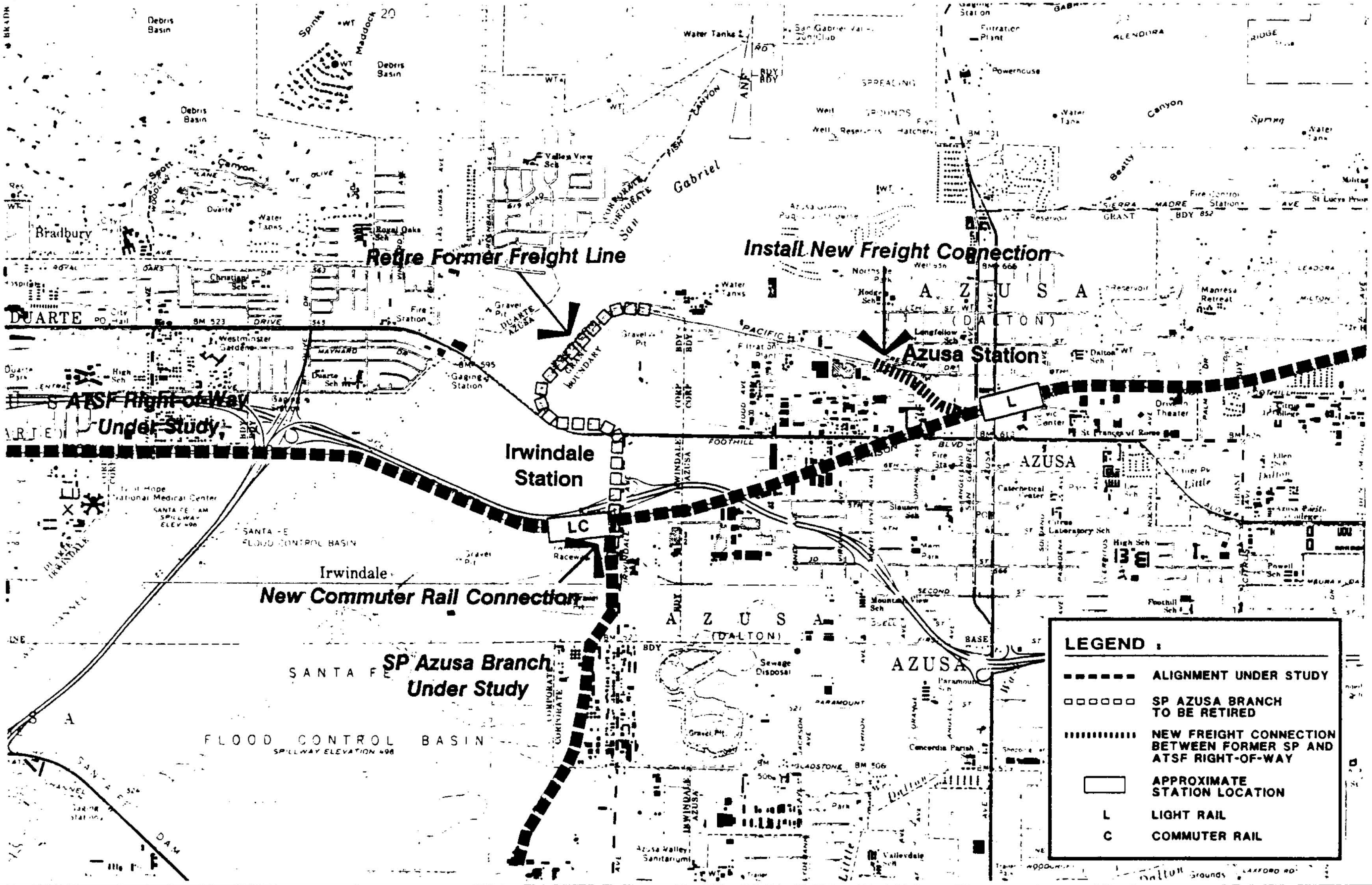
GENERAL ALIGNMENT AND STATION LOCATIONS

FIGURE 4.4



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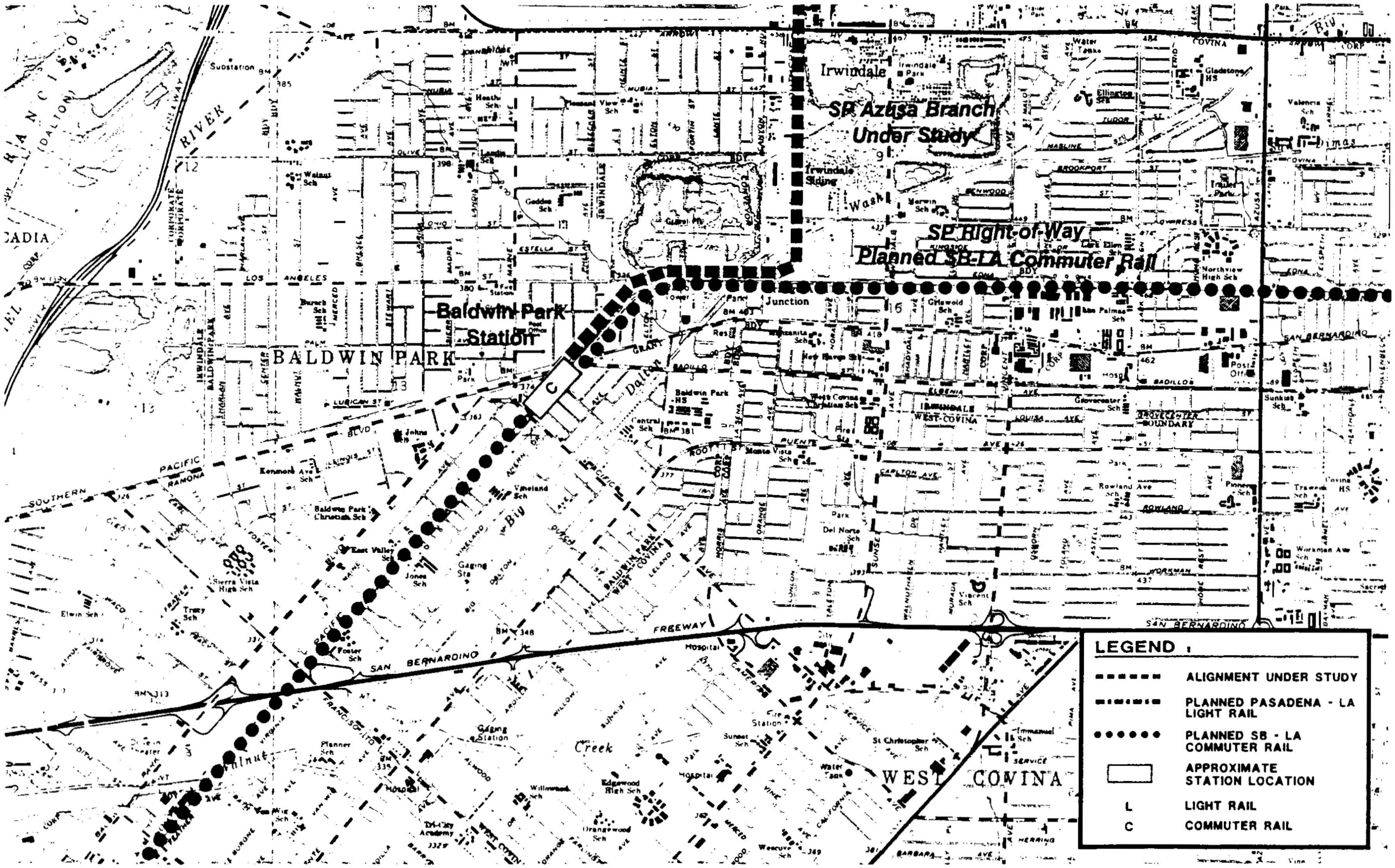
GENERAL ALIGNMENT AND STATION LOCATIONS

FIGURE 4.5



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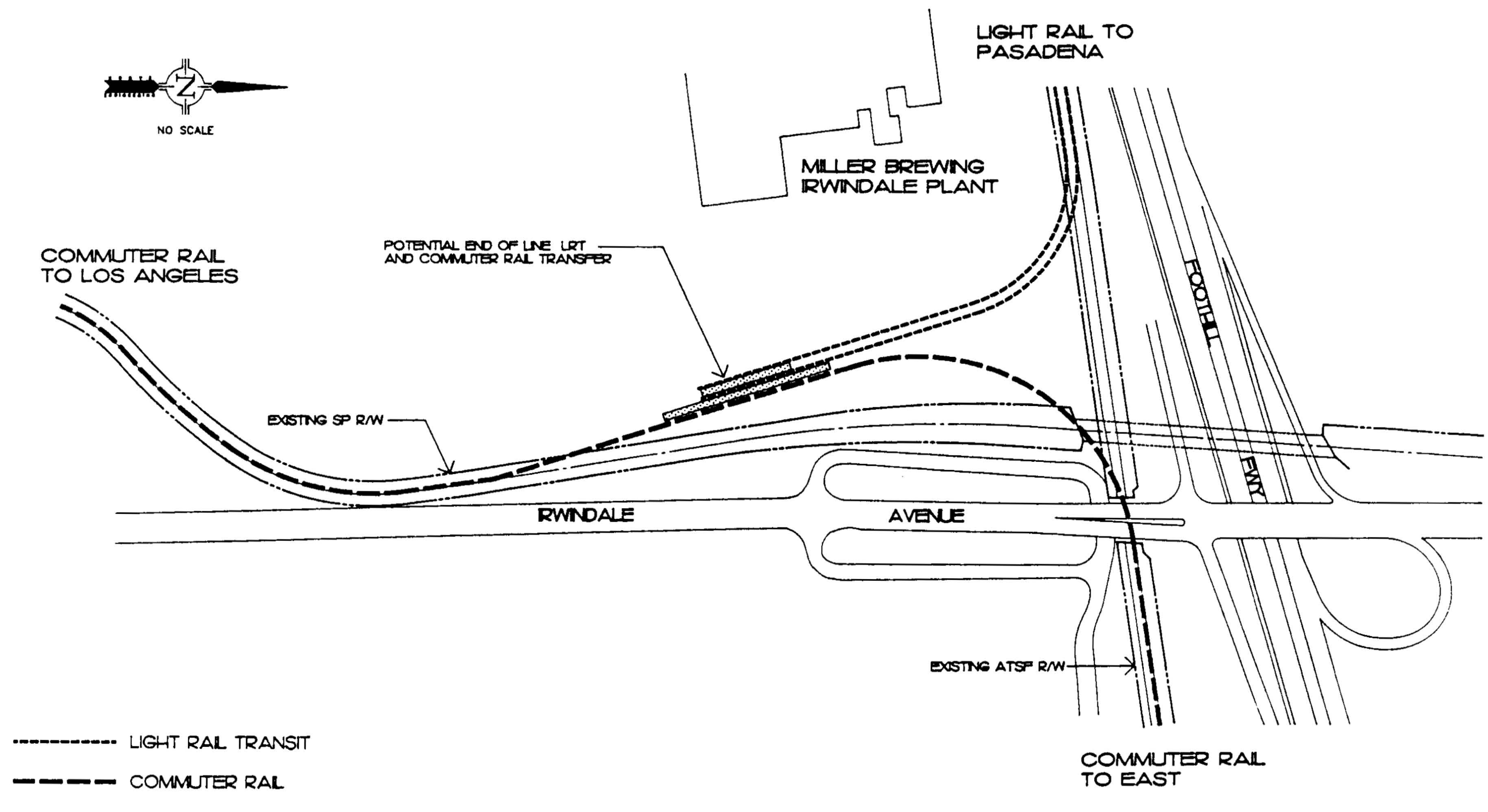
GENERAL ALIGNMENT AND STATION LOCATIONS

FIGURE 4.6



SOURCE SPTC VALUATION MAP

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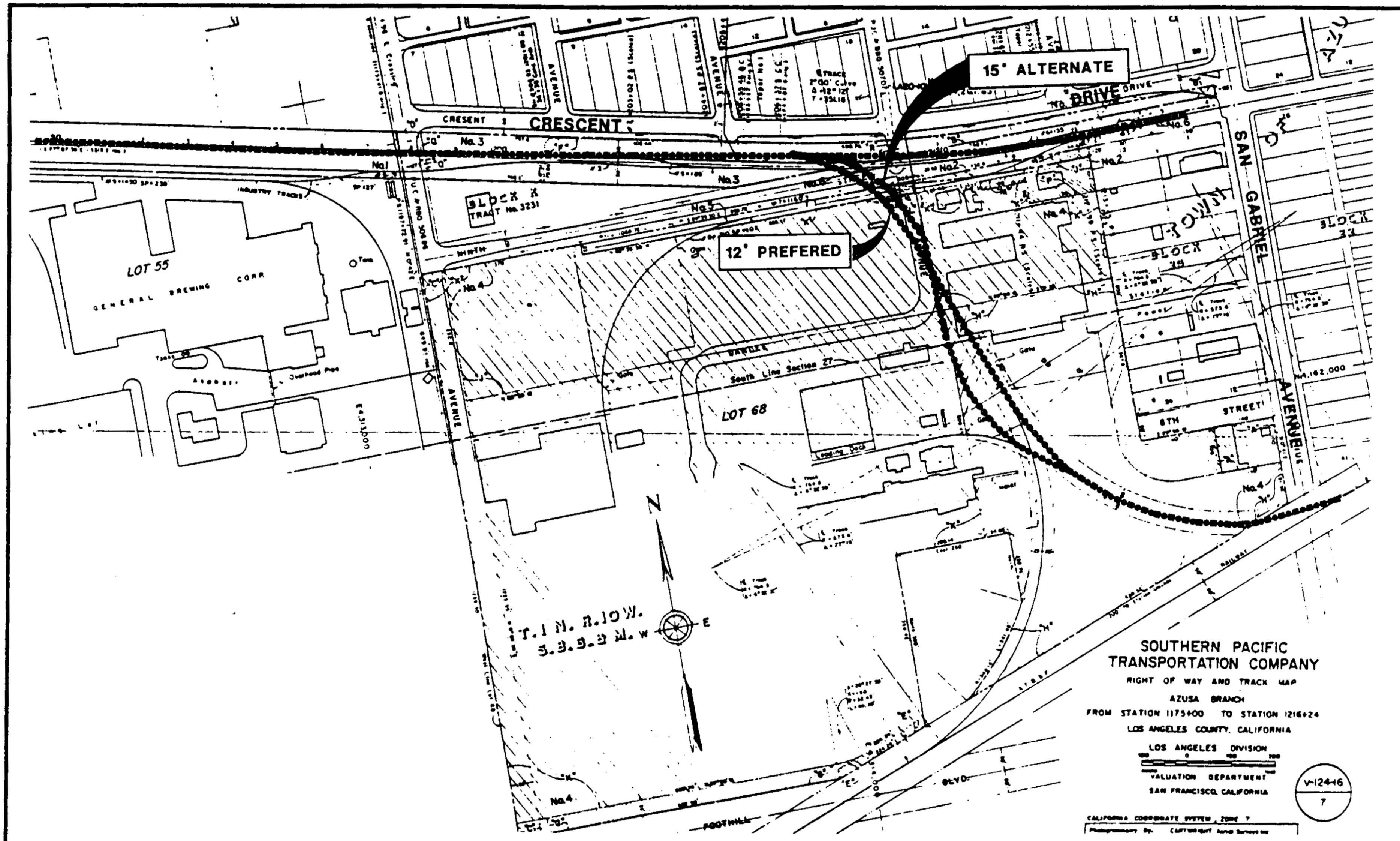
CONCEPT FOR LRT TERMINUS AND COMMUTER RAIL CONNECTION AT IRWINDALE

FIGURE 4.7



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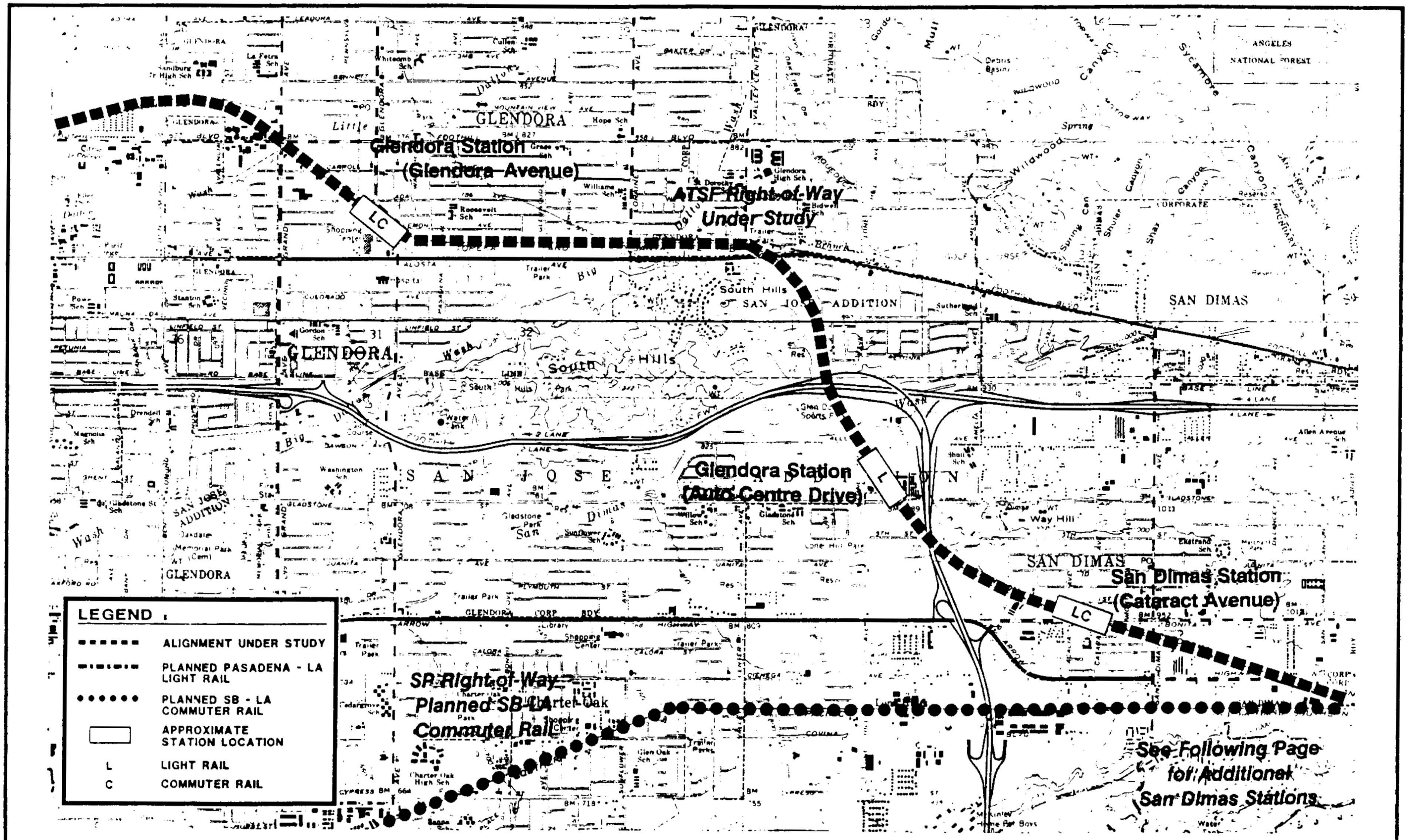
POTENTIAL SANTA FE TO SOUTHERN PACIFIC R/W CONNECTION FOR LOCAL FREIGHT IN AZUSA

FIGURE 4.8



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GENERAL ALIGNMENT AND STATION LOCATIONS

FIGURE 4.9

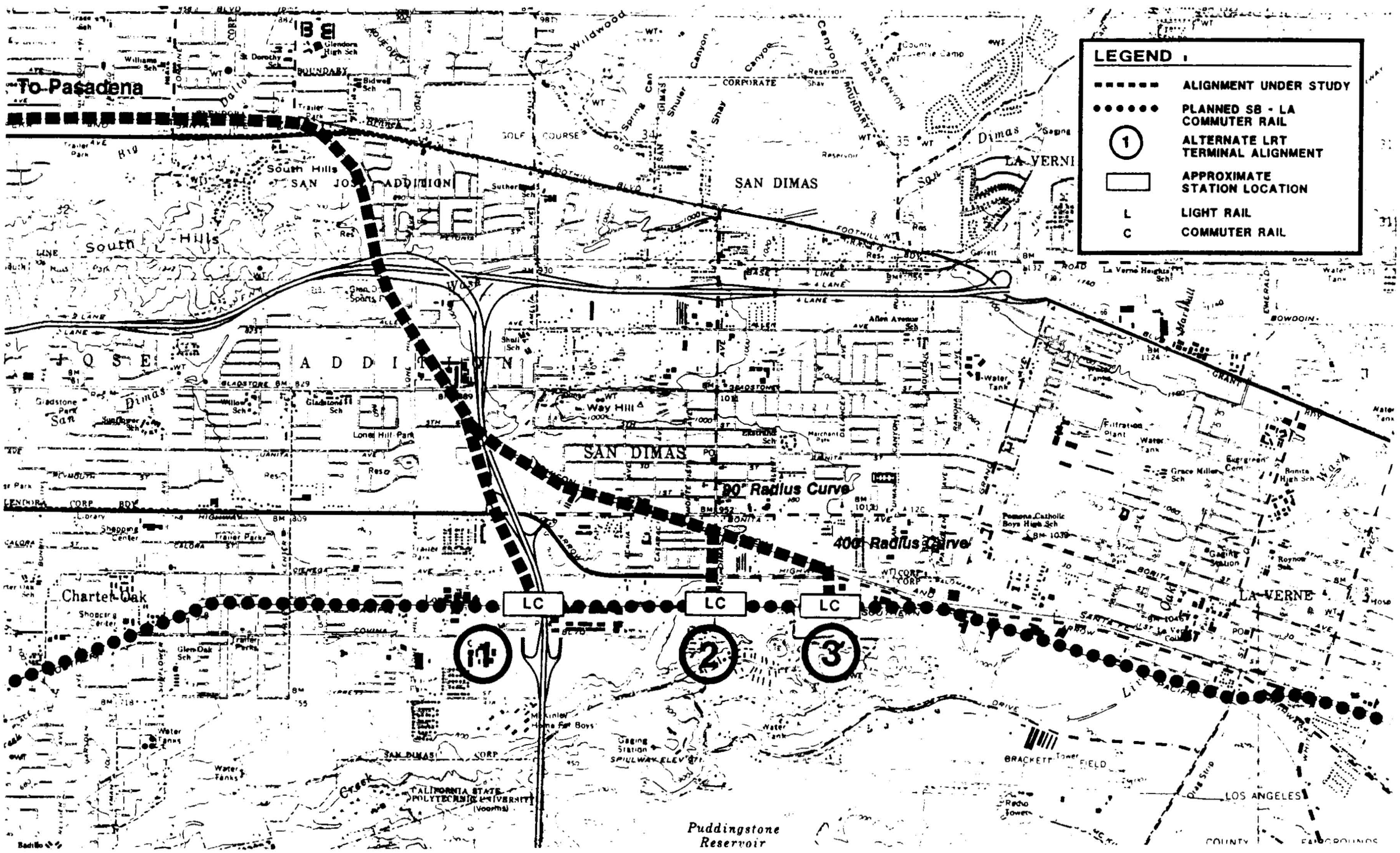

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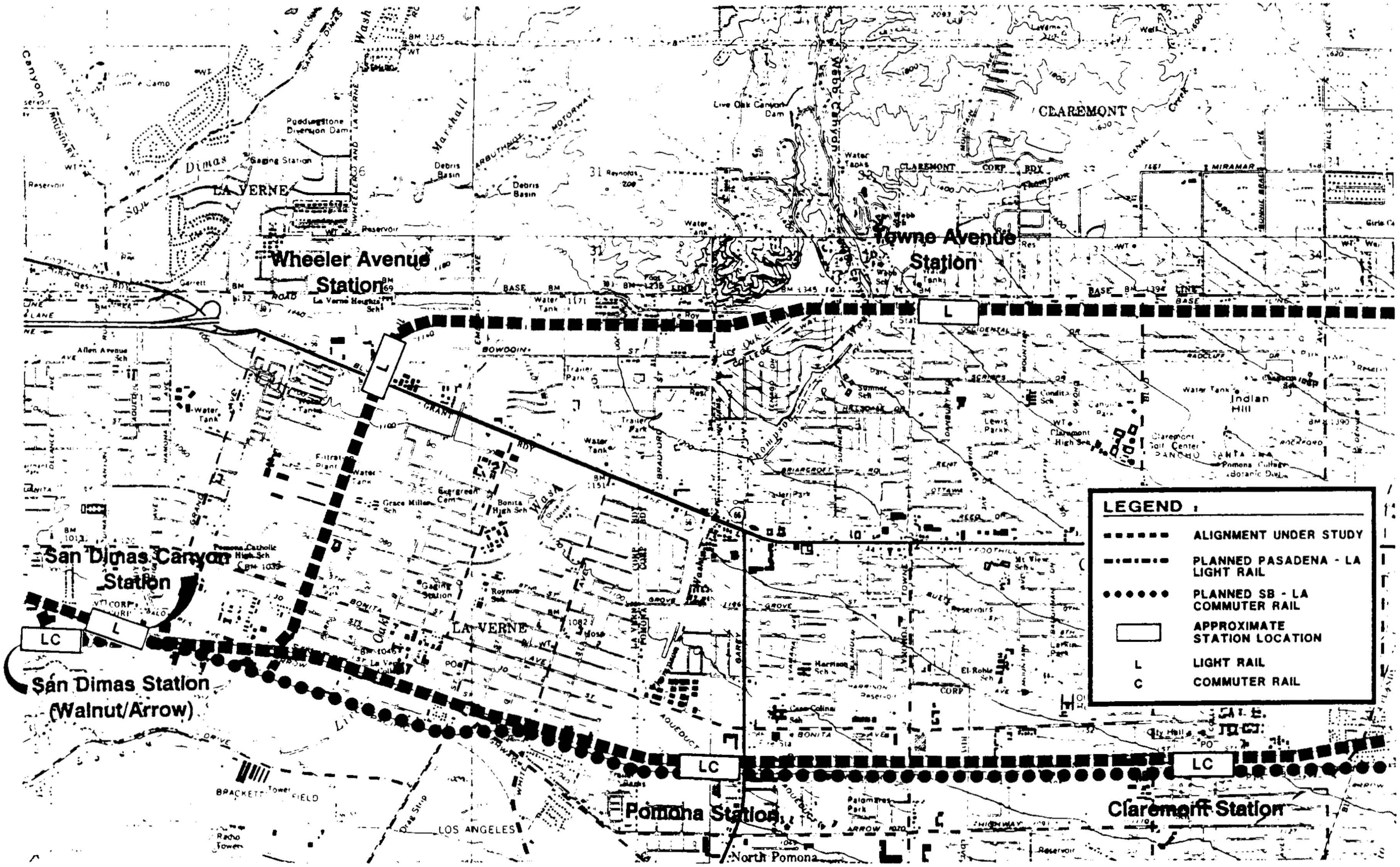
FIGURE 4.10

ALTERNATIVE LRT TERMINAL ALIGNMENTS IN SAN DIMAS



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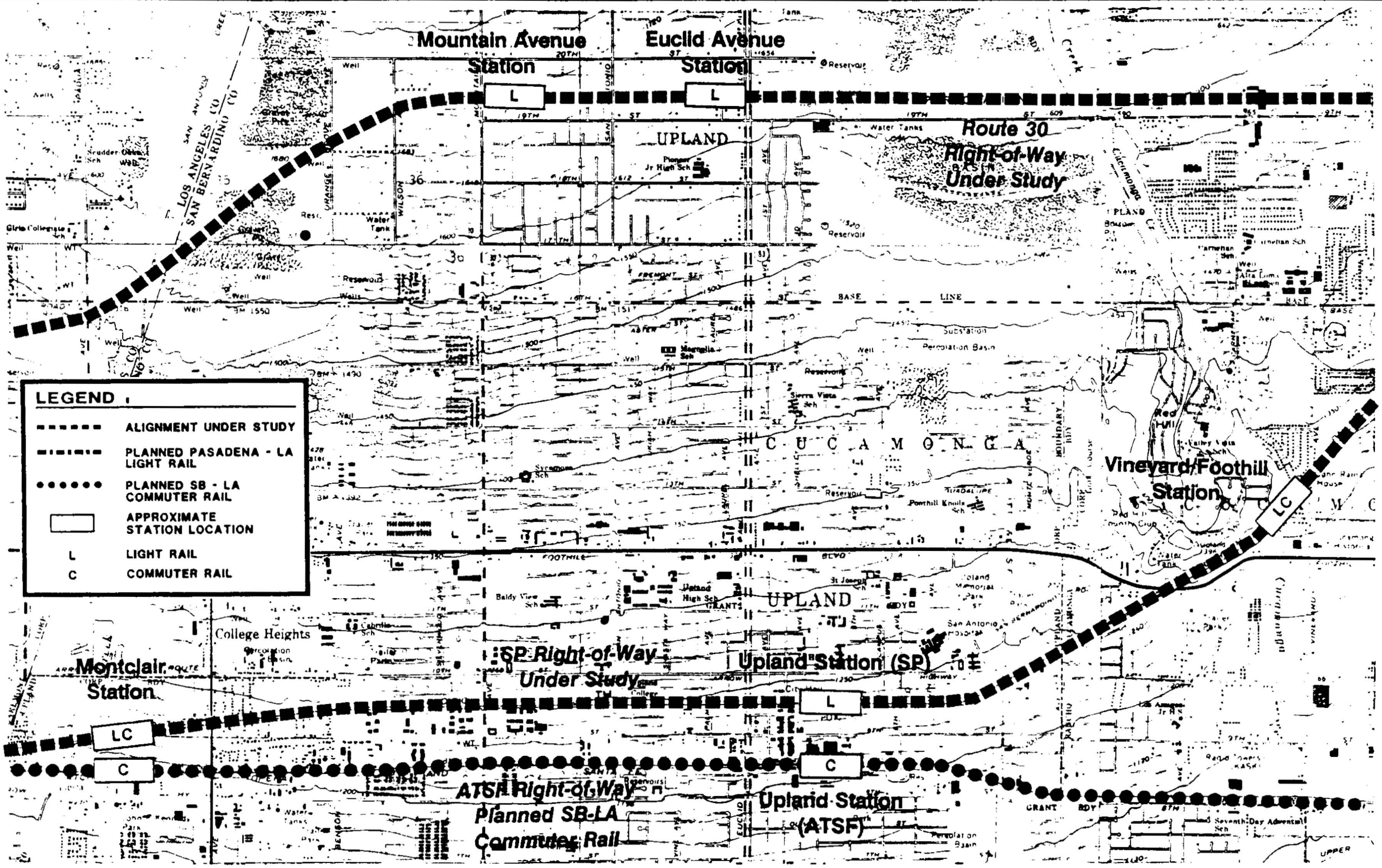
GENERAL ALIGNMENT AND STATION LOCATIONS

FIGURE 4.11



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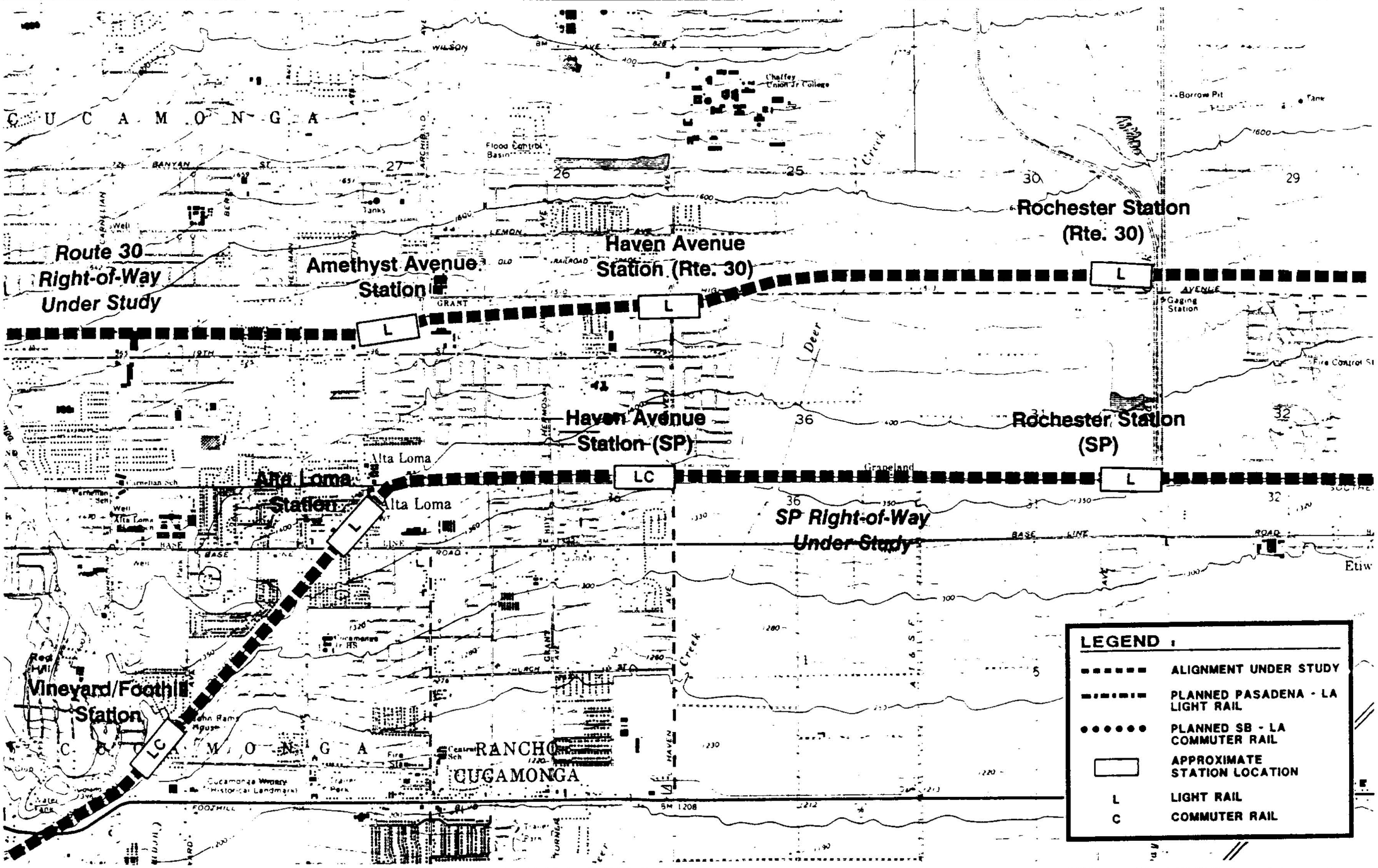
GENERAL ALIGNMENT AND STATION LOCATIONS

FIGURE 4.12



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GENERAL ALIGNMENT AND STATION LOCATIONS

FIGURE 4.13

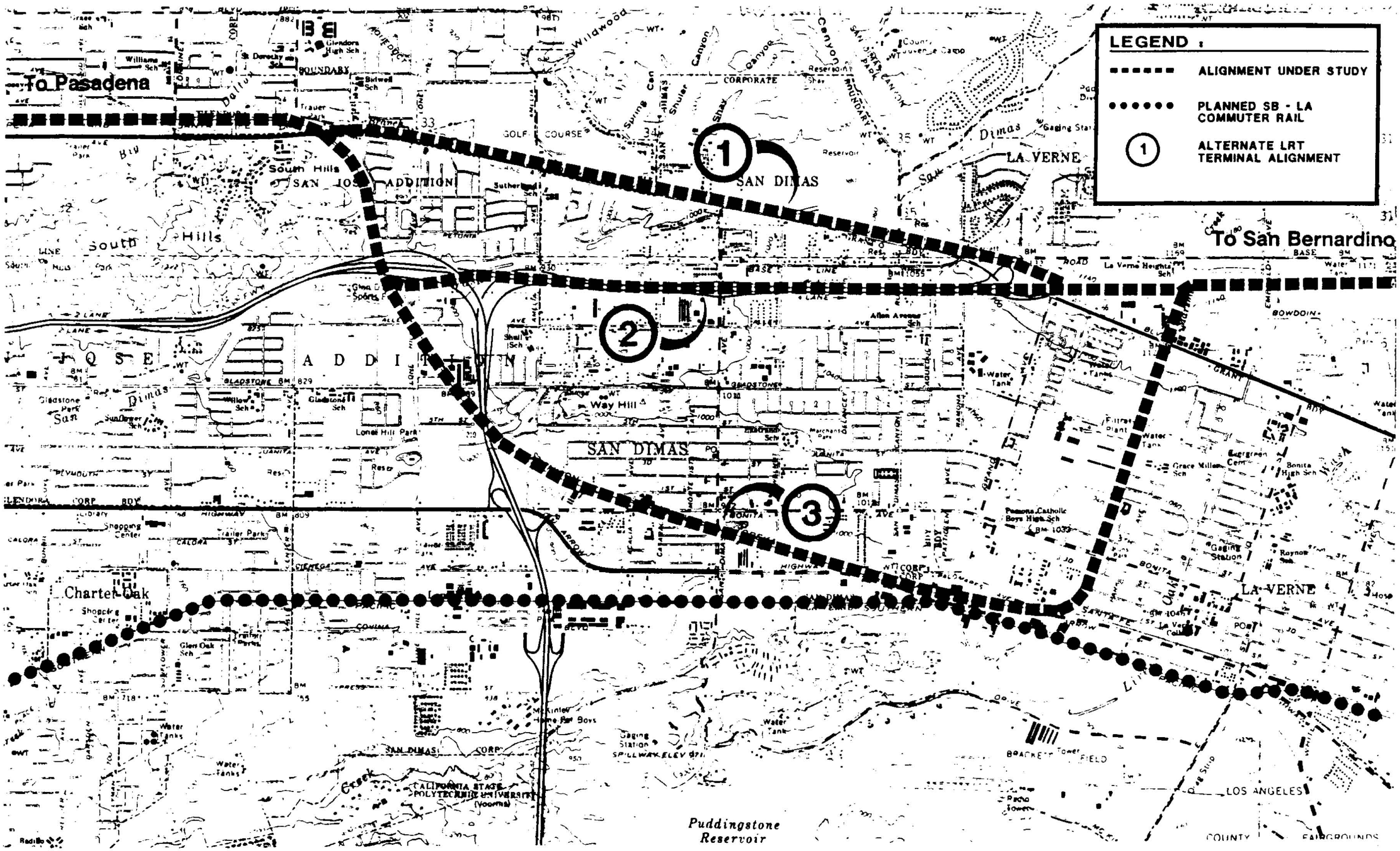

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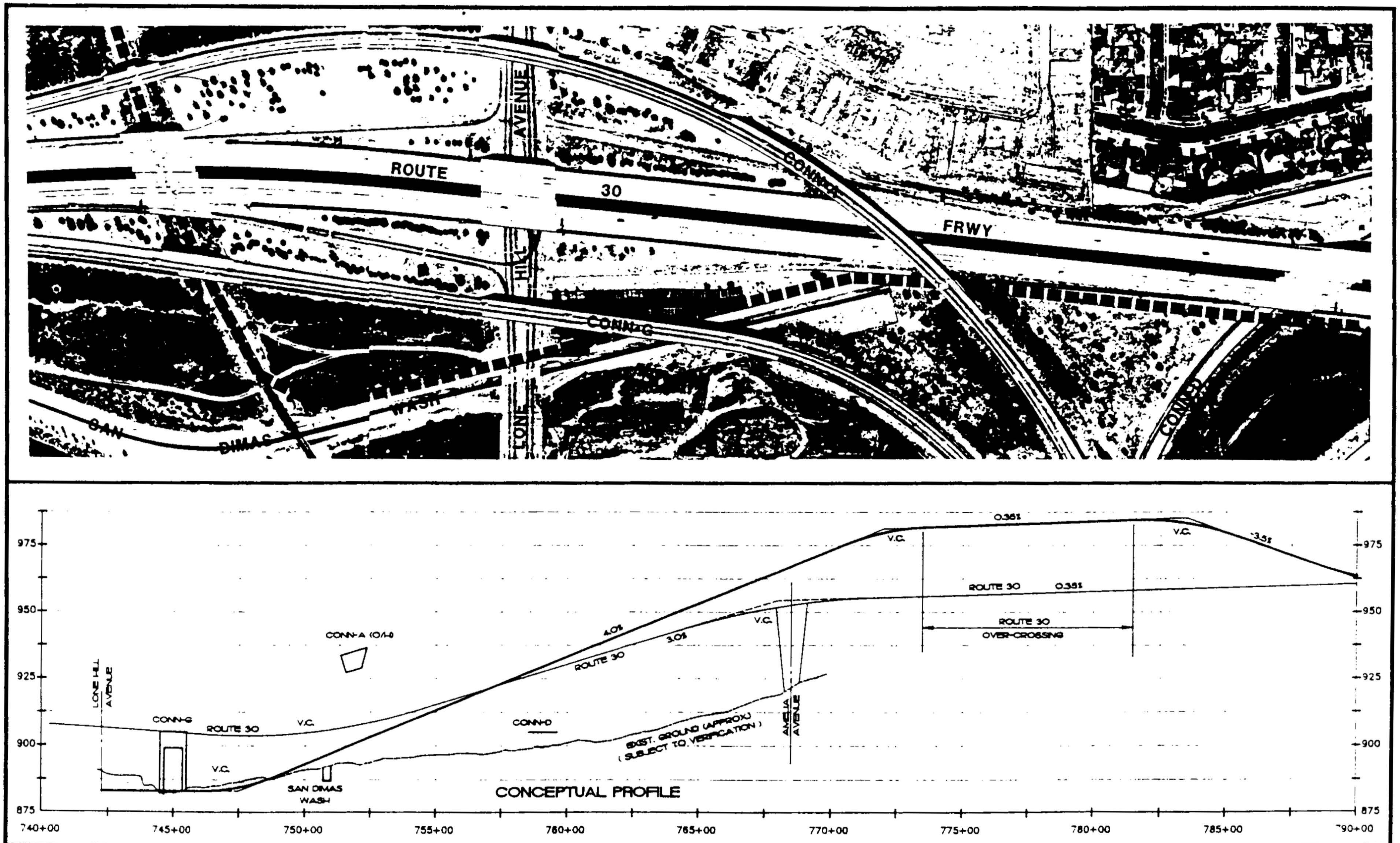
FIGURE 4.14

ALTERNATIVE LRT ALIGNMENT CONNECTIONS : SANTA FE R/W TO ROUTE 30 IN SAN DIMAS



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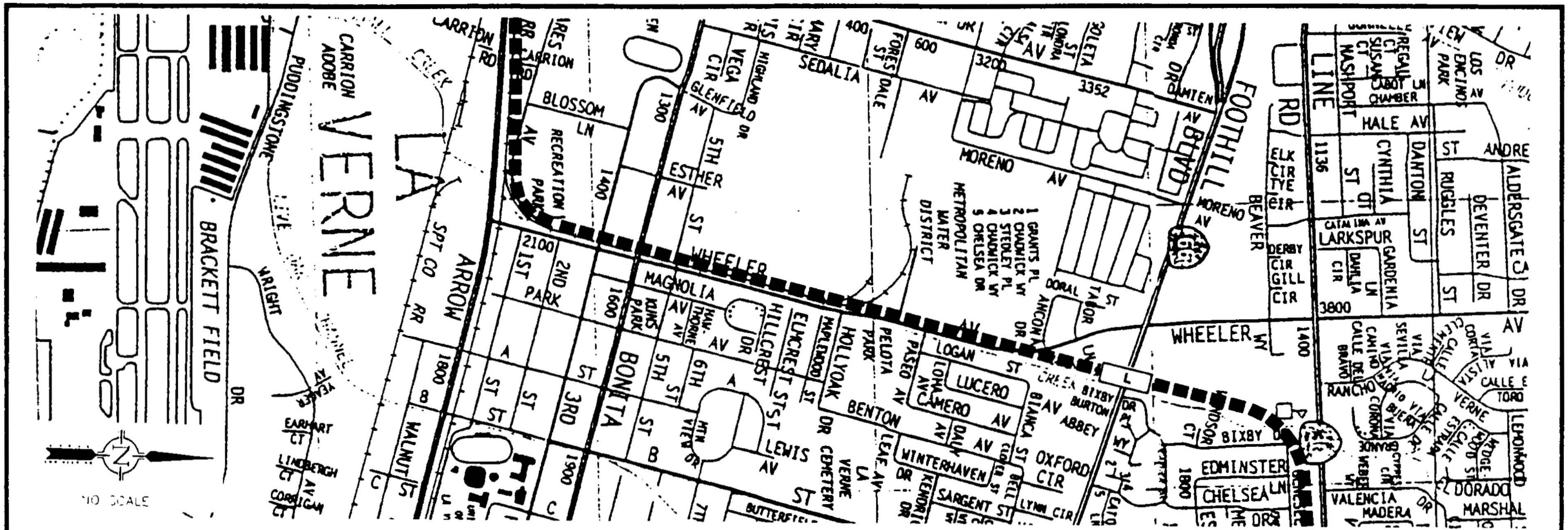
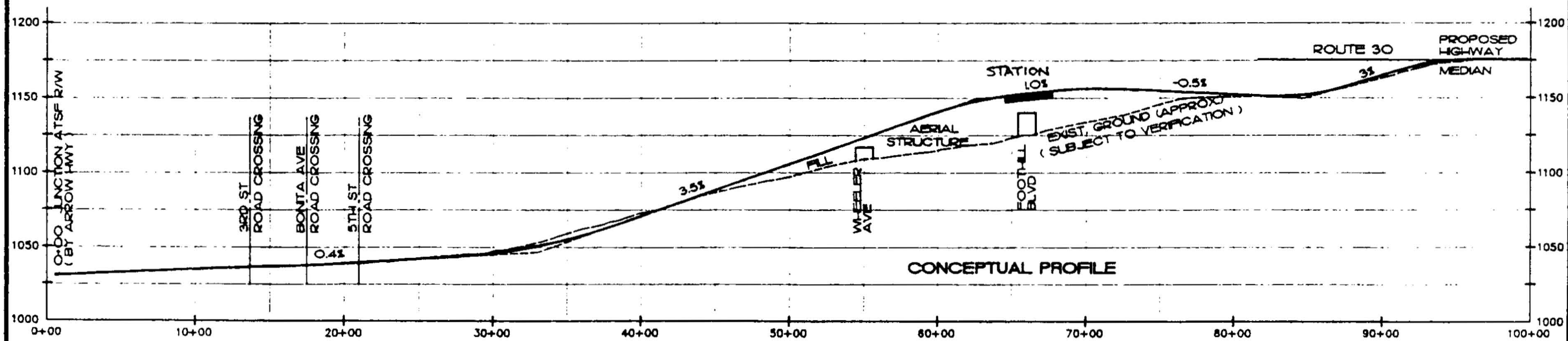
LRT ALIGNMENT : CONCEPTUAL PLAN AND PROFILE FOR TRANSITION FROM SANTA FE TO ROUTE 30 R/W AT I-210 / ROUTE 30 INTERCHANGE

FIGURE 4.15





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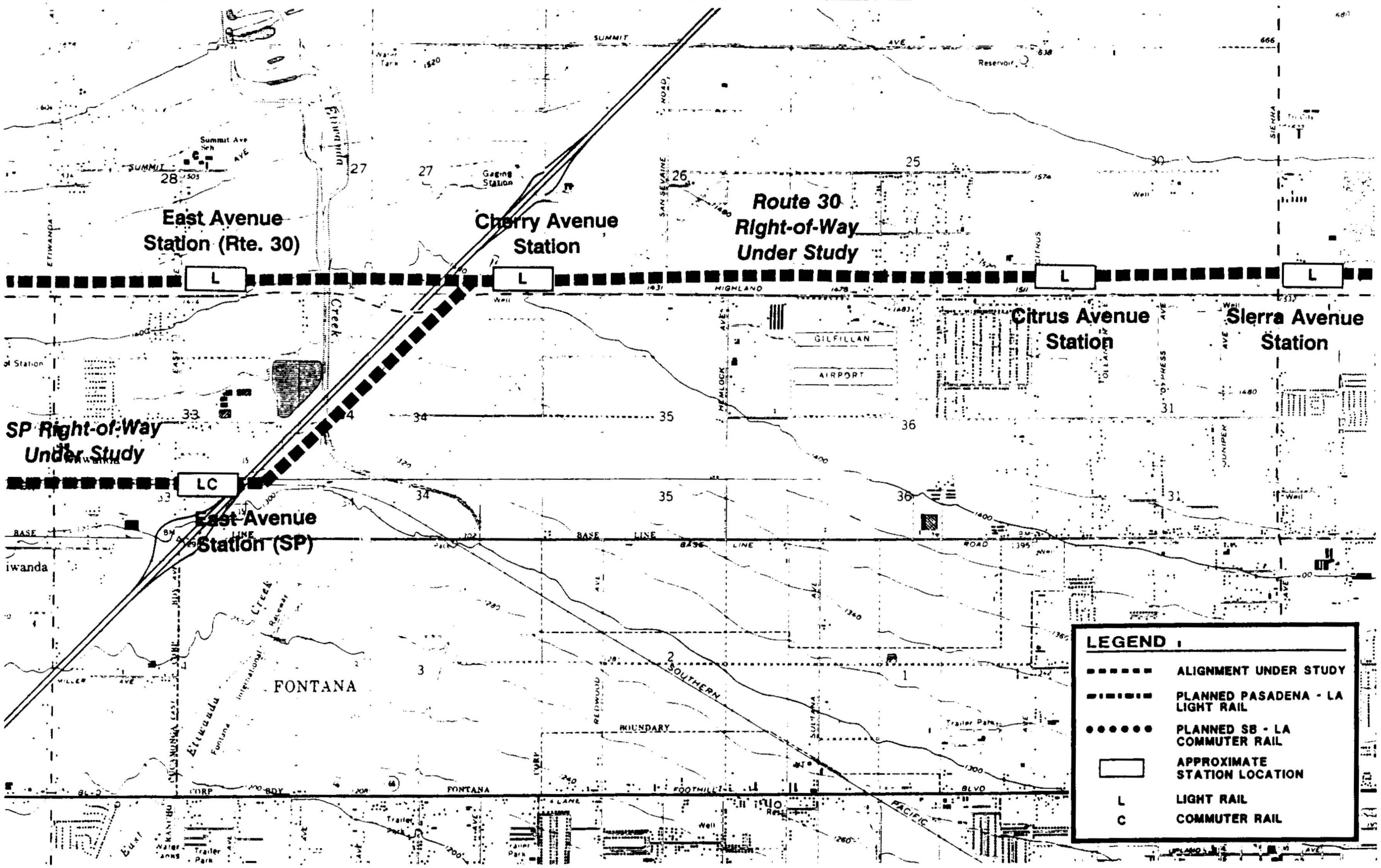
LRT ALIGNMENT : CONCEPTUAL PLAN AND PROFILE FOR TRANSITION FROM SANTA FE TO ROUTE 30 R/W VIA WHEELER AVENUE CORRIDOR

FIGURE 4.16



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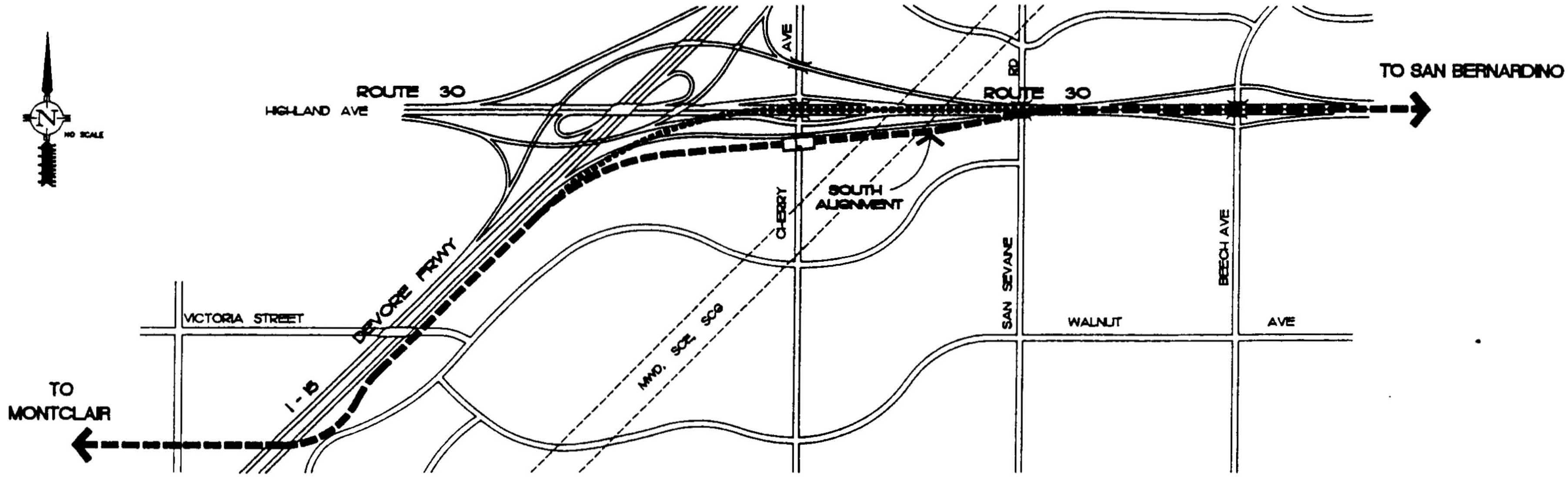
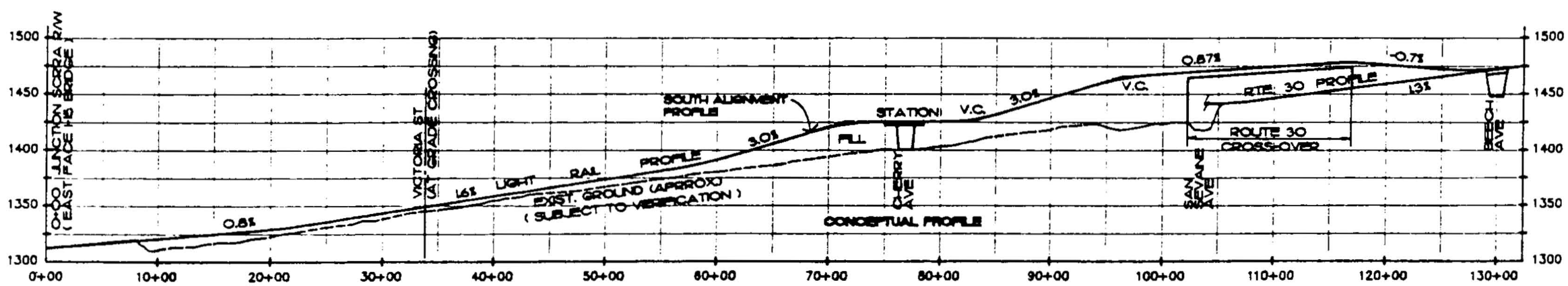
GENERAL ALIGNMENT AND STATION LOCATIONS

FIGURE 4.17





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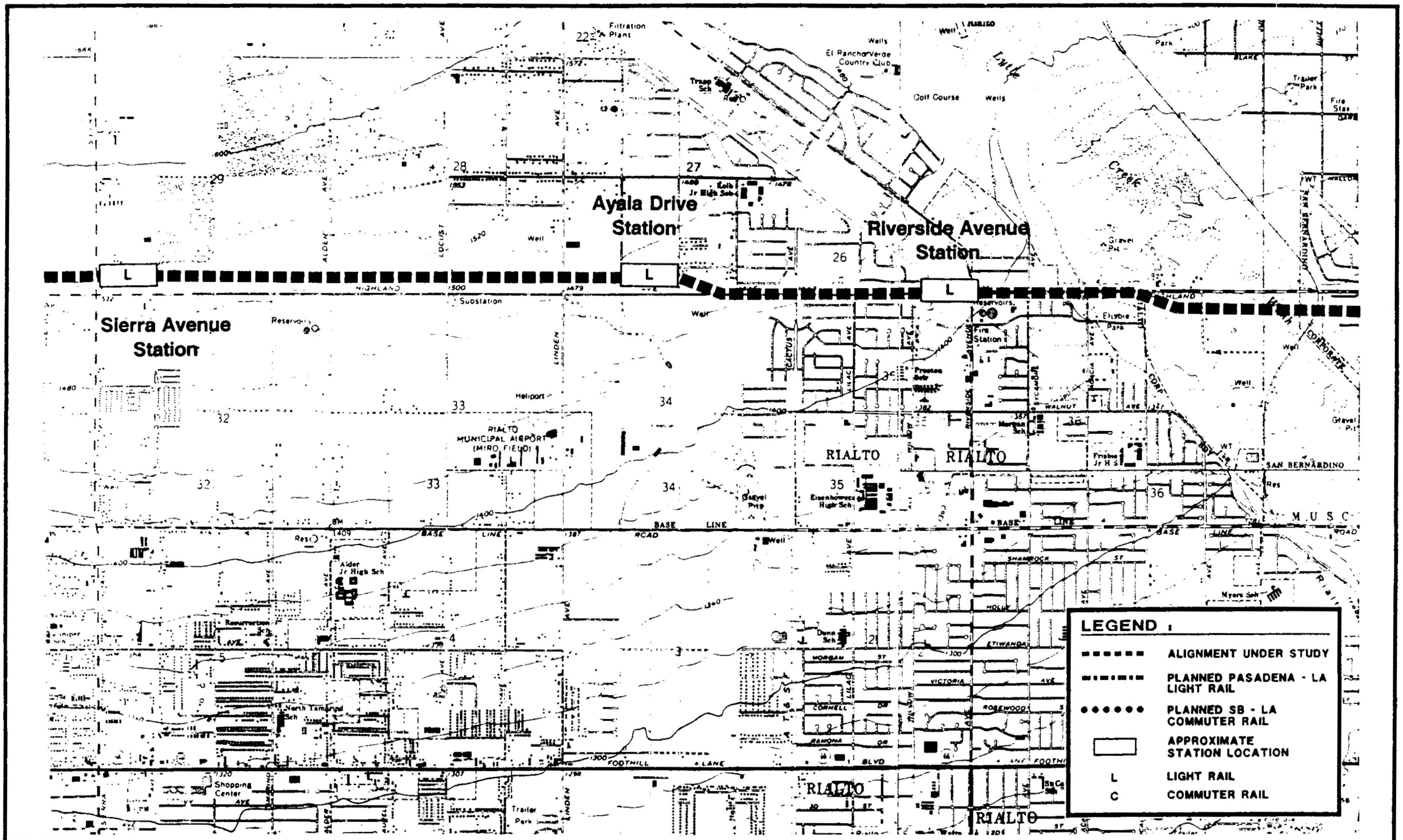
LRT ALIGNMENT : CONCEPTUAL PLAN AND PROFILE
AT I-15 / ROUTE 30 INTERCHANGE

FIGURE
4.18



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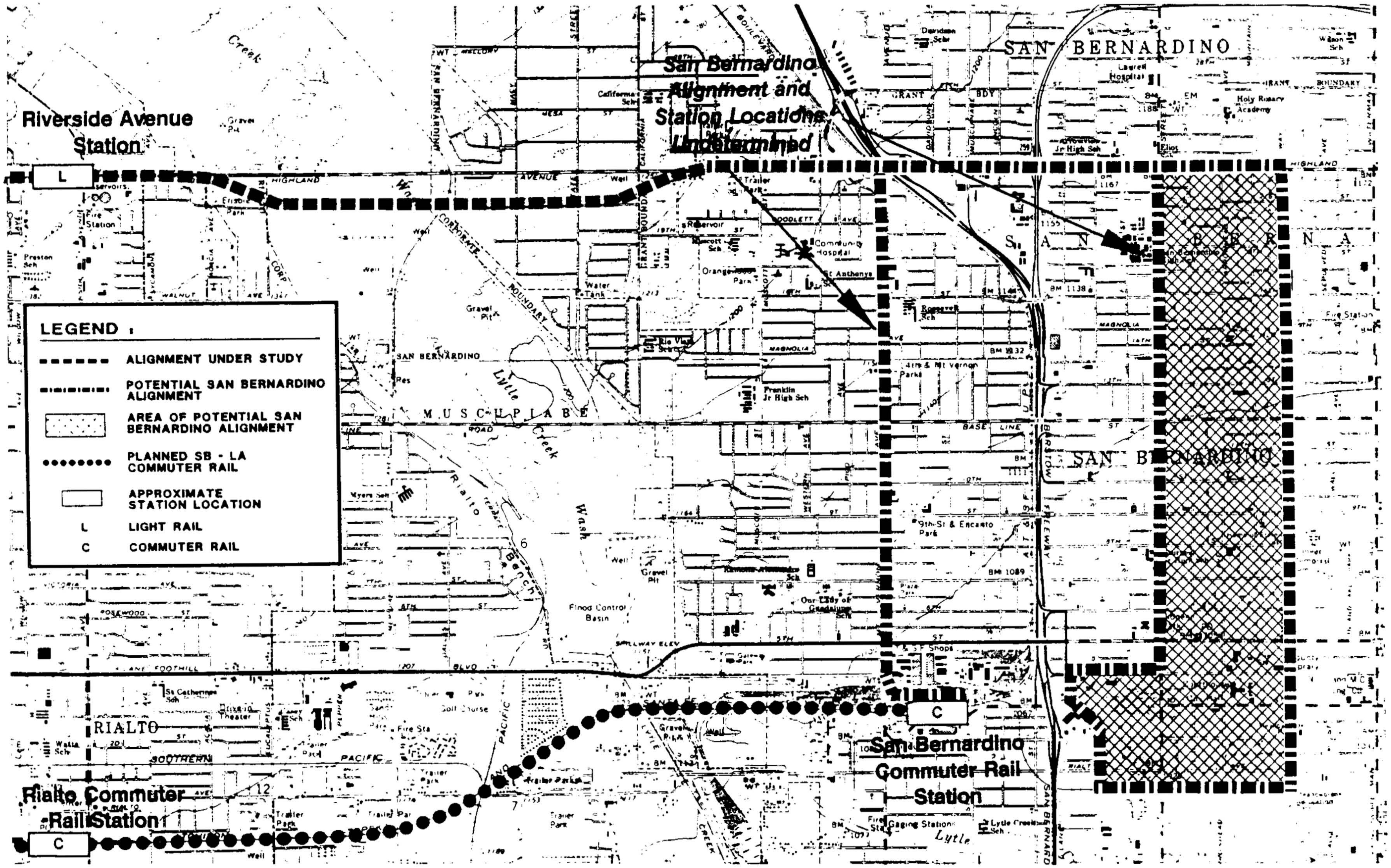
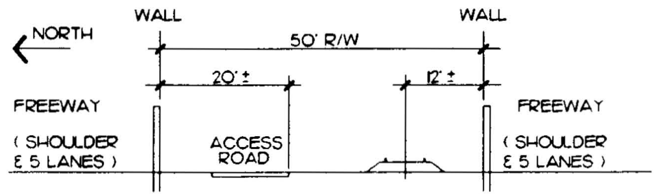
GENERAL ALIGNMENT AND STATION LOCATIONS

FIGURE 4.19

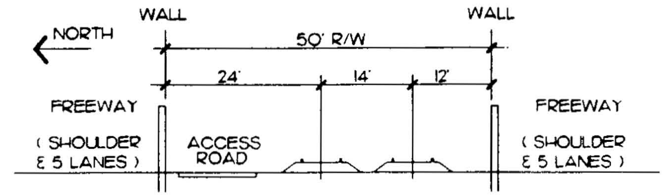


Korve Engineering R.L. Banks and Associates	N. SAN GABRIEL / SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR PRELIMINARY PLANNING STUDY GENERAL ALIGNMENT AND STATION LOCATIONS	FIGURE 4.20

ATSF RIGHT-OF-WAY IN I-210 AT BALDWIN AVENUE

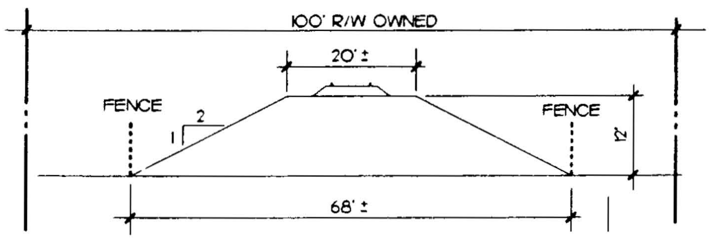


(A) COMMUTER RAIL (AS EXISTING)

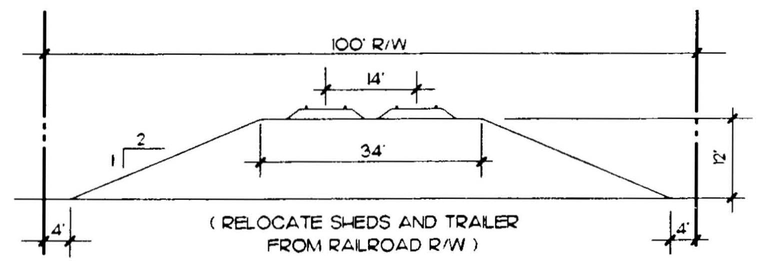


(B) LIGHT RAIL

ATSF RIGHT-OF-WAY NEAR HUNTINGTON DRIVE



(A) COMMUTER RAIL (AS EXISTING)



(B) LIGHT RAIL

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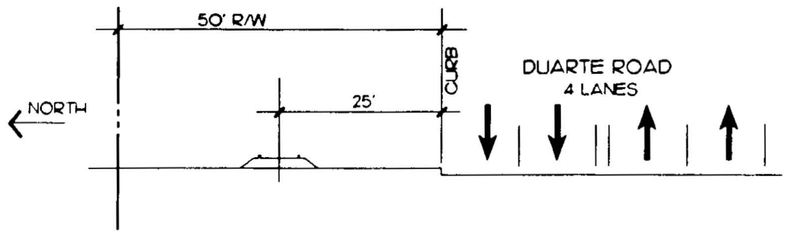
PRELIMINARY PLANNING STUDY

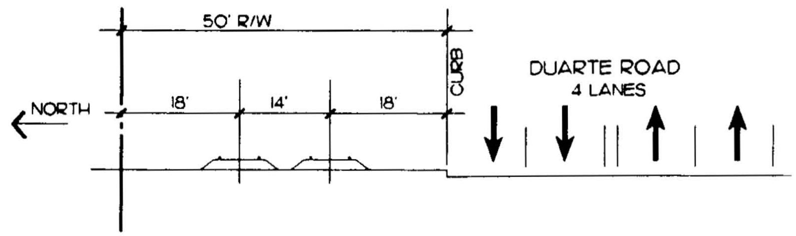
PROTOTYPICAL CROSS SECTION

FIGURE 4.21

ATSF RIGHT-OF-WAY ADJACENT TO DUARTE ROAD

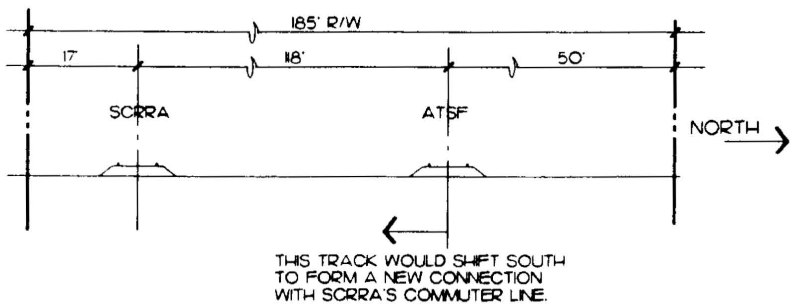


Ⓐ COMMUTER RAIL (AS EXISTING)

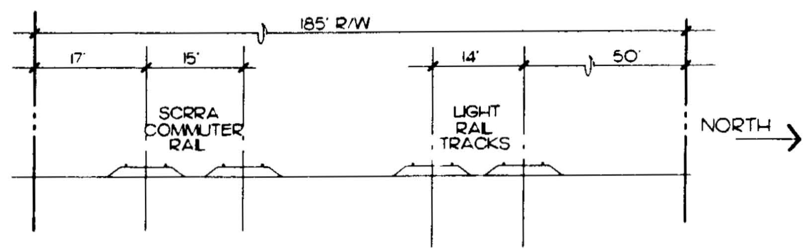


Ⓑ LIGHT RAIL

ATSF RIGHT-OF-WAY IN LA VERNE, EAST OF WHITE AVENUE



Ⓐ COMMUTER RAIL (AS EXISTING)



Ⓑ LIGHT RAIL

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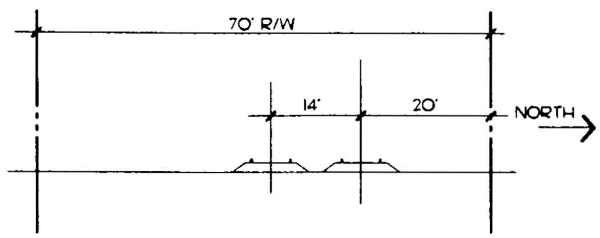
PRELIMINARY PLANNING STUDY

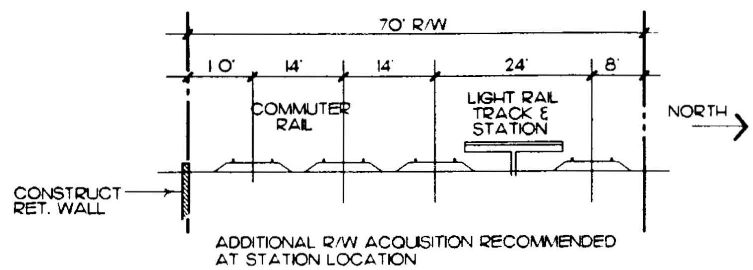
PROTOTYPICAL CROSS SECTION

FIGURE 4.22

ATSF RIGHT-OF-WAY AT CLAREMONT STATION

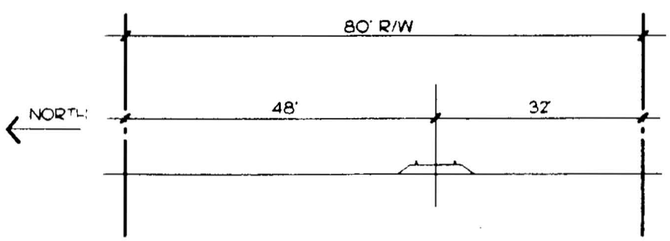


Ⓐ COMMUTER RAIL (AS EXISTING)

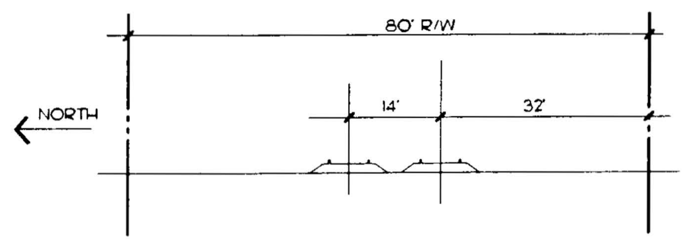


Ⓑ LIGHT RAIL

ATSF RIGHT-OF-WAY IN RANCHO CUCAMONGA AT HAVEN AVENUE



Ⓐ COMMUTER RAIL (AS EXISTING)



Ⓑ LIGHT RAIL

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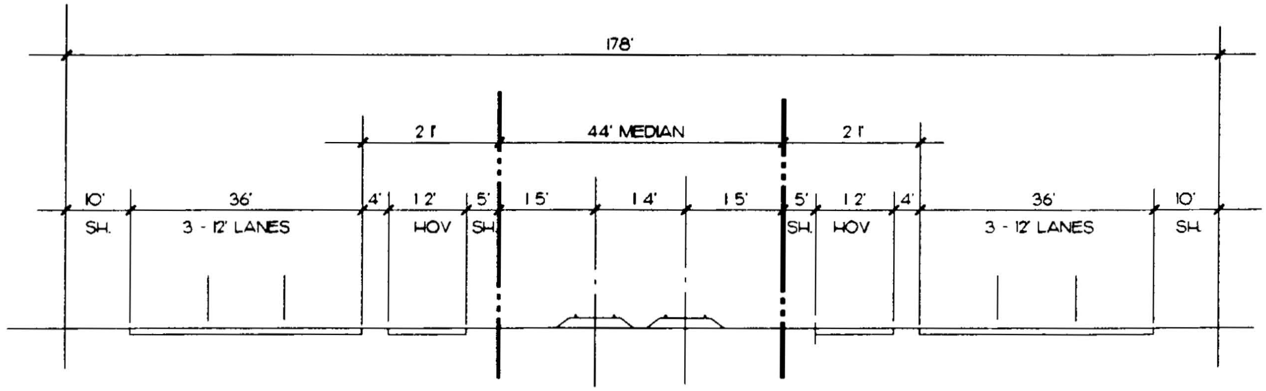
PRELIMINARY PLANNING STUDY

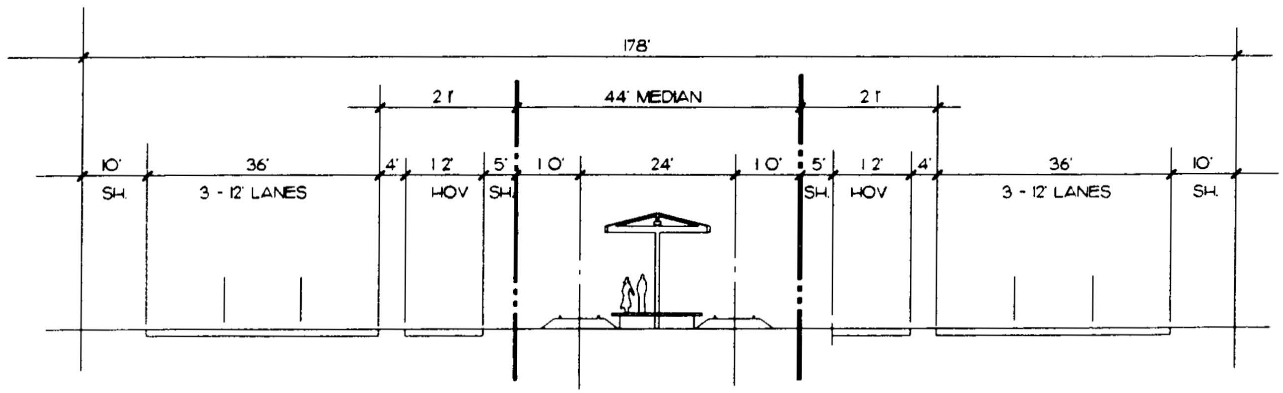
PROTOTYPICAL CROSS SECTION

FIGURE 4.23

ROUTE 30 FREEWAY WITH LRT IN MEDIAN



(A) BETWEEN STATIONS



(B) AT STATION

(SOURCE FOR ROUTE 30 FREEWAY SECTIONS : SANBAG)

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PRELIMINARY PLANNING STUDY

PROTOTYPICAL CROSS SECTION

FIGURE 4.24

5. STATION SITE PLANNING

5.0 Station Site Planning

5.1 Overview of Station Analysis

The station site planning effort began with an analysis to identify and evaluate potential station locations in the study corridor. Potential station locations in each segment were identified from a number of sources. Several public agencies, including LACTC, SANBAG and SCAG have evaluated station locations along each alignment, and all of these sites were included in the preliminary segment analysis. Many of the cities throughout the corridor had identified additional potential sites; these were also included. Finally, the consultant team's observations in the field were used to develop additional potential sites, especially along the SP ROW and Route 30 alignment in San Bernardino County.

After the six alternatives were developed, these potential station sites were narrowed down through discussions with cities along the corridor and through further field analysis. A final set of station sites was selected to be included in the evaluation of alternatives. A total of 34 station sites were identified: twelve on the ATSF ROW between Pasadena and Claremont, seven on the SP ROW between Claremont and Fontana, and fifteen in the Route 30 corridor. Specific station sites were not identified between the Route 30 corridor and downtown San Bernardino.

Some of the locations would be light rail stations only, some would be commuter rail only, and others would be potential transfer stations between modes. Station locations are listed in Table 5.1, indicating what type of service would be provided under each of the six system alternatives. Station locations are also shown in Figures 4.3 through 4.20.

The station site planning effort produced a concept site plan for each station, which included parking space potential, bus access, and relation to adjacent land uses. Characteristics of light rail stations included high station platforms between two tracks, with platform lengths of 200 feet, expandable to 300 feet for 3-car trains. Characteristics of commuter rail stations included low platforms to one side of the tracks, with 425 foot platforms expandable to 850 feet for 8-car trains. Parking at stations ranged from 250 to 1,750 spaces, averaging about 500-700 spaces. The greatest need for parking was at the potential end-of-line stations. A number of stations were identified as potential end-of-line stations--Arcadia, Irwindale, San Dimas, Montclair, and Rancho Cucamonga/Fontana. These end-of-line stations were included in the evaluation, although other potential end-of-line stations could also include Duarte, Azusa, and Pomona.

5.2 Station Locations

Station locations are listed in Table 5.1 and were previously illustrated in Figures 4.3 through 4.20. These locations have been discussed with local jurisdictions and appear

Table 5.1
Station Locations by Alternatives

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Station Locations		System Alternatives					
City	Cross Street	1	2	3	4	5	6
ATSF ROW							
Pasadena	Sierra Madre Villa	L/C	L	L	L	L	L
Arcadia	1st Avenue	L/C	L	L	L	L	L
Monrovia	Myrtle Avenue	X	L	L	L	L	L
Duarte/Monrovia	Mountain Avenue	C	L	L	L	L	L
Irwindale	Irwindale Avenue	C	L/C	L	L	L	L
Azusa	Azusa Avenue	X	X	L	L	L	L
Glendora	Glendora Avenue	C	C	L	L	L	L
Glendora/San Dimas	Auto Center Drive	C	C	L	L	L	L
San Dimas	Cataract Avenue	C	C	L	L	L	L
San Dimas	Walnut/Arrow	X	X	L/C	X	X	X
La Verne/San Dimas	San Dimas Canyon	X	X	X	L/C	X	X
Pomona	Fulton-Garey	C-C	C-C	C	C	L/C	L/C
Claremont	College Avenue	C	C	C	C	L	L
SP ROW							
Montclair	Monte Vista		C-C	C-C		L/C	L/C
Upland	3rd-6th Avenue		X	X		L	L
Rancho Cucamonga	Vineyard/Foothill		C	C		L	L
Rancho Cucamonga	Baseline/Amethyst		X	X		L	L
Rancho Cucamonga	Haven Avenue		C	C		L	L
Rancho Cucamonga	Rochester		X	X		L	L
Rancho Cucamonga	East Avenue/I-15		C	C		L	L

<u>Legend</u>:

C = commuter rail station
L = light rail station
L/C = transfer station
X = no stop on this line
C-C = dual commuter rail (SP & SF)

Table 5.1
Station Locations by Alternatives

Station Locations		System Alternatives					
City	Cross Street	1	2	3	4	5	6
Route 30 ROW							
La Verne	Wheeler/Foothill				L		
Claremont	Towne Avenue				L		
Upland	Mountain Avenue				L		
Upland	Euclid Avenue				L		
Rancho Cucamonga	Amethyst Avenue				L		
Rancho Cucamonga	Haven Avenue				L		
Rancho Cucamonga	Rochester Avenue				L		
Rancho Cucamonga	East Avenue				L		
Fontana	Cherry Avenue				L		L
Fontana	Citrus Avenue				L		L
Fontana	Sierra Avenue				L		L
Rialto	Ayala Drive				L		L
Rialto	Riverside Avenue				L		L
San Bernardino	Medical Center Drive				L		L
San Bernardino	Highland				L		L
San Bernardino	@ Baseline				L		L
San Bernardino	@ 4th				L		L
San Bernardino	Downtown				L		L

Legend:

C = commuter rail station
L = light rail station
L/C = transfer station
X = no stop on this line
C-C = dual commuter rail (SP & SF)

feasible, with local support for most locations, particularly in Los Angeles County. The concept site plans prepared for each location were generally based on a minimum configuration, although options regarding additional land for parking, joint development, and improved access were noted where appropriate. A full technical report on the station analysis, including individual site plans was prepared in Technical Memorandum #2. Station characteristics are summarized, by location, in Table 5.2. Each of the station locations is discussed briefly below.

5.2.1 ATSF ROW

Arcadia - First Avenue

This site is located just north of Santa Clara Street and just west of First Avenue. It is in the commercial center of Arcadia and was once used as a railroad station. The City owns land north of the tracks and west of First Street which could be used for parking. Street access is good, and Santa Anita Avenue on the west side provides access via an interchange with I-210. Four existing bus routes pass by or terminate near this site. The Arcadia station would be either a commuter rail/light rail transfer station (Alternative 1), or a light rail station (Alternatives 2-6). Shuttle service could be provided to Santa Anita Racetrack and Fashion Park.

Monrovia - Myrtle Avenue

This site is located just north of Duarte Road and west of Myrtle Avenue. The historic Monrovia depot stands on the site. Monrovia owns several parcels on the west side of Myrtle that are currently used as an unimproved park-and-ride lot. Access to the site would be provided from Myrtle and Primrose Avenue (on the west end of the site). If the property south of the site were acquired, additional parking could be provided with access to/from Duarte Road. In Alternative 1 (Commuter Rail), this station site would not be utilized, but it would be a light rail station in Alternatives 2 through 6.

Duarte - Mountain Avenue

This site is a three-acre City-owned parcel in the northeast quadrant of the Duarte Road/Mountain Avenue intersection. The site is currently occupied by a light industrial building which would be vacated and demolished for station construction. Access would be from Hamilton Road only, one block north of Duarte. This site would host a commuter rail station in Alternative 1 and a light rail station in Alternatives 2 through 6. Shuttle service could be provided to City of Hope Medical Center.

Irwindale - Irwindale Avenue

This site is southwest of the I-210/Irwindale Avenue interchange, on land currently owned by Miller Brewing. Access would be from Irwindale Avenue. This site would host a commuter rail station in Alternative 1, a commuter rail/light rail station in Alternative 2, and a light rail station in Alternatives 3 through 6. Miller Brewery has indicated a willingness to consider a station in this location, partly on its property. An alternate location would be east of Irwindale Avenue and north of the ATSF tracks, in Caltrans' right-of-way.

<u>Azusa - Azusa Avenue</u>

The station would be located just east of the San Gabriel/Azusa Avenue one-way pair. The former railroad depot is just east of Azusa Avenue, between the railroad and Santa Fe Avenue. Parking would be located in the wide railroad right-of-way. Access could potentially be from four streets: San Gabriel Avenue, Azusa Avenue, Alameda Avenue and Dalton Avenue. A light rail station would be included here in Alternatives 3 through 6; the site would not be utilized in Alternatives 1 and 2 (commuter rail). The City is also interested in an alternate station site about four blocks to the east, east of Pasadena Avenue.

<u>Glendora - Glendora Avenue</u>

This site is located between Glendora and Vermont Avenues, just south of Ada Avenue. It is north of the Glendora Shopping Center and borders a redevelopment area. This is a former railroad depot site, and railroad property is available for bus access and parking. The main access would be from the northeast side of the tracks, with bus loading, kiss-and-ride and parking. Mid-block access points would be provided on Ada and Glendora. This site would be used as a commuter rail station in Alternatives 1 and 2 and a light rail station in Alternatives 3 through 6.

<u>Glendora - Auto Centre Drive</u>

This site is located south of Auto Centre Drive and east of Lone Hill Avenue. The site would have excellent access from both I-210 and Route 30. The existing Lone Hill park-and-ride lot is just to the north. The proposed site involves acquisition of about five acres on the southeast corner of Lone Hill and Auto Centre Drive for station parking. This site would be used for light rail in Alternatives 3 through 6, but would not be utilized in Alternatives 1 and 2. Depending on the configuration, a station could probably be implemented with minimal land takes from the future Auto Center site. However, the city has expressed reservations about using this site for a transit station, preferring to see it used for Auto Centre expansion as planned, and does not believe the site to be a feasible station location. The only viable alternative near this location is on the west side of Lone Hill Avenue, south of the tracks, and in the northeast corner of a large undeveloped parcel. This would require coordination and possible joint development with the landowner.

<u>San Dimas - Cataract Avenue</u>

This site is located in the northwest quadrant of the Cataract/Bonita intersection and is also the site of a proposed train museum. Parking would be provided in a City-owned parcel south of Bonita, and possibly in a current industrial parcel in the block to the west. An area for kiss-and-ride and bus loading would be provided between Bonita and the tracks on a site currently occupied by a small restaurant and shop. A commuter rail station would be established here in Alternatives 1 and 2, with a light rail station being proposed in Alternatives 3 through 6.

San Dimas - Walnut/Arrow

This site, located along Arrow Highway just east of Walnut Avenue, would be the terminus point for the Blue Line LRT in Alternative 3. It would not be a station location in other alternatives. The light rail line would cross Arrow Highway at-grade and continue south to a station platform just north of the Metrolink Line. A new station would be built for Metrolink. The site, which is currently vacant, could provide parking for about 1,000 cars as well as bus loading and kiss-and-ride facilities. To facilitate access to the parking lot, an entrance roadway could be built along the north side of the former Southern Pacific ROW to Walnut Avenue. This station site is privately owned and currently vacant so land purchase or joint development would be necessary at this location.

La Verne/San Dimas - San Dimas Canyon

Similar to the Walnut/Arrow station, this station would only be used (in Alternative 4) as the terminus of the Blue Line LRT. In this case, however, the line would connect not only to the Metrolink commuter rail service but also to a light rail service on Route 30 in San Bernardino County. The proposed station site is where the SP and ATSF rail corridors nearly converge, north of Arrow Highway and east of San Dimas Canyon Road, on the boundary between San Dimas and La Verne. A large vacant site between the ATSF ROW and Palomares Avenue, just east of San Dimas Canyon Road, could be used for parking and other access functions. A pedestrian overcrossing of Arrow Highway would be necessary to connect the light rail and commuter platform. This site would require a new Metrolink station.

Pomona - Fulton/Garey

This is a large site consisting of both the ATSF and SP rights-of-way between the two streets. The existing AMTRAK station is at the east end and SCRRA has developed a site plan for a station along the SP tracks as part of the initial Metrolink network. In Alternatives 1 and 2, there would also be commuter rail service along the Santa Fe corridor to Pasadena and this would be a dual commuter rail station. In Alternatives 3 and 4, this station would be used only for commuter rail on the SP (San Bernardino) corridor. In Alternatives 5 and 6, this would be a dual commuter/light rail station as light rail was extended in the ATSF corridor. Primary access for the added commuter/light rail service would be from Fulton.

Claremont - College Avenue

This is the site of the old Claremont depot, east of College Avenue and south of First Street. In Alternatives 1 through 4, this would be a skip-stop on the Metrolink commuter rail line. In Alternatives 5 and 6, this would be a light rail station only. (Commuter rail service would be dropped because of the added frequency of light rail service, the proximity of adjacent commuter rail stations, and the difficulty of fitting both platforms into the ROW.) Access would be provided from both First Street and College Avenue.

5.2.2 SP ROW

Montclair - Monte Vista

This is the site of a new Metrolink commuter rail station between the ATSF and SP tracks, just east of the proposed extension of Monte Vista Avenue. This site would be used as a single commuter rail station in Alternative 1 and 4, a dual commuter rail station in Alternatives 2 and 3, and a dual commuter/light rail station in Alternatives 5 and 6. In all cases, parking would be provided between the two tracks, both north and south of a proposed extension of Richton Street to provide additional access.

Upland - Third Avenue to Sixth Avenue

This site is located between Third and Sixth Avenues on vacant railroad ROW. The site has good street access and is close to the downtown commercial and government areas. Because it is so close the Upland commuter station on the SP ROW, this site is only proposed as a light rail station in Alternatives 5 and 6. Bus bays would be provided along Third Street to accommodate buses that could be rerouted from Euclid and Arrow.

Rancho Cucamonga - Vineyard/Foothill

This large triangular site is bordered by the SP tracks and the northwest corner of the Vineyard/Foothill intersection. With access from both Vineyard and Foothill, this site is well situated to collect patrons from the western portion of Rancho Cucamonga. In Alternatives 2 and 3, this would be a commuter rail station. In Alternatives 5 and 6 it would be a light rail station. The site would not be utilized in Alternatives 1 and 4. To obtain access from Vineyard, San Bernardino Road would need to be extended across Cucamonga Creek into the station site.

Rancho Cucamonga - Baseline/Amethyst

This site is located along the track section between Baseline Road and Amethyst Avenue. The former depot located here no longer exists. Access would be provided off Baseline and Amethyst. Both access points are complicated by the proximity of the at-grade rail crossings, which will make it difficult to turn left out of the station. This site would be used as a light rail station in Alternatives 5 and 6, and would not be used in any of the commuter rail alternatives.

Rancho Cucamonga - Haven Avenue

This site is a large vacant parcel just west of Haven Avenue. Access would be provided off of Haven only. Bus loading and kiss-and-ride would be provided off-street. The site would be used as a commuter rail station in Alternatives 2 and 3 and a light rail station in

Alternatives 5 and 6. The site would not be utilized in Alternatives 1 and 4. This site has been considered by SCRRA for about 700 parking spaces with off-street bus access and bus ride. A further 700 parking spaces could potentially be provided. Rancho Cucamonga has expressed concerns about the location of this station because of the larger number of potential parking spaces, and the adjacent residential land uses.

Rancho Cucamonga - Rochester Avenue

This site is located in the southeast quadrant of the junction of Rochester Avenue and the tracks. The five-acre parcel is owned by the City and tentative plans were to develop it as an affordable housing site, although no action has been taken. Access would be from Rochester, with bus loading on-street. This site would be used as a light rail station in Alternatives 5 and 6.

Rancho Cucamonga - East Avenue/I-15 Freeway

This site is on the eastern edge of Rancho Cucamonga, and is bounded by the SP ROW, East Avenue and I-15. The site could have freeway access from I-15 and arterial access from Base Line Road and East Avenue. There is an existing Caltrans park-and-ride lot at the I-15/Base Line interchange. This site would be used as commuter rail station in Alternatives 2 and 3 and a light rail station in Alternatives 5 and 6. In all but one of these alternatives, it would be an end-of-the-line station, so regional park-and-ride facilities would be important. The site could accommodate about 900 parking spaces.

5.2.3 Route 30 ROW

Route 30 stations would only be utilized for LRT, in Alternatives 4 and 6, with only the eastern half of the corridor included in Alternative 6. From Towne Avenue to Riverside Drive, all stations are in the median of the proposed freeway. Unfortunately these stations would be relatively isolated from the adjacent communities because of the barrier effect of the freeway itself, particularly where stations are located at interchanges. This would necessitate long walks downtown into the station, and may lead to bus and kiss-and-ride access problems at busy freeway interchange locations. Access to the platforms would be generally be provided by stairways and elevators. East of Riverside Drive, station locations were not specified because of alignment uncertainties.

La Verne - Wheeler/Foothill

In Alternative 4, the proposed alignment includes an extension of tracks along Wheeler to connect into the planned Route 30 Freeway north of Foothill. An elevated station is proposed at the crossing of the tracks and Foothill Boulevard, just to the east of Wheeler Avenue. Access would be provided from both Foothill and Wheeler and bus stops could be provided on both sides of Foothill.

Claremont - Towne Avenue

This station in Alternative 4 would be located just east of Towne Avenue. Stairs and an elevator would connect the east sidewalk of Towne to the west end of the platform. Parking would be provided in the northeast quadrant with access from Baseline Road.

Upland - Mountain Avenue

This station in Alternative 4 would be located just east of Mountain Avenue. A vacant parcel in the northeast quadrant (between the freeway and 20th Street) could be used for parking, with the primary access from Mountain, but a second entrance could be provided from 20th Street. Off-street layover space is provided for buses and kiss-and-ride.

Upland - Euclid Avenue

This proposed station would be west of Euclid. Parking, kiss-and-ride and bus loading would be located in the northwest quadrant between the freeway and 20th Street. Access could be provided from both Euclid and 20th. The environmental assessment identified several historic structures along Euclid near this location, and a station at Euclid may therefore not be possible because of negative impacts to these structures.

Rancho Cucamonga - Amethyst Avenue

The platform would be east of Amethyst, which would pass over Route 30 with no interchange. Parking would be provided in both the northeast and southeast quadrants. Access would be provided from both Amethyst and Highland.

Rancho Cucamonga - Haven Avenue

This station is located directly over Haven, which will pass under the freeway. Parking is proposed on a large vacant parcel in the southeast quadrant. Bus stops are proposed under the Route 30 overpass, with vertical circulation from both sides of Haven to the light rail platform above.

Rancho Cucamonga - Rochester Avenue and East Avenue

These stations will utilize a prototype site plan for stations along Route 30 at cross-streets without freeway interchanges. There is very little current development around these sites. Prototype A calls for parking in the southeast quadrant with access from the major north/south arterial.

Fontana - Cherry Avenue

This station would be located just west of Cherry. The current freeway plan calls for a Route 30/Cherry interchange and elimination of the I-15/Cherry interchange. This station location, however, lies among the many interchange ramps. Because the ramps conflict with station access needs, a revision to the Route 30/Cherry interchange ramp plan is suggested. The suggested revision is to change the westbound on-ramp to Route 30 to a loop ramp, thereby freeing up the northwest quadrant for parking and other station access functions. The engineering feasibility of this concept with respect to freeway operation should be evaluated further. Patrons from the parking lot would walk under the westbound lanes of Route 30, and then take stairs or an elevator to the platform.

Fontana - Citrus Avenue and Sierra Avenue

A second prototype site plan (Type B) was prepared for these stations, which will both cross over Route 30 with diamond interchanges at sites where there is little or no current development. The main station parking area would be located in the southeast quadrant with access from the north/south arterial and a relocated Highland Avenue. Access to/from the north/south arterial would be limited.

Rialto - Ayala Drive

The Ayala station would utilize Prototype Plan A, similar to the stations at Rochester and East Avenue.

Rialto - Riverside Avenue

This station would be directly below Riverside Avenue, which will pass over Route 30 with a diamond interchange. Parking is proposed on both the northeast and southeast quadrants. On-street bus loading bays are proposed on the bridge over Route 30. To avoid having passengers cross Riverside, vertical circulation would be provided from both sides of the bridge down to the LRT platform.

San Bernardino

Because a specific light rail alignment was not defined into the downtown area of San Bernardino, station locations could not be identified nor site plans prepared. In general, potential locations for light rail could include: on Highland Avenue where the alignment turned south, or whichever north-south alignment is selected in the areas of Baseline, Fourth, and one or two locations in the downtown near the Civic Center and Central City Hall, and the AMTRAK Depot.

291090x0(#1):\REPORTS\FINAL.RPT\Section.#5/zhm

Table 5.2
Station Characteristics

291090x0(#1):\REPORTS\FINAL.DRF\Table5-2.Rpt/zhm

Station Location	Mode	Bus Connections	Adjacent Land Uses	Access Facilities (number of spaces)			Comments
				P&R	K&R	Bus	
ATSF Pasadena Subdivision							
Pasadena (Sierra Madre Villa)	L/C			500-1000	25	4	Blue Line end-of-line. Alternate CR/LRT junction in Alt. 1 but constrained configuration.
Arcadia (1st Avenue)	L/C	RTD #79, 379, 491 Foothill #187	Lumber yard, building supplies, commercial	235	25	5	CR/LRT junction in Alt. 1.
Monrovia (Myrtle Avenue)	L	RTD #188, 270 Foothill #494, 690 Local circulator	Commercial, warehouse	460	20	5	Historic depot standing on site.
Duarte (Mountain Avenue)	L/C	RTD #188 Foothill #187 Local circulator	Light industrial	375	20	3	City already purchased property for station.
Irwindale (Irwindale Avenue)	L/C	Foothill #187, 494	Industrial	500	20	0	CR/LRT junction in Alt. 2.
Azusa (Azusa Avenue)	L	Foothill #187, 494	Commercial, residential	350	20	4	Near redevelopment area. City also interested in alternative site east of Pasadena Avenue.
Glendora (Glendora Avenue)	L/C	Foothill #187, 274, 488, 494	Commercial	335-555	25	4	Borders redevelopment area.

Legend:

C = commuter rail station
L = light rail station
L/C = transfer station
X = no stop on this line
C-C = dual commuter rail (SP & SF)

Table 5.2
Station Characteristics

291090x0(#1):\REPORTS\FINAL.DRF\Table5-2.Rpt/zhm

Station Location	Mode	Bus Connections	Adjacent Land Uses	Access Facilities (number of spaces)			Comments
				P&R	K&R	Bus	
Glendora (Auto Center Drive)	L	Foothill #690	Commercial	500	25	2	In redevelopment area. City has reservations about station at this site due to conflicts with Auto Center expansion.
San Dimas (Cataract)	L/C	Foothill #185, 276, 492	Commercial, industrial	500	15	3	Site of proposed train museum.
San Dimas (Walnut/Arrow)	L/C	Foothill #185, 276, 492	Light industrial	1,040	20	4	CR/LRT junction in Alt. 3; requires new CR station on SB-SA Line.
La Verne/San Dimas (San Dimas Canyon Road)	L/C	Foothill #185	Light industrial, residential	540	20	2	CR/LRT junction in Alt. 4; requires new CR station on SB-SA Line.
Pomona (Fulton/Garey)	L/C	Foothill #185, 187, 194, 291	Industrial	420-740	20	0-6	Alternate LRT end-of-line in Alts. 5 and 6. SB-LA CR station.
Claremont (College Avenue)	L/C	Foothill #185, 192/194, 293, 690	Commercial/retail	300	15	2	CR skip-stop.

Legend:

C = commuter rail station
L = light rail station
L/C = transfer station
X = no stop on this line
C-C = dual commuter rail (SP & SF)

Table 5.2
Station Characteristics

291090x0(#1):\REPORTS\FINAL.DRF\Table5-2.Rpt/zhm

Station Location	*Mode*	*Bus Connections*	*Adjacent Land Uses*	*Access Facilities (number of spaces)*			*Comments*
				P&R	*K&R*	*Bus*	
SP Baldwin Park Branch (San Bernardino County)							
Montclair (Monte Vista Avenue)	L/C	Omnitrans #14, 60, 62, 64, 65, 110, 496 Foothill #185 RTD #497	Commercial, light industrial	1,750	30	17	LRT end-of-line in Alts. 5 & 6.
Upland (Third-Sixth Avenues)	L	Omnitrans #14, 60, 62, 64	Commercial, residential	300	27	2	Close to SB-LA commuter rail stop.
Rancho Cucamonga (Vineyard/Foothill)	L/C	Omnitrans #60	Residential, retail	340-570	25	4	
Rancho Cucamonga (Baseline/Amethyst)	L	Omnitrans #60	Residential, office, light industrial	400	25	4	Former station lcation. Access points close to crossings; difficult left-turns out of station.
Rancho Cucamonga (Haven Avenue)	L/C	Omnitrans #60, 61	Residential	657	28	2	
Rancho Cucamonga (Rochester)	L	None	Residential	500	25	2	

Legend:

C = commuter rail station
L = light rail station
L/C = transfer station
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Table 5.2
Station Characteristics

Station Location	***Mode***	***Bus Connections***	***Adjacent Land Uses***	***Access Facilities (number of spaces)***			***Comments***
				P&R	***K&R***	***Bus***	
Rancho Cucamonga (East Avenue/I-15)	L/C	None	Agricultural	900	25	4	Possible park & ride site; CR feeder end-of-line in Alts. 2 & 3; LRT end-of-line in Alt. 5.
Route 30 ROW							
La Verne (Wheeler Avenue)	L	Foothill #187	Residential, commercial/retail	300	20	2	
Claremont (Towne Avenue)	L	Foothill #291, 293	Residential, school	480	20	2	
Upland (Mountain Avenue)	L	Omnitrans #62	Residential, agricultural	300	50	2	
Upland (Euclid Avenue)	L	Omnitrans #62	Residential, agricultural	510-670	20	2	Historic structures may prevent station at this location.
Rancho Cucamonga (Amethyst)	L	None	Residential, retail	500	20	2	
Rancho Cucamonga (Haven Avenue)	L	Omnitrans #60, 61	Residential, retail	500	20	4	
Rancho Cucamonga (Rochester Avenue)	L	None	Undeveloped	500	25	2	Prototype site plan A.

Legend:

C = commuter rail station
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L/C = transfer station
X = no stop on this line
C-C = dual commuter rail (SP & SF)

Table 5.2
Station Characteristics

Station Location	*Mode*	*Bus Connections*	*Adjacent Land Uses*	*Access Facilities (number of spaces)*			*Comments*
				P&R	*K&R*	*Bus*	
Rancho Cucamonga (East Avenue)	L	None	Undeveloped	500	25	2	Prototype site plan A. May have impact on historic structure.
Fontana (Cherry Avenue)	L	None	Undeveloped	500	20	4	Requires revision to ramps at Route 30/Cherry interchange.
Fontana (Citrus Avenue)	L	None	Undeveloped	300-600	15-30	2	Prototype site plan B.
Fontana (Sierra Avenue)	L	Omnitrans #20	Undeveloped	300-600	15-30	2	Prototype site plan B.
Rialto (Ayala Drive)	L	None	Undeveloped, residential	500	25	2	Prototype site plan A.
Rialto (Riverside Avenue)	L	Omnitrans #26	Residential, commercial	600	30	4	
San Bernardino (Medical Center)	L	Omnitrans #21	Commercial, residential	230	20	4	At Highland.

Legend:

C = commuter rail station
L = light rail station
L/C = transfer station
X = no stop on this line
C-C = dual commuter rail (SP & SF)

6. OPERATIONS PLANNING

6.0 Operations Planning

6.1 Concept Operating Plans

Concept rail operating plans were prepared for each of the six system alternatives under study. The operating plans define train frequencies, running times, and operating characteristics, and are used to estimate rail car needs (fleet size), ridership, and operating costs.

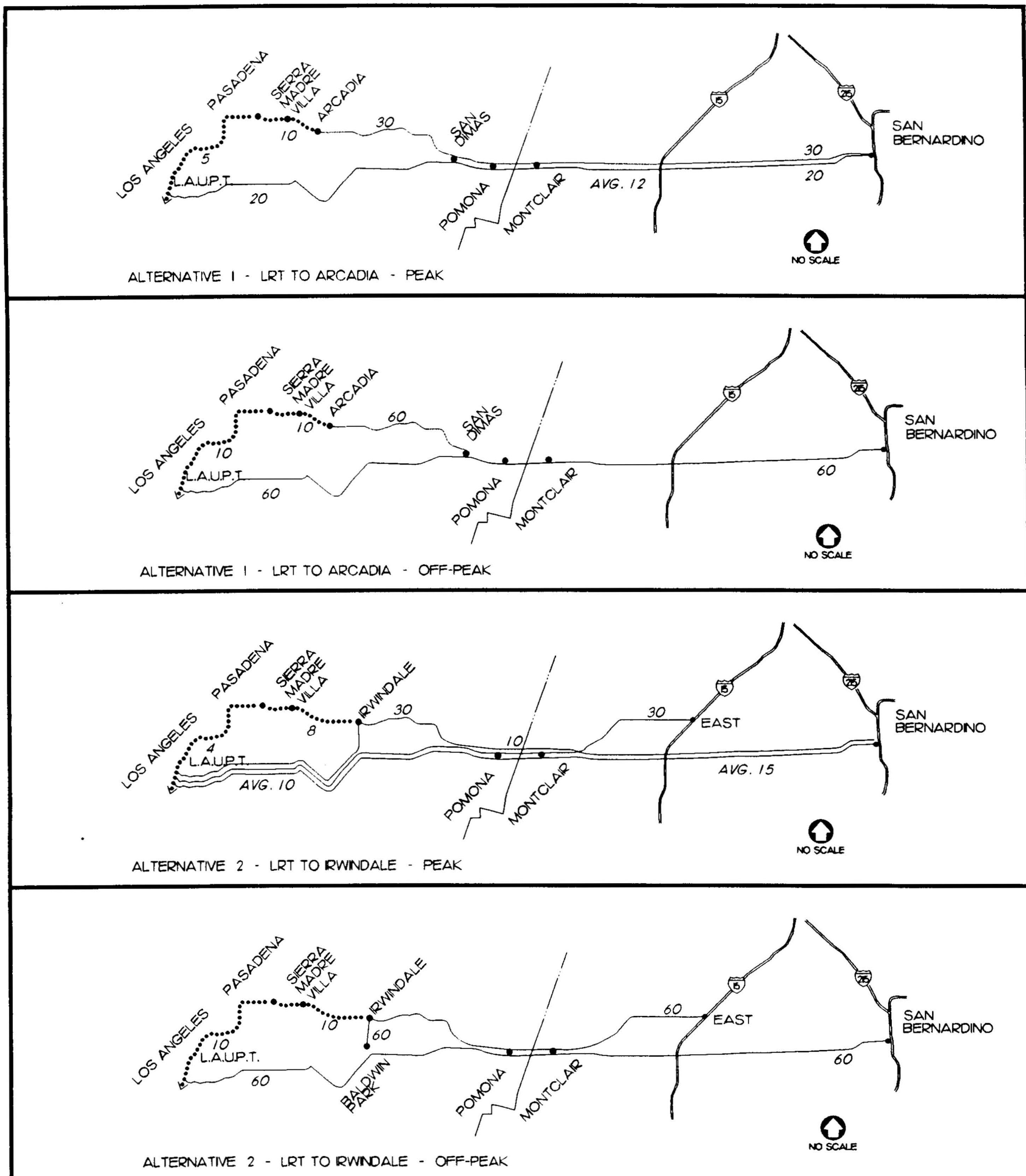
Figure 6.1 illustrates schematically the concept operating plans for each alternative. These indicate the proposed routing of trains and the operating frequencies (headways), for both peak and off-peak periods. These are initial estimates that were based on corridor characteristics, projected headways for the Pasadena Blue Line and SCRAA Commuter lines, and on the level of service considered necessary to attract patronage. The key aspects of the operating plans are summarized below.

> Use of Tracks. Commuter rail would use single track with passing tracks in all alternatives. Light rail would use double track in all alternatives, although in some alternatives short sections of single track would be necessary.
>
> Headways. Peak period headways for light rail would generally be 4-5 minutes through Pasadena, 5-10 minutes to Irwindale and 10 minutes east of Irwindale. Off-peak headways would be about 10 minutes west of Irwindale and 20 minutes east of Irwindale. Commuter rail headways for the added service in each alternative would be 30 minutes, while off-peak headways would be 60 minutes.
>
> Train Consists. Light rail would typically operate in two or three car trains. Commuter rail consists would be a locomotive plus four cars, expandable to eight cars if needed in the future.
>
> Maintenance/Storage Facilities. Maintenance and storage facilities could be located in the La Verne/San Dimas area for Los Angeles County, or around Montclair to jointly serve Los Angeles and San Bernardino County.

6.1.1 Baseline Regional Operating Assumptions

The baseline assumptions for light rail in 2010 included the Pasadena Blue Line, the Glendale Branch, and the downtown Blue Line connection, such that trains will operate through downtown to either the Long Beach or proposed Exposition lines.

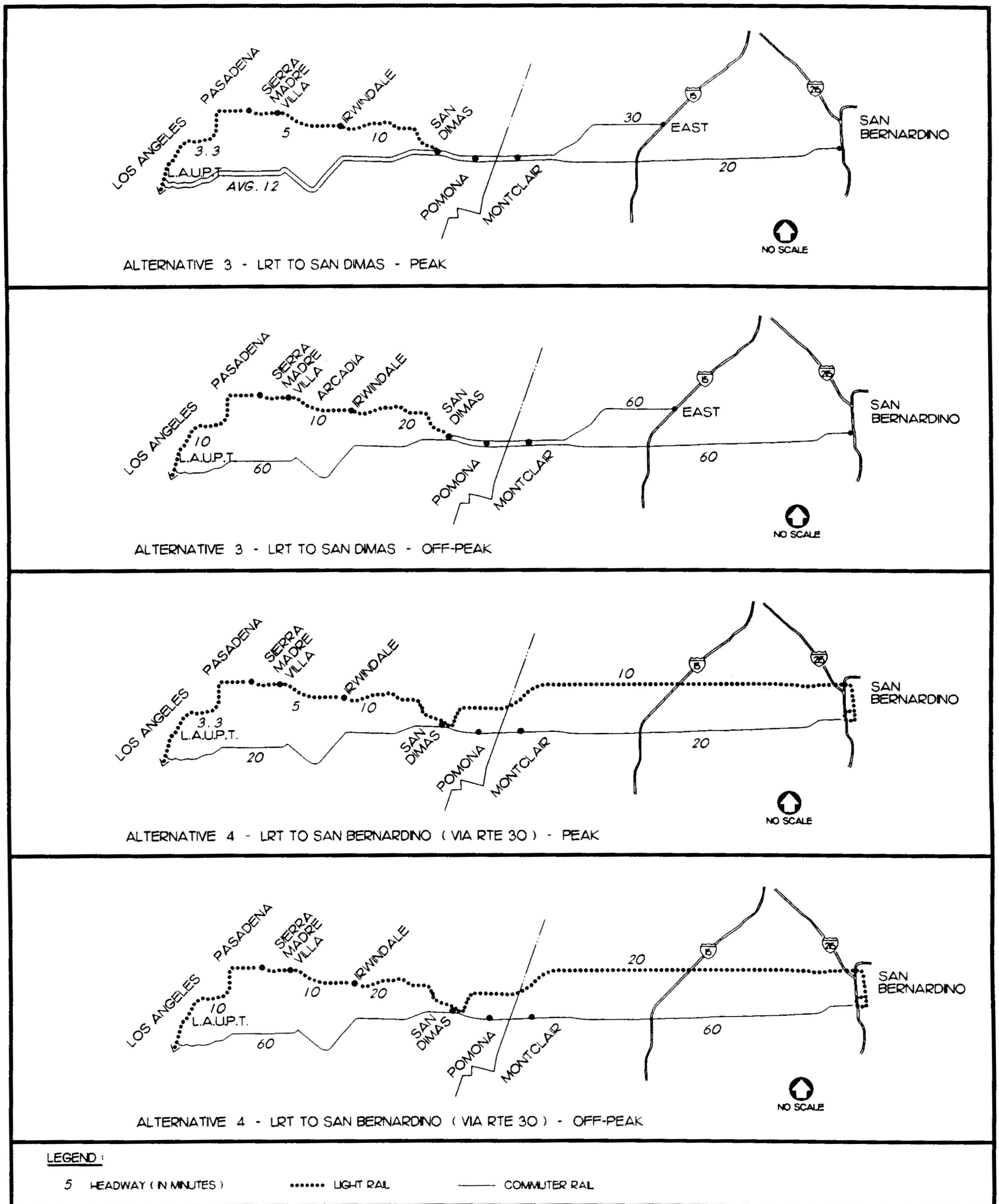
For commuter rail, the baseline assumption for 2010 was the "high" service level proposed for the San Bernardino to Los Angeles line on the SP Baldwin Park Branch. This calls for 20-minute peak headways and hourly off-peak service. Reverse peak service at hourly headways was assumed. It was also assumed that as part of the regional commuter rail



LEGEND :

5 HEADWAY (IN MINUTES) ······· LIGHT RAIL ——— COMMUTER RAIL

Korve Engineering Manuel Padron and Associates SBSGOPRV.DWG	N. SAN GABRIEL / SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR PRELIMINARY PLANNING STUDY OPERATING PLANS BY ALTERNATIVE	FIGURE 6.1

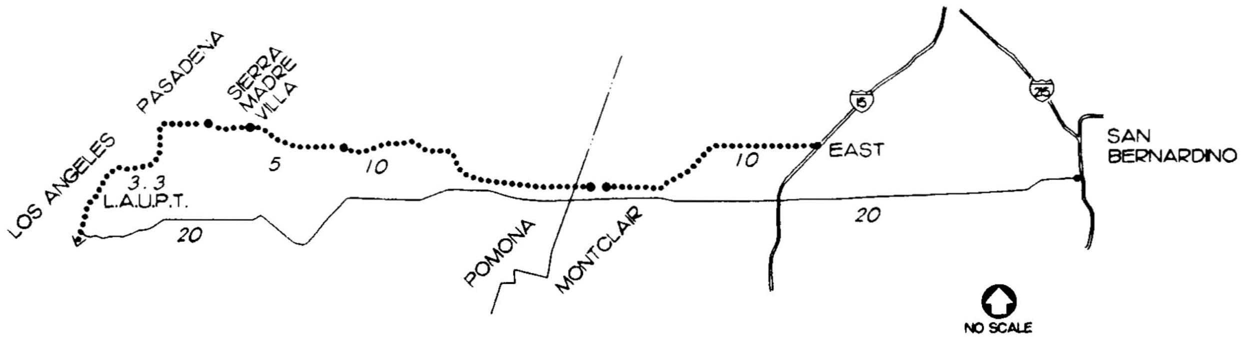


Korve Engineering
Manuel Padron and Associates
SBSGOPRV.DWG

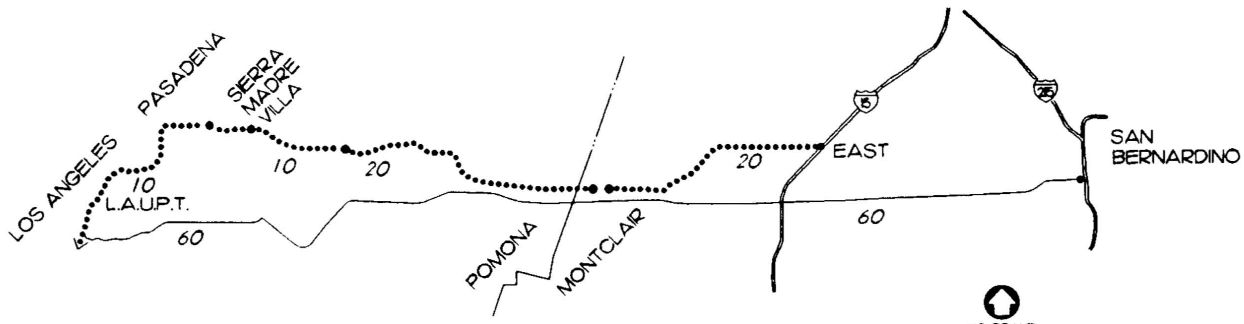
N. SAN GABRIEL / SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR
PRELIMINARY PLANNING STUDY

OPERATING PLANS BY ALTERNATIVE

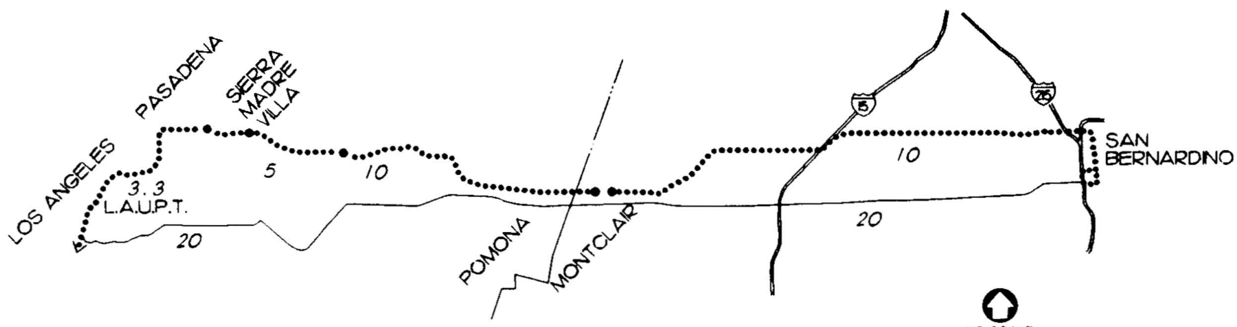
FIGURE 6.1



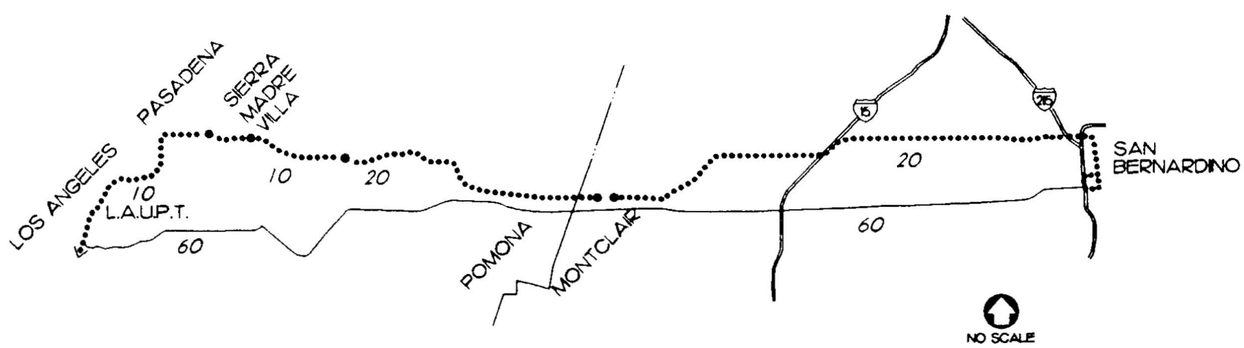
ALTERNATIVE 5 - LRT TO FONTANA (VIA SP) - PEAK



ALTERNATIVE 5 - LRT TO FONTANA (VIA SP) - OFF-PEAK



ALTERNATIVE 6 - LRT TO SAN BERNARDINO (VIA SP/RTE 30) - PEAK



ALTERNATIVE 6 - LRT TO SAN BERNARDINO (VIA SP/RTE 30) - OFF-PEAK

LEGEND :

5 HEADWAY (IN MINUTES) •••••• LIGHT RAIL —— COMMUTER RAIL

Korve Engineering Manuel Padron and Associates SBSGOPRV.DWG	N. SAN GABRIEL / SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR PRELIMINARY PLANNING STUDY OPERATING PLANS BY ALTERNATIVE	FIGURE 6.1

system, the SP Baldwin Park Branch would be double-tracked prior to any additional service contributed from the Northern San Gabriel or San Bernardino valleys.

6.1.2 System Operating Concepts

Commuter rail could operate on continuous direct service along the entire corridor between San Bernardino and Pasadena. Light rail, on the other hand, would not operate end-to-end through the corridor. The more frequent station stops and lower operating speed for light rail make such an operation inappropriate, particularly since light rail trains will travel beyond Pasadena to downtown Los Angeles and potentially to other lines.

For example, light rail from downtown Los Angeles to downtown San Bernardino would extend for a total distance of 67 miles, with a total running time of over two hours. Such long combined running times would adversely affect schedule reliability, and complicate the scheduling of peak service.

Montclair was considered to be the maximum easterly extent of viable continuous operations for the Pasadena Blue Line. Logical alternate terminating points for the Blue Line extension were identified at Arcadia, Irwindale, San Dimas and Montclair, primarily to allow for the possibility of transfers at these locations between commuter rail and light rail. These assumptions do not necessarily preclude the possibility of other light rail terminus points, however, such as Duarte, Azusa, or Pomona.

For light rail alternatives in San Bernardino County, the western terminus of light rail service would logically coincide with the eastern terminus of Los Angeles County light rail service, i.e., San Dimas, Montclair, or possibly Pomona. Travel between the two counties would require a transfer between lines, at one of these locations.

6.1.3 Operating Plans by Alternative

The following provides a brief description of the concept operating plans by alternative. These are illustrated in Figure 6.1.

Alternative 1. LRT to Arcadia – Light rail would be extended to Arcadia, and commuter rail would operate from San Bernardino to Arcadia in the peak, and from Pomona to Arcadia in the off-peak. Passengers would transfer at Arcadia.

Alternative 2. LRT to Irwindale – Light rail would be extended to Irwindale. Commuter rail would operate along the ATSF corridor from Pomona to Irwindale and south on the SP Azusa Branch to Baldwin Park, as well as on the SP Line between I-15 and Montclair. Commuter rail service would consist of three peak services:

- San Bernardino to Los Angeles via Covina (30-minute headway)
- San Bernardino to Los Angeles via Irwindale (30-minute headway)
- East Avenue to Los Angeles via Covina (30-minute headway)

Assumptions used in the calculation of light rail run times include maximum speeds of up to 55 mph, 20 second dwell times at stations, and rapid acceleration/deceleration at stations. Assumptions for commuter rail times included maximum speeds of up to 70 mph (although in most segments speeds did not reach this level), 60 second dwell times at stations, and slower acceleration/deceleration at stations. Station locations identified in the conceptual engineering analysis were input to the run-time analysis. Throughout the corridor, average station spacing for light rail was about two miles (quite long for LRT systems), and four to five miles for commuter rail (typical for commuter systems).

Table 6.1 shows a comparison of travel times into downtown Pasadena from various points in the regional corridor. From Irwindale, the trip to downtown Pasadena would take about 21 minutes by light rail and 28 minutes by commuter rail. From Montclair, the trip to Pasadena would take about 44 minutes by light rail and 55 minutes by commuter rail. From San Bernardino, however, the trip to Pasadena would be faster on commuter rail: about 85 minutes by commuter rail and about 95 minutes by light rail. Table 6.2 shows a similar comparison for more local journeys within the San Gabriel Valley.

Based on this analysis, light rail times into downtown Pasadena would generally be about 20% faster than commuter rail times. This difference is due primarily to the fact that a commuter rail trip into downtown Pasadena would require at least one transfer (and in some cases two transfers), while a light rail trip would require no transfer. An effective transfer time of five minutes was assumed for this analysis. Other factors contributing to this difference are the shorter station dwell times, faster acceleration/deceleration and unusually long station spacing for light rail.

6.3 Operating Statistics

Based on the operating concepts described previously, operating plans were developed in some detail to include projections of running times, train consists, number of vehicles, and operating statistics such as vehicle miles, train hours, and peak vehicle needs, for use in cost-estimating.

Light rail running times were estimated by Manuel Padron & Associates, using a light rail performance model that was recently recalibrated to reflect actual on-board observations for the Blue Line (Long Beach/Los Angeles). The running time projections for the San Gabriel Valley corridor are based on the experience for the mid-corridor section of the LB/LA Line. This segment has station spacing of one to two miles, and has signal preemption where trains cross streets at-grade. It was assumed that similar signal preemption will be used in this corridor.

Commuter rail running times were estimated by R. L. Banks & Associates (RLBA). The times are based on performance characteristics of the equipment currently being procured by the Southern California Regional Rail Authority (SCRRA) for the Metrolink system. Detailed operating statistics were included in Technical Memorandum 2.

Table 6.1
Regional Corridor Run Time Comparisons into Pasadena (Memorial Park)

From	Alt. 1 LRT - Pasadena to Arcadia CR - Arcadia to Pomona	Alt. 2 LRT - Pasadena to Irwindale CR - Baldwin Park via Irwindale & Claremont to I-15	Alt. 3 LRT - Pasadena to San Dimas CR - Montclair to I-15	Alt. 4 LRT - Pasadena to San Dimas and San Dimas to San Bernardino	Alt. 5 LRT - Pasadena to Montclair and Montclair to I-15	Alt. 6 LRT - Pasadena to Montclair and Montclair to San Bernardino
Irwindale: Miller Brewery	28 mins.	21 mins.	21 mins.	21 mins.	21 mins.	21 mins.
San Dimas: Cataract Ave.	40 mins.	39 mins.	33 mins.	33 mins.	33 mins.	33 mins.
Pomona: Garey Ave.	47 mins.	45 mins.	44 mins.	44 mins.	39 mins.	39 mins.
Montclair: Transit Center	55 mins.	53 mins.	52 mins.	52 mins.	44 mins.	44 mins.
Rancho Cucamonga: East Ave.	NC	76 mins.	70 mins.	62 mins.	67 mins.	67 mins.
Fontana: Sierra Ave.	NC	NC	NC	69 mins.	NC	74 mins.
San Bernardino: Downtown	90 mins.	88 mins.	87 mins.	88 mins. (LRT) or 87 mins. (CR)	87 mins.	94 mins. (LRT) or 87 mins. (CR)

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Note: NC = No Connection.

Table 6.2
Local SGV Run Time Comparisons into Pasadena (Memorial Park)

From	Alt. 1 LRT - Pasadena to Arcadia CR - Arcadia to Pomona	Alt. 2 LRT - Pasadena to Irwindale CR - Baldwin Park via Irwindale and Claremont to I-15	Alt. 3 LRT - Pasadena to San Dimas CR - Montclair to I-15	Alt. 4 LRT - Pasadena to San Dimas and San Dimas to San Bernardino	Alt. 5 LRT - Pasadena to Montclair and Montclair to I-15	Alt. 6 LRT - Pasadena to Montclair and Montclair to San Bernardino
Arcadia: First Street	17 mins.	12 mins.	12 mins.	12 mins.	12 mins.	12 mins.
Monrovia: Myrtle Avenue	NC	NC	15 mins.	15 mins.	15 mins.	15 mins.
Duarte: Mountain Avenue	22 mins.	22 mins.	17 mins.	17 mins.	17 mins.	17 mins.
Irwindale: Miller Brewery	28 mins.	28 mins.	21 mins.	21 mins.	21 mins.	21 mins.
Azusa: Downtown	NC	NC	NC	24 mins.	24 mins.	24 mins.
Glendora: Glendora Avenue	34 mins.	34 mins.	33 mins.	27 mins.	27 mins.	27 mins.

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Note: NC = No Connection

6.4 Freight Operations and Shared Track Use

Introduction of commuter or light rail service on the rights-of-way under study may conflict with local freight traffic currently operating on these alignments. All AMTRAK service between Los Angeles and San Bernardino, as well as all through freight traffic, will be rerouted in 1994, leaving local freight traffic as the only potential source of conflict. The degree to which passenger service may conflict with local freight service differs for commuter and light rail.

Federal Railroad Administration (FRA) regulations allow local freight operations to share tracks with commuter trains day or night. Commuter rail service, therefore, would not generally conflict with local freight delivery times. FRA regulations, however, prohibit concurrent operation of light rail systems with freight traffic, requiring one of two solutions. The first is to operate passenger and freight service on separate, parallel, exclusive tracks within the same right-of-way. This solution is expensive and would be infeasible in many locations due to restricted ROW. The second solution is for freight and passenger service to share the same tracks on a non-concurrent basis; in other words, operate light rail service in the daytime and freight traffic at night time.

The only potential conflict between freight and passenger service appears to be on the ATSF ROW between Pasadena and Claremont. Active freight customers on each of the rights-of-way are reviewed below, and the opportunities and constraints for shared track use are noted.

6.4.1 ATSF Pasadena Subdivision - Pasadena to Claremont

Seven active and three inactive rail customers were identified on this ROW. Most of the active shippers on this segment stated that freight service times were at the discretion of Santa Fe, and indicated an ability to adjust to night service. However, the two largest customers--Miller Brewery in Irwindale and Warehouse Specialists, Inc. in Pomona--indicated a preference for continued daytime freight service.

Warehouse Specialists, which terminated an estimated 3,120 carloads of paper products last year, prefers current lunchtime deliveries. The company has indicated, however, that it could adjust to night service. It is possible that daytime service could be retained even with the introduction of light rail service. This could be accomplished since access to the site would be provided by a new crossing from SCRRA's Metrolink tracks across the light rail tracks. Freight operations could use the Metrolink tracks without conflicts, rather than the light rail tracks. A similar crossing exists on the Long Beach Blue Line.

Miller Brewing terminates approximately 25 carloads and originates about 10 boxcars of beer each month. Miller requires rail service daily and arranges production around lunchtime service. The company stated that the best time for service is between 12:00 noon and 1:00 p.m. because it loads during its first shift only. This would not present problems for the commuter rail service proposed in Alternatives 1 and 2, which could operate on these tracks concurrently with the freight traffic. If light rail service were implemented on the ATSF ROW, however, the only way to retain daytime freight service to Miller would be for the ATSF freight trains to use Southern Pacific tracks between Pomona and Irwindale. SCRRA's agreement with Southern Pacific restricts use by other railroads, so an agreement modification would be necessary to implement such an arrangement.

Note that a potential plan to transport trash from a transfer plant in Irwindale east by train on the ATSF to dump sites in San Bernardino County, would operationally be compatible with commuter rail on the line, but not with light rail unless it occurred during the nighttime.

6.4.2 SP Azusa Branch

Ten active freight customers are located along this branch, six south of Irwindale and four north of the ATSF tracks at Irwindale. The Azusa Branch would be utilized for passenger service only in Alternative 2, for commuter rail service. Local freight service could still be offered south of the ATSF tracks in conjunction with commuter rail service, but would suffer from fewer conflicts if scheduled during late night hours. In Alternative 2, the SP ROW north of the ATSF tracks at Irwindale would be abandoned, because a new connection would be made to the ATSF tracks at Irwindale. To continue serving customers north of Irwindale, an additional new short connection would have to be constructed in Azusa between the ATSF way and SP freight track.

6.4.3 SP Baldwin Park Branch - Claremont to Fontana

This segment presents no apparent potential freight/passenger conflicts. Only the westernmost 3.8 miles remain in service, and the existing customer is moving because that property will become the site of the Claremont commuter rail station. The rest of this ROW has been embargoed due to poor track condition and there is no active freight service.

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7. PATRONAGE FORECASTS

7.0 Patronage Forecasts

Preliminary patronage forecasts were developed for each of the six rail system alternatives. The first part of this section describes the methodology used to develop the patronage forecasts, while the second part presents the results of the forecasts.

7.1 Methodology

Patronage forecasts were based on use of data and procedures from the Southern California Association of Governments (SCAG) regional transportation model. This is a comprehensive computer model developed and applied by SCAG over many years to forecast future travel in the region. The model estimates trip generation, trip distribution, modal split, and assigned trip volumes. SCAG's methodology is normally applied to a full, network-based model using the UTPS software.

For this preliminary planning study, a simplified version of the SCAG model methodology was used to produce forecasts of the number of rail transit riders in each alternative. The methodology used in this study was based on the use of SCAG Regional Model year 2010 trip tables, and the recalculation of modal split to determine the number of trips that would use rail transit in the corridor. This analysis was performed in a spreadsheet-based model rather than the full SCAG network-based model.

7.1.1 Data Sources

The SCAG transportation planning database and model methodologies provided much of the data necessary for the patronage forecasts. Data taken from the model included:

- 2010 home-to-work person trip table;
- 2010 auto times and distances;
- 2010 zonal median income;
- Auto operating and parking costs;
- Mode-split model parameters and input data.

Additional data for each alternative was developed from the operational analysis performed in this study. This data included:

- Station locations
- Transit running times on both light rail and commuter rail;
- Transit wait and transfer times;
- Transit fares
- Station access times.

No parking constraints were assumed at station sites.

SCAG model information used in this study was model data prepared for the Regional Mobility Plan (RMP) for the year 2010, including the GMP socioeconomic data representing the regional jobs/housing balance data set.

7.1.2 Patronage Estimates and Refinements

Patronage forecasts were then estimated by applying the SCAG mode-split model methodology and input parameters calculated for this study to the year 2010 home-work person trip table, and by using SCAG-developed factors to develop daily trip totals for all trip types combined.

The SCAG RMP is a framework to guide the region's long-range transportation development, and includes plans to help the region achieve certain federally mandated air-quality goals. In modelling for the RMP, SCAG makes several refinements to its "trend" forecasts to achieve air quality compliance. These include:

- A trip table which reflects a significantly improved "jobs/housing balance" in the region. By moving some of the jobs and housing closer together than would be assumed in a trend forecast, the amount of regional travel is reduced.
- Achievement of a 30% cut in work travel (person trips) due to improved Transportation Demand Management (TDM) measures.
- Achievement of a 19% regional transit mode split.

The effect of the first two measures is to significantly reduce overall travel in the region, including both auto and transit trips. The effect of the third measure is to increase transit ridership.

This study is one of the first for which SCAG model runs reflecting the RMP have been available. To be consistent with the most recent modeling efforts for SANBAG's update of the Route 30 Freeway EIR, initial patronage figures were produced using the SCAG assumptions and adjustments listed above.

This methodology, however, is not consistent with previous rail corridor studies conducted in Los Angeles County. These previous studies were based on model runs that did not make the adjustments identified above, and were not based on the regional jobs/housing balance socioeconomic data sets. In order to provide a reasonable comparison with studies for other rail corridors in Los Angeles County, the patronage forecasts were adjusted to reflect pre-GMP SCAG modelling efforts, to exclude jobs/housing balance, TDM reductions, and regional transit mode split goals.

Using this revised methodology, both line ridership and station boarding totals were projected for the six system alternatives.

7.2 Line Ridership Forecasts

The number of total daily trips on alignment segments for each of the six system alternatives are shown in Table 7.1 and Figure 7.1. These total daily trips represent all trips made on the segment, including trips that begin on the segment, begin outside the segment, or pass through the segment.

The ridership estimates indicate that an extension of the Pasadena Blue Line into the San Gabriel Valley would generate from 15,900 to 35,800 daily trips depending on the terminus point. Forecasts indicate daily ridership of 15,900 to Arcadia (Alternative 1), 19,600 to Irwindale (Alternative 2), about 30,000 to San Dimas (Alternatives 3 & 4), and up to 35,800 to Montclair (Alternatives 5 & 6).

For commuter rail service on the former ATSF ROW, daily ridership forecasts are estimated at 8,100 trips for commuter rail between Pomona and Arcadia (Alternative 1), and 6,600 trips for the commuter rail connection through Glendale/Azusa/Irwindale to downtown Los Angeles (Alternative 2). The majority of the 8,100 trips forecast in Alternative 1 would transfer to light rail at Arcadia and continue on to either Pasadena or Los Angeles.

Light rail forecasts in Alternative 1 and 2 would be somewhat lower without the commuter rail connection in those alternatives. Without a commuter rail connection, light rail ridership to Arcadia in Alternative 1 would total about 10,800 daily riders. In Alternative 2, about 40% of added commuter rail riders would utilize the new commuter rail link to downtown Los Angeles along the Azusa Branch, although many of these would probably be diverted from the SP Line commuter service and would not represent new riders to the system. Without a commuter rail connection, most of these trips would utilize the Blue Line to reach downtown. Therefore the light rail forecasts in Alternative 2 would be only slightly lower without commuter rail (about 19,000 daily riders).

In San Bernardino County, ridership on the SP Baldwin Park Branch between Montclair and Fontana would range from a low of 2,400 daily riders with commuter rail in Alternative 3 to a high of about 5,000 daily riders with light rail in Alternatives 5 and 6. Much of this ridership, however, would be diverted from the San Bernardino-Los Angeles commuter rail line to the south and would not represent new ridership. Light rail on Route 30 could generate about 14,000 daily riders in Alternative 4, and about 12,200 daily riders when combined with the SP Branch in Alternative 6. Most of the Route 30 ridership would take place at the far east end of the Route 30 right-of-way heading into downtown San Bernardino.

The forecasts appear intuitively reasonable. The patronage estimates also reflect characteristics of regional trip movements forecast by SCAG for 2010. The SCAG data indicate relatively few long distance trips from San Bernardino County into the San Gabriel Valley. Far more trips are made into downtown Los Angeles than into Pasadena from both San Bernardino County and the San Gabriel Valley, though a significant amount of trips do occur along the Foothill corridor in the San Gabriel Valley. There are even fewer trips projected traveling eastward from the San Gabriel Valley into San Bernardino County.

Table 7.1
Line Ridership Estimates (Total Daily Riders)

ALTERNATIVE	Alt. 1	Alt. 2	Alt. 3	Alt. 4		Alt. 5		Alt. 6	
Light Rail System Extension	Pasadena to Arcadia	Pasadena to Irwindale	Pasadena to San Dimas	Pasadena to San Dimas	San Dimas to San Bern. (via Route 30)	Pasadena to Montclair	Montclair to I-15	Pasadena to Montclair	Montclair to San Bern. (via SP/Rte 30)
Blue Line Extension - ATSF (Pasadena - Montclair)	15,900	19,600	29,200	30,100	NA	35,500	NA	35,800	NA
Commuter Rail Extension - ATSF (Pasadena - Pomona)	8,100	6,600	NA	NA	NA	NA	NA	NA	NA
New Light Rail - SP (Montclair - Fontana)	NA	NA	NA	NA	NA	NA	5,000	NA	combined
New Commuter Rail - SP (Montclair - Fontana)	NA	2,700	2,400	NA	NA	NA	NA	NA	NA
New Light Rail - Route 30	NA	NA	NA	NA	14,000	NA	NA	NA	12,200

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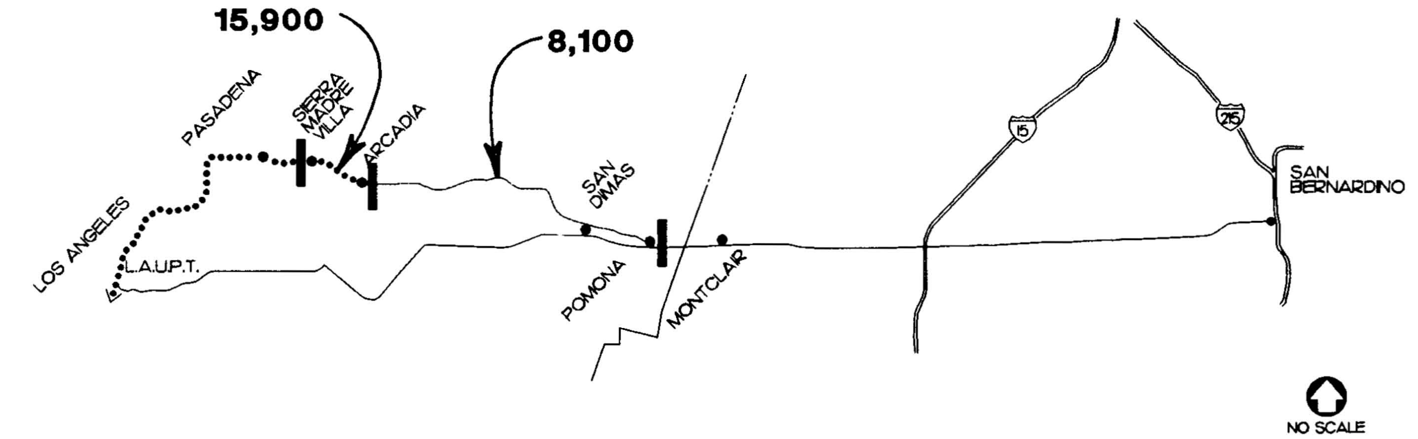
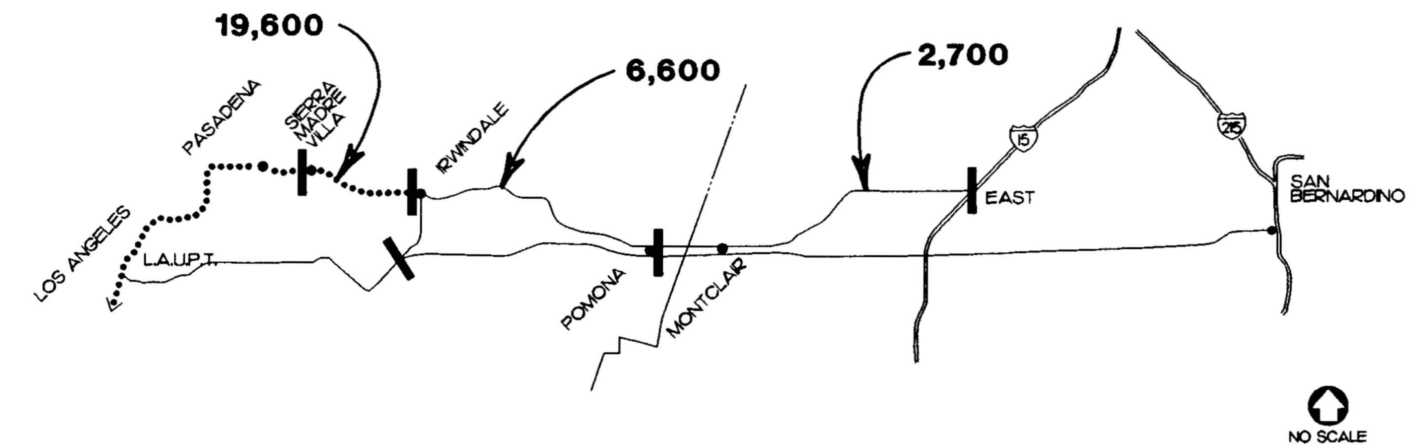
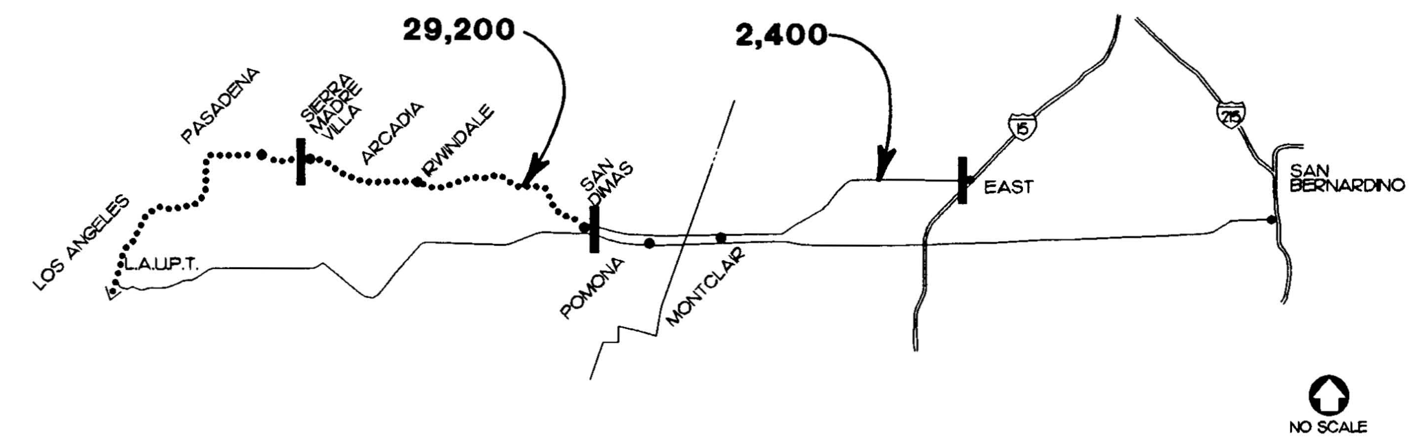
Note: Line ridership totals include all trips traveling on segment between designated end points; trips produced on segment, trips attracted to segment from outside, and trips passing through segment.



ALTERNATIVE 1 - LRT TO ARCADIA



ALTERNATIVE 2 - LRT TO IRWINDALE



ALTERNATIVE 3 - LRT TO SAN DIMAS

LEGEND:

•••••• LIGHT RAIL —— COMMUTER RAIL **29,200** DAILY RIDERSHIP ON SEGMENT

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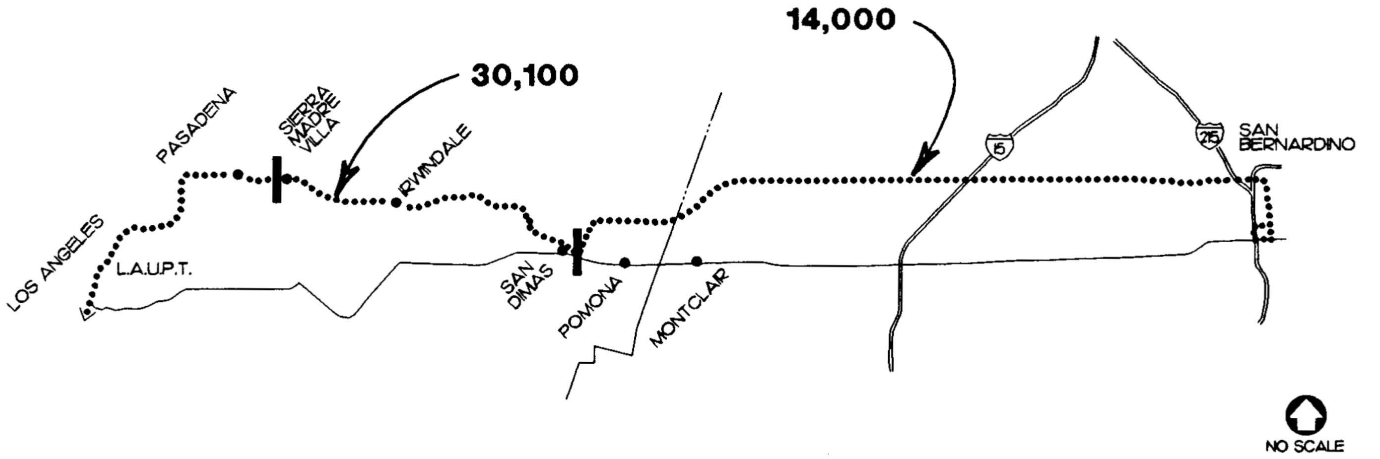
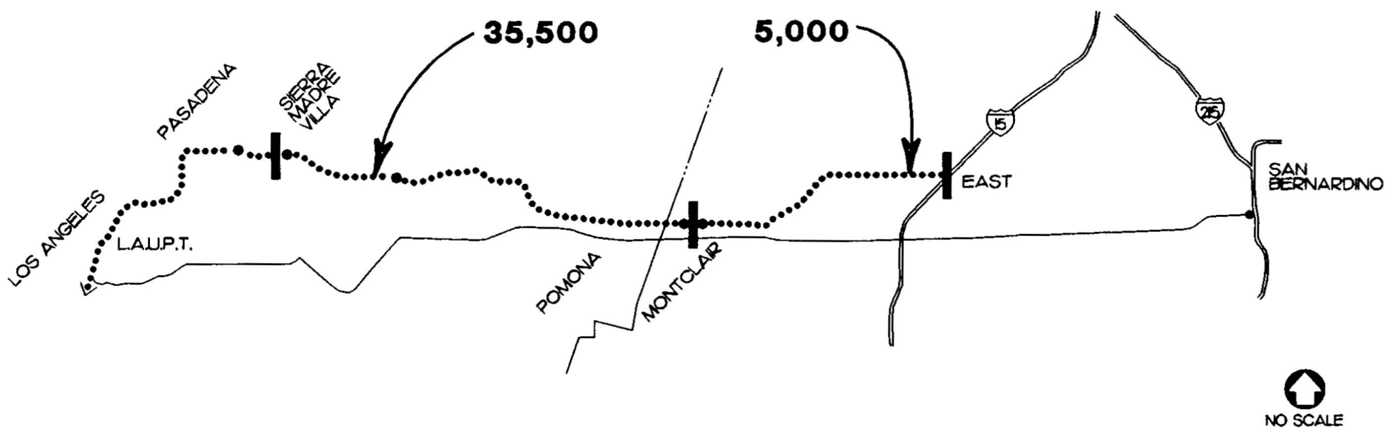
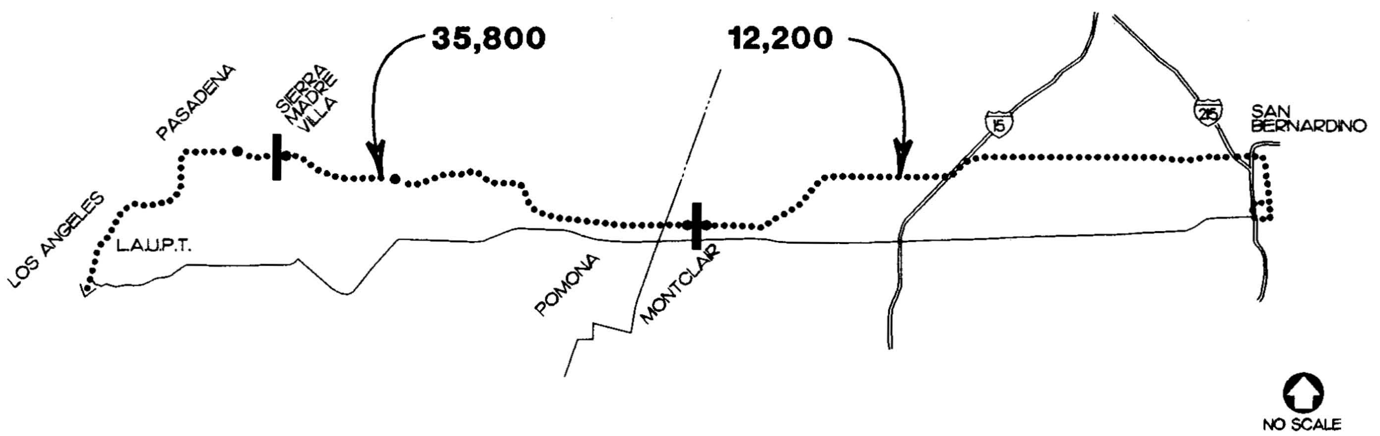
	PRELIMINARY LINE RIDERSHIP ESTIMATES	7.1



ALTERNATIVE 4 - LRT TO SAN BERNARDINO (VIA ROUTE 30)



ALTERNATIVE 5 - LRT TO FONTANA (VIA SP)



ALTERNATIVE 6 - LRT TO SAN BERNARDINO (VIA SP/ROUTE 30)

LEGEND :

••••••• LIGHT RAIL —— COMMUTER RAIL **29,200** DAILY RIDERSHIP ON SEGMENT

Korve Engineering	N. SAN GABRIEL / SAN BERNARDINO VALLEY TRANSPORTATION CORRIDOR PRELIMINARY PLANNING STUDY	FIGURE
	PRELIMINARY LINE RIDERSHIP ESTIMATES	7.1

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It should be noted however that SCAG's model is based on regional trip origin, destination and distribution patterns surveyed in the 1960's, so the level of intercounty travel may be underestimated considering the considerable development in San Bernardino County since then. While SCAG is in the process of updating regional travel pattern data based on findings taken in 1990/91, this information is not yet available for the travel forecast models. The patronage forecasts may be low for this reason as well as the following:

- These patronage estimates were produced without running the full, network-based regional model, which includes the full range of regional rail transit connections which would be available in 2010.

- Special generators may not have been fully represented in the SCAG data used for this study. These special generators include the Santa Anita Racetrack, Santa Anita Fashion Park, Pomona Fairgrounds, and potential regional park-and-ride lots at the I-210/I-605 and I-210/SR-30 junctions.

- The sketch planning method used for this study does not account for potential induced transit demand that would result from the introduction of a new transit line (i.e., additional or changed trip making due to the added rail line).

- The definition of light rail in the Route 30 Freeway corridor included average station spacing of 2+ miles which is quite long for light rail. If additional station locations were identified, patronage potential could increase.

Further studies should address patronage in a more detailed manner to confirm and refine the estimates made there. Further patronage forecasts should be made with the SCAG Regional model, and based on the recent travel survey updated to ensure existing inter-county travel patterns are adequately reflected.

7.3 Station Boardings

Daily station boarding estimates for Alternatives 1 through 6 are summarized in Tables 7.2 and 7.3. The daily boardings present only the number of riders boarding from outside the transit system; transfers from another segment of the rail system are not included.

Because some trips will be bound for destinations outside the segments under study, total boardings on a given segment will not be equal to total ridership. For example, a daily round trip between Monrovia and downtown Los Angeles will constitute two trips on the Blue Line Extension east of Pasadena. Only one of the trips (the morning trip), however, will be counted as a boarding on the segment. The evening trip from Los Angeles to Monrovia will still count as a trip on the segment, but will not be counted as a boarding on the segment since the boarding took place in Los Angeles.

Table 7.2
Light Rail Station Boarding Estimates

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ALTERNATIVE Light Rail	Alt. 1 Pasadena to Arcadia	Alt. 2 Pasadena to Irwindale	Alt. 3 Pasadena to San Dimas	Alt. 4 Pasadena to San Dimas; San Dimas to San Bernardino	Alt. 5 Pasadena to Montclair; Montclair to I-15	Alt. 6 Pasadena to Montclair; Montclair to San Bernardino
ATSF PASADENA SUBDIVISION						
Arcadia	5,390	3,880	3,860	3,880	3,860	3,850
Monrovia	NA	2,440	2,440	2,450	2,490	2,460
Duarte	NA	2,660	2,740	2,750	2,760	2,750
Irwindale	NA	3,150	2,850	3,000	2,940	2,950
Azusa	NA	NA	3,210	3,220	3,240	3,230
Glendora (Ada)	NA	NA	2,780	2,840	2,810	2,800
Glendora (Auto Center)	NA	NA	1,300	1,360	1,450	1,990
San Dimas (Cataract)	NA	NA	900	910	2,490	2,500
San Dimas (Arrow/SP)	NA	NA	450	NA	NA	NA
Pomona	NA	NA	NA	NA	940	940
Claremont	NA	NA	NA	NA	1,200	1,220
SP BALDWIN PARK BRANCH						
Montclair	NA	NA	NA	NA	520	560
Upland	NA	NA	NA	NA	870	1,010
RC - Vineyard	NA	NA	NA	NA	880	690
RC - Alta Loma	NA	NA	NA	NA	780	170
RC - Haven	NA	NA	NA	NA	170	417
RC - Rochester	NA	NA	NA	NA	10	60
RC - East	NA	NA	NA	NA	470	110

Table 7.2
Light Rail Station Boarding Estimates

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ALTERNATIVE Light Rail	Alt. 1 Pasadena to Arcadia	Alt. 2 Pasadena to Irwindale	Alt. 3 Pasadena to San Dimas	Alt. 4 Pasadena to San Dimas; San Dimas to San Bernardino	Alt. 5 Pasadena to Montclair; Montclair to I-15	Alt. 6 Pasadena to Montclair; Montclair to San Bernardino
ROUTE 30 CORRIDOR						
Wheeler	NA	NA	NA	1,780	NA	NA
Towne	NA	NA	NA	340	NA	NA
Mountain	NA	NA	NA	170	NA	NA
Euclid	NA	NA	NA	140	NA	NA
Amethyst	NA	NA	NA	550	NA	NA
Haven	NA	NA	NA	270	NA	NA
Rochester	NA	NA	NA	90	NA	NA
East	NA	NA	NA	40	NA	NA
Cherry	NA	NA	NA	290	NA	170
Citrus	NA	NA	NA	460	NA	290
Sierra	NA	NA	NA	280	NA	270
Ayala	NA	NA	NA	20	NA	170
Riverside	NA	NA	NA	505	NA	510
Medical Center	NA	NA	NA	2,100	NA	2,120
Highland/E Street	NA	NA	NA	1,600	NA	1,840
Baseline/Mountain View	NA	NA	NA	940	NA	680
Civic Center	NA	NA	NA	970	NA	1,020
Central City Mall	NA	NA	NA	940	NA	920

Note: Line ridership totals include all trips traveling on segment between designated end points; trips produced on segment, trips attracted to segment from outside, and trips passing through segment.

Table 7.3
Commuter Rail Station Boarding Estimates

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ALTERNATIVE	Alt. 1	Alt. 2	Alt. 3
Commuter Rail	Arcadia to Pomona	Arcadia via Irwindale & Claremont to I-15	Arcadia to San Dimas; Montclair to I-15
ATSF ROW			
Arcadia	270	NA	NA
Monrovia	NA	NA	NA
Duarte	450	NA	NA
Irwindale	1,220	1,710	NA
Azusa	NA	NA	NA
Glendora (Ada)	960	2,180	NA
Glendora (Auto Center)	NA	NA	NA
San Dimas (Cataract)	1,670	750	NA
San Dimas (Arrow/SP)	NA	NA	NA
Pomona	NA	NA	NA
Claremont	NA	NA	NA
Montclair	NA	NA	NA
SP ROW			
Upland	NA	700	560
RC - Vineyard	NA	NA	NA
RC - Alta Loma	NA	390	390
RC - Haven	NA	NA	NA
RC - Rochester	NA	360	300
RC - East	NA	NA	NA

Note: Segment ridership does not equal boardings due to trips destined to and returning from outside segment.
Added commuter rail service only in Alternative 1-3.

7.4 Conclusions and Patronage Estimates

The following key points can be concluded from the patronage analysis:

- There appears to be insufficient demand for a direct long distance commuter rail connection into Pasadena from San Bernardino County. (This conclusion is based on SCAG model data, which is currently being updated by SCAG to reflect more recent development patterns in San Bernardino County. This conclusion should be verified when the updated model data is available.)

- The planned alignment for long-distance commuter rail on the ATSF ROW in San Bernardino County and the SP ROW in Los Angeles County will best serve regional commuter rail demand into downtown Los Angeles.

- There is substantial demand within the San Gabriel Valley for local movements and travel to Pasadena and downtown Los Angeles that is best served by light rail in the ATSF right-of-way.

- While the use of the ATSF between Pomona and Irwindale and the SP Azusa Branch to Baldwin Park would provide good commuter rail connections, there would be a relatively low additional demand for such connections given the planned service only 2-3 miles to the south.

- Although the SP ROW in San Bernardino County could potentially provide good feeder service to Los Angeles County and the regional commuter rail service, there is a low demand for both light rail and commuter rail service on this ROW.

- There is low demand for light rail in the Route 30 corridor. Rail service in this corridor would likely be a duplication of commuter rail service on the ATSF ROW to the south. Demand to Pasadena is low throughout this corridor. The low density residential uses and long station spacing within this corridor are principal reasons for the low patronage forecasts. The highest potential for ridership is east of I-15 into San Bernardino. This is also where the best opportunities exist to modify and densify land use plans to encourage transit use and increase ridership potential in San Bernardino County.

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8. TRAFFIC IMPACT ASSESSMENT

8.0 Traffic Impact Assessment

A preliminary traffic impact assessment was performed along the entire study corridor. Because of the length of the corridor, gaps in the availability of traffic counts and the preliminary nature of this study, a detailed, quantitative analysis could not be performed. Instead, the traffic assessment was more general in nature and focused on two areas: potential traffic issues, impacts and solutions at station locations; and at grade crossings with the street system along the corridor.

8.1 Station Area Traffic Issues

To assess station area impacts, the amount of peak hour vehicle traffic generated at each station was projected. The methodology for these forecasts included the following steps:

1. A typical mode of access split for rail stations was estimated based on station access percentages at existing California rail transit stations. For light rail, access percentages were based on data from the Long Beach Blue Line, San Diego Trolley and Sacramento Rail Transit. For commuter rail, access percentages were based on data from the AMTRAK San Diegan and Orange County Commuter train, and the Caltrain commuter service in Northern California.

2. This typical mode of access split was then refined to produce a station by station estimate, depending on such factors as available transit service, available parking, proximity to major employment centers, etc.

3. The mode of access percentages were applied to projected boarding totals at each station, and a p.m. peak hour factor was applied to determine peak hour vehicle trips.

4. A preliminary estimate of potential idea of added traffic volumes on major streets around each station was prepared. Where traffic volumes at a station would vary by alternative, the worst case alternative was used.

The results of the traffic impact assessment at station areas are summarized in Table 8.1. The table identifies the arterials and intersections most likely to be affected, potential roadway and signalization improvements, and other pertinent traffic issues around stations. Key conclusions from this assessment include:

- Commuter rail stations will generate much more vehicle traffic than light rail stations. Over 90% of commuter rail patrons can be expected to access the station by automobile, while less than half of light rail patrons will be likely to use a car to reach the station.

- Adverse traffic impacts are most likely at the western San Gabriel Valley stations along the ATSF ROW since station boarding totals will be highest in that area. Roadway geometric and signalization improvements may be necessary adjacent to station locations.

- Minimal traffic impacts would be expected at stations along the SP ROW in San Bernardino County because of low potential station boarding totals.

- Traffic impacts would also be minimal at most stations on the Route 30 alignment because of the extremely low station boarding totals.

8.2 Grade Crossings

There are over eighty at-grade crossings of the rail tracks and streets along the rights-of-way studied in the corridor. While it was not possible to address this high number of crossings quantitatively, a review was conducted based on an inventory of all crossings, including location, type/configuration of crossing, traffic data where available, and estimated traffic volumes in the year 2010.

At-grade crossings require control systems to protect street traffic from passing trains. The general form of control is the same for both light rail and commuter rail, this being barrier gates which are lowered across the street as the train passes. The gates are accompanied by flashing lights, warning bells, and other signage as appropriate. The design, placement and operation of the gate system is regulated by the Public Utilities Commission in the State of California.

One of the principal issues regarding at-grade crossings is the kind of impact that lowering gates every so often across a street has on the traffic conditions on the street, and whether significant traffic delays or congestion is caused. The kind of impact generally is determined by the frequency of train operation. It is also determined by the location and physical configuration of the crossing. Both light rail and commuter rail trains typically require the gates to be down for only about 40 seconds for a single train passing. This is significantly less time than is often required for a much longer, slower moving freight train.

In general, the simplest form of at-grade crossing with the lowest potential impact is the mid-block crossing where the tracks cross the street between intersections. Typically, there is sufficient distance between the tracks and adjacent intersections for traffic to queue while the gates are down without causing backups into intersections.

Crossings immediately adjacent to intersections and parallel to one of the streets can also typically be handled without significant traffic impacts, because gate control can be coordinated with the regular traffic signal at the intersection. Some turn restrictions may be necessary while trains are passing, but usually traffic on the parallel street can continue to flow simultaneously with the passing train.

This configuration leads to more significant problems if the tracks cross up to 150 feet away from the intersection, as the short distance between the tracks and intersection can be difficult to control, with potential queue backups across the tracks and into the intersection. Careful design and development of signal and gate control procedures can usually mitigate these circumstances, however.

The most difficult configuration is where the tracks pass diagonally through the center of the intersection, because all intersection approaches must be stopped to allow trains to pass.

The inventory of at-grade crossing is summarized in Table 8.2 The inventory identifies the street location, type/configuration of crossing, current and projected daily traffic volumes (if available), and potential traffic and/or train control issues.

8.2.1 Commuter Rail

Typical commuter rail headways would be 30 minutes, with service primarily in the peak direction. This would typically result in three to four trains per hour during the peak period. Since trains would pass by relatively infrequently, significant traffic impact problems would not, in general, be expected at grade crossings on the commuter rail alternatives in the study corridor. Gate crossing protection should be installed at all grade crossings on the commuter rail line, but should not cause significant traffic problems.

In the longer term, if train service frequency were to be increased, and if traffic volumes increase in future years, then four arterial roadway crossings should be studied further. These are Santa Anita Avenue, Euclid Avenue, Archibald Avenue, and Haven Avenue. By the year 2010, traffic volumes on these streets could exceed 40,000 daily vehicles, which would warrant consideration of grade separations at these locations.

8.2.2 Light Rail

Light rail service will typically operate at 10-minute headways in both directions during peak periods, resulting in about twelve trains per hour, or a train passing through an at-grade crossing about every five minutes on average. This more frequent rate of occurrence means that light rail has a much higher potential for impacts on street traffic than commuter rail. The shorter intervals between trains provides less time for traffic queues to dissipate and for traffic to "recover" before the next train arrives.

In general, there are three different strategies for dealing with at-grade crossings of light rail systems with surface streets.

LRT priority - In this strategy priority at the crossing is given to the light rail train, which automatically triggers a lowering of the crossing gates on its approach. This is called LRT "pre-emption," because the crossing gates are always lowered for the light rail train irrespective of prevailing traffic conditions on the street. This is a common method of operation for light rail systems and works very well even on arterial streets with low to moderate traffic volumes.

No LRT priority - On streets with higher traffic volumes, or some traffic congestion, it is not always possible to afford light rail priority at the crossing. In these cases, the light rail train is sometimes stopped prior to the crossing and waits a short while before proceeding in a manner that minimizes traffic queuing and disruption of traffic on the arterial roadway. This action can sometimes be coordinated with an adjacent station stop to minimize delays to the light rail service.

Grade Separation - In cases where traffic volumes are extremely high, with frequent light rail train service, and the potential exists for significant delays to either the light rail or traffic flow, then grade separation sometimes becomes necessary at the crossing. Due to the expense of this solution grade separation is usually considered a last resort strategy. If grade separation is required then studies need to be conducted to determine whether the change in elevation should be accommodated on either the rail line (which has more significant grade limitations) or the crossing roadway.

At a substantial majority of the at-grade crossings along the corridors studied in the San Gabriel and San Bernardino Valleys, traffic volumes are low, and the at-grade crossing is at a mid-block location. It should therefore be possible to provide LRT priority at many of these crossings with negligible impacts on the street system and roadway traffic.

A number of crossings have been identified where the unrestricted provision of LRT priority may not be feasible. At these locations some degree of LRT control may be necessary to minimize impacts or to minimize impacts on traffic flow, during peak periods. During off-peak periods, LRT priority should be possible. These locations are the following:

Santa Anita Avenue - The high traffic volume, particularly on certain days during race track operations, and the proximity of the crossing to the intersection of Santa Anita Avenue and Colorado Boulevard and the station entrance on Santa Anita Avenue may make LRT priority infeasible at this location.

Myrtle Avenue - While Myrtle carries only moderate traffic volumes, the tracks cross Myrtle Avenue about 100 feet from the intersection with Duarte Road. This location should be carefully studied to determine geometric improvements that may be necessary, as well as a crossing control strategy for light rail that is coordinated with the traffic signal at the Myrtle/Duarte intersection.

Foothill Boulevard/Grand Avenue - At this location the tracks run diagonally through the center of the intersection, requiring that traffic be stopped on all streets (all red signal) to let light rail pass. This would be particularly disruptive to traffic operations at the intersection, particularly if light rail were afforded priority to pre-empt the signal at any time. At this location it will be necessary to study further potential light rail control strategies to consider ways of coordinating train passage through the crossing to minimize the frequency of such events, and to determine the level of impact on traffic operations.

<u>Lone Hill Avenue</u> - While there are only moderate current traffic volumes at this location, this at-grade crossing is close to the intersection with Auto Center Drive, close to intersections with freeway ramps to the north, and will also be in close proximity to a station site and entrance driveways, as well as being adjacent to the Glendora Auto Mall and a potential shopping mall.

<u>Garey Avenue</u> - Garey Avenue currently handles moderate traffic volumes. However this crossing will potentially handle both light rail transit service and commuter rail transit service, which combined could lead to a high frequency of crossings at the roadway. In the future if traffic volumes increase significantly on Garey it will be unlikely that priority can be afforded to the train service at the crossing. This crossing will also be adjacent to the proposed Pomona Transportation Center which will tend to increase vehicular activity at and in the vicinity of the crossing. This location should be carefully studied to evaluate potential train control strategies.

In San Bernardino County there are four roadways where LRT priority may not be feasible in the long term. These are Indian Hill, Euclid Avenue, Archibald Avenue, and Haven Avenue. LRT priority should be feasible at Indian Hill Boulevard unless traffic volumes increase significantly in the future. At Euclid, Archibald and Haven, traffic volumes are already at or above 30,000 vehicles a day, and could potentially well exceed 40,000 vehicles a day in the future. These high levels of traffic may preclude LRT priority at these locations. Depending on specific circumstances at each location, grade separations are often considered as a potential solution where traffic volumes exceed 40,000 vehicles a day, and under certain circumstances may need to be considered in the 30,000 - 40,000 vehicles a day range. However, they are not necessarily required nor always necessary, depending on local circumstances.

All of the above locations will need to be studied in further detail depending on which rail system alternative may be implemented. For light rail, grade separations may not be necessary at start-up, but may need to be considered in the longer term, depending on the potential effectiveness of light rail control strategies. If such strategies would lead to unacceptable levels of delay to the light rail system, then grade separations may need to be considered. Based on this preliminary review, potential candidates for grade separation of street crossings would include the following locations:

- Santa Anita Avenue (Arcadia)
- Foothill Boulevard/Grand Avenue (Glendora)
- Lone Hill Avenue (San Dimas)
- Garey Avenue (Pomona)

- Euclid Avenue (Upland)
- Archibald Avenue (Rancho Cucamonga)
- Haven Avenue (Rancho Cucamonga)

Detailed further studies would be necessary at these locations to determine if grade separations were the most effective strategy, and to define engineering and cost options. It should also be noted that in San Bernardino County, the patronage forecasts indicated relatively low ridership levels. The operating frequency of light rail could thus be somewhat longer than the 10-minute headway assumed for this analysis, which would reduce the level of input and could push consideration of grade separation issues further into the future.

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Table 8.1
Traffic Issues at Station Sites

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Station Location	Potentially Impacted Arterials - PM Peak	Potentially Impacted Intersections - PM Peak	Potential Improvements	Other Issues
ATSF Pasadena Subdivision				
Arcadia (First Street)	Santa Anita Avenue - 110-200 added vehicles.	Santa Anita/Huntington Santa Anita/Colorado	Signalization may be needed at Santa Anita/St. Joseph with intersection improvements for station access. Realign Front Street and St. Joseph Street for improved access.	
Monrovia (Myrtle Avenue)	Duarte Road - up to 110 added vehicles. Myrtle Avenue - up to 90 added vehicles.	Duarte/Myrtle		
Duarte (Mountain Avenue)	Duarte Road - up to 90 additional vehicles. Mountain Avenue - 50 to 60 additional vehicles.	Duarte/Mountain	Duarte/Mountain intersection should be realigned to improve geometrics Possible signal timing adjustments at Duarte/Mountain	
Irwindale (Irwindale Avenue)	Irwindale Avenue - added volumes; 300-400 if transfer station 160-220 if LRT only 100-170 if CR only	Irwindale/Adelante Irwindale/Foothill	May need signal & geometric improvements at Irwindale/Adelante for full access. Re-design Irwindale/Montoya to provide access to station site.	

Table 8.1
Traffic Issues at Station Sites

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Station Location	Potentially Impacted Arterials - PM Peak	Potentially Impacted Intersections - PM Peak	Potential Improvements	Other Issues
Azusa (Azusa Avenue)	San Gabriel - up to 100 added SB vehicles. Foothill - 100-200 EB added vehicles.	Foothill/San Gabriel Foothill/Azusa		Alameda Avenue and Dalton Avenue must remain open as through streets for access to City Hall and Police Dept.
Glendora (Glendora Avenue)	Glendora Avenue - 100-180 added vehicles.	Alosta/Glendora Glendora/Foothill	One-way circulation loop in front of station.	
Glendora (Auto Centre Drive)	Lone Hill - up to 110 added vehicles.	Lone Hill/Auto Center		Excellent freeway access with Lone Hill and Auto Centre Drive.
San Dimas (Cataract Avenue)	Bonita Avenue - 75-115 added EB vehicles, 35-60 added WB. Cataract - 35-60 added SB.	Bonita/Cataract San Dimas/Bonita	Signalization may be needed at Bonita/Cataract. May also need geometric improvements at Bonita/Cataract.	
San Dimas (Walnut/Arrow)	Arrow Highway - minor added volume.	Walnut/Arrow	May need signal at station entrance on Arrow Hwy.	High rail-to-rail transfer; low auto access boardings.
San Dimas (Arrow/Wheeler)	Arrow Highway - minor added volumes. Wheeler Avenue - minor added volumes.	Arrow/Wheeler Arrow/San Dimas Cyn.		High rail-to-rail transfer; low auto access boardings.
Pomona (Fulton/Garey)	Fulton Road - up to 90 added vehicles.	Fulton/Arrow		Access for new service on Fulton only.
Claremont (College)	College Avenue - up to 90 added vehicles (residential street).	College/First	May need signal at College/First.	

Table 8.1
Traffic Issues at Station Sites

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Station Location	Potentially Impacted Arterials - PM Peak	Potentially Impacted Intersections - PM Peak	Potential Improvements	Other Issues
SP Baldwin Park Branch				
Montclair (Monte Vista Avenue)	Monte Vista, Central Ave. - minor increase in volume.	Monte Vista/Arrow Central/Arrow	Extension of Richton St.	Need for good pedestrian access between platforms on SP & ATSF ROWs.
Upland (Third-Sixth Avenues)	Euclid Avenue - minor increase in volume.	Euclid/C Street		Very close to commuter rail station on ATSF at Upland. Possible duplication.
Rancho Cucamonga (Vineyard/Carnelian)	Vineyard/Carnelian - minor increase in volume. Foothill Boulevard - minor increase in volume.	Vineyard/Foothill Carnelian/San Bernardino	Extension of San Bernardino Road west across Cucamonga Creek to station site.	
Rancho Cucamonga (Baseline/Amethyst)	Baseline Road - minor increase in volume. Amethyst Avenue (residential street).	Baseline/Amethyst, Baseline/Archibald	Access improvements adjacent to grade-crossings at Baseline and Amethyst.	May impact adjacent residential access, particularly to north.
Rancho Cucamonga (Haven Avenue)	Haven Avenue, Baseline Road - minor increases in volume.	Haven/Baseline Haven/19th Street	Geometric improvements at station driveway on Haven Avenue.	
Rancho Cucamonga (Rochester Avenue)	Rochester Avenue - minor increase in volume.	Rochester/Victoria Park Rochester/Baseline		
Rancho Cucamonga (East Avenue)	Base Line Rd., East Ave., Victoria St. - minor increases in volume.	East/Baseline East/Freeway Ramps	New SB off-ramp from I-15 to P&R lot and East Ave. New intersection of station driveway with East Avenue.	New off-ramp minimizes traffic impacts at East/Baseline intersection.

Table 8.1
Traffic Issues at Station Sites

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Station Location	Potentially Impacted Arterials - PM Peak	Potentially Impacted Intersections - PM Peak	Potential Improvements	Other Issues
Route 30 ROW				
La Verne (Wheeler Avenue)	Foothill Blvd. - 80-100 added vehicles. Wheeler Ave. - about 50 added vehicles.	Foothill/Wheeler	Intersection geometric improvements and possible traffic control improvements at station driveway and Foothill.	Exact station site & access points need to be determined by further study.
Route 30 Stations - Towne to Ayala	Minor added volumes on N/S arterials at stations. Minor added volumes on E/W streets north and south of freeway.	Intersections between N/S arterial at station and E/W arterial north and south of freeway	Probably not required - low boarding totals result in low traffic volumes	Impacts difficult to project because of prototypical nature of most stations
Medical Center	Highland Avenue - up to 75 added vehicles	Highland/Medical Center	At-grade alignment in Highland Avenue would require modifications to street geometry and intersection (including traffic control) at Highland/Medical Center Drive	Feasibility of at-grade station needs to be studied further.

9. ENVIRONMENTAL ASSESSMENT

9.0 Environmental Assessment

A preliminary analysis of environmental issues or constraints was conducted to identify potentially significant environmental issues associated with the alternative alignments and station locations and to determine whether those issues affect the viability of the transit alternatives.

9.1 Methodology

Listed below are the impact categories that were investigated for potentially significant impacts or constraints. The data sources that were reviewed and surveys conducted are also identified below.

Noise - A windshield survey was conducted to identify noise sensitive uses (i.e., residences, hospitals, schools and parks) along the alternative alignments and their proximity to the proposed rail rights-of-way (ROW) and station sites. Aerial photos and Thomas Brothers maps were also used to verify the existence and location of sensitive uses.

The alternative technologies under consideration are light rail and commuter rail. The projected Community Noise Equivalent Levels (CNEL) generated by LRT vehicles (172 trains per day) traveling at 55 mph on the Blue Line are 66 dBA at 50 feet from the track centerline and 63 dBA at 100 feet. CNEL is an integrated measure of noise over a 24-hour period that is commonly used to determine noise impacts. CNELs typically range from about 40 to 47 dBA in rural areas, 52 to 60 dBA in suburban and low-density urban areas, and 57 to 67 dBA in urban areas. Generally, a 5 dBA increase in CNEL is considered significant; however, recent draft Federal Transportation Administration (formerly UMTA) guidelines establish noise impact criteria which allow larger CNEL increases in quiet areas and smaller increases in areas with high ambient noise levels. The maximum noise level (Lmax) due to the passby of an LRT vehicle traveling at 55 mph is 87 dBA at 50 feet and 82 dBA at 100 feet.

For comparison, diesel-powered commuter rail trains travelling at a speed of 80 mph would result in a Lmax of 95 dBA at 50 feet or about 8 dBA more than the projected Lmax from an LRT vehicle travelling at a maximum speed of 55 mph. Since commuter rail systems generally focus on providing peak-period service with typical intervals of 30 to 60 minutes between trains, there are substantially fewer commuter rail trains per day than LRT trains. A commuter rail system similar to the proposed Metrolink system with 10 trains per day and train speeds of 80 mph would result in an estimated CNEL of 63 dBA at 50 feet and 58 dBA at 100 feet.

Parklands, Historic and Recreation Areas - Sections 106 and 4(f) - Windshield surveys and a review of Thomas guide maps, U.S.G.S. maps and aerial photos were conducted to identify parklands and recreation areas in the immediate vicinity of the proposed alignments. Historic resources were identified using the following historic resource lists or designations: the National Register of Historic Places; the California Historical Landmarks; the California Points of Historical Interest and the Los Angeles County Points of Historic Interest. Resources previously determined eligible for inclusion in the National Register were obtained from listings in the Federal Register and also a "Historic Properties Survey Report: Interstate 215, San Bernardino County Widening and Interchange Improvements" completed in September 1991 for Caltrans. Previously documented historic/ architectural resources surveys reviewed include: the "Historic Resources Reconnaissance Survey: San Bernardino, California" prepared on April 30, 1991 for the City of San Bernardino Department of Planning and Building Services. The documentation investigation was limited to a study area within approximately 500 feet of the proposed project alignments.

Floodplains and Drainage - The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) and the Los Angeles County Department of Regional Planning Flood and Inundation Hazards Map were reviewed to determine if the proposed alignments and station sites are located within 100-year floodplains. A review of U.S.G.S. maps was also conducted to identify the presence of blueline streams in the corridor.

Biological Resources - The California Department of Fish and Game (CDFG) Natural Diversity Data Base (NDDB) was reviewed to determine if sensitive species and habitats are located in the vicinity of the proposed alignments and stations.

Hazardous Waste - The state Office of Planning and Research Hazardous Waste and Substances Sites List (March 1990) was reviewed to identify listed sites in the immediate vicinity of the proposed alignments and stations.

Seismicity - The state Alquist-Priolo Special Studies Zones maps were reviewed to identify areas subject to fault rupture hazards. The Los Angeles County Regional Planning Department Liquefaction Map was also reviewed to determine if the proposed alignments and station sites are located in areas that are subject to a high risk of liquefaction in the event of a major earthquake.

Air Quality - A qualitative assessment was conducted of the potential local and regional air quality impacts of the proposed alternatives. Localized air quality impacts would occur in the vicinity of stations due to the pollutant emissions from automobiles and buses travelling to and from those stations. At intersections experiencing high volumes of traffic in areas with poor air quality, it is possible that carbon monoxide (CO) "hot spots" could occur with one- or eight-hour exceedances of federal CO standards. Generally, however, both commuter rail and light rail systems are likely to have an overall beneficial impact on air quality due to the reduction in motor vehicle miles travelled and the corresponding improvements in the level of congestion on local streets and highways.

The greatest air quality benefits would occur with implementation of light rail rather than commuter rail due to the higher ridership volumes that can be achieved with frequent LRT train service and the fact that the light rail vehicles are electrically powered and nonpolluting. (Generation of the electricity to power light rail vehicles would result in pollutant emissions; however, more than half of the electricity supplied to the Southern California region is generated outside the South Coast Air Basin).

Land Use - General land uses (e.g. residential, commercial, industrial and open space) were identified along each of the alignments based on the results of field surveys and a review of maps and aerial photos. Potential land use impacts include the potential acquisition and displacement of existing land uses to accommodate the proposed alignments and stations. Also assessed was the compatibility of the proposed transit systems and stations with adjacent land uses. Consideration was given to both the "transit compatibility" and "environmental" compatibility of potential transit facilities with adjacent land uses.

Transit compatibility is defined as the ability of different uses to function together in a manner that is mutually supportive. For example, a transit facility in an area of high commercial activity is a compatible use because it provides an efficient way for people to reach the commercial center, and the presence of the commercial center, in turn, generates riders for the system. Uses with high compatibility to a transit station would therefore include office commercial and high-density multi-family residential uses. Uses with moderate compatibility are single-family residential, heavy and light industry, and institutional uses. Open space is considered to be incompatible with a transit station. However, a transit system or station may be considered environmentally less compatible if the adjacent land uses are sensitive to the adverse effects resulting from transit system operations such as potential increases in traffic, noise and vibration, air pollutants or light and glare.

9.2 Issues and Constraints

The potentially significant environmental issues or constraints, are summarized below. It should be recognized, however, that these issues have been identified based on the results of a preliminary review. As the project and environmental process proceeds, additional analysis would be required to determine the areas of potential effect and the precise extent and significance of potential impacts.

Also critical to determining the significance of potential effects and whether those impacts affect the viability of the alternatives are the applicable criteria and environmental regulations. Federally funded projects are subject to federal (NEPA) environmental regulations. Federal environmental regulations, in some instances, establish more stringent significance criteria than the state CEQA guidelines and may also require the preparation of special studies in conjunction with a formal consultation and review process. Preparation of these special studies and an impacts evaluation based on the criteria established by federal agencies could, therefore, lead to determinations of significance that would not otherwise occur under CEQA regulations. In addition, the time required to prepare, review and process the special studies and to develop and implement mitigation measures in compliance with federal regulations could have a significant impact on the project schedule and cost.

Two issues or constraints which may be significant and require additional review and study include the noise impacts of LRT operations and the possible presence of endangered species in the vicinity of the proposed alignments.

Noise-sensitive land uses near the LRT alignments under consideration could experience significant adverse noise impacts due to LRT operations. Those areas where the noise impacts may be of the greatest concern due to the proximity and number of adjacent residences include: the segment of the SP Baldwin Park Branch through the City of Rancho Cucamonga (Alternatives 5 and 6); Wheeler Avenue in La Verne (Alternative 4); and some of the arterial alignments between the Route 30 corridor and downtown San Bernardino (Alternatives 4 and 6). The SP Baldwin Park Branch through Rancho Cucamonga currently experiences very little freight rail traffic. Therefore, a large increase in the number of trains due to implementation of LRT operations may result in significant noise impacts at adjacent noise-sensitive residential uses. The greatest impacts could occur in the vicinity of grade crossings where adjacent uses would experience the cumulative effect of noise from warning bells, train horns and train passby noise.

The possible presence of endangered species and habitat in the vicinity of the proposed alignments may also be a constraint. A listed endangered bird species, the Least Bell's Vireo, has been sighted in gravel pits in the City of Irwindale upstream of where the ATSF Pasadena Subdivision crosses the San Gabriel River. Riparian vegetation, which may also be present in the vicinity of the railroad crossing, is important as habitat for the vireo and for other species. Alternatives 2 through 6 would require construction of a new bridge across the San Gabriel River to accommodate LRT tracks. The impact of construction activities on critical habitat of the vireo is a potentially significant issue. Alternative 2 also includes implementation of commuter rail service along the SP Azusa Branch. This alignment passes near the locations of the vireo sightings in Irwindale. Lytle Creek Wash in the vicinity of the proposed Route 30 Freeway may contain Santa Ana River Woollystar, which is listed as an Endangered plant species by both the state and federal governments.

In order to determine the presence of the Endangered species identified above, field surveys should be conducted to verify the presence of the Least Bell's Vireo and its habitat and the Santa Ana River Woollystar. If the project is federally funded, a Biological Assessment would have to be prepared if the listed species or their habitat are within the project impact area. The purpose of the Biological Assessment is to provide information on the species status and how the project may affect the species and any critical habitat. Section 7 of the federal Endangered Species Act requires federal agencies to ensure any action authorized, funded or carried out by them is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of its designated critical habitat.

Another issue is the encroachment into 100-year floodplains of 3 proposed station sites in Rancho Cucamonga: at Haven Avenue along the SP ROW (Alternatives 1, 2, 3, 5 and 6); and at Amethyst Street (Alternative 4) and Haven Avenue (Alternative 4) along the Route 30 ROW.

Impacts to historic resources may also be a significant issue. The proposed LRT station at Euclid Avenue (Alternative 4) in Upland would require acquisition of a historic property, the R.T. Nelson House. Acquisition and demolition of the structure would be a significant impact that could affect the viability of this station site. Euclid Avenue and the Henry G. Eckstein House are other historic properties which could be affected by the Euclid Avenue station. The Pitzer House in Claremont, which is listed on the National Register of Historic Places, is located immediately west of the proposed LRT station at Towne Avenue (Alternative 4). The station site at East Avenue (Alternative 4) in Rancho Cucamonga may affect the Ernst Mueller House at 6563 East Avenue. There are also a large number of significant historic properties in San Bernardino some of which may be affected by an LRT alignment. Potential impacts could include noise and vibration, visual or right-of-way acquisition of historic properties.

Finally, it should be noted that the environmental clearance process for federally funded projects requires that a survey of properties along the project alignment be conducted to identify all historic structures within the area of potential effect that are potentially eligible for listing on the National Register. The federal regulations also require a determination of the effects of the project on those structures. Should it be determined that the project could result in significant adverse impacts, e.g. significant noise or vibration impacts, or require the acquisition of property from a significant historic resource, then the viability of that alternative may be in jeopardy.

9.3 Environmental Clearance Process

In 1978, the California State legislature passed an exemption (amended in 1982) from the regulations of the California Environmental Quality Act (CEQA) for "a project for the institution or increase of passenger or commuter services on rail or highway rights-of-way already in use" (Section 21080 (b)(11) of CEQA). Thus, preparation of an environmental document (Negative Declaration or an Environmental Impact Report (EIR)) is not required for projects that qualify under Section 21080 (b)(11).

The proposed Southern California Metrolink commuter rail lines are considered to be exempt from CEQA and a Notice of Exemption has been filed by the Southern California Regional Rail Authority (SCRRA). Filing of the Notice of Exemption starts a 35-day statute of limitation period on legal challenges to the lead agency's decision that the project is exempt from CEQA.

It is assumed that any additional commuter rail lines instituted on existing rail rights-of-way in the San Gabriel/San Bernardino Valley corridor would also be exempted from CEQA by SCRRA. It should be noted, however, that the exemption does not prohibit the lead agency from preparing an environmental document if it so desires. In addition, although the exemption has been broadly interpreted by the state supreme court, the exemption may not cover new stations or other rail facilities that require substantial right-of-way outside the existing railroad right-of-way. In those instances, a Negative Declaration would be appropriate if there are no significant adverse impacts or the project is revised to mitigate ing light rail unit costs: fare collection, parking spaces, station signs and graphics. The communications cost was estimated to be 50% of the estimate light rail cost ($500,000 per mile vs. $1 million for LRT).

Other Costs

Professional services were estimated at 15%, compared to 34% for light rail. This reflects the relatively simple design required for construction work. It also reflects the fact that a large portion of the capital cost for commuter rail is the vehicles, which can be bought "off-the-shelf," with very little design work.

Add-ons for testing, insurance, and agreements were assumed to be the same as for light rail, except that the latter two add-ons were not applied to vehicle procurement.

Contingencies were estimated at 15%. This is slightly higher than for light rail (10%), reflecting the fact that commuter rail unit costs were not based on final contract costs, as opposed to the LRT unit costs.

Quantities

Quantities for the commuter rail alternatives were based on the conceptual engineering work. Parking quantities were developed from station site plans. Rail vehicle requirements were estimated from operating plan data. Table 10.4 summarizes the quantities that were used to produce the capital cost estimates.

10.1.3 Capital Cost Estimates

Capital cost estimates are summarized in Table 10.5. The capital cost estimates are through the start-up period, and included testing and pre-operations, insurance, master agreements, professional services and contingencies. They also include right-of-way costs. The ROW is generally sufficient for construction of the track, although additional land may be required at station locations, depending on the property included in the recent ATSF ROW purchase and ultimate station site configurations.

Capital costs were estimated separately for light rail and commuter rail segments, and then combined into for each alternative. The capital costs by alternative range from $316 million for Alternative 1 (light rail and commuter rail to Arcadia) to $1,948 million for Alternative 6 (light rail between Pasadena and San Bernardino). Light rail costs range from $33 to $39 million per mile. This is somewhat lower than other corridors in the county, and reflects the good condition of the railroad ROW and the relatively simple engineering of the line with limited aerial structure.

Capital costs estimates for extension of the Blue Line are estimated at $124 million to Arcadia, $351 million to Irwindale, $682 million to San Dimas, and $841 million to Montclair. Light rail costs in San Bernardino would total $1,267 million from San Dimas to downtown San Bernardino in the Route 30 corridor.

Table 10.4
Capital Cost Input Summary – Commuter Rail

ALTERNATIVE:	1	2	3	2
	Arcadia to Pomona	Baldwin Park via Irwindale to Pomona	Montclair to I-15	Baldwin Park via Irwindale & Claremont to I-15
Guideway				
Grading new track	0.2	0.0	0.0	0.0
Grading 2nd track	6.2	6.0	6.2	12.2
Grading existing track	0.0	2.6	12.3	14.9
Bridge, new	469	404	374	778
Bridge, rehabilitate	1318	253	133	386
Total Length:	17.2	13.9	12.3	26.2
Stations				
Station (one track)	3	3	1	4
Station (two tracks)	2	0	3	3
Parking spaces	2,020	1,625	2,205	3,830
Yards & Shops				net
Layover Yard Base	1	0	1	1
Layover Yard (track)	8	9	8	11
Shops				
Vehicles				
Locomotives	7	9	7	*11*
Passenger Cars	27	35	27	*44*
				net
Equipment				
Trackwork:	6.4	8.6	18.5	27.1
Turnout (medium speed)	6	6	6	12
Turnout (slow speed)	29	31	0	31
Replace rail, 1/3 ties	17.2	11.3	0.0	11.3
Signals (interlocking)	6	5	6	11
Signals (intermediate)	23.2	19.9	18.5	38.4
Signals (turnouts)	29	31	0	31
Highway Crossing	37	34	30	64

Source: Manuel Padron & Assoc., R.L. Banks & Assoc.

Table 10.5
Capital Cost Summary

ALTERNATIVE:	1	2	3	4		5 & 6	5		6	
LIGHT RAIL	Pasadena to Arcadia	Pasadena to Irwindale	Pasadena to San Dimas	San Dimas San Bern.	Pasadena to San Dimas & San Bern.	Pasadena to Montclair	Montclair I-15 *via SP*	Pasadena to I-15	Montclair to San Bern. via SP, Rte. 30	Pasadena to San Bern. via SP, Rte. 30
Miles (double-track)	3.3	9	17.9	34.2	51.9	23.9	11.4	35.3	28.3	52.2
Stations	1	4	9	19	27	11	7	18	16	27
Parking Spaces	760	2,155	3,800	8,200	11,500	3,500	3,015	6,515	5,845	9,345
Yards & Shops	0	0.5	1	0.5	1.5	1	0.5	1.5	0.5	1.5
Rail Cars	7	23	44	49	93	51	12	63	42	93
Capital Cost (millions)	$124	$351	$682	$1,267	$1,934	$841	$376	$1,217	$1,107	$1,948
COMMUTER RAIL										
From:	Arcadia	Baldwin Pk.	Montclair							
To:	Pomona	East Ave.	East Ave.							
Miles (new)	17.2	26.2	12.3							
Stations (new)	5	7	4							
Parking Spaces	2,020	3,830	2,205							
Locomotives	7	11	7							
Rail Cars	27	44	27							
Capital Cost (millions)	$192	$296	$182							
TOTAL (LRT+CR)										
Miles	20.5	35.2	30.2		51.9			35.3		52.2
Stations	6	11	13		27			18		27
Parking Spaces	2,780	5,985	6,005		11,500			6,515		9,345
Rail Cars	34	67	71		93			63		93
Capital Cost (millions)	$317	$660	$866		$1,934			$1,217		$1,948

NOTES:
Vehicles are additional vehicles required.

Source: Manuel Padron & Associates, R.L. Banks & Associates, RCC.

Commuter rail costs are considerably lower, ranging from $11 to $15 million per mile. Capital costs of providing commuter rail service from Arcadia to Pomona would total $192 million, and between I-15 and Baldwin Park using the SP line in San Bernardino County, the ATSF through Glendora/Azusa, and the SP Azusa Branch, would total $296 million. The capital cost of commuter rail on the SP Branch between I-15 and Montclair would total $182 million.

It should be noted that the capital cost estimates for both commuter rail and light rail represent total costs, and include guideway, stations, vehicles, system costs, master agreements, professional services and contingencies.

10.2 Operating Costs

Operating costs for the six alternatives were estimated based on the operating plans outlined in Chapter 6. Operating cost estimates were prepared by mode and then combined for alternatives.

10.2.1 Light Rail Transit

Light rail operating costs were estimated using a model developed for LACTC by Manuel Padron & Associates. The model was initially developed for the Blue Line (Long Beach/Los Angeles), using costs from other similar West Coast light rail systems. The model has been subsequently revised to reflect the actual first-year operating costs for the Blue Line.

The model is a detailed resource build-up model, which includes every position classification, and all budget-line items for non-labor costs. Each item is related to one or more operating statistics, so that changes in system characteristics and/or levels of service will be reflected in appropriate cost changes.

Table 10.6 is a summary of the operating statistics that were used as input to the operating cost model. These statistics were derived from the operating plan statistics.

Operating cost estimates were calculated for each alternative and the baseline. Alternatives 4, 5, and 6 were split into two segments, generally reflecting the portions in Los Angeles and in San Bernardino Counties, although the operational split for Alternative 4 was assumed to be at San Dimas. The cost estimates are for the northern portion of the Blue Line; that is, everything north of 7th/Flower Station, including the Pasadena and Glendale Lines. The incremental costs of the extensions in the San Gabriel Valley corridor were also calculated along with various cost-effectiveness measures such as operating cost per passenger and cost per car mile.

10.2.2 Commuter Rail

The operating cost model for commuter rail was developed by Manuel Padron & Associates (MPA) under contract to the Southern California Regional Rail Authority (SCRRA), under

Table 10.6
Input to Operating Cost Estimates – Light Rail

DRIVING VARIABLE	Baseline 7th/Flower to Pasadena Year 2010	Alt. 1 7th/Flower to Arcadia Year 2010	Alt. 2 7th/Flower to Irwindale Year 2010	Alt. 3 7th/Flower to San Dimas Year 2010	Alt. 4 7th/Flower to San Dimas Year 2010	Alt. 4 San Dimas SAn Bern. Year 2010	Alt. 5&6 7th/Flower to Montclair Year 2010	Alt. 5 Montclair to I-15 Year 2010	Alt. 6 Montclair to San Bern. Year 2010
PASS (ANN TOT)	30	33.6	34.7	37.6	37.8	4.2	39.5	1.5	3.7
DIVISION	1	1	1.5	2	2	1	2	0.5	1
PEAKCAR	57	63	77	95	95	42	101	10	36
TOTALCAR	66	73	89	110	110	49	117	12	42
CARMILE	5.49	6.26	7.62	9.17	9.2	4.1	9.91	1.2	3.25
TRAINHOUR	112.7	120.0	143.6	161.4	161.4	61.6	170.2	19.1	52.8
ROUTEMILE	22.6	25.8	31.4	40	40	34.2	46.5	11.4	28.3
STATION	25	26	29	34	34	19	36	7	16
AERIAL	1	1	1	1	1	4	1	0	0
ATGRADE	19	20	23	28	28	15	30	7	16
SUBWAY	5	5	5	5	5	0	5	0	0
DAILY EXT PASS		15,900	19,600	29,200	30,100	14,000	35,500	5,000	12,200

Note: Data include entire Pasadena & Glendale Lines north of 7th/Flower.

Source: Manuel Padron & Associates

subcontract to Booz-Allen Hamilton. The general methodology and format of the model are similar to that of the light rail model. The commuter rail model was based on projected operating statistics and costs for the first three commuter rail lines: San Bernardino, Moorpark, and Santa Clarita.

SCRRA has contracted with AMTRAK to operate the service. The AMTRAK cost proposal identified staffing levels and costs for an initial and intermediate level of service for the first three lines. In addition, SCRRA's budget contains projections of costs for other functions such as marketing that will not be provided by AMTRAK. These functions are performed for the entire commuter rail system. The costs are allocated to the various lines, including San Bernardino, on the basis of train-miles. The commuter rail cost model has just recently been completed, and will be documented more fully in a subsequent report.

Table 10.7 contains the operating statistics that were used as input to the commuter rail cost model. It should be noted that these statistics are for the year 2010, and imply a higher level of service than in SCRRA's near-term cost projections. For example, longer service hours, including Saturday and Sunday service, are assumed by the year 2010. The model was run for the baseline, Alternatives 1 through 3. Alternatives 4 through 6 include the base level of commuter rail service, the same as the base line. Although the model was run for the entire SCRRA system, only the allocated costs for the San Bernardino corridor are used for this study.

10.2.3 Operating Cost Estimates

Table 10.8 summarizes the operating cost estimates for light rail and commuter rail by alternative. Table 10.8 shows total operating costs; however, incremental costs are more meaningful for comparing the various alternatives, since the total operating costs include many common elements that are not relevant to this study, such as the Glendale light rail branch and the base commuter rail service to San Bernardino. A null alternative, the base-line, is included in the table and should be used as the base for calculating the incremental operating costs.

The incremental increase in annual operating and maintenance cost estimates range from $12.1 million for Alternative 1 (light rail and commuter rail to Arcadia) to $59.3 million for Alternative 4, which has light rail service all the way to San Bernardino via the Route 30 corridor. The incremental increase in operating costs for light rail in Los Angeles County alone would be approximately $3.5 million to Arcadia, $16.1 million to Irwindale, $27.5 million to San Dimas and $30.9 million to Montclair.

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Table 10.7
Input to Operating Cost Estimates - Commuter Rail

DRIVING VARIABLE	Baseline Union Sta. to San Bernardino	Alt. 1 Add Arcadia to Pomona	Alt. 2 Add Branch via Irwindale & Claremont to I-15	Alt. 3 Add Montclair to I-15 Branch
DIVISION	1	1	1	1
PEAK LOCO	11	17	21	17
FLEET LOCO	13	20	24	20
PEAK CAR	44	68	84	68
TOTAL CAR	48	75	92	75
TRAIN-TRIPS	12,878	24,256	27,256	24,256
CAR-MILE (mill.)	2.9	4.0	4.8	3.9
TRAIN-MILE (K)	729	1,064	1,303	1,036
TRAIN-HOUR (K)	30.3	46.1	52.1	46.1
ROUTE-MILE	56.6	73.8	85.2	68.9
STATION	13	18	19	16

Source: Manuel Padron & Associates

Table 10.8
Operating Cost Summary

ALTERNATIVE:	Baseline	1	2	3	4 (LA)	4 (SB)	5&6 (LA)	5 (SB)	6 (SB)
LIGHT RAIL		Pasadena to Arcadia	Pasadena to Irwindale	Pasadena to San Dimas	Pasadena to San Dimas	San Dimas to San Bern.	Pasadena to Montclair	Montclair to I-15	Montclair to San Bern.
COMMUTER RAIL		Arcadia to Pomona	Baldwin Park via Irwindale & Claremont to I-15	Montclair to I-15					
TOTAL OPERATING COST INCL. BASE									
Light Rail (1)	$41.8	$45.3	$57.9	$69.2	$69.3	NA	$72.7	NA	NA
Commuter Rail (2)	$17.8	$26.5	$31.2	$26.0	(3)	(3)	(3)	(3)	(3)
INCREMENTAL OPERATING COSTS									
Light Rail	base	$3.5	$16.1	$27.4	$27.5	$31.8	$30.9	$13.2	$27.8
Commuter Rail	base	$8.6	$13.4	$8.1	$0.0	$0.0	$0.0	$0.0	$0.0
Total	base	$12.1	$29.5	$35.5	$27.5	$31.8	$30.9	$13.2	$27.8

NOTES:

1. Includes cost for all Blue Line operations north of 7th/Flower.
2. Includes cost for Los Angeles - San Bernardino corridor service, plus allocation of shared SCRRA costs.
3. Commuter rail system is same as Alternative A, which includes main L.A.-San Bernardino line.

Source: Manuel Padron & Associates.

11. COMPARATIVE EVALUATION

11.0 Comparative Evaluation

This study has comprehensively examined the potential for implementing the light rail and commuter rail on four separate rights-of-way in the Northern San Bernardino Valley. Six alternative ways of linking and utilizing these rights-of-way have been analyzed. These alternatives are not easily compared because they have different orientations (in terms of both destination and mode), involve different lengths of facility, and cover an extremely long corridor. The issues at each end of this lengthy corridor, for example, tend to vary substantially.

The evaluation of the alternatives is therefore approached in two ways. Summary and evaluative data is provided both by alternative and by right-of-way segment. This allows some insight into opportunities and constraints that tend to be obscured if only the alternatives are evaluated. Finally, a series of principal conclusions by right-of-way are included, along with their implications for the six alternatives.

11.1 Summary Comparison Statistics

This section summarizes information on the rail alternatives for comparative purposes. The information is summarized in two tables: Table 11.1 reviews the service characteristics of each alternative (such as length, number of vehicles, headways, travel times, etc.), while Table 11.2 reviews performance characteristics (such as ridership, costs, ridership per mile, costs per mile, etc.). These tables allow for a comparison of each alternative's descriptive statistics and details, broken down by light rail and commuter rail components.

11.2 Evaluation Summary

An evaluation summary matrix, broken down by each of the four rights-of-way under study, was also prepared. This matrix, shown in Table 11.3, summarizes key criteria in both qualitative and quantitative fashion, including transportation service, environmental impacts, engineering feasibility and cost parameters. The information on the Azusa Branch in this table has been adjusted to reflect ridership and costs for only the portion of the Azusa Branch itself. (In the alternatives analysis, the ridership and cost figures reflected all added commuter rail service in the alternative, including commuter rail ridership and costs for commuter rail segments further east.)

Table 11.1
Service Characteristics by Alternative

ALTERNATIVE	1	2	3	4		5		6	
LRT:	Pasadena to Arcadia	Pasadena to Irwindale	Pasadena to San Dimas	Pasadena to San Dimas	San Dimas to San Bern.	Pasadena to Montclair	Montclair to I-15	Pasadena to Montclair	Montclair to San Bern.
Commuter Rail:	Arcadia to Pomona	Baldwin Park via Irwindale & Claremont to I-15	Montclair to I-15						
Criteria									
Length (in miles)									
Light rail									
At grade – RR	3.2	8.8	17.4	17.4	2.0	23.6	11.4	23.6	11.4
At grade – street	0	0	0.2	0	5.9	0	0	0	7.6
At grade – fwy.	0	0	0	0	25.7	0	0	0	9.3
Aerial	0	0	0	0	0.6	0	0	0	0
Bridges	0.1	0.2	0.3	0.3	0	0.3	0	0.3	0
Light Rail Total	3.3	9.0	17.9	17.7	34.2	23.9	11.4	23.9	28.3
Commuter Rail	17.2	26.2	12.3	0	0	0	0	0	0
Total Length	20.5	35.2	30.2	17.7	34.2	23.9	11.4	23.9	28.3
Number of New Stations									
Light rail	0	3	8	8	19	11	7	11	7
Light rail/commuter rail	1	1	1	1	0	0	0	0	4
Commuter rail	4	5	3	0	0	0	0	0	5
Total New Stations	5	9	12	9	19	11	7	11	16
Average Station Spacing									
Light rail	3.3	2.3	2.0	2.0	1.8	2.2	1.6	2.2	2.6
Commuter rail	4.3	4.4	4.1	0.0	0.0	0.0	0.0	0.0	0.0
Parking Spaces									
Light rail	760	2,155	3,800	3,305	8,205	3,505	3,015	3,505	5,845
Commuter rail	2,020	3,830	2,205	0	0	0	0	0	0
Total Parking Spaces	2,780	5,985	6,005	3,305	8,205	3,505	3,015	3,505	5,845

Table 11.1
Service Characteristics by Alternative

ALTERNATIVE	1	2	3	4		5		6	
LRT:	Pasadena to Arcadia	Pasadena to Irwindale	Pasadena to San Dimas	Pasadena to San Dimas	San Dimas to San Bern.	Pasadena to Montclair	Montclair to I-15	Pasadena to Montclair	Montclair to San Bern.
Commuter Rail:	Arcadia to Pomona	Baldwin Park via Irwindale & Claremont to I-15	Montclair to I-15						
Criteria									
Peak Period Headways									
Light rail	10	8	10	10	10	10	10	10	10
Commuter rail	30	30	30	NA	NA	NA	NA	NA	NA
Off-Peak Headways									
Light rail	10	10	20	20	20	20	20	20	20
Commuter rail	60	60	60	NA	NA	NA	NA	NA	NA
Train consist size (peak/off-peak)									
Light rail	3/2	3/2	3/2	3/2	3/2	3/2	3/2	3/2	3/2
Commuter rail	4/4	4/4	4/4	NA	NA	NA	NA	NA	NA
Travel Time (in minutes to Mem. Park)									
From Irwindale	28	21	21	21	NA	21	NA	21	NA
From San Dimas	41	40	33	33	NA	33	NA	33	NA
From Montclair	55	53	52	NA	52	NA	44	NA	44
From East Ave. (I-15)	NA	77	71	NA	70	NA	67	NA	67
From San Bernardino	96	94	88	NA	101	NA	84	NA	101
New Vehicles									
Light rail	7	23	44	44	49	51	12	51	42
Commuter rail – locomotives	7	11	7	0	0	0	0	0	0
Commuter rail – cabs	27	44	27	0	0	0	0	0	0
Total New Vehicles	41	78	78	44	49	51	12	51	42
Annual Vehicle Miles (millions)									
Light rail	0.77	2.13	3.68	3.71	4.10	4.42	1.20	4.42	3.25
Commuter rail	1.10	1.90	1.00	NA	NA	0.00	0.00	0.00	0.00
Total Annual Vehicle Miles	1.87	4.03	4.68	3.71	4.10	4.42	1.20	4.42	3.25

Table 11.1
Service Characteristics by Alternative

ALTERNATIVE	1	2	3	4		5		6	
LRT:	Pasadena to Arcadia	Pasadena to Irwindale	Pasadena to San Dimas	Pasadena to San Dimas	San Dimas to San Bern.	Pasadena to Montclair	Montclair to I-15	Pasadena to Montclair	Montclair to San Bern.
Commuter Rail:	Arcadia to Pomona	Baldwin Park via Irwindale & Claremont to I-15	Montclair to I-15						
Criteria									
Yards/Shops									
Light rail	0	0.5	1	1	0.5	5	0.5	5	0.5
Commuter rail	1	1	1	NA	NA	NA	NA	NA	NA

Table 11.2
Performance Characteristics by Alternative

ALTERNATIVE	1	2	3	4		5		6	
LRT:	Pasadena to Arcadia	Pasadena to Irwindale	Pasadena to San Dimas	Pasadena to San Dimas	San Dimas to San Bern.	Pasadena to Montclair	Montclair to I-15	Pasadena to Montclair	Montclair to San Bern.
Commuter Rail:	Arcadia to Pomona	Baldwin Park via Irwindale & Claremont to I-15	Montclair to I-15						
Criteria									
Length (in miles)									
Light rail									
At grade – RR	3.2	8.8	17.4	17.4	2.0	23.6	11.4	23.6	11.4
At grade – street	0	0	0.2	0	5.9	0	0	0	7.6
At grade – fwy.	0	0	0	0	25.7	0	0	0	9.3
Aerial	0	0	0	0	0.6	0	0	0	0
Bridges	0.1	0.2	0.3	0.3	0	0.3	0	0.3	0
Light Rail Total	3.3	9.0	17.9	17.7	34.2	23.9	11.4	23.9	28.3
Commuter Rail	17.2	26.2	12.3	0	0	0	0	0	0
Total Length	20.5	35.2	30.2	17.7	34.2	23.9	11.4	23.9	28.3
Number of New Stations									
Light rail	0	3	8	8	19	11	7	11	7
Light rail/commuter rail	1	1	1	1	0	0	0	0	4
Commuter rail	4	5	3	0	0	0	0	0	5
Total New Stations	5	9	12	9	19	11	7	11	16
Average Weekday Ridership									
Light rail – Los Angeles Co.	15,900	19,600	29,200	30,100	NA	35,500	NA	35,500	NA
Light rail – San Bernardino Co.	NA	NA	NA	NA	14,000	NA	5,000	NA	12,200
Commuter rail	8,100	9,300	2,400	NA	NA	NA	NA	NA	NA
Capital Costs (millions of dollars)									
Light rail	$124	$351	$682	$667	$1,267	$841	$376	$841	$1,107
Commuter rail	$192	$296	$182	$0	$0	$0	$0	$0	$0
Total Capital Costs	$316	$647	$864	$667	$1,267	$841	$376	$841	$1,107

Table 11.2
Performance Characteristics by Alternative

ALTERNATIVE	1	2	3	4		5		6	
LRT:	Pasadena to Arcadia	Pasadena to Irwindale	Pasadena to San Dimas	Pasadena to San Dimas	San Dimas to San Bern.	Pasadena to Montclair	Montclair to I-15	Pasadena to Montclair	Montclair to San Bern.
Commuter Rail:	Arcadia to Pomona	Baldwin Park via Irwindale & Claremont to I-15	Montclair to I-15						
Criteria									
Capital Costs per Mile (millions)									
Light rail	$37.6	$39.0	$38.1	$37.7	$37.0	$35.2	$33.0	$35.2	$39.1
Commuter rail	$11.2	$11.3	$14.8	NA	NA	NA	NA	NA	NA
Total Capital Costs per Mile	$15.4	$18.4	$28.6	$37.7	$37.0	$35.2	$33.0	$35.2	$39.1
Annual O & M Costs (millions)									
Light rail	$3.5	$16.1	$27.4	$27.5	$31.8	$30.9	$13.2	$30.9	$27.8
Commuter rail	$8.6	$13.4	$8.1	NA	NA	NA	NA	NA	NA
Total Annual O & M Costs	$12.1	$29.5	$35.5	$27.5	$31.8	$30.9	$13.2	$30.9	$27.8
Capital Costs per Annual Rider (dollars)									
Light rail	$26	$60	$78	$74	$302	$79	$251	$79	$302
Commuter rail	$86	$116	$276	NA	NA	NA	NA	NA	NA
Daily Riders per Mile									
Light rail	4,818	2,178	1,631	1,701	409	1,485	439	1,485	431
Commuter rail	471	355	195	NA	NA	NA	NA	NA	NA

Table 11.3
Evaluation Criteria by ROW Corridor

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Right-of-Way Segment	Rail Mode Distance	Transportation Service					Environmental		Engineering		Costs
		Frequency of Service	Travel Time to Pasadena (includes transfers)	Local Service	Regional System Orientation & Linkage	Highest Daily Riders	Sensitive/ Compatible Land Uses	Natural Environment	Alignment Feasibility	Traffic Impact	Capital Costs
Santa Fe Pasadena Subdivision Pasadena to Montclair	Light Rail 23.9 miles	10 minutes	44 minutes	Yes	Pasadena: CR/LRT transfer	35,500	Some. Residential	Potential Impact	Good. Upgrade to double track & replace some structures.	Low to Moderate	$841
	Commuter Rail 17.2 miles	30 minutes	55 minutes	No	Pasadena: CR/LRT transfer	8,100	Some. Residential	Potential Impact	Very good. Requires minimal upgrade.	Low	$192
Southern Pacific Azusa Branch Irwindale to Baldwin Pk. Branch	Commuter Rail 2.6 miles	30 minutes	7 minutes	No	Pasadena: CR/LRT transfer. D/T LA: CR direct.	2,700	Low. Industrial	No/negligible Impact	Poor. Complete track rebuild. New connections at SF & SP.	Low	$ 61
Southern Pacific Baldwin Park Branch - S.B. Co. Montclair to I-15	Light Rail 12.3 miles	10 minutes	18 minutes	Yes	Pasadena: LRT direct. D/T LA: LRT/CR transfer.	5,000	High. Residential	No/negligible Impact	Fair. Upgrade to double track and replace some structures.	Low to Moderate	$376
	Commuter Rail 12.3 miles	30 minutes	19 minutes	No	D/T LA: CR direct. Pasadena: CR/LRT transfer.	2,400	High. Residential	No/negligible Impact	Good. Replace single track.	Low	$182
Route 30 San Dimas to San Bernardino	Light Rail 34.2 miles	10 minutes	63 minutes	Yes	Pasadena: LRT direct. D/T LA: LRT/CR transfer.	14,000	Low. Residential in San Bernardino.	Potential Impact	Fair. In freeway median. Difficult connections to SF ROW and to D/T San Bernardino.	Low	$1,267

11.3 Principal Conclusions by Right-of-Way

A number of conclusions can be made from a review of the summary comparison statistics, the evaluation summary matrix, and some of the detailed information in previous chapters. The principal conclusions resulting from this study are summarized below by right-of-way.

11.3.1 ATSF Pasadena Subdivision - Pasadena to Montclair

- This railroad ROW provides a good physical corridor for rail transit. The ROW is sufficient for double track LRT, and the current trackage is in good condition. No significant engineering problems were identified along the ROW, although improvements and/or additions to two major bridge structures (Huntington Drive and San Gabriel River) would be needed for light rail double track.

- The corridor serves downtown Pasadena and downtown Los Angeles (via connection to the Pasadena Blue Line). It also serves central employment centers in Arcadia, Monrovia, duarte, Irwindale, Azusa, Glendora, San Dimas, and Claremont. A variety of special generators are served, including Santa Anita racetrack, Santa Anita Fashion Park, Arcadia/Monrovia "Hotel Circle," City of Hope, the planned San Dimas Train Museum, Pomona Fairgrounds, Pomona Transit Center, and the Montclair Transit Center.

- The ROW runs through general medium density residential land uses, with pockets of high density residential.

- Viable station sites were identified in each of the local communities.

- Rail service would generally have a low environmental impact in the corridor.

- Light rail service would provide frequent local service to communities, and regional connections to Pasadena, downtown Los Angeles and the rest of the region.

- Light rail would carry significant ridership of up to 35,500 riders per day, by far the highest of the four ROWs studied. Light rail in this corridor would also have the highest riders per mile and lowest costs per rider of all the alternatives studied.

- Light rail service would provide about 20% faster travel times than commuter rail in the San Gabriel Valley.

- Light rail has strong local support in the San Gabriel Valley.

- Commuter rail on this ROW is certainly viable, and at a much lower cost that light rail.

- Commuter rail appears to be less appropriate than light rail in this corridor, however, for several reasons.

- Although commuter rail would provide regional connections to Pasadena, it would require an awkward commuter rail/light rail transfer just east of Pasadena.
- The travel analysis based on SCAG data also indicated less demand for regional travel from San Bernardino County into the San Gabriel Valley and Pasadena than for more local travel within the San Gabriel Valley or from the Valley west into Pasadena and downtown Los Angeles. (When SCAG's travel forecasts based on recent 1990/91 data become available, this should be verified.)
- Commuter rail does not really provide local service, with lower operating frequencies and fewer stations than commuter rail.
- The long distance nature of commuter rail is therefore not appropriate for the San Gabriel Valley, particularly with SCRRA plans for commuter rail service on the SP ROW to the south.

- Commuter rail would have about 20% longer travel times into Pasadena, and would carry less than one-fourth of potential light rail ridership.

- Light rail on the ATSF ROW is the most effective combination of all modes and corridors studied, in terms of overall patronage and costs per rider.

11.3.2 SP Azusa Branch - Irwindale to Baldwin Park

- The preliminary analysis concluded that light rail was not an appropriate mode for this corridor due to high costs, low potential ridership, and lack of system connectivity for LRT. Therefore, only commuter rail was studied on this corridor.

- The ROW is narrow and in very poor condition. Complete track and facility replacement would be needed for commuter rail service.

- Potential engineering problems were identified connecting this ROW to the corridors at each end. Solutions were identified, but would be expensive and potentially problematical (connection at Irwindale from ATSF to SP, and connector at south end up to Baldwin Park Branch). These solutions would also require restricted speeds around sharp curves.

- This ROW would provide good regional commuter rail connections, although there appears to be low demand for such connections. The segment would primarily provide a commuter rail connection from Glendora and Azusa to downtown Los Angeles.

- The ROW runs through a predominantly industrial area. No station sites were identified.

- The segment appears to have very low new patronage potential. The majority of commuter rail ridership on this segment would be diverted from the San Bernardino to Los Angeles commuter rail line on the SP ROW to the south.

- This ROW would serve primarily as a linkage between the ATSF and SP corridors with little local benefit.

- Commuter rail service on this ROW would have a low environmental impact.

11.3.3 SP Baldwin Park Branch - Montclair to I-15

- This railroad ROW provides a good physical corridor for rail transit. The ROW is sufficient for double track LRT. The current trackage is in poor condition and would need to be totally replaced. No significant engineering problems were identified.

- The corridor would provide feeder service from Rancho Cucamonga into the regional commuter rail line and/or a San Gabriel Valley light rail line. It could also provide a feeder service from a regional park-and-ride lot at I-15.

- If light rail service were implemented, a same-mode trip to Pasadena would be provided but a transfer would be necessary in the Montclair/San Dimas area. If commuter rail were implemented, a direct connection to downtown Los Angeles would be provided and a transfer would be required to Pasadena.

- The corridor runs through medium-density residential communities and serves no existing special generators.

- Viable station sites have been identified along the segment.

- Rail service could have a significant noise impact in this corridor on adjacent residential land uses.

- Light rail would provide more locally oriented service. Light rail service would be more frequent than commuter rail.

- Light rail patronage would be about twice that of commuter rail patronage, but still very low for a light rail line. The ridership per mile would be about one-fourth the level of light rail ridership on the ATSF ROW in Los Angeles County. The single (residential) land use along this segment limits patronage because there are no major employment destinations.

- Patronage may be underestimated and should be re-evaluated after SCAG's update of regional travel patterns.

- A single, direct light rail line to Pasadena is not considered operationally viable due to the length of the line, so transfers would be necessary for long distance trips.

- Commuter rail on this ROW was projected to have the lowest ridership of all mode/corridor combinations studied. Commuter rail on this ROW is also duplicative of the commuter rail on the ATSF ROW to the south.

- Neither light rail nor commuter rail are likely near-term proportion considering the high cost of implementation and low ridership potential.

- The SP ROW could be utilized for recreational purposes (bike path, jogging rails, etc.) as part of a local and regional open space network. This would gain immediate community use of the ROW while also preserving it for potential future transit use if conditions change.

- Changes in land use policies could make transit use of this ROW more effective.

11.3.4 Route 30 Freeway ROW - San Dimas to San Bernardino

- New freeway construction will provide the potential opportunity for rail transit in the median of the freeway.

- The preliminary evaluation determined that commuter rail was inappropriate in this corridor.

- The freeway ROW is sufficient for light rail and stations in the median, although parking and vehicular access at stations would have to be provided outside the freeway right-of-way. There are a few points where ROW is restricted, but these should not prevent implementation of light rail service.

- There are significant engineering concerns at each end of the corridor.

  - At the west end, the connection from the ATSF ROW to the existing Route 30 is difficult through the I-210/SR-30 interchange. The preferred solution is to connect east of the interchange, running tracks alongside Wheeler Avenue and connecting to Route 30 near Wheeler and Foothill. This would require a short aerial structure as well as air rights and property acquisition near Foothill Boulevard.
  - At the east end, connections into downtown San Bernardino were not evaluated in detail, but could involve at-grade or aerial solutions. Potential engineering problems were identified along Highland Avenue at I-15 and SR-259.

- The freeway also serves as something of a barrier to transit use, making access and parking difficult.

- The ROW generally runs through low density residential areas with few current significant employment centers or special generators. At the west end, the preferred alignment could serve the Pomona Fairgrounds.

- Station sites were only identified tentatively because the freeway design is not yet complete.

- Rail service would generally have a low environmental impact in the corridor, with the highest impacts at the west and east ends (potential residential noise impacts, etc.).

- Light rail ridership would be as high as 14,000 daily riders, which is low for light rail systems. The majority of this ridership would be focused at the east end of the corridor into the City of San Bernardino.

- This corridor has the highest cost per mile and cost per rider of all mode/corridor combinations studied.

- Light rail service is an unlikely near-term proposition in this corridor, due to high costs, low potential patronage and relatively low density of existing and planned development.

- The ROW in the median could be preserved for longer-term transit use in conjunction with modified land use policies to increase densities around the corridor, particularly east of I-15.

11.4 Principal Conclusions by Study Alternatives

The study conclusions indicate that light rail transit is the most appropriate rail transit mode in the northern San Gabriel and San Bernardino Valley Corridor. Commuter rail is not an appropriate rail transit mode because of the projected low level of regional travel demand in this corridor between San Bernardino and Pasadena, and because of potential duplication with the planned commuter rail line to the south which will more appropriately serve long distance travel from San Bernardino into downtown Los Angeles.

While the SP Azusa branch and SP Line in San Bernardino County provide the opportunity for commuter rail feeder connections to the regional commuter rail line, the analysis indicates a relatively low level of demand for such a service in the near to mid-term future. (The travel forecasts were based on SCAG data which is currently being updated. Subsequent analysis should be conducted to confirm the above conclusions.)

The study has found light rail transit to be feasible in Los Angeles County, from an engineering, operational, and patronage perspective. It is viable to extend the Blue Line Light Rail out to the Los Angeles County Line in the vicinity of Pomona/Claremont/Montclair. Such an extension would serve a large number of cities, with both population and employment concentrations; a variety of activity centers, including Santa Anita, City of Hope and the Pomona Fairgrounds; and provide good regional system-wide connections to the commuter rail system in the area between San Dimas and Montclair.

Within Los Angeles County there is no significant difference in light rail configuration between Alternatives 4, 5 and 6. A variety of feasible end of line locations for light rail have been identified, principally Irwindale, San Dimas, Pomona and Montclair. Being close to major freeway interchanges, both Irwindale and San Dimas provide good potential for regional park and ride lots to service an end of the line location. Montclair provides a good opportunity to link bus feeder service and regional park-and-ride in San Bernardino County into an end of the line light rail station at the Montclair Transit Center.

Within Los Angeles County, if implementation of a light rail extension were to be phased, then the Irwindale area may be considered an appropriate end point for the first phase, and San Dimas for the second phase. Extending light rail to Irwindale would offer the potential to serve five cities in the San Gabriel Valley, access regional park-and-ride facilities at the interchange of the I-210 and the I-605 freeways, and relieve the most severely congested section of I-210 (the Foothill Freeway) between Azusa and Pasadena. There is local interest and support for an end-of-line station in the general location of Irwindale. It would also be possible to operate a simple commuter rail shuttle between Irwindale and Pomona/Montclair to provide initial system connectivity in the corridor. This shuttle could be provided for only minimal capital costs as the current track is in good condition, and only minimal infrastructure improvements would be necessary (for example, simple stations and basic signal upgrades). Phase II of the light rail extension would then be implemented to San Dimas, and a comprehensive transit system linkage provided by a commuter rail/light rail transfer station in San Dimas. As the right-of-way east of Irwindale is wider than to the west of Irwindale, light rail should be able to be constructed in the future within the ROW without disrupting the commuter rail shuttle service that it would replace, thus maintaining rail service at all times. Although it may be necessary to first relocate parts of the single commuter rail track, this should be a relatively low-cost item.

The study has also concluded that light rail transit in San Bernardino is an unlikely proposition in the near-term future. In this segment of the corridor, relatively low development densities and relatively long station spacing indicate a low patronage potential focused primarily in the east end of the corridor toward downtown San Bernardino.

The study has identified significant engineering problems with the Route 30 alignment at both the west and east ends. At the west end, engineering issues are less complex for the alignment in Alternative 6, through San Dimas along Wheeler Avenue, than for Alternative 4, through the I-210/SR-30 interchange. The analysis indicates little difference in patronage potential between the two LRT alignments studied in San Bernardino County (Route 30 from San Dimas to San Bernardino versus SP right of way from San Dimas to I-15 and Route 30 for I-15 to San Bernardino.) Patronage potential for rail transit use in the corridor in San Bernardino County could be significantly enhanced by changes in land use policies to encourage densification around the transit rights-of-way, and by the identification of additional station locations to provide better transit access to local communities. In the future, before any further expansion of the Route 30 Freeway into the median is considered, the potential for rail transit compared to additional freeway capacity should be evaluated in further detail.

An important conclusion of the study, therefore, is that planning and implementation of light rail transit does not need to progress simultaneously in both the northern San Gabriel and San Bernardino Valleys. Implementation of light rail in the San Bernardino Valley is likely to lag behind implementation of light rail in the San Gabriel Valley by a considerable time. While this study has shown potential alignments and station locations for light rail connections between Los Angeles and San Bernardino County, as well as a variety of system operating alternatives, implementation of light rail in Los Angeles County can proceed independently of light rail consideration in San Bernardino County, while still retaining the potential for future system-wide compatibility.

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