ROUTE 10/60 CORRIDOR PRELIMINARY PLANNING STUDY

FINAL REPORT

NOVEMBER, 1993

PREPARED FOR

LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

AND

CITIES OF ALHAMBRA, EL MONTE, LOS ANGELES, MONTEBELLO, SAN GABRIEL, WHITTIER, AND COUNTY SUPERVISORIAL DISTRICTS 1, 4, AND 5

PREPARED BY

KAKU ASSOCIATES
A Corporation

IN ASSOCIATION WITH

PARSONS, BRINCKERHOFF, QUADE & DOUGLAS
BARRIO PLANNERS, INC.

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PRELIMINARY PLANNING STUDY
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I. EXECUTIVE SUMMARY

This Executive Summary is intended to give an overview of the Route 10/60 Corridor Study Preliminary Planning Study final report.

1.1 STUDY PURPOSE

The Route 10/60 Corridor was identified as one of the Candidate Corridors in the 30 Year Integrated Transportation Plan prepared by the Los Angeles County Metropolitan Transportation Authority (MTA). The cities within the corridor, in conjunction with the County Supervisors offices affected by the alignments, worked with MTA to develop a scope for the Route 10/60 Corridor Preliminary Planning Study. The Cities of Alhambra, El Monte, Los Angeles, Montebello, San Gabriel, and Whittier along with County Supervisorial Districts 1, 4, and 5 agreed to jointly sponsor and assist MTA in the funding of the Preliminary Planning Study.

The Route 10/60 Corridor Preliminary Planning Study is intended to determine if light rail transit is an appropriate technology for the San Gabriel Valley and if enough patronage can be developed in the study area to support light rail. Another key evaluation factor is the ability to properly connect a light rail line in the San Gabriel Valley to the rest of the countywide transportation system.

The purpose of the Route 10/60 Corridor Preliminary Planning Study is to determine whether or not light rail transit is an appropriate transit technology for this corridor and, if so, to identify the specific corridor alignments that have the most potential to attract ridership. The alignments are to be evaluated on the basis of engineering feasibility, system operations, environmental impacts, cost, patronage, and system connectivity.

1.2 STUDY AREA

Exhibits S-1 and S-2 show the location of the study area within the Los Angeles metropolitan region and a more specific illustration of the study area boundaries. The study area is generally bounded on the west by downtown Los Angeles, on the north by Huntington Drive/Main Street/ Las Tunas Drive as this corridor traverses Los Angeles, Alhambra, San Gabriel, Temple City and Arcadia. On the south, the study area is generally bounded by Whittier Boulevard and Olympic Boulevard as they traverse Los Angeles, Montebello, Pico Rivera and the City of Whittier. On the east, the study area is bounded by Interstate 605 in the northern part of the study area and the easterly boundary of the City of Whittier in the southern portion of the study area.

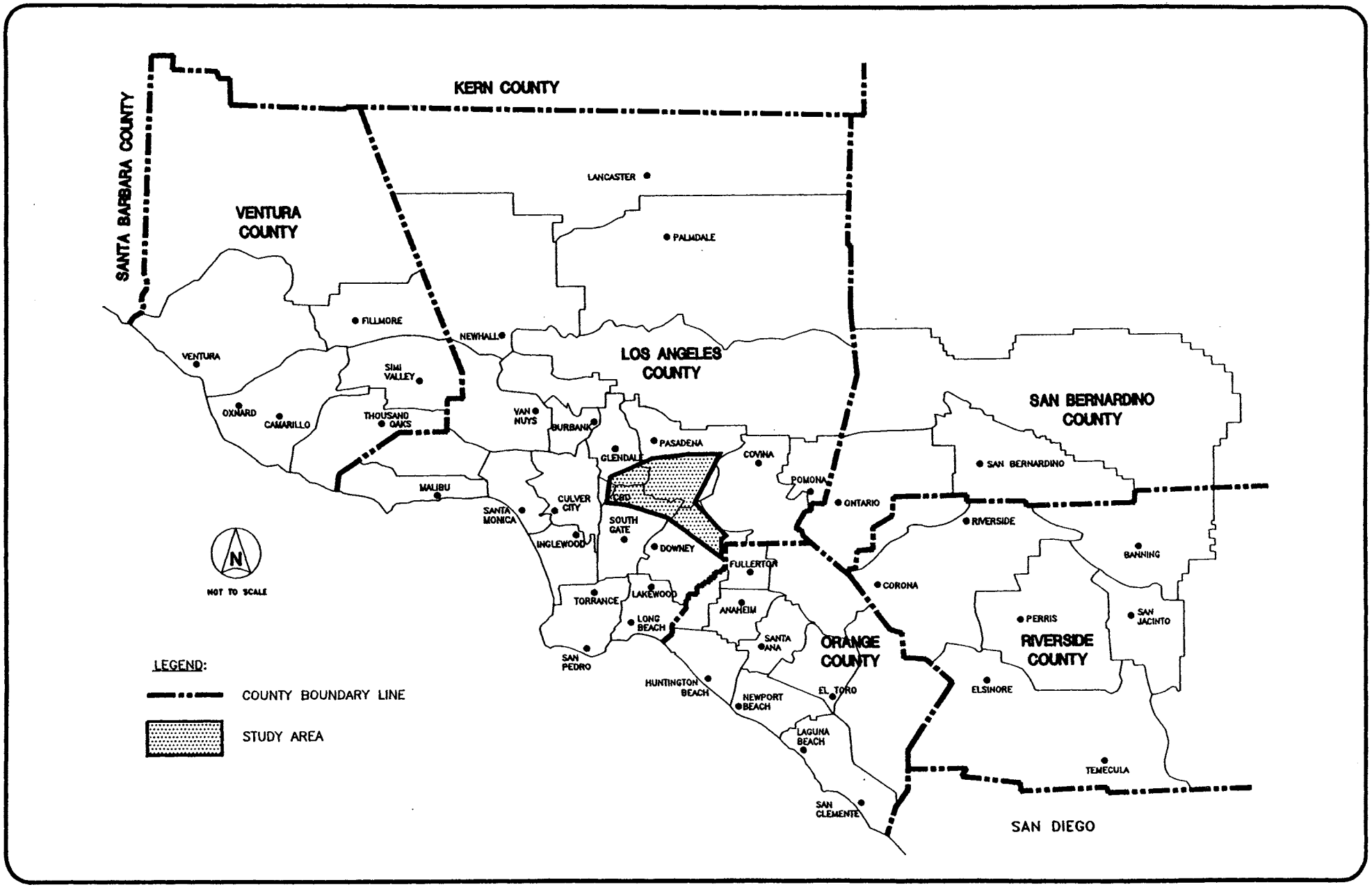
The study area is served by an extensive regional and local network of buses. Commuter rail in the form of Metrolink recently began service in both the I-10 and the SR 60 corridors. The east-west freeways traversing the study area are among the most congested in Los Angeles County during peak hours – a condition which certainly contributes to the high levels of trucks and autos using the surface arterial street system during these peak periods.

The alignment corridors pass a wide variety of land uses in the study area. Residential, commercial (both retail and office), and light industrial employment areas are served by the potential corridors under study in this work effort. A number of major activity centers are also served by the various alignments.

1.3 STUDY PROCESS

1.3.1 Study Approach

The Route 10/60 Corridor Preliminary Planning Study is divided into three major tasks. Task 1 analyzed seven alignments on a corridor-level basis. These seven alignments were developed by the MTA in conjunction with the Corridor Cities. The intent of Task 1 was to identify those alignments that have the most potential for light rail technology, patronage development, operating efficiency, and cost effectiveness. The end product of the corridor-level analysis was the identification of routes worthy of additional study.

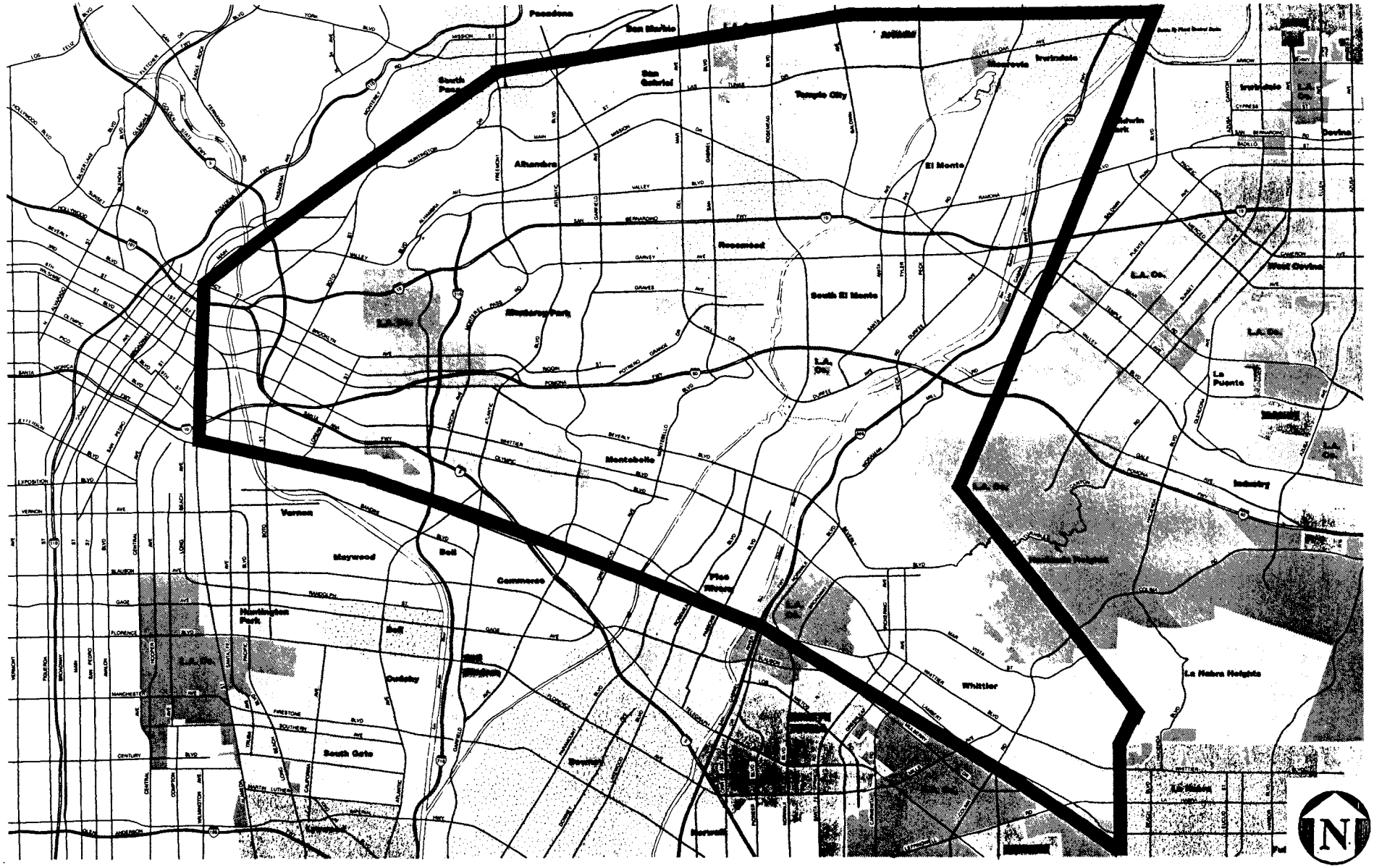


Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT S-1
REGIONAL CONTEXT



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PARSON, BRINCKERHOFF, QUADE & DOUGLAS and BARRIO PLANNERS, INC.

EXHIBIT S-2
STUDY AREA

In Task 2 the narrowed list of corridors was analyzed in more detail. The remaining corridors were divided into route segments and each segment was evaluated in categories such as implementation feasibility, station location and impacts, traffic impacts, environmental assessments, and preliminary patronage estimates. The end product of the segment-level analysis was a recommendation for a finalist route(s) to be evaluated in Task 3.

Task 3 refined the patronage estimates developed during the segment-level analysis and prepared cost estimates for implementation and operation/maintenance for the alignments.

1.3.2 Study Task Force

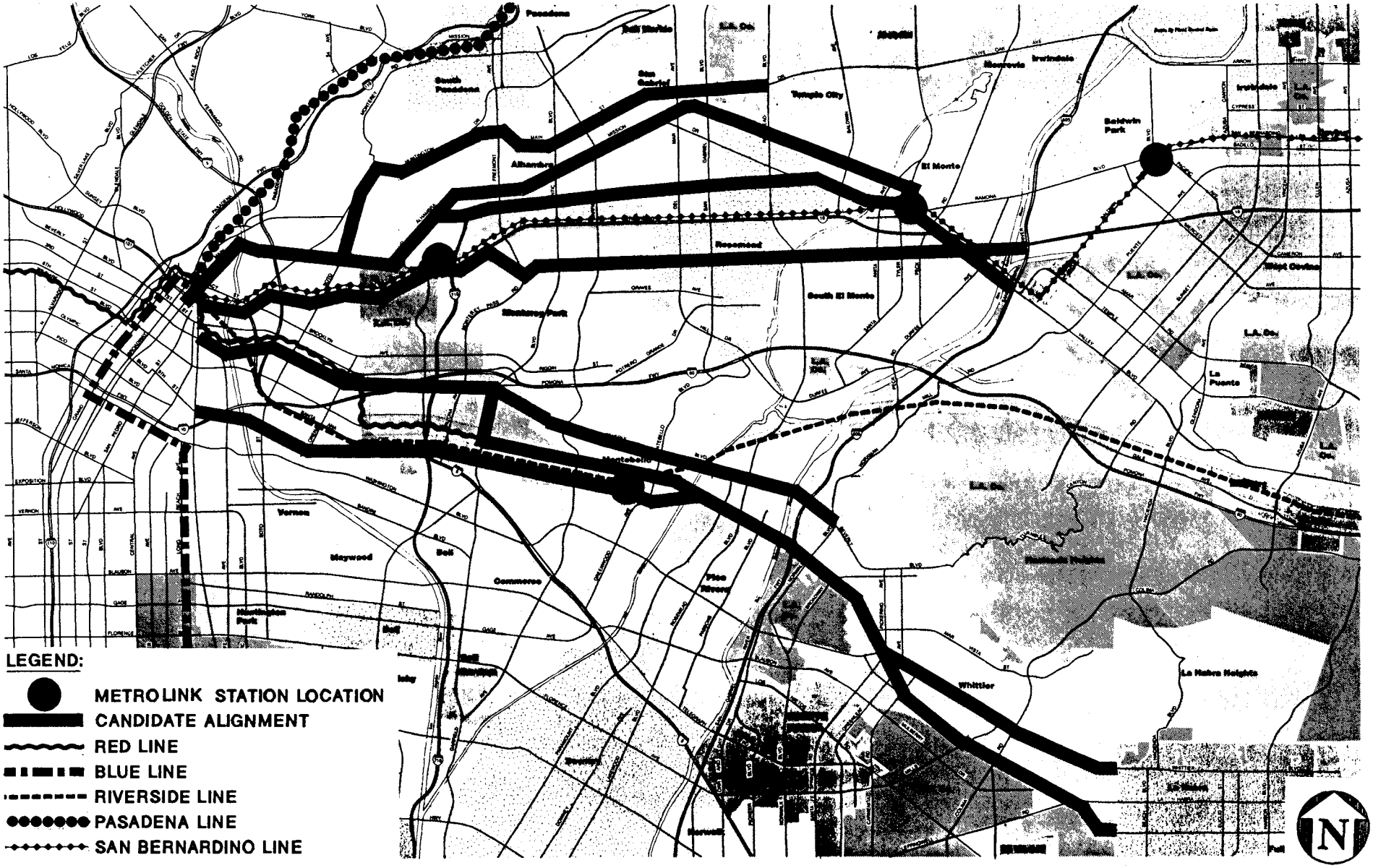
The conduct of the Route 10/60 Corridor Preliminary Planning Study was guided by a Corridor Task Force made up of technical staff members from the Corridor Cities, the County Supervisors' offices, and MTA. At key points in the study, technical analysis results and recommendations were presented to the Task Force, and the Task Force made recommendations regarding narrowing of alternatives, station locations, alignment adjustments, land use impacts, etc.

1.4 RAIL CORRIDOR OPTIONS

The Los Angeles County MTA, in conjunction with the Corridor Cities, developed seven basic alignments within the study area that appeared worthy of analysis as potential light rail corridors. Exhibit S-3 shows the alignments of these seven corridors. From north to south they are:

- Huntington Drive/Las Tunas -- An at-grade, in-street LRT route that moves easterly out of Downtown via Main Street and Mission Boulevard. The route then turns onto Huntington Drive, Main Street, and Las Tunas to serve the commercial and residential areas of El Sereno, Alhambra, and San Gabriel.

- Mission Drive/SPRR Right-of-Way -- The route alignment is identical to the first segment of the Huntington/Las Tunas route. At Mission/Soto/Huntington interchange, this route continues easterly using the Southern Pacific Transportation Company (SPTC) rail right-of-way. The two LRT tracks would be constructed parallel to the single existing freight rail tracks. The alignment would stay in the rail right-of-way until El Monte where the LRT route would end.



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PARSON, BRINCKERHOFF, QUADE & DOUGLAS and BARRIO PLANNERS, INC.

EXHIBIT S-3
SEVEN CORRIDOR ALIGNMENTS

- Valley Boulevard – This route would cross the study area at-grade in the center of the existing Valley Boulevard street cross section. The eastern terminus of the route would be in the vicinity of I-605 in El Monte.

- Garvey Avenue – The Garvey route would leave Downtown Los Angeles in the I-10 freeway corridor, transferring to at-grade, in-street operations along the Garvey corridor at Fremont. This corridor would also end in the I-605 area.

- Beverly Boulevard – The Beverly corridor would leave Downtown Los Angeles through Boyle Heights in in-street operation along Third and Fourth Streets. The at-grade alignment would end just east of I-605.

- Whittier Boulevard – The Whittier route would also use the Third and Fourth Street route to Atlantic where the LRT in-street line would turn south to Whittier Boulevard and then east to the eastern boundary of the City of Whittier. Through the City of Whittier, there are two options. First, the line could continue along Whittier Boulevard in an at-grade, in-street operation. The second option would see the LRT line switch to the Union Pacific Railroad (UPRR) right-of-way along Lambert Road. Both of these options would end near the City's eastern boundary.

- Olympic Boulevard – This alignment would leave the southeast corner of Downtown Los Angeles via Olympic Boulevard. The route would be in-street, at-grade operation joining the Whittier Boulevard alignment in the eastern portion of the City of Montebello.

1.5 CORRIDOR EVALUATION

The seven basic light rail transit (LRT) alignments that were developed by MTA and the Corridor Cities (shown in Exhibit S-3) were evaluated on a broad, corridor-level basis to identify any particular flaws that might render any one of the alignments unworkable. Alignments surviving the corridor level analysis were then evaluated on a segment-by-segment basis to identify the combination of alignment options that best served the study area.

1.5.1 Corridor Level Analysis Approach

The initial corridor level screening involved an iterative process in which the consultant team defined general evaluation criteria, measured the different LRT alignments against those criteria, and then held intensive workshops with the Corridor Task Force to discuss and evaluate the results.

Since this corridor level evaluation was intended to be a general overview, it was clear that detailed patronage and detailed implementation cost information would not be available. Therefore, the consultant team developed a list of evaluation criteria that would reflect the patronage potential and implementation cost parameters of each route alignment. All seven route alignments were then measured against these evaluation criteria to identify any routes that performed particularly poorly in any of the evaluation categories.

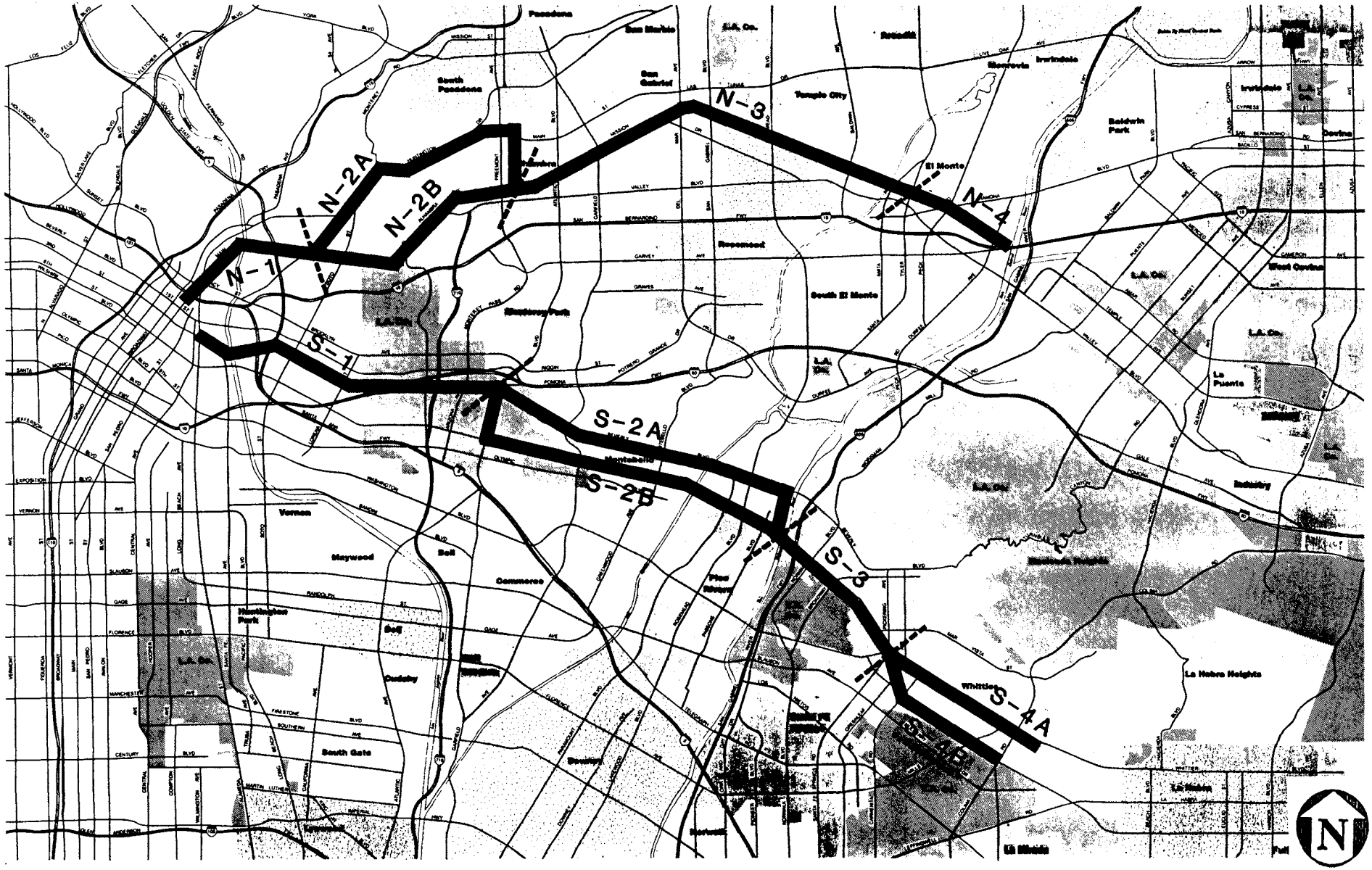
The following general evaluation criteria were applied to each of the seven route alignments:

- LRT Design Criteria
- Topography and Existing Circulation System
- Land Use Impacts
  - General land use service
  - Redevelopment area service
- Potential Ridership
  - Station locations
  - Land use intensity near stations
- Implementation Costs
  - Length of corridor
  - Right-of-way constraints
  - Engineering constraints
  - Overall construction impacts
- Connectivity
  - Transit service to stations
- Impacts
  - Traffic
  - On-street parking
  - Median treatments

1.5.2 Corridor Level Analysis Results

Exhibit S-4 shows the recommendation of the Corridor Task Force as a result of the corridor level analysis. The rationale behind the recommendations for each route is as follows:

- Huntington Drive/Las Tunas Route – The Huntington Drive/Las Tunas route was proposed as an in-street operation. The Task Force felt that this route should be terminated in the vicinity of Fremont where the route would turn southerly and join with the Mission Drive/SPRR ROW route. The easterly portion of this route was dropped from further consideration because of the high parking impact and impact on the business districts in Alhambra, San Gabriel and, to a lesser degree, Temple City. The end of the line at Las



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PARSON, BRINCKERHOFF, QUADE & DOUGLAS and BARRIO PLANNERS, INC.

EXHIBIT S-4

CORRIDOR ANALYSIS RECOMMENDED ROUTES BY SEGMENT

Tunas and Rosemead is already fully developed and a terminus parking problem could develop at Rosemead.

Retaining the westerly portion of the alignment would serve an under-served transit dependent area of El Sereno in northeast Los Angeles.

- Mission Drive/SPRR Right-of-Way – This alignment utilizes the existing SPRR right-of-way. The proposal involves the LRT line sharing the right-of-way (but on separate, parallel tracks) with the existing freight service. The Task Force decided that this alignment should be retained for further study and, in fact, extended from the proposed terminus at the Metrolink station in order to reach the I-605 area where a more logical park-and-ride facility could be developed.

- Valley Boulevard – The Valley Boulevard in-street operation alignment was dropped from consideration unless the Mission Drive/SPRR ROW corridor proved to be financially infeasible. Therefore, Valley Boulevard was to be considered as an alternate to the Mission/SPRR ROW alignment.

  The basic reasons for dropping Valley Boulevard were the impacts on business districts that would result from the loss of the center turn lane and the high impact of on-street parking removal. Both of these impacts appear solvable if the Mission Drive/SPRR ROW alignment proves infeasible.

- Garvey Avenue – The Garvey Avenue in-street operation alignment was dropped from further consideration. While this corridor does have some of the highest density station areas, it also has the highest parking impacts and the most amount of landscaped median that would have to be removed in order to accommodate on-street light rail transit. In addition, the westerly portion of this route would operate along the I-10 Freeway right-of-way which would either replace the existing carpool/bus lanes, usurp freeway capacity, or cause substantial land use displacement. This alignment would also traverse some very difficult topography making LRT construction very expensive. This proposed alignment location would put the stations a very long walking distance from any employment or residential centers.

  Finally, the Garvey Avenue corridor, like the Valley corridor, closely parallels the San Bernardino Freeway high occupancy vehicle lanes and the Metrolink alignments. Therefore, it was felt that significant regional transit money has already been spent in this immediate corridor.

- Beverly Boulevard – The Beverly Boulevard corridor was recommended as an in-street operation. The Task Force selected this route for further study although adjustments were made at the easterly end of the initially proposed route. On the eastern end, the Beverly alignment, instead of crossing the San Gabriel River and the I-605 Freeway, should turn southerly west of the freeway in order to meet the Whittier alignment. This modification would save a significant amount of money in that the river, freeway and rail crossing would be very expensive in this alignment.

- Whittier Boulevard – The Whittier in-street operation alignment was retained for further study with the understanding that integration with the Metro Red Line be considered. The Task Force chose to retain both the Whittier Boulevard and the Lambert corridor in the

east end of the study area so that traffic impacts and station area considerations could be further studied.

- Olympic Boulevard – The Olympic Boulevard corridor was dropped from any further consideration. The Olympic alignment was proposed as an in-street, at-grade operation which turned out to be inferior in almost all respects to the Beverly alignment. West of Atlantic Boulevard, Olympic serves a very low density industrial area that, because of high infrastructure costs, does not appear to be an area that will intensify in development levels.

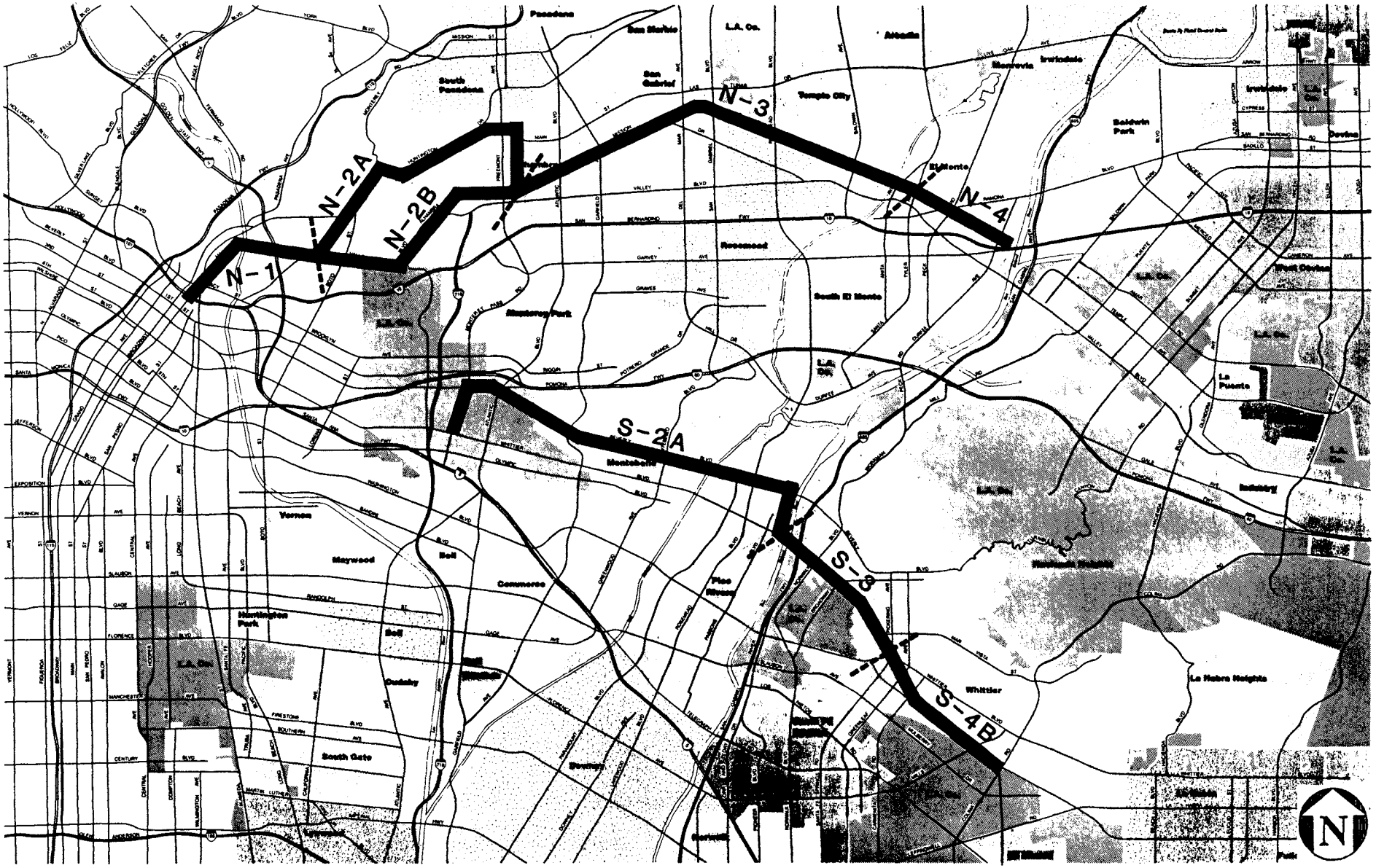
1.5.3 Segment Level Analysis Results

Each of the route segments shown in Exhibit S-4 was evaluated in the areas of conceptual engineering, environmental impacts, and traffic impacts.

Exhibit S-5 shows the route segments recommended for detailed analysis. The Route 10/60 Corridor Task Force recommended that all of the North Line segments be carried into the next level of detailed analysis. The focus of the detailed evaluation will be the comparison of patronage, costs and operating conditions along Segments N-2A and N-2B.

Along the South Line segments, it was recommended that Segments S-1, S-2B and S-4A be dropped from further consideration. The construction and land use impacts of Segment S-1 makes it prohibitively costly to construct. Segment S-2B is also being dropped from further consideration because of its land use impacts (right-of-way requirements and parking loss) and traffic impacts. In the far eastern end of the South Line, the Task Force felt that Segment S-4B produced similar light rail transit service at a lower cost and a lower land use/parking/traffic impact than Segment S-4A.

Segment S-2A will be reconfigured as part of the detailed analysis to utilize Mednick Avenue and Arizona Avenue to reach the Arizona/Whittier Metro Red Line station. This alignment change will allow the South Line to connect to the rest of the regional rail system by transferring passengers at the Metro Red Line station.



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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EXHIBIT S-5

SEGMENT LEVEL ANALYSIS RECOMMENDED ROUTES FOR DETAILED ANALYSIS

1.6 CONCEPTUAL ENGINEERING

The primary tool used during the detailed evaluation of Conceptual Engineering was a set of aerial photographs flown specifically for this project in December, 1992. These aerials, at a scale of one inch equals two hundred feet, were used to plot LRT alignments, station locations and configurations, right-of-way impacts, and grade separation locations.

1.6.1 Key Engineering Conclusions and Issues

The conceptual engineering analysis identified several key engineering issues in both the North and South corridors. The issues are listed below and discussed in the segment descriptions above. The project cost estimates include the necessary engineering improvements to mitigate the design issues at each of these locations.

North Corridor

Union Station Interface
Los Angeles River Crossing
North Main Street Aerial Section and I-5 Crossing
Mission Road/Soto Street/Huntington Drive Intersection
Main Street and Palm Avenue Aerial Section
Transition from Palm Avenue to SPTC Railroad Trench
SPTC Railroad Trench Reconstruction

South Corridor

Metro Red Line Interface
Arizona Boulevard/East 3rd Street Intersection
San Gabriel River Crossing
San Gabriel Freeway (I-605) Crossing
Whittier Boulevard/Washington Street Intersection (5-points)

No insurmountable design problems were identified in the study segments described in this report. Many of the locations listed above present difficult (and oftentimes expensive) design solutions, but solutions are available and the cost of these solutions has been included in the project cost estimates.

1.6.2 Freight Operations & Shared Right of Way Considerations

A major portion of the North Line is proposed to share right-of-way with Southern Pacific freight traffic. There is also a portion of the South Line that would share freight right-of-way. Therefore, a key engineering design issue at the outset of the study was the evaluation of these rail facilities.

The Southern Pacific Transportation Company (SPTC) railroad tracks along the North Corridor presently host an average of 13 freight operations per day. The UPRR tracks along the South Corridor presently host an average 13-15 freight operations per day. These operations represent through train traffic and do not account for local freight and industrial services.

Under Federal Railroad Administration Guidelines, concurrent operations of freight trains and light rail on the same track is prohibited. As such, the route and service alternatives analyzed in this study assume exclusive light rail operations with no concurrent freight service on the same tracks. No interface between the two modes would occur. Any crossings of the light rail and freight lines have been designed as grade separations and considered as part of the LRT implementation costs. However, there will be several segments along both alternative alignments where the right-of-way may host light rail and adjacent freight operations. On the North Line, this includes Segment N-2B, Segment N-3 and Segment N-4. On the South Line, this includes Segment S-4B.

In general, sufficient right-of-way is available to accommodate both light rail (double track) and freight operations. However, on the North Line, the SPTC tracks are located in a trench section through the City of Alhambra. The SPTC has no plans to relocate its current freight service from the trench, which is their only remaining freight line in the San Gabriel Valley. The trench will require extensive reconstruction to accommodate the LRT in addition to the existing freight operations. On the South Line, additional right of way will be required along some section of the UPRR.

The SPTC has expressed the following concerns regarding light rail transit operations in the Alhambra trench along with existing freight operations:

- Based on SPTC standard design and operational requirements (i.e., space between tracks, maintenance road, space to trench walls, etc.) the entire existing trench bottom (45 feet) is needed for existing freight operations.
- Reconstruction of the trench to provide for Light Rail Transit operations must allow for continued freight operations without interruption.
- Trench reconstruction must allow for adequate separation of LRT and freight operations.

Based on these concerns, reconstruction of both sides of the trench would be required to allow for LRT operations and temporary tracks would be required to allow for freight operations during construction. The construction cost estimate for the trench section includes provisions to meet the SPTC requirements and concerns.

1.7 OPERATIONS PLANNING

A conceptual rail operations plan has been prepared for the north and south alignment alternatives.

The Route 10/60 Corridor Project could become a key element of the regional rail transit system, linked to the Red and Blue Lines and Metrolink via connections made at Union Station. In this analysis the baseline assumptions include the following light rail lines coming into Union Station:

- The Blue Line extension to Pasadena operating on 4 minute headways during the peak hour.
- A Glendale/Burbank extension operating on 8 minute headways during the peak hour.
- A downtown Blue Line "Connector" that runs south of Union Station operating on 8 minute headways during the peak hour.
- The 10/60 line will operate on 6 minute headways during the peak hour.

At the east end of the North Line, the 10/60 light rail line would share a common station with Metrolink trains (at Tyler Avenue). It should also be noted that in terms of system connectivity, both the north and south alignments have the opportunity for excellent regional connections on the west (through the Metro Red Line or through Union Station).

On both the north and south alignments, double track operations will be used. The line is designed to operate 20 hours per day, seven days per week, but will be able to operate 24 hours per day if required. The operating hours for initial service segments may be less than 20 hours per day based upon the characteristics of the line and the availability of resources. For this study, weekday operations were established at twenty hours per day and sixteen hours per day on Saturday, Sunday, and Holidays.

The operating plan assumptions were used to help develop the patronage forecasts. This included the development of train frequencies, fleet requirements and maintenance facility needs. The data derived from the operating plans, such as running times, were used to calculate capital and operating costs.

The peak period headway for the north and south corridors was established at six minutes. LRT run time statistics on the North Line Alternative 1 shows the average running speed is estimated to be approximately 34 miles per hour with an end to end running time of about 30 minutes. The average station spacing is about 1.5 miles.

The LRT run time statistics on the North Line Alternative 2 is estimated to be approximately 40 miles per hour with an end to end running time of about 23 minutes. The average station spacing is 1.4 miles.

The LRT run time on the South Line is estimated to be approximately 31 miles per hour with an average station spacing of about 1.5 miles. The end to end running time is approximately 24 minutes.

The operating statistics for the North and South Lines are based on the running times and train assumptions discussed above. On the North Line Alternative 1, annual car hours are about 65,000 and annual vehicle miles are approximately 2,091,574. On North Line Alternative 2, annual car hours are about 52,300 and annual vehicle miles are approximately 1,450,781. On the South Line Alternative, annual vehicle miles are about 1,161,850 and annual car hours are approximately 53,000.

1.8 PATRONAGE ESTIMATES

The patronage estimates for the northern and southern alignments in the Route 10/60 Corridor were developed using the Metro Rail Red Line model as the basis for projections. The Metro Red Line patronage model is a recently-developed mode split model that has been used to forecast the anticipated ridership for the proposed easterly extension of the Metro Red Line subway. The model has been the subject of extensive peer review and, in fact, has been accepted as the model that will be used for all MTA corridor planning work. The model has been developed to include all the commuter rail, light rail, and heavy rail lines proposed in MTA's 30-Year Integrated Transportation Plan. The model also includes the major bus lines in the county so that transfers from one transit mode to another can be accounted for in the model.

The model indicates that the northern alignment would attract a total of 26-30,000 passengers per day. The higher end of the range is expected to occur on the Huntington/Main/Palm alignment alternative.

The southern route that would traverse Beverly and Whittier Boulevards between the Arizona/ Whittier Metro Red Line station and the Lambert Rail Line/Colima Road station would attract a total of approximately 11,000 passengers per day.

Year 2010 projections for the northern portion of the Route 10/60 Corridor indicate that there will be 22 express bus lines running parallel to the light rail transit. These 22 lines would carry 35,100 express bus passengers per day. For the purposes of this study, it was estimated that at least 25-30% of the redundant express bus service would be eliminated upon opening of the light rail line. If the light rail captured only 50% of the former express bus patrons from these deleted lines, an additional 5,250 passengers per day would be added to the light rail transit patronage.

Parallel to the southern route, 14 express bus lines are projected to operate and these 14 lines would carry a total of 18,300 passengers per day. Again, if a similar number of the express bus passengers transferred to light rail, this would add 2,750 passengers per day to the light rail estimates.

The patronage estimate, assuming the attraction of express bus patrons, indicates that the northerly alignments could be expected to attract between 31,000 and 35,000 per day. The southern alignment could attract a total of approximately 14,000 patrons per day.

1.9 CAPITAL, OPERATING AND MAINTENANCE COSTS

1.9.1 Capital Costs

The unit costs for construction and equipment of light rail transit for the Route 10/60 Corridor Study were derived from actual construction costs of the Metro Blue Line (Long Beach to Los Angeles), the Generic Unit Cost Guide of the Rail Construction Corporation (RCC), and other light rail projects. The contingency and add-on costs are consistent with the RCC's guidelines.

The cost estimates for the three routes under consideration range from $798 million for the South Line to slightly over $1 billion for the North Line Alternate 1 (Mission/Huntington/Main/Palm), and the average cost per mile ranges from $60.4 million to $64.8 million per mile.

The northern routes have a comparatively small amount of budget allocated to right-of-way. However, the reconstruction of the trench in the northern alignments adds to the cost of these two routes.

The most expensive part of the southern route is the acquisition of right-of-way. Even assuming that a total of 25% of the right-of-way costs can be recovered by selling excess right-of-way back on the private market, the right-of-way costs for the southern alignment still total over $205 million.

Construction costs for the North Lines would be substantially less if freight operations are removed from the SPTC line. Without freight operations, no reconstruction of the existing railroad trench would be required and the cost of the North Line with Segment N-2A and N-2B would be $864 and $746 million, respectively.

1.9.2 Operation and Maintenance Costs

The operations and maintenance costs for the North and South Line Alternatives were derived from the patronage forecast summaries and are based on the following operating parameters:

- The 10/60 line will operate on 6 minute headways during the peak hour.
- The line will operate seven days a week, initially for 20 hours per day on week days and 16 hours per day on weekends.
- The LRT operating cost in 1993 is $413 per car hour. This rate is based on the actual operating costs for the Metro Blue Line as calculated by the MTA. Thus, these cost estimates are based on actual local operating experience.

On the North Line Alternative 1, the annual operating and maintenance cost is estimated to be approximately $26,731,838. The cost per car mile on this segment is about $13. These figures are based on an annual patronage of about 10,485,000 passengers and annual revenue car hours of about 65,000. On the North Line Alternative 2, the annual operating and maintenance cost is estimated to be approximately $21,605,682. The cost per car mile on this alignment is approximately $10. These figures are based on an annual patronage of about 9,435,000 passengers and annual revenue car hours of about 52,300. On the South Line, the annual operating and maintenance cost is estimated to be approximately $21,907,172. The cost per car mile on this alignment is about $10. These figures are based on an annual patronage of about 4,230,000 passengers and annual revenue car hours of about 53,000.

1.10 ENVIRONMENTAL ASSESSMENT

A detailed comparison of route segments in terms of their potential environmental impacts was conducted as a part of Task 2 of this Corridor study. This section presents the results of a comparison of route segments in terms of their potential environmental impacts. For ease of reference, all corridor segments evaluated during both Task 2 and Task 3 are summarized here. The environmental assessment analyzed the comparative impacts of the alternate alignments in the following categories:

- Sensitive Land Use Impacts
- Resource Impacts
- Air Quality
- Safety and Security
- Displacement
- Circulation
- Construction

The environmental impact assessment did not indicate any impacts that could not be reasonably mitigated except along Segment S-1, which was deleted from detailed study after Task 2 of the study. The high construction impacts coupled with the impacts on residential and other sensitive land uses and the historic and cultural impacts make this route segment a very difficult one to mitigate from a variety of environmental impacts standpoints.

Other impact areas to be considered include the loss of circulation and side street accessibility in Segments S-1, S-2A and S-2B. Curb parking loss impacts in these three segments will also have to be addressed in the design of any light rail transit in these segments.

1.11 COMPARATIVE EVALUATION AND STUDY CONCLUSIONS

A comparison of the key evaluation factors is presented in Exhibit S-6. This comparison of evaluation leads to the following study conclusions:

1. From an engineering, system connectivity, operational, traffic impact, and patronage perspective, light rail transit seems to be feasible and supportable in either of the North Line alignments.

2. The North Line alignment that utilizes the Mission/ Huntington/Main/Palm routing should be explored due to its potential to more directly serve the Alhambra business area and the major bus transfer point at Eastern Avenue. The North Line alignment that stays along the SPRR rail right-of-way also represents an acceptable alignment and it too should be pursued during subsequent design and environmental analyses.

3. Light rail transit along the South Line (Beverly/Whittier/Lambert) is an unlikely proposition in the near-term future. This conclusion is based primarily on the relatively low patronage projections, traffic and parking impacts, and right-of-way impacts.

4. The South Line patronage analysis should be revisited if the Metro Red Line patronage levels are higher than now expected and/or if Orange County selects a rail corridor that would connect to the Lambert/Colima station.

EXHIBIT S-6
COMPARATIVE EVALUATION OF ROUTE 10/60 ALIGNMENTS

Alignment	Distance (miles)	One-Way Travel Time (minutes)	Daily Potential Patronage (# of riders)	Station Types (# of Stations)				Park-and-Ride		Traffic Impacts			
				At-Grade On-Street	At-Grade Off-Street	Aerial/ Trench	Total	# Stations Served	# Spaces	# Impacted Intersections After Mitigation	# At-Grade Crossings	Medium or High On-Street Parking Impacts	
												# miles	% of Corridor
North Line (Mission/Huntington/Main/Palm)	16.74	30	35,000	0	6	6	12	6 [1]	1,750 [1]	5	25	4.5	14
North Line (SPTC RR Right-of-Way)	15.36	23	31,500	0	6	6	12	7 [1]	1,860 [1]	5	9	0	0
South Line	12.30	24	14,000	7	2	0	9	6	2,019	1	46	4.9	20

Note:
[1] Does not include park-and-ride spaces at Union Station, El Monte Metrolink Station, or downtown San Gabriel (Ramona Blvd) Station.

EXHIBIT S-6 (Continued)
COMPARATIVE EVALUATION OF ROUTE 10/60 ALIGNMENTS

Alignment	Land Use Impacts					Cost ($ mil)		Cost Effectiveness		
	Residential Adjacency		# Sensitive Land Use Receptors	Significant Right-of-Way Impacts [2]		Construction	Annual Operation and Maintenance	Construction Cost per Mile ($ mil)	Operating & Maintenance Cost per Car Mile ($)	Total Cost per Passenger ($)
	# miles	% of Corridor		# miles	% of Corridor					
North Line (Mission/Huntington/Main/Palm)	2.83	18	10	2.50	16	1,011	26.7	60.4	12.78	2.55
North Line (SPTC RR Right-of-Way)	2.30	16	9	1.61	11	952	21.6	62.0	10.33	2.29
South Line	3.86	32	17	4.49	37	798	21.9	64.8	10.47	5.18

Note:
[2] Defined as right-of-way purchases greater than 10 feet in frontage depth.

II. STUDY PURPOSE

2.1 INTRODUCTION

The Los Angeles metropolitan region has a current population of approximately fourteen million people. By the year 2010, the area's population is projected to increase to eighteen million -- an increase of thirteen percent. However, during this same period both daily and home to work trips are projected to increase by about forty-two percent. This increase in travel must be accommodated on a roadway network that is already heavily congested.

In recognition of these future mobility need, the Los Angeles County Metropolitan Transportation Authority (MTA) has developed an ambitious program to maintain and enhance countywide mobility. This program includes the development and implementation of a 30 Year Integrated Transportation Plan. One of the key components of the 30 Year Plan is the development of a four hundred mile rail network which will combine light rail, heavy rail, commuter rail and perhaps even monorail technologies.

Implementation of the countywide rail system has begun with Metro Blue Line service from Long Beach to downtown Los Angeles already in service. Metro Red Line heavy rail service began in January, 1993 from downtown Los Angeles westerly to MacArthur Park. Eventually service will extend northwesterly into the San Fernando Valley. The next component of the rail system is already under construction as the Metro Green Line -- an east-west facility in the Century Freeway Corridor. Northerly extensions of the Metro Blue Line to Pasadena are planned. Other extensions of the regional rail system fall into the category of "Candidate Corridors" which are now under varying stages of planning or engineering studies. A light rail line from downtown Los Angeles westerly to Santa Monica along the Exposition Rail right-of-way as well as an extension to the Pasadena Blue Line easterly to Irwindale or Azusa are two examples of Candidate Corridors now under study.

The Route 10/60 Corridor was identified as one of the Candidate Corridors in the 30 Year Integrated Transportation Plan. The cities within the corridor, in conjunction with the County Supervisors offices affected by the alignments, worked with MTA to develop a scope for the Corridor Study. The Cities of Alhambra, El Monte, Los Angeles, Montebello, San Gabriel, and Whittier along with County Supervisorial Districts 1, 3, and 5 agreed to jointly sponsor and assist MTA in the funding of the Preliminary Planning Study. Other cities in the study area who did not financially participate in the funding of the study still participated in the technical evaluation of the corridor alignments by serving as non-voting members of the Corridor Task Force.

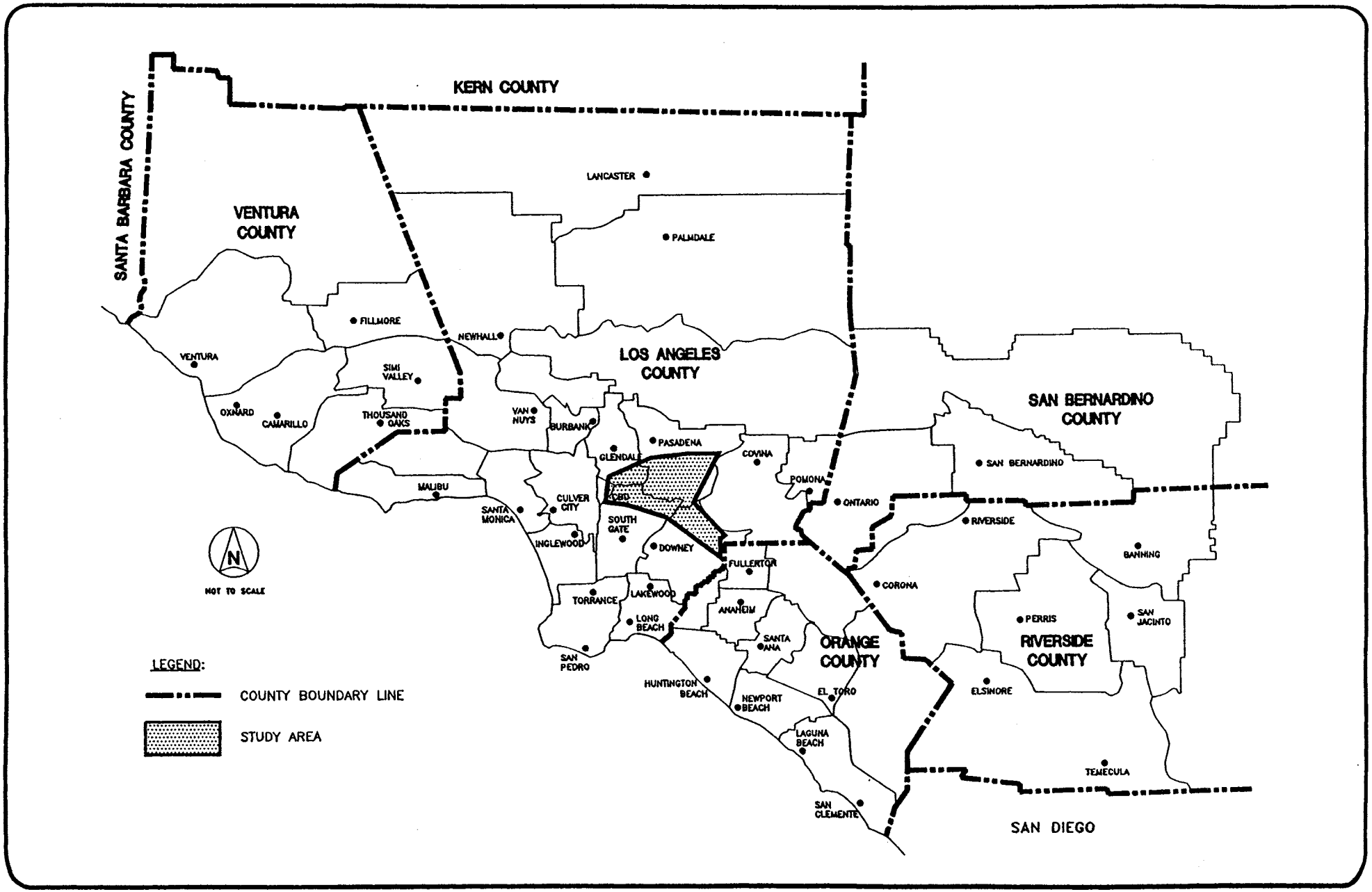
The Route 10/60 Corridor Preliminary Planning Study is intended to determine if enough patronage can be developed in the West San Gabriel Valley, and further if a West San Gabriel Valley light rail alignment can be properly connected to the rest of the countywide system. These two criteria, along with implementation cost, will determine whether this corridor can support light rail transit.

2.2 STUDY AREA

2.2.1 Regional Setting

Exhibits 1 and 2 show the location of the study area within the Los Angeles metropolitan region and a more specific illustration of the study area boundaries. The study area is generally bounded on the west by downtown Los Angeles, on the north by Huntington Drive/Main Street/ Las Tunas Drive as this corridor traverses Los Angeles, Alhambra, San Gabriel, Temple City and Arcadia. On the south, the study area is generally bounded by Whittier Boulevard and Olympic Boulevard as they traverse Los Angeles, Montebello, Pico Rivera and the City of Whittier. On the east, the study area is bounded by Interstate 605 in the northern part of the study area and the easterly boundary of the City of Whittier in the southern portion of the study area.

The study area is served by north-south freeways at both the east and west boundaries and by two east-west freeways that traverse the length of the study area. A system of arterial streets forms a grid pattern in much of the northern portion of the study area, but the topography and



Route 10/60 Corridor

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EXHIBIT 1

REGIONAL CONTEXT

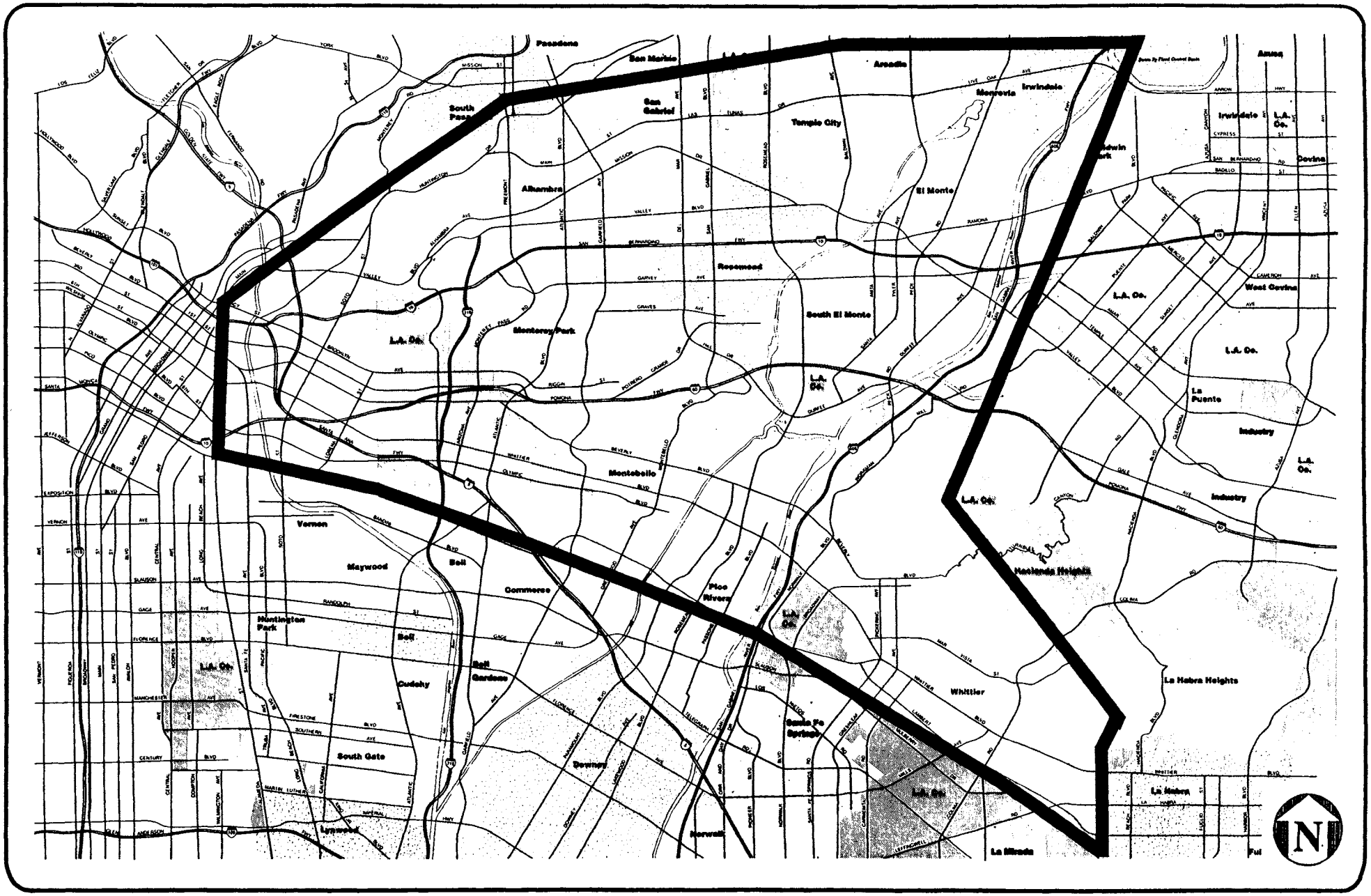

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EXHIBIT 2
STUDY AREA

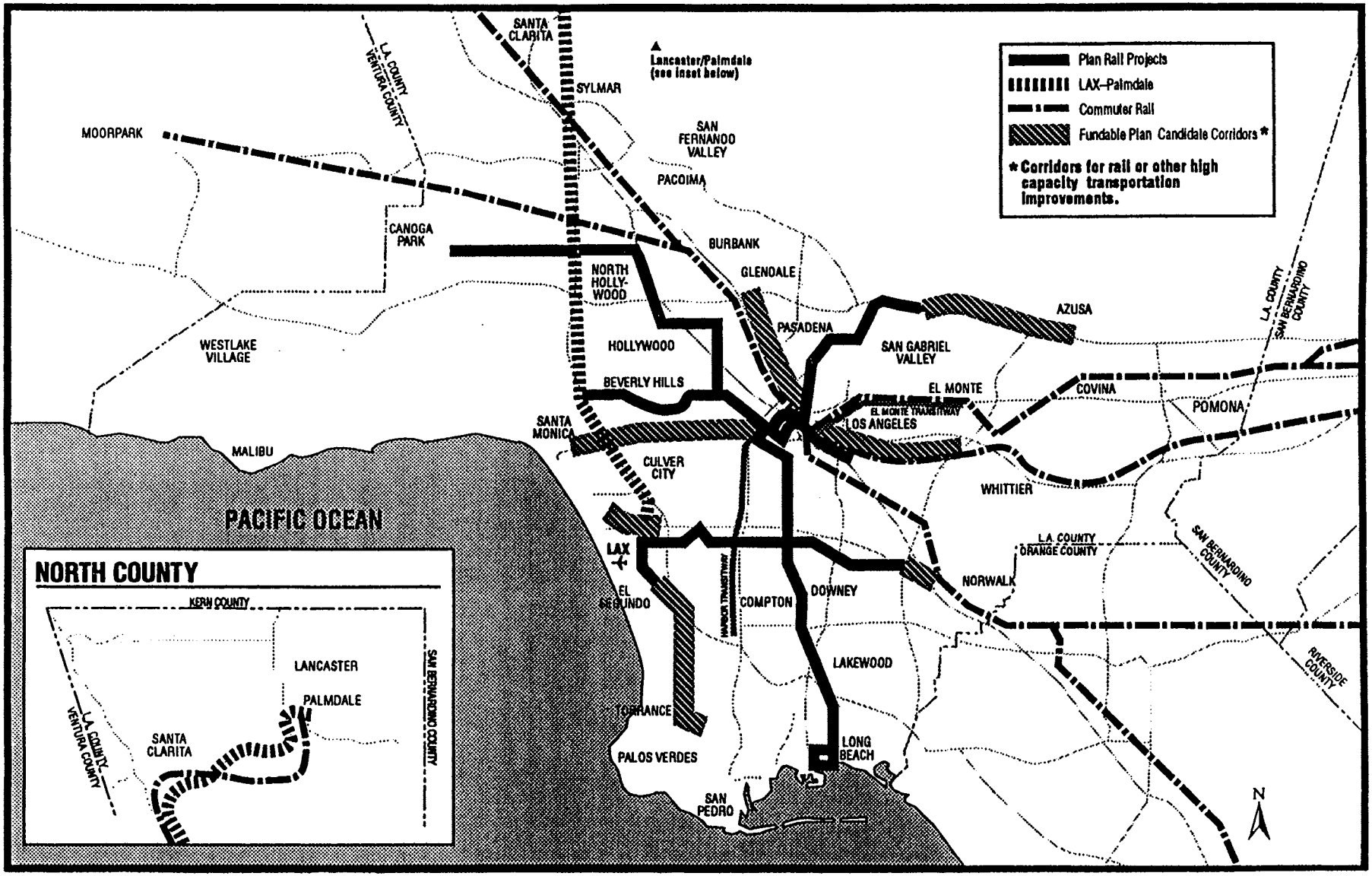
other natural barriers make the grid discontinuous from north to south and in the southern portion of the study area.

Transit service to the study area includes an extensive network of arterial and express buses as well as Metrolink commuter rail service. The El Monte High Occupancy Vehicle (HOV) Busway between El Monte and downtown Los Angeles offers the opportunity for express bus service, park-and-ride, and carpool/vanpool priority service in the study area.

With downtown Los Angeles at the far western edge of the study area, the regional rail transit is also accessible to the study area. The first segment of the Metro Red Line subway is in operation, and studies are now underway to extend the service easterly into the study area. The Metro Blue Line light rail line from Long Beach to downtown Los Angeles is also now in operation as the first segment of a countywide network of light rail lines.

2.2.2 Planned Major Transportation Improvements

Rail planning within the West San Gabriel Valley must be done within the context of the 30-Year Integrated Transportation Plan. The 30-Year Plan includes a number of components such as congestion management, high occupancy vehicle lanes, commuter rail, etc. As shown in Exhibit 3, capital improvements within the West San Gabriel Valley are already included as part of the 30-Year Integrated Transportation Plan. These improvements include high occupancy vehicle lanes along Interstate 10 (existing) and State Route 60 (proposed). Metrolink commuter rail service along both the Interstate 10 and State Route 60 corridors will have train stations within the study area offering commuters yet another alternative to the single occupant automobile. The Interstate 5 corridor, just to the south of the study area, will also accommodate Metrolink service. The Metro Red Line will extend into the western part of the study area to the area of Whittier/ Atlantic (presently under study). Westerly extensions of the Metro Red Line include service to Hollywood and then to the San Fernando Valley, as well as a westerly extension to the Pico/San Vicente area. The Metro Blue Line will be extended just north of the study area through downtown Pasadena and into eastern Pasadena. A Metro Blue Line Downtown Connector Study is now underway to determine the best way to connect the light rail routes radiating out of



SOURCE: LACTC PROPOSED 30 YEAR INTEGRATED TRANSPORTATION PLAN, MARCH 1992

Route 10/60 Corridor

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EXHIBIT 3
30 YEAR PLAN

downtown. The Metro Green Line is under construction in the Glenn Anderson Freeway corridor and, when open, will serve the area just south of the study area.

The above transit improvements, along with the highway and street improvements that are ongoing in the study area, make up the background setting for the planning of additional light rail service to the study area.

2.3 STUDY PURPOSE

One of the plan elements identified in Exhibit 3 is the "Fundable Plan Candidate Corridor". The Route 10/60 Corridor is one of seven such Candidate Corridors in the 30 Year Transportation Plan. The purpose of the Route 10/60 Corridor Preliminary Planning study is to determine whether or not light rail transit is an appropriate transit technology for this corridor and, if so, to identify the specific corridor alignments that have the most potential to attract ridership. The alignments are to be evaluated on the basis of engineering feasibility, system operations, environmental impacts, cost, patronage, and system connectivity.

2.4 STUDY PROCESS

2.4.1 Study Approach

The Route 10/60 Corridor Preliminary Planning Study is divided into three major tasks. Task 1 analyzed seven alignments on a corridor-level basis. These seven alignments were developed by the MTA in conjunction with the Corridor Cities. The intent of Task 1 was to identify those alignments that have the most potential for light rail technology, patronage development, operating efficiency, and cost effectiveness. The end product of the corridor-level analysis was the identification of routes worthy of additional study.

In Task 2 the narrowed list of corridors was analyzed in more detail. The remaining corridors were divided into route segments and each segment was evaluated in categories such as implementation feasibility, station location and impacts, traffic impacts, environmental

assessments, and preliminary patronage estimates. The end product of the segment-level analysis was a recommendation for a finalist route(s) to be evaluated in Task 3.

Task 3 refined the patronage estimates developed during the segment-level analysis and prepared cost estimates for implementation and operation/maintenance for the alignments.

2.4.2 Study Task Force

The conduct of the Route 10/60 Corridor Preliminary Planning Study was guided by a Corridor Task Force made up of technical staff members from the Corridor Cities, the County Supervisors' offices, and MTA. At key points in the study, technical analysis results and recommendations were presented to the Task Force, and the Task Force made recommendations regarding narrowing of alternatives, station locations, alignment adjustments, land use impacts, etc.

2.4.3 Previous and Ongoing Planning Studies

The Route 10/60 Preliminary Planning Study had to be conducted in the context of the recent and ongoing regional transportation planning. A number of recent technical studies and indeed a number of studies in process at this time provide important input to decisions to be made in the Route 10/60 Corridor. Some of the key studies are described below.

1. Pasadena Light Rail Transit Alternatives Study – The preliminary planning and environmental studies for the Pasadena LRT extension from downtown Los Angeles to the east side of Pasadena investigated LRT alignments as far south and east as the El Monte Busway and I-710 corridors. Thus, alignment and engineering data was available for the Route 10/60 study.

2. Metro Red Line Extension Study – The alternatives analysis for the easterly extension of the Metro Red Line is now in its final stages. Valuable information regarding system connectivity and transit service reorganization was supplied by this study. In addition, the Metro Red Line study developed a countywide transit patronage forecasting model which was used in the Route 10/60 Corridor study.

3. Blue Line Downtown Connector Study – This study is an ongoing study to determine the most appropriate connection between the Long Beach/Los Angeles Metro Blue Line and the Los Angeles/Pasadena Metro Blue Line. This study is important to the Route 10/60

Corridor Study because any selected alignment in the Route 10/60 Corridor will have to interface with the regional system somewhere in downtown Los Angeles. The better the interface, the better the regional system connectivity for the Route 10/60 Corridor travellers.

4. Northern San Gabriel/San Bernardino Valley Corridor Study -- This is a preliminary planning study for a rail corridor immediately north of the Route 10/60 Corridor. As such, it was important to know the location of the alignments under consideration and their possible impacts on the Route 10/60 Corridor alignments.

2.5 REPORT ORGANIZATION

This report is one of a series of technical documents that summarize the analysis and findings of the Route 10/60 Corridor Preliminary Planning Study. Other published documents include:

Route 10/60 Corridor Preliminary Planning Study -- Task 1 Report, January, 1993
Route 10/60 Corridor Preliminary Planning Study -- Task 2 Report, March, 1993
Route 10/60 Corridor Preliminary Planning Study -- Task 3 Report, June, 1993
Route 10/60 Corridor Preliminary Planning Study -- Alignment Configurations, June, 1993

This document is intended to be a summary of the individual Task Reports. This Final Report begins with an Executive Summary and Chapter 2 presents the context and the purpose of the technical study. Chapter 3 describes the study area and the alignments selected for analysis. Corridor-level and segment-level alignment evaluation results are presented so the reader can follow the process that the Corridor Task Force went through in narrowing down the alignment alternatives for detailed study.

Chapter 4 presents the detailed analysis of the alternatives selected by the Corridor Task Force. Conceptual engineering, station site planning, operations planning, patronage estimates, traffic impacts, cost estimates, and environmental assessment are all discussed.

The final chapter presents a comparative evaluation of the final alignments and describes the recommendations of the Corridor Task Force.

III. RAIL TRANSIT SYSTEM DEVELOPMENT OPTIONS

The Los Angeles County MTA, in conjunction with the Corridor Cities, developed seven basic alignments within the study area that appeared worthy of analysis as potential light rail corridors. Exhibit 4 shows the alignments of these seven corridors. From north to south they are:

- Huntington Drive/Las Tunas – An at-grade, in-street LRT route that moves easterly out of downtown Los Angeles via Main Street and Mission Boulevard. The route then turns onto Huntington Drive, Main Street, and Las Tunas to serve the commercial and residential areas of El Sereno, Alhambra, and San Gabriel.

- Mission Drive/SPRR Right-of-Way – The route alignment is identical to the first segment of the Huntington/Las Tunas route. At Mission/Soto/Huntington interchange, this route continues easterly using the Southern Pacific Transportation Company (SPTC) rail right-of-way. The two LRT tracks would be constructed parallel to the single existing freight rail tracks. The alignment would stay in the rail right-of-way until El Monte where the LRT route would end.

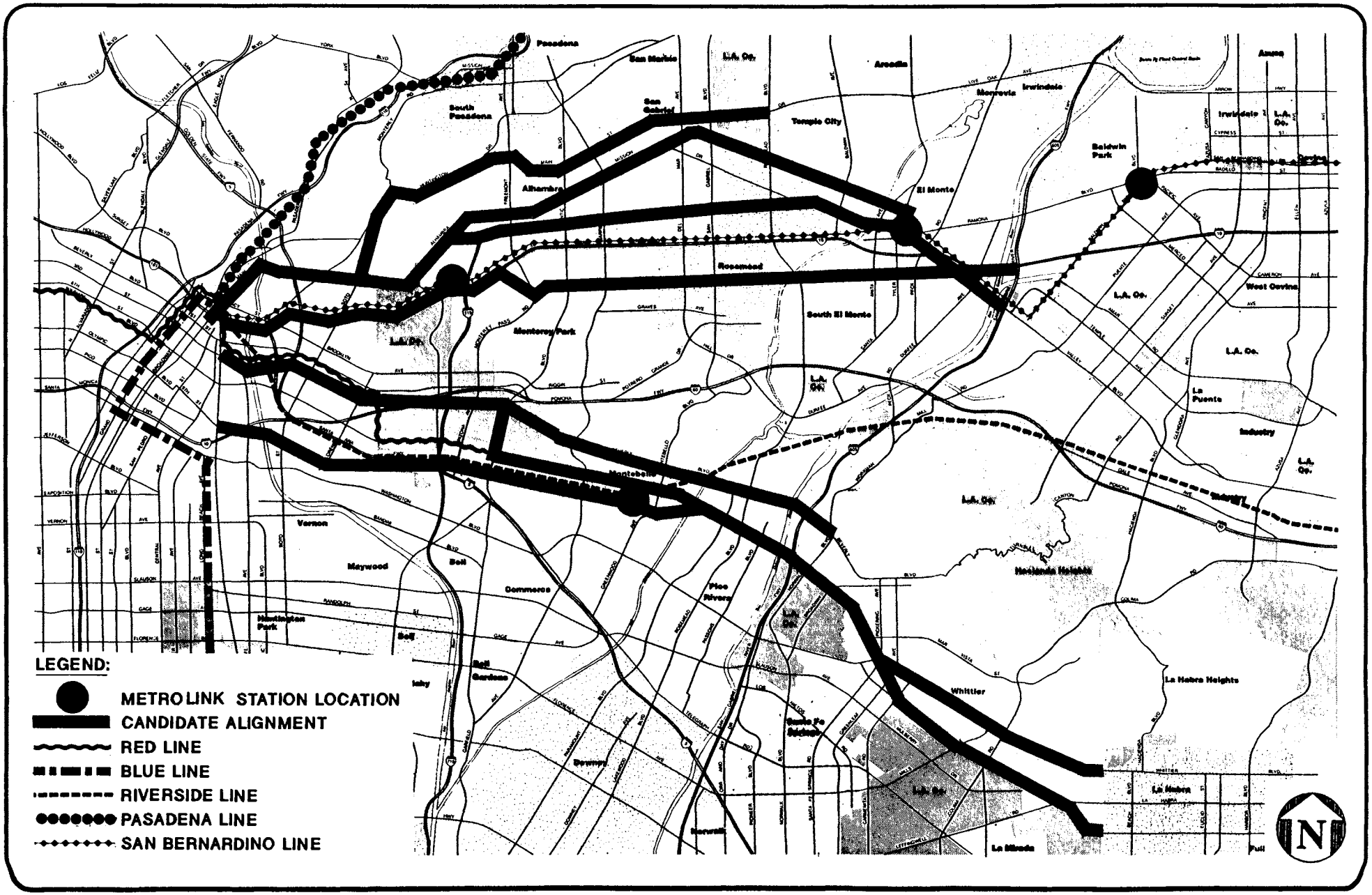
- Valley Boulevard – This route would cross the study area at-grade in the center of the existing Valley Boulevard street cross section. The eastern terminus of the route would be in the vicinity of I-605 in El Monte.

- Garvey Avenue – The Garvey route would leave downtown Los Angeles in the I-10 freeway corridor, transferring to at-grade, in-street operations along the Garvey corridor at Fremont. This corridor would also end in the I-605 area.

- Beverly Boulevard – The Beverly corridor would leave downtown Los Angeles through Boyle Heights in in-street operation along Third and Fourth Streets. The at-grade alignment would end just east of I-605.

- Whittier Boulevard – The Whittier route would also use the Third and Fourth Street route to Atlantic where the LRT in-street line would turn south to Whittier Boulevard and then east to the eastern boundary of the City of Whittier. Through the City of Whittier, there are two options. First, the line could continue along Whittier Boulevard in an at-grade, in-street operation. The second option would see the LRT line switch to the Union Pacific Railroad (UPRR) right-of-way along Lambert Road. Both of these options would end near the City's eastern boundary.

- Olympic Boulevard – This alignment would leave the southeast corner of downtown Los Angeles via Olympic Boulevard. The route would be an in-street, at-grade operation joining the Whittier Boulevard alignment in the eastern portion of the City of Montebello.



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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EXHIBIT 4
SEVEN CORRIDOR ALIGNMENTS

This chapter describes the first two levels of evaluation for the seven LRT lines described above. Each line was evaluated on a corridor-level basis and the list of potential corridors was narrowed. The second level of analysis evaluates each route segment along the narrowed list of corridors. This second level analysis selected the route segments for final evaluation.

3.1 STUDY AREA CHARACTERISTICS

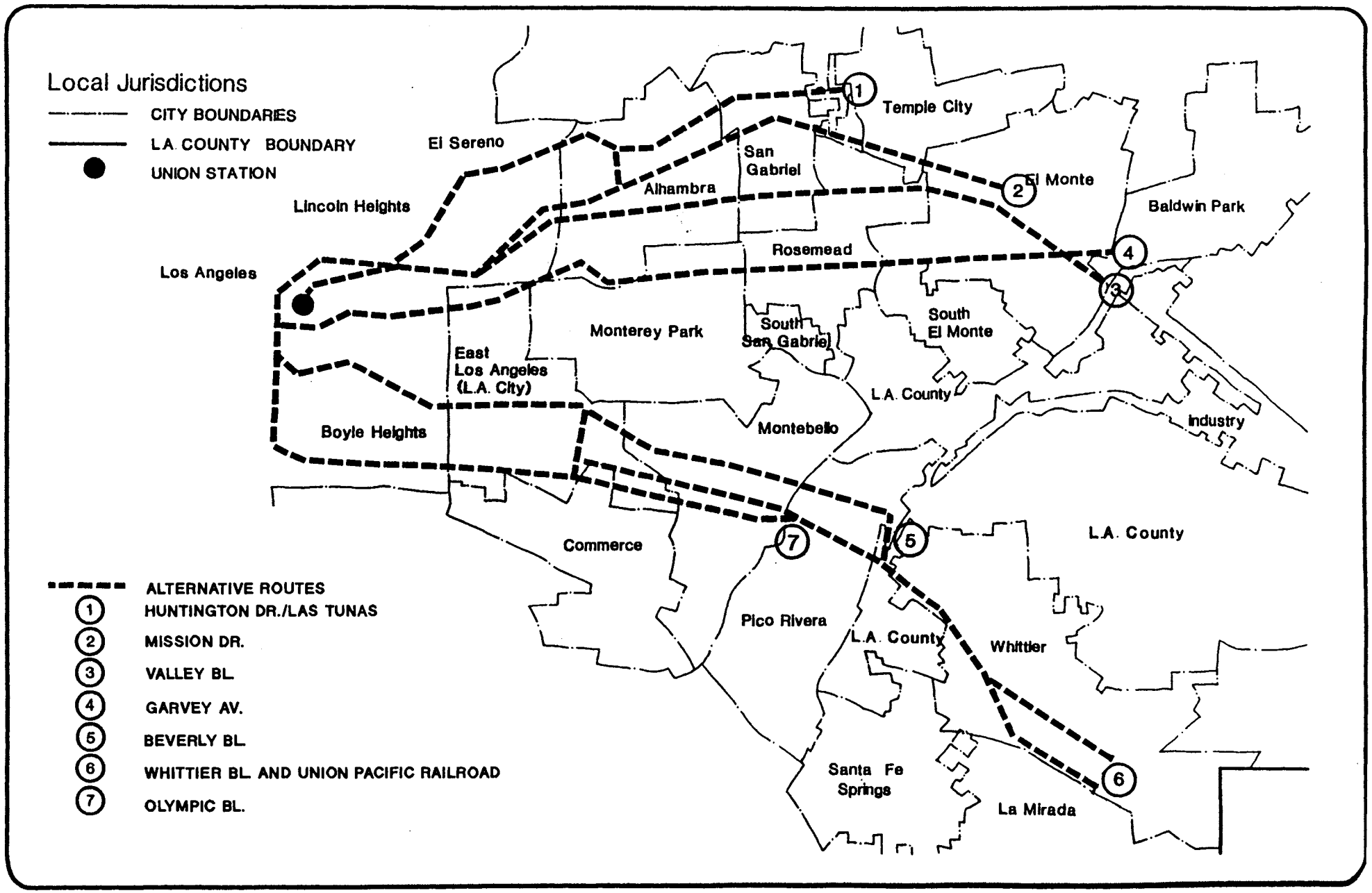
The Route 10/60 Corridor Study area extends thirteen lineal miles from downtown Los Angeles to its northeasterly terminus in the City of El Monte and sixteen lineal miles to its southeasterly terminus in the City of Whittier. This western portion of the San Gabriel Valley includes all or portions of seventeen city and county jurisdictional areas and portions of the First, Fourth and Fifth Supervisorial Districts.

The corridor area contains natural hillside topography which originates with the Montebello Hills and becomes more severe with the La Puente Hills just north of the City of Whittier. The hillside topography divides the corridor area into three sectors including the western core area, the northern and the southern sectors.

As shown in Exhibit 5, the western core sector includes the City of Los Angeles and the communities of Boyle Heights, Lincoln Heights and El Sereno as well as the unincorporated community of East Los Angeles. The southern sector includes all or portions of the cities of Monterey Park, Montebello, Commerce, Pico Rivera, Whittier, La Mirada and portions of Los Angeles County. The northern sector includes all or portions of the cities of Alhambra, Rosemead, San Gabriel, Temple City, El Monte, South El Monte and the unincorporated community of South San Gabriel.

3.1.1 Generalized Land Use

The Route 10/60 Corridor route alternatives contain a variety of existing land uses that have developed since the 1920's up to the present day. The route alternatives all represent the most



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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EXHIBIT 5
LOCAL JURISDICTIONS

continuous, major east-west thoroughfares that exist within the corridor study area. The following is a brief overview of the existing land uses along each of the route alternatives.

Main Street/Huntington Drive/Las Tunas Drive

Main Street contains a mixture of industrial, limited commercial and residential uses through the Lincoln Heights community. Huntington Drive contains considerable residential uses and includes the neighborhood commercial core of El Sereno. As Huntington diverts to Main Street and Las Tunas Drive, it proceeds through the entire commercial core of the City of Alhambra and the City of San Gabriel. The Las Tunas Drive route alternative continues through predominantly commercial uses and terminates at the Temple City commercial core.

Southern Pacific Rail/Alhambra Avenue/Mission Road

Predominant uses along the western edge of this route are industrial uses. Through the City of Alhambra, the north side contains industrial concentrations and lower density residential uses on the south side. The balance of this portion of the route, through the City of Alhambra contains a mixture of single family homes and multiple apartment units as well as recreation and public school facilities. Through the City of San Gabriel, the routes include the San Gabriel Mission, Civic Center core area, industrial uses and some residential uses. The route continues through a combination of single family neighborhoods and smaller industrial concentrations along the borders of Rosemead and Temple City. Through the City of El Monte, the route contains mostly industrial uses and terminates near the Civic Center and the commercial core of the City of El Monte.

Valley Boulevard

Valley Boulevard through El Sereno contains mostly industrial uses. The route continues through mostly strip commercial corridors within the cities of Alhambra, San Gabriel and Rosemead. Commercial concentrations are more intensified at key intersections such as New Avenue, Del Mar Avenue and San Gabriel Boulevard. Through the City of El Monte, the route proceeds through a mixture of industrial and commercial uses and continues through the commercial and civic center core of the City of El Monte.

Garvey Avenue

The western portion of this route is within the San Bernardino right-of-way and is within close proximity to the L.A. County Hospital complex and California State University, Los Angeles. As the route continues onto Garvey Avenue, the predominant land uses are residential. The route proceeds through the commercial core areas of Monterey Park. Through the City of Rosemead, the route continues through a strip commercial corridor in the City of El Monte and terminates within an industrial sector of the city.

Beverly Boulevard

The western portion of this route, through Boyle Heights and East Los Angeles, traverses a mixture of residential, strip commercial uses as well as a number of public facilities and cemeteries. East of Atlantic Boulevard, the route proceeds through mostly strip commercial uses, and the community commercial and civic center core of Montebello. East of Rio Hondo River, the predominant land uses are residential or public facilities.

Whittier Boulevard

The Whittier Boulevard route originates at the community commercial core area of the City of Commerce, proceeds through strip commercial in the East Los Angeles community and the neighborhood commercial core area of Montebello. Through the City of Pico Rivera, the route continues through the community commercial core of the City and through the City of Whittier. The route continues through some industrial uses and onto newer commercial uses and commercial concentrations such as the Whittier Quad and the Whittwood Shopping Center.

Lambert Road/Union Pacific Rail

As an alternate to the far eastern portions of Whittier Boulevard, the Lambert Road route traverses through mostly single family uses with commercial concentrations at significant intersections.

Olympic Boulevard

The Olympic Boulevard route contains industrial concentrations on the south and predominantly multiple residential uses on the north through the Boyle Heights community. Through the East Los Angeles community, the predominant land use is strip commercial on the western edge and single and multiple residential on the eastern edge. The route continues through single and multiple residential uses and industrial uses on the south side as it continues and terminates in the City of Montebello.

3.1.2 Activity Centers

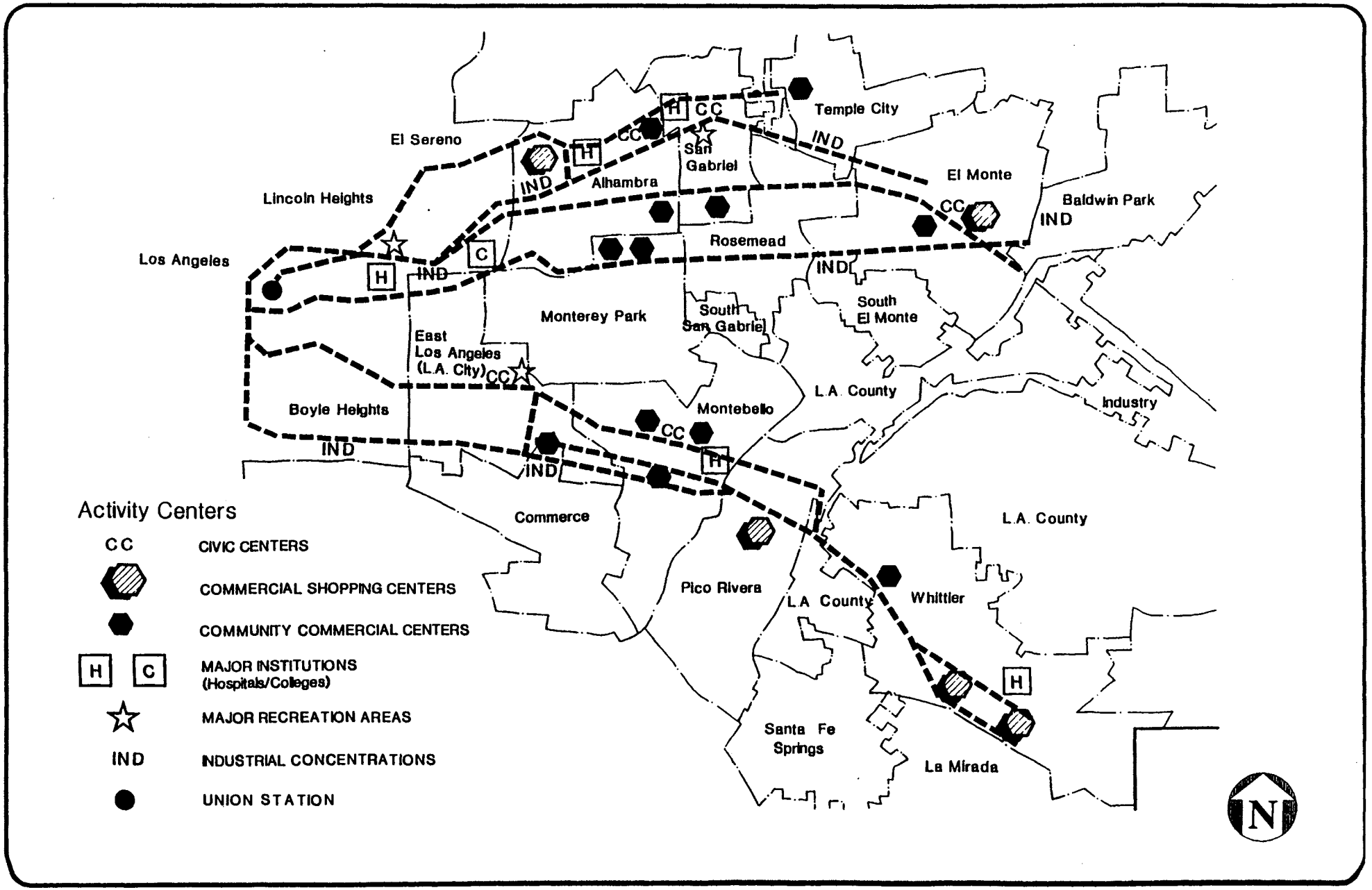
Exhibit 6 shows that the Route 10/60 Corridor Study area contains several activity centers within close proximity of the alternative route alignments. For purposes of this study, activity centers are defined as major destination points where persons gather to shop, recreate or conduct civic business. They also include major institutions such as hospitals or colleges and major employment centers such as industrial concentrations. The following identifies the major activity centers along each of the alternative routes.

Main Street/Huntington Drive/Las Tunas Drive

- LA County/USC Medical Complex
- Lincoln Park/Playa de la Raza
- Price Club/Target Shopping Center
- Alhambra Hospital
- Alhambra Main Place Commercial
- San Gabriel Valley Medical Center
- Albertson K-Mart Commercial Center

Southern Pacific Rail/Alhambra Avenue/Mission Road

- LA County/USC Medical Complex
- Industrial Concentration (Fremont Avenue)
- YMCA/Almansor Golf Course
- San Gabriel Mission/San Gabriel Civic Center
- Industrial Concentration (Baldwin Avenue)



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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EXHIBIT 6
ACTIVITY CENTERS

Valley Boulevard

- The Market Place/Valley Square/West Coast Plaza
- San Gabriel Square
- El Monte Mall
- El Monte Civic Center
- Home Base Shopping Center

Garvey Avenue

- LA County/USC Medical Complex
- Industrial Concentration (Bonnie Beach Place)
- California State University, Los Angeles
- Monterey Park Community Core (Atlantic Boulevard, Garfield Boulevard)
- Industrial Concentration (Rosemead Boulevard)
- Industrial Concentration (Baldwin Park Boulevard)

Beverly Boulevard

- LA County Courthouse/Roybal Health Center/Belvedere Park
- Beverly Wilcox Village
- Mart of Montebello
- Montebello Civic Center
- Beverly Hospital

Whittier Boulevard

- Commerce Commercial Center
- Crawfords Corner (Montebello Boulevard)
- Pico Rivera Plaza/Crossroads Plaza Shopping Center
- Whittier Market Place
- Whittier Quad Shopping Center
- Whittwood Shopping Center
- Whittier Hospital

Olympic Boulevard

- Industrial Concentration (Lorena Street)
- Industrial Concentration (Goodrich Boulevard)

3.1.3 Existing Transportation System Serving the Corridor

The Route 10/60 Corridor is presently served by a variety of transportation modes and services. Regional freeway access is excellent, and an extensive system of continuous arterial streets covers the study area.

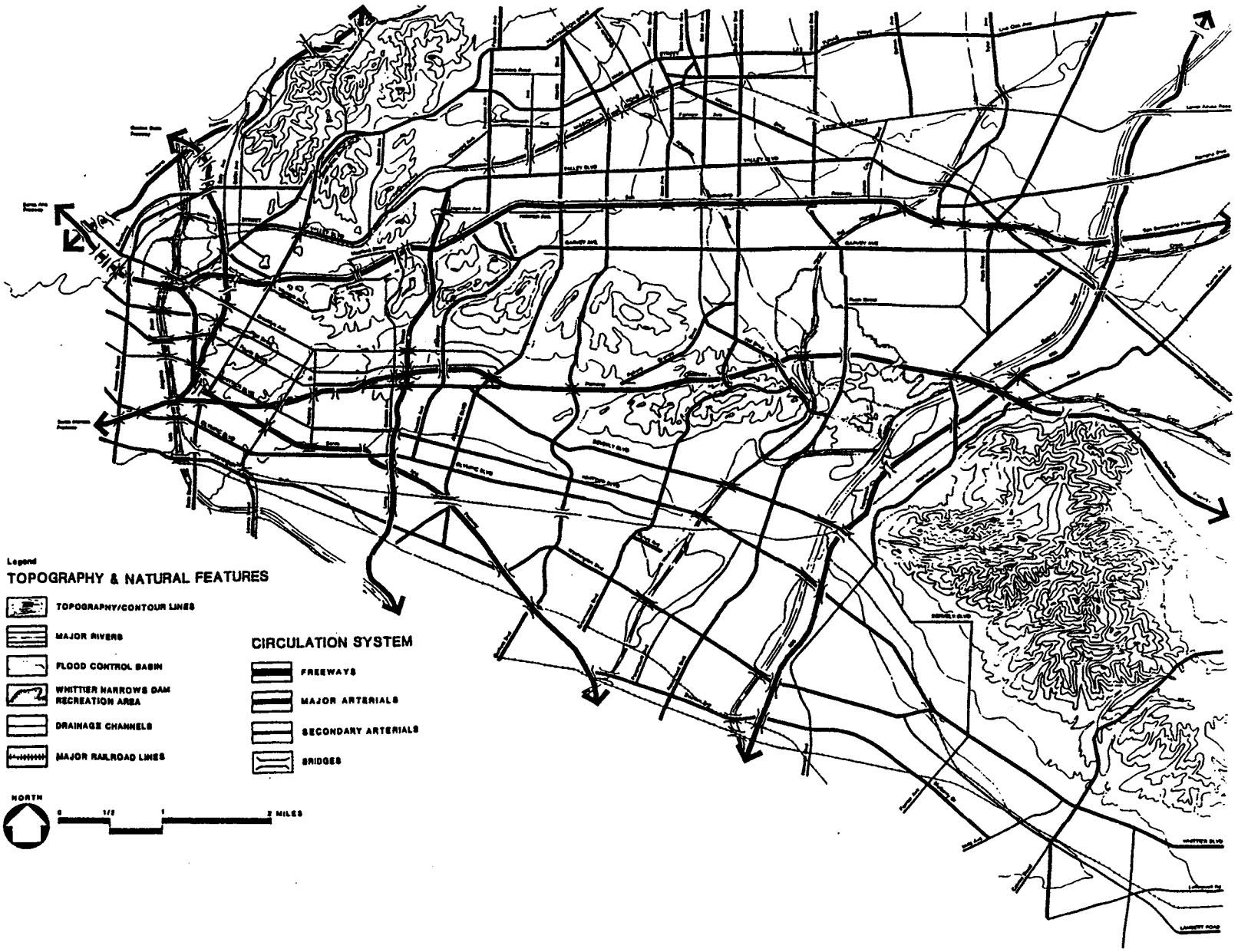
Transit service in the form of express and local bus routes is available within the study area from MTA, Foothill Transit, and Montebello Bus Line. Some cities, El Monte and Whittier in particular, have supplemented the arterial bus service with local shuttle and/or demand-responsive systems. Commuter rail service to the study area recently began with the implementation of Metrolink service in both the I-10 and SR 60 corridors. Of course, the El Monte Busway connecting the study area to Downtown Los Angeles represents one of the pioneering efforts in express bus and high occupancy vehicle service in Southern California.

To this existing transportation infrastructure should be added the possibility of light rail transit to Pasadena from Downtown Los Angeles and the planned extension of the Metro Red Line into the eastern portion of the study area. It should also be noted that the 30 Year Transportation Plan also includes the development of new HOV lanes in the SR 60 corridor.

Since much of the route and alignment planning for the LRT line in the Route 10/60 Corridor centers around service in or adjacent to arterial streets, it is important to have a good understanding of the arterial street system serving the study area. Exhibit 7 depicts the freeway and arterial street system in the context of the topography and natural features of the study area. The following paragraphs briefly describe the physical characteristics of the key arterial streets in the corridor.

East-West Arterial Streets

- Huntington Drive -- The segment between Valley Boulevard and Main Street in Alhambra is essentially six lanes wide with on street parking and a raised median. The segment through the commercial center of El Sereno is eight lanes with on street parking and a raised median. Approaching El Sereno from the west, Huntington Drive has a fairly steep grade. Adjacent land uses along the western end of this segment on the north side of the street are primarily single and multi-family residential, while on the south there is more of a mixture of residential and commercial.



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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EXHIBIT 7

STREET SYSTEM

- Main Street – East of Huntington Drive, Main Street has a six lane divided cross-section with on-street parking. In the vicinity of Poplar Boulevard, Main Street has a four lane cross-section with on-street parking and either a raised median or a striped two-way left-turn median. The adjacent land uses are commercial. The segment through downtown Alhambra has special sidewalk and curb treatments, with limited or no on-street parking.

- Las Tunas Drive – Main Street becomes Las Tunas Drive in the City of San Gabriel. Adjacent land uses vary from single and multi-family residential to mixed-use commercial. East of San Gabriel Boulevard to Rosemead Boulevard, Las Tunas Drive has a six lane cross-section with a two-way left-turn median and on-street parking. East of Rosemead Boulevard the cross-section drops back to four lanes.

- Mission Drive – Traveling west from the at-grade crossing with the SPRR at Junipero Serra Drive, Mission Drive has a four lane cross-section and no on-street parking. On the north side of the street, the adjacent land uses are single and multi-family residential. There is no development on the south side of the street as the railroad transitions from at-grade operation to below-grade trench operation. At Atlantic Boulevard the adjacent land uses begin to change from residential to commercial to light industrial. Between Lowell and Fremont there is a short two lane segment. West of Lowell, Mission Drive becomes Alhambra Avenue where the cross-section becomes four lanes with on-street parking. The adjacent land uses are low intensity industrial.

- Valley Boulevard – Traveling east from Huntington Drive, Valley Boulevard has a four lane cross-section with on-street parking and a two-way left-turn median. There are also peak direction on-street parking restrictions. This cross-section is maintained over the remaining segments to Rosemead Boulevard. The adjacent land uses over these segments are commercial.

- Garvey Avenue – Traveling westbound from Rosemead Boulevard, Garvey has a four lane cross-section with on-street parking and a two-way left-turn median. The adjacent land uses are commercial. In Monterey Park there is a raised median. West of Atlantic Boulevard, the adjacent land uses are residential.

- Monterey Pass Road – This is a four lane road with a two-way left turn median. The adjacent land uses are light industrial and warehousing.

- Beverly Boulevard – Traveling eastbound from Atlantic Boulevard, Beverly has a four lane cross-section with a raised median and on-street parking. In Montebello, the cross-section is the same but the raised median intermittently becomes a two-way left turn lane. This cross-section remains the same to Rosemead Boulevard except for the bridge over the Rio Hondo which is four lanes with sidewalks. The railing-to-railing width is about 50 feet. The adjacent land uses are commercial. There is a short stretch in Pico Rivera where there are single family residential housing units fronting Beverly, but they are set back from the street.

- Whittier Boulevard – Traveling westbound from Rosemead Boulevard to Atlantic Boulevard, Whittier Boulevard has four lanes with on-street parking and a two-way left turn median. The adjacent land uses are commercial. The bridge over the Rio Hondo is four lanes with sidewalks.

- Olympic Boulevard – West of Garfield, Olympic Boulevard has four lanes with on-street parking and a two-way left turn median. The adjacent land uses are residential until Hendricks where they become commercial. Near Goodrich the adjacent land uses become industrial and there is no on-street parking permitted. West of Atlantic the cross-section goes back to four lanes with on-street parking and a two-way left turn median. In the vicinity of Rowan there are some light industrial land uses. West of Lorena, there are public housing projects on the north side of the street and light industrial and vacant industrial properties on the south. Approaching Soto Street, there is no on-street parking.

North-South Arterial Streets

- Fremont Avenue – The entire segment south of Alhambra Road in Alhambra is essentially four lanes with double yellow centerline markings. Parking is allowed on either side of the street. Adjacent land uses are primarily single and multifamily residential, with the exception of the segment between Mission Road and Main Street which is primarily commercial. The segment north of Alhambra Road is mainly residential.

- Atlantic Boulevard – The entire segment within the study area offers four lanes. Land uses are predominantly retail south of Garvey Avenue, with a two-way left turn median and on-street parking on both sides. Between Garvey Avenue and Glendon Way, land uses are retail, with both a two-way left turn median and a raised median. No parking is allowed on this segment. Between Glendon Way and Mission Drive in the City of Alhambra, median type is a two-way left turn median and land uses are primarily residential. Parking is available except between Valley Boulevard and Mission Drive. Between Mission Drive and Main Street land uses are retail. North of Main Street, land uses are strictly residential.

- Del Mar Avenue – The entire segment within the study area is four lanes with on-street parking available and is bordered by residential land uses with the exception of the segments between Las Tunas Drive and Mission Drive and between Valley Boulevard and Garvey Avenue, where land uses are commercial and retail.

- San Gabriel Boulevard – The entire segment within the study area is essentially four lanes with on-street parking and a two-way left turn median. Adjacent land uses between Garvey Avenue and Las Tunas Drive are primarily retail. Land uses north of Las Tunas Drive are residential.

- Rosemead Boulevard – The segment between the northern study area boundary and Marshall Street in the City of Rosemead has four lanes with on-street parking. Adjacent land uses are primarily single and multifamily residential, with the exception of the segments between Las Tunas Drive and Pentland Street and between Mission Drive and Valley Boulevard, which are primarily retail. The segment south of Marshall Street is essentially six lanes with a raised median and the adjacent land uses vary from retail to commercial. No parking is available in this segment.

- Garfield Avenue – The entire segment has four lanes with on-street parking except for between Mission Drive and Main Street where there is no parking. Adjacent land uses south of Mission Drive and north of Main Street are primarily residential Land uses

between Mission Drive and Main Street vary from retail to commercial. The segment south of Mission Drive has a two-way left turn median and the segment north of Mission Drive is marked with double yellow centerline.

3.2 LIGHT RAIL TRANSIT (LRT) MODAL CHARACTERISTICS

3.2.1 LRT Technology

Light rail transit is typically classified as a "medium capacity" transit technology. With hourly passenger capacities of up to 6,000, LRT easily outperforms street lanes and even most commuter rail lines. Heavy rail subway systems carry more hourly passengers than does LRT, but the light rail transit technology serves the medium demand corridor very well. LRT is flexible in that it can operate elevated, at-grade, and in subway environments. Typical station spacing along an LRT line is in the order of 1-2 miles and frequency of service in the 5-minute range in peak hours is common. The LRT line from Long Beach to Los Angeles (Metro Blue Line) presently carries over 35,000 passengers per day.

3.2.2 Modal Interface

One of the key goals of the Route 10/60 Corridor study is to develop and enhance the connectivity of the study area to the regional transportation system. For that reason, it was very important from the outset of the study to identify the potential interface points with other elements of the regional system. Some of the key interchange locations are:

- Metro Red Line Eastern Extension
- Metrolink Stations in El Monte, Montebello, and at California State University, Los Angeles
- El Monte Busway Station
- Pasadena LRT Line (under study)
- Metro Blue Line Downtown Connector (under study)

3.2.3 Modal Compatibility with Freight Service

Some of the sections of the alignments under study in the Route 10/60 Corridor Study will share railroad right-of-way with freight service. LRT and freight trains should not operate on the same tracks. Even when operating on adjacent, parallel tracks, the two types of rail activity still have some areas of conflict that should be considered in the evaluation of the feasibility of a particular route. LRT service obviously attracts and generates pedestrian activity. This pedestrian activity presents operational and safety considerations for the freight service that would not exist without the LRT activity. The same considerations exist for park-and-ride automobile activity as well as bus activity. Finally, the railroads are typically concerned that the introduction of LRT transit to their freight corridors not impede their ability and flexibility to service and maintain their systems. While most, if not all, of these problems are solvable, it is important to keep them in mind when designing/evaluating mixtures of freight and LRT shared right-of-way.

3.3 SCREENING OF CORRIDOR OPTIONS – CORRIDOR LEVEL ANALYSIS

Exhibit 4 (presented at the beginning of this chapter) depicts the seven basic LRT alignments that were developed by MTA and the Corridor Cities. These alignments were evaluated on a broad, corridor-level basis to identify any particular flaws that might render any one of the alignments unworkable. This section of the report presents the results of that corridor-level analysis.

3.3.1 Corridor Level Analysis Approach

The initial corridor level screening involved an iterative process in which the consultant team defined general evaluation criteria, measured the different LRT alignments against those criteria, and then held intensive workshops with the Corridor Task Force to discuss and evaluate the results. A summary of the corridor level analysis is presented below.

3.3.2 Corridor Level Evaluation Criteria

Since this corridor level evaluation was intended to be a general overview, it was clear that detailed patronage and detailed implementation cost information would not be available. Therefore, the consultant team developed a list of evaluation criteria that would reflect the patronage potential and implementation cost parameters of each route alignment. All seven route alignments were then measured against these evaluation criteria to identify any routes that performed particularly poorly in any of the evaluation categories.

The following general evaluation criteria were applied to each of the seven route alignments:

- LRT Design Criteria
- Topography and Existing Circulation System
- Land Use Impacts
  - General land use service
  - Redevelopment area service
- Potential Ridership
  - Station locations
  - Land use intensity near stations
- Implementation Costs
  - Length of corridor
  - Right-of-way constraints
  - Engineering constraints
  - Overall construction impacts
- Connectivity
  - Transit service to stations
- Impacts
  - Traffic
  - On-street parking
  - Median treatments

3.3.3 Corridor Level Analysis Results

LRT Design Criteria

Based on the design of stations and the location of the overhead catenary system, on-street light rail transit requires between twenty-four and thirty-two feet of width for double-track, two-way operation. Therefore, since all of the route alignments that deal with on-street light rail service

are important arterial streets, it was determined that it would be unlikely that any of these streets could be reduced to one automobile travel lane in each direction. This meant that a seventy foot wide curb-to-curb cross section would be necessary to adequately accommodate two lanes of moving traffic in each direction plus two-way light rail transit service within the street. Even under these conditions, on-street parking on both sides of the street would have to be prohibited.

This basic seventy-foot wide street cross section was used as the evaluation criterion to investigate the impacts of on-street light rail on such factors as on-street parking and right-of-way.

Topography

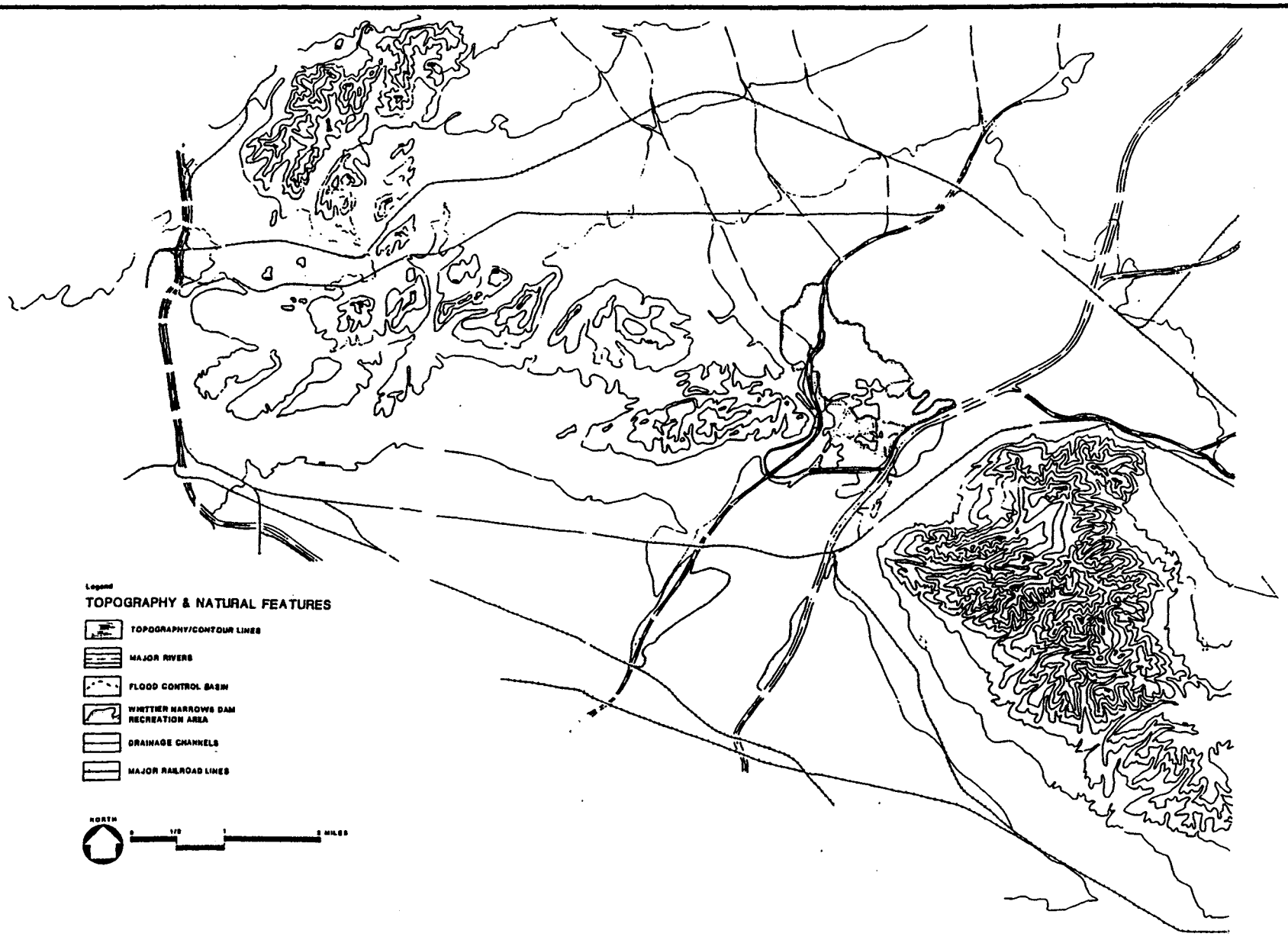
The general topographical constraints (hills/mountain ranges and arroyos/rivers) and the existing major circulation system within the West San Gabriel Valley will both affect the alignment possibilities for light rail transit. Exhibit 8 shows the topography and natural features in the study area. The impact of these topographical features is described under "Engineering Constraints" below.

Land Use Impacts

- Land Use Patterns – It is important to understand the general land use patterns along the proposed route alignments. This land use pattern gives an understanding of potential ridership and it also allows MTA and the corridor cities to understand where the placement of a light rail alignment might have the most effect in terms of influencing future land use patterns. Exhibit 9 shows a generalized land use pattern for the entire study area. This data was used to evaluate potential ridership and potential land use impacts.

- Redevelopment Area Service – The active redevelopment areas within the West San Gabriel Valley that would be served by the various route alignments were identified and mapped. One evaluation criterion for the various alignments was the influence that the placement of a light rail transit might have on changing land uses. It was felt that since the redevelopment mechanism was already in place in many of the communities, it made sense to investigate the service to these redevelopment areas in terms of joint development opportunities.

  Service to redevelopment areas varied from a low of two redevelopment areas served along the Beverly route to a high of five different redevelopment areas served along the Whittier route.



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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EXHIBIT 8
TOPOGRAPHICAL FEATURES

Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 9
CORRIDOR LAND USE

Potential Ridership

- Station Locations – Possible station locations along the seven route alignments were identified. Station spacing has generally been shown at approximately a 1 to 1.5 mile spacing. Criteria for the selection of station spacing included service to activity centers as well as service to major cross streets where existing bus service is located.

  The number of stations vary between a low of seven stations along the Beverly route to a high of fourteen potential stations along the Valley Boulevard route.

- Land Use Intensity – In order to evaluate the level of activity around each station, the number of residents and the number of existing jobs within a 1/4 mile walking distance of each station were tabulated. The stations along each route were then categorized as low, medium or high activity areas with the "low" areas having less than 2,000 employees and/or residents within the 1/4 mile radius and the "high" activity stations having more than 4,000 residents and/or employees. Exhibit 10 shows the locations of stations along each of the seven routes and ranks those stations by land use intensity.

  In this evaluation category, the Olympic Boulevard corridor stood out as having a large number (almost one-half) of its stations at very low density.

Implementation Costs

- Corridor Length – Certainly the overall length of the corridor is important from an implementation cost standpoint, if all other design considerations are equal (i.e., number of bridges, river crossings, tunnel sections, etc.). Of the seven route alignments being evaluated, the length varies from a low of 10.1 miles for the Huntington/Las Tunas route to a high of 15.2 miles for the Olympic Boulevard/Whittier Boulevard route combination.

- Right-Of-Way Constraints – Street cross-sections were categorized into high, medium and low right-of-way widths based on existing right-of-way widths in the corridors. Low right-of-way constraints were associated with any street sections that had greater than 76-foot wide existing rights-of-way. "High" right-of-way constraints were associated with all those street sections that had less than 48-foot rights-of-way. In order to develop on-street light rail in these "high" right-of-way constraint corridors, physical widening will likely be necessary. Even the right-of-way sections with 60-64 feet of right-of-way may require some minor widening to adequately provide four lanes of traffic plus double light rail tracks.

  Whittier Boulevard corridor has the highest amount of "high impact" right-of-way constraint areas with almost four miles of impacted sections. Exhibit 11 shows the locations of the right-of-way constrained sections.

- Engineering Constraints – Exhibit 12 shows the specific locations along each route where engineering constraints were evaluated. These engineering constraints could be a steep grade, a narrow bridge, another rail track that needs to be crossed, etc. The location of

EXHIBIT 10
STATION AREA ACTIVITY

Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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● 2,000 OR LESS

2,000 TO 4,000

● 4,000 OR MORE

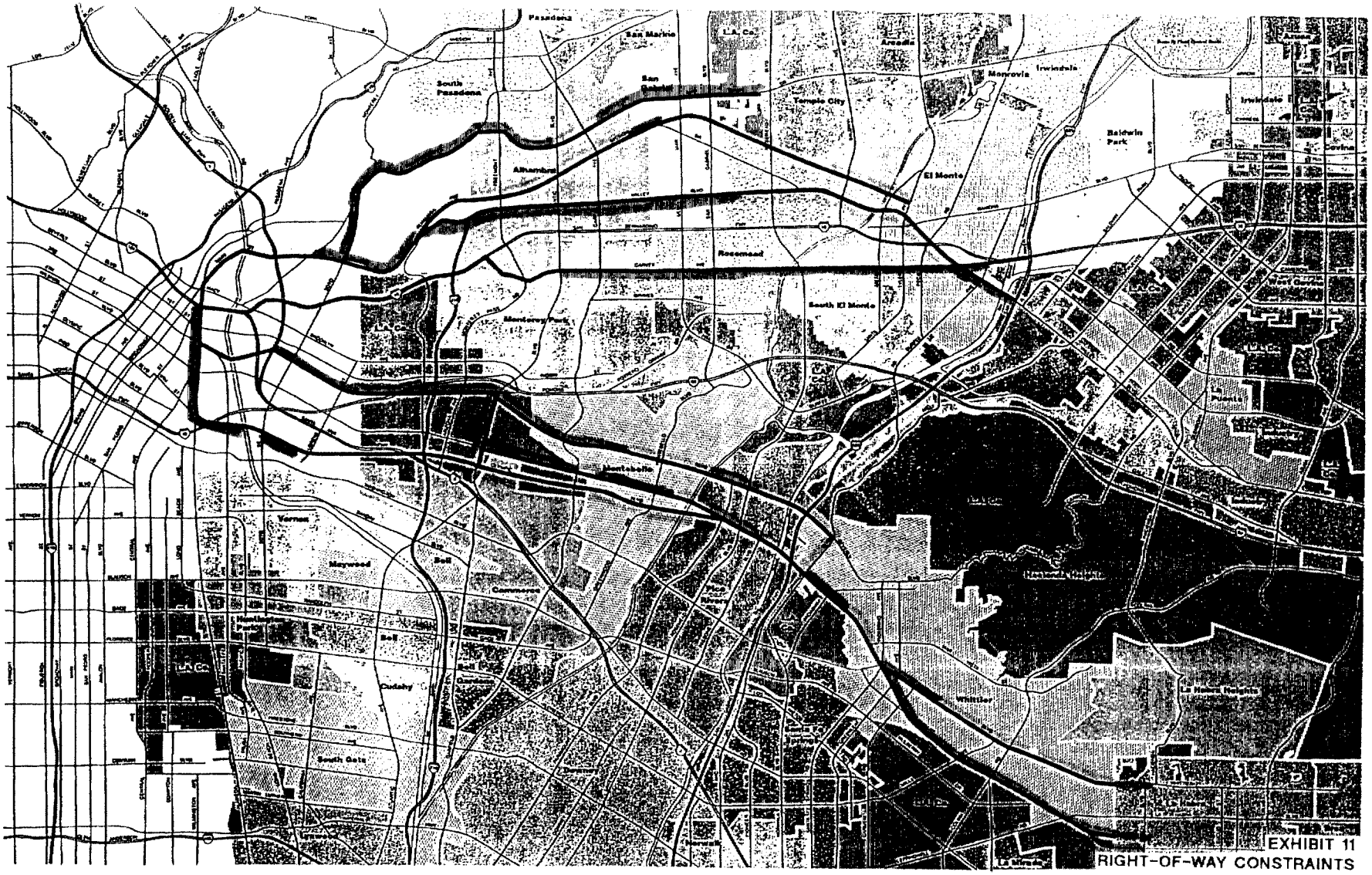

EXHIBIT 11
RIGHT-OF-WAY CONSTRAINTS

Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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48 FEET OR LESS

60 TO 64 FEET

76 FEET OR MORE

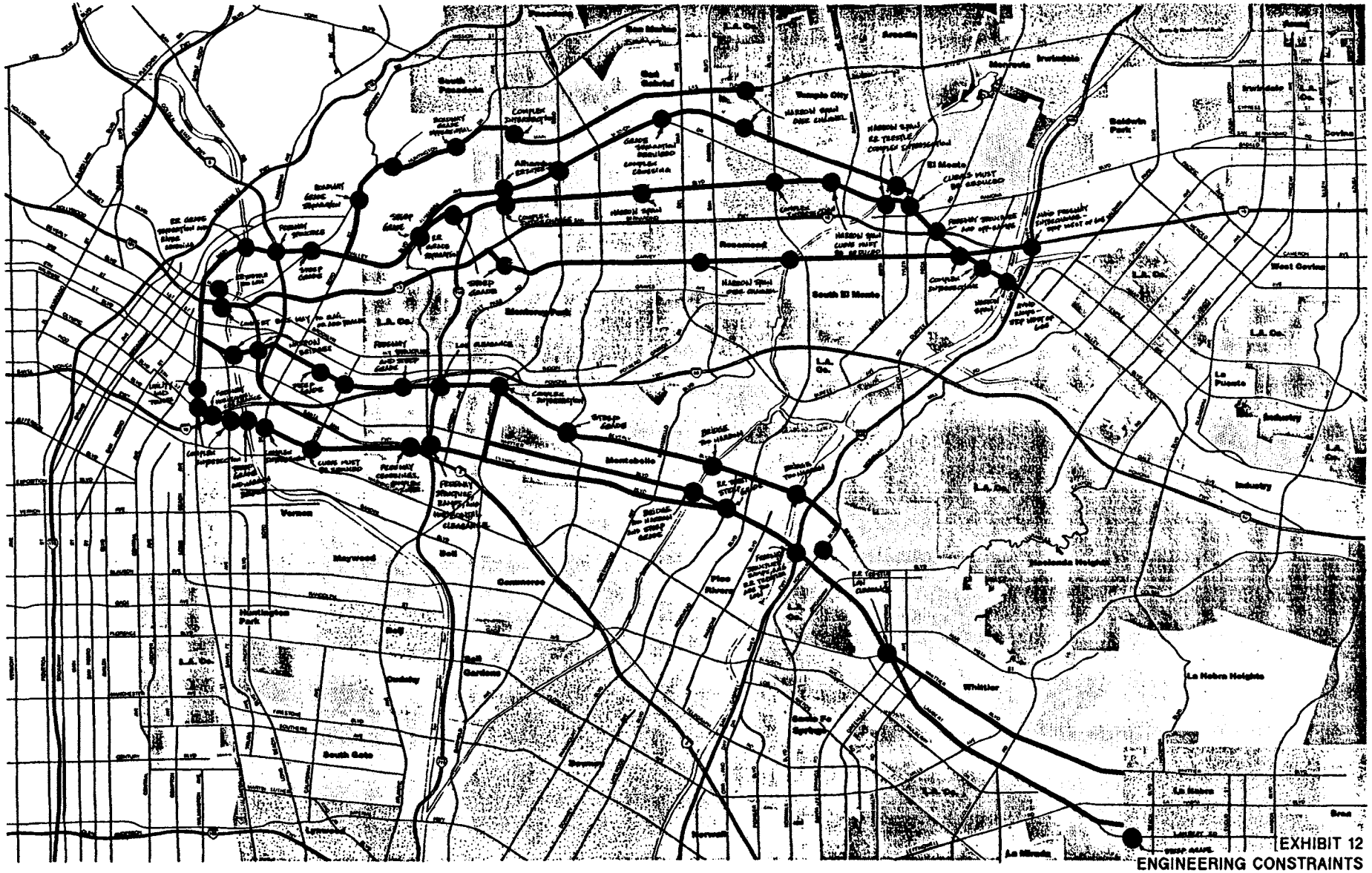

EXHIBIT 12
ENGINEERING CONSTRAINTS

Route 10/60 Corridor

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these engineering constraints varies from a low of five locations along the Garvey and Whittier Boulevard routes to a high of eighteen locations along the Valley Boulevard route.

- Overall Construction Impacts – Exhibit 13 shows the combination of the engineering and right-of-way constraints described above. The "Overall Construction Impacts" category was used as the basis for identifying corridor sections where construction activities would produce a more severe impact. Those street sections that were considered to have high construction impacts have been identified. In this category, the Valley Boulevard route and the Huntington/Las Tunas routes have approximately 0.4 miles each of "high construction impact" sections. On the other end of the spectrum, the Olympic Boulevard route and the Whittier Boulevard route have 3.1 and 4.0 miles of high construction impact sections respectively.

Connectivity

- Transit Service – Certainly the connectivity to other portions of the 30-Year Integrated Transportation Plan is important at each end of the route alignments. In addition, this evaluation criterion looked at the existing and possible future transit service to each of the stations along each route alignment. A station with "high" transit service was one that essentially had significant transit service available today. A "medium" transit service station was one where bus service could be provided relatively easily in an expanded bus system. A "low" transit service was a location where even in the future bus service was going to be difficult to provide. In general, high transit service is available to most of the stations along the route alignments, primarily because station locations were selected at the major cross street arterials.

Street Impacts

- Traffic Impacts – On-street light rail operation will likely degrade traffic operations on those streets as a result of the loss of the center median and loss of cross-street and turning movement capacity. The most significant level of service degradation will occur along the Beverly Boulevard and the Olympic Boulevard routes where existing Level of Service D operation will likely degrade to Level of Service F in some locations. The Whittier Boulevard route already operates at Level of Service F in some locations and this level will be negatively impacted by the addition of on-street light rail transit.

  The least traffic impact will occur along the Mission Drive route where much of the proposed alignment is already a rail corridor alignment.

- On-Street Parking Impacts – Street sections were identified as having high, medium or low on-street parking impacts. Low impacts were those street sections that already had parking prohibited or sections that were wide enough where parking could remain even after the addition of on-street light rail transit. Medium parking impacts were defined as those locations where curb parking would be prohibited but there appeared to be sufficient off-street parking adjacent to or within the same block face as the parking

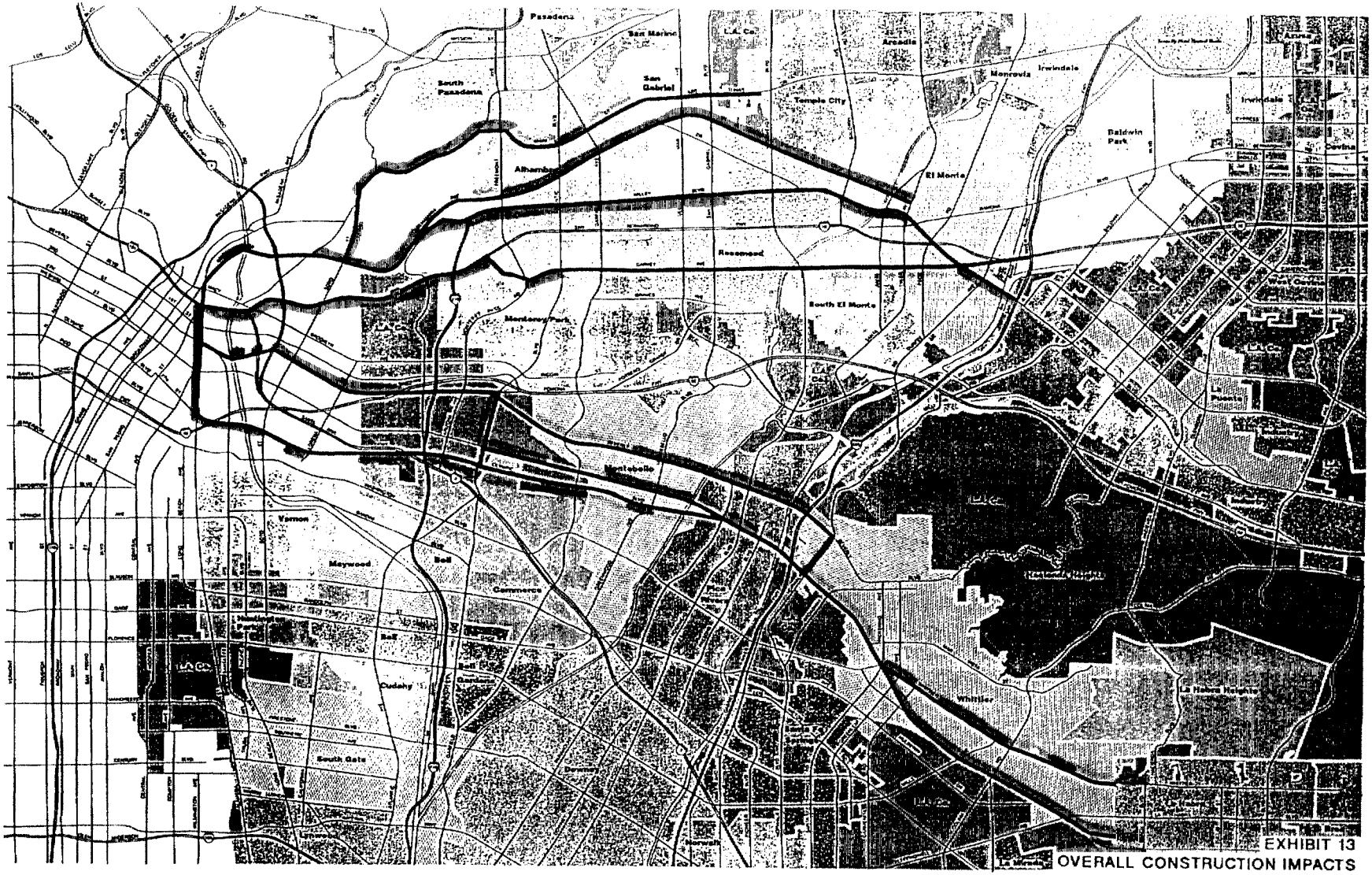

EXHIBIT 13
OVERALL CONSTRUCTION IMPACTS

Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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HIGH MEDIUM LOW

prohibitions. High parking impacts were those locations where the prohibition of on-street parking was going to be a problem for existing residents or businesses.

Exhibit 14 shows that the Mission Drive alignment has the least impact in terms of on-street parking impact because of its operation in an existing rail alignment. The highest on-street parking impact would be felt along the Whittier Boulevard and the Garvey Avenue routes.

- Median Treatment -- A great deal of concern was expressed by a number of the corridor cities regarding the impact of on-street light rail transit on the median treatments along the routes. Some communities had recently completed major urban design/landscaping treatments of their center medians and were very concerned at the possibility of losing this recent improvement. Other locations that had painted two-way left-turn lane channelization felt that the loss of this lane would be detrimental to the business districts along the corridors. Therefore, the street sections were rated as to the type of center median treatment. Each street section was identified as having no center median, a painted center median or a landscaped center median. Exhibit 15 shows the locations of the various types of center median treatments.

  The Garvey Avenue alignment has almost eight miles of landscaped center median so it will have the highest impact under this criterion. Again, the Mission Drive alignment has almost no impact according to the center median treatment criteria.

3.3.4 Corridor Level Evaluation Summary

Exhibit 16 shows a table summarizing the impact categories described above. This summary table was used as the basis for determining the routes to be recommended for additional study.

3.3.5 Corridor Level Evaluation Recommendations

Exhibit 17 shows the recommendation of the Corridor Task Force as a result of the corridor level analysis. The rationale behind the recommendations for each route is as follows:

- Huntington Drive/Las Tunas Route -- The Huntington Drive/Las Tunas route was proposed as an in-street operation The Task Force felt that this route should be terminated in the vicinity of Fremont where the route would turn southerly and join with the Mission Drive/SPRR ROW route. The easterly portion of this route was dropped from further consideration because of the high parking impact and impact on the business districts in Alhambra, San Gabriel and, to a lesser degree, Temple City. The end of the line at Las Tunas and Rosemead is already fully developed and a terminus parking problem could develop at Rosemead.

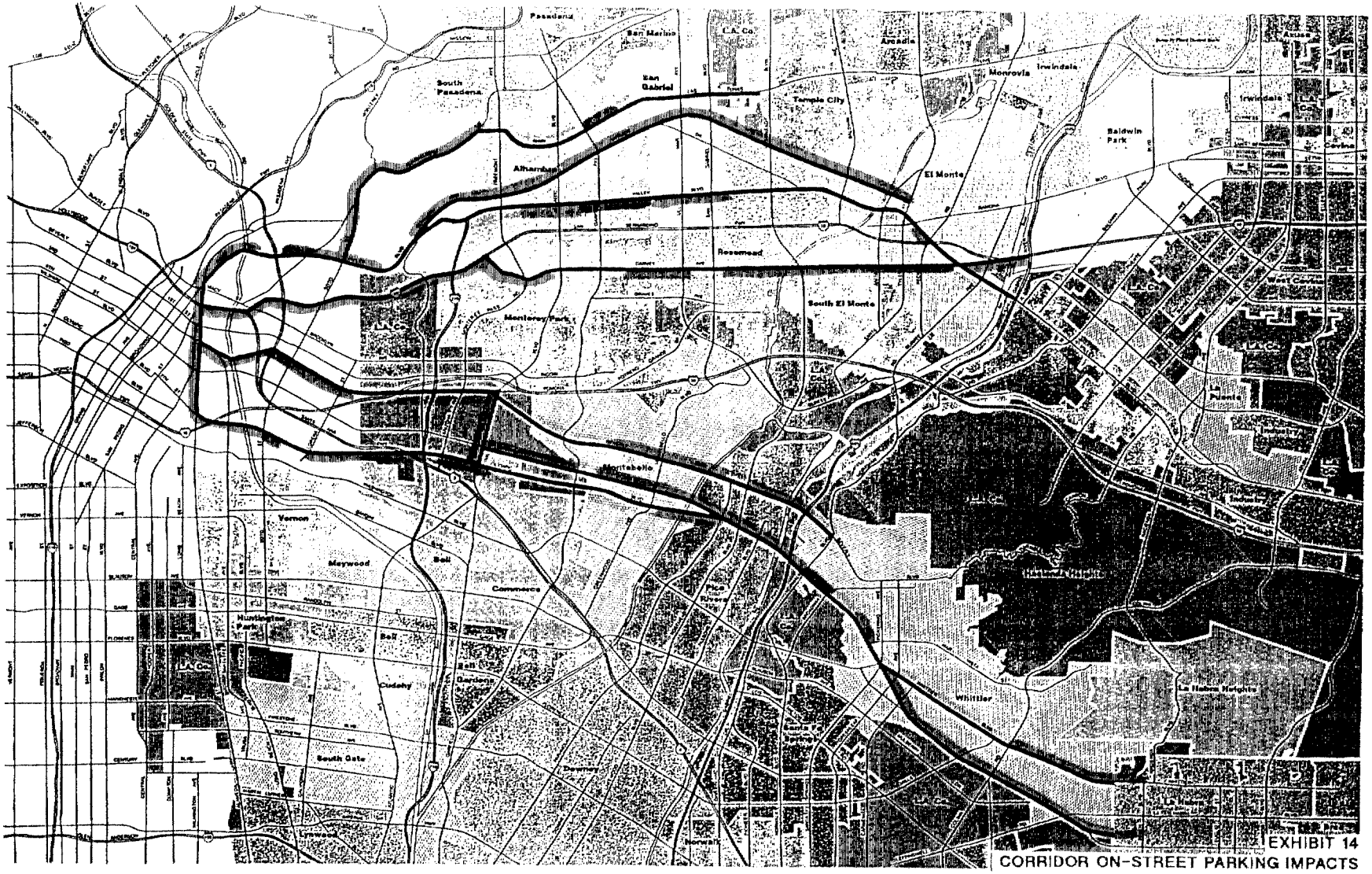

EXHIBIT 14
CORRIDOR ON-STREET PARKING IMPACTS

Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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HIGH MEDIUM LOW

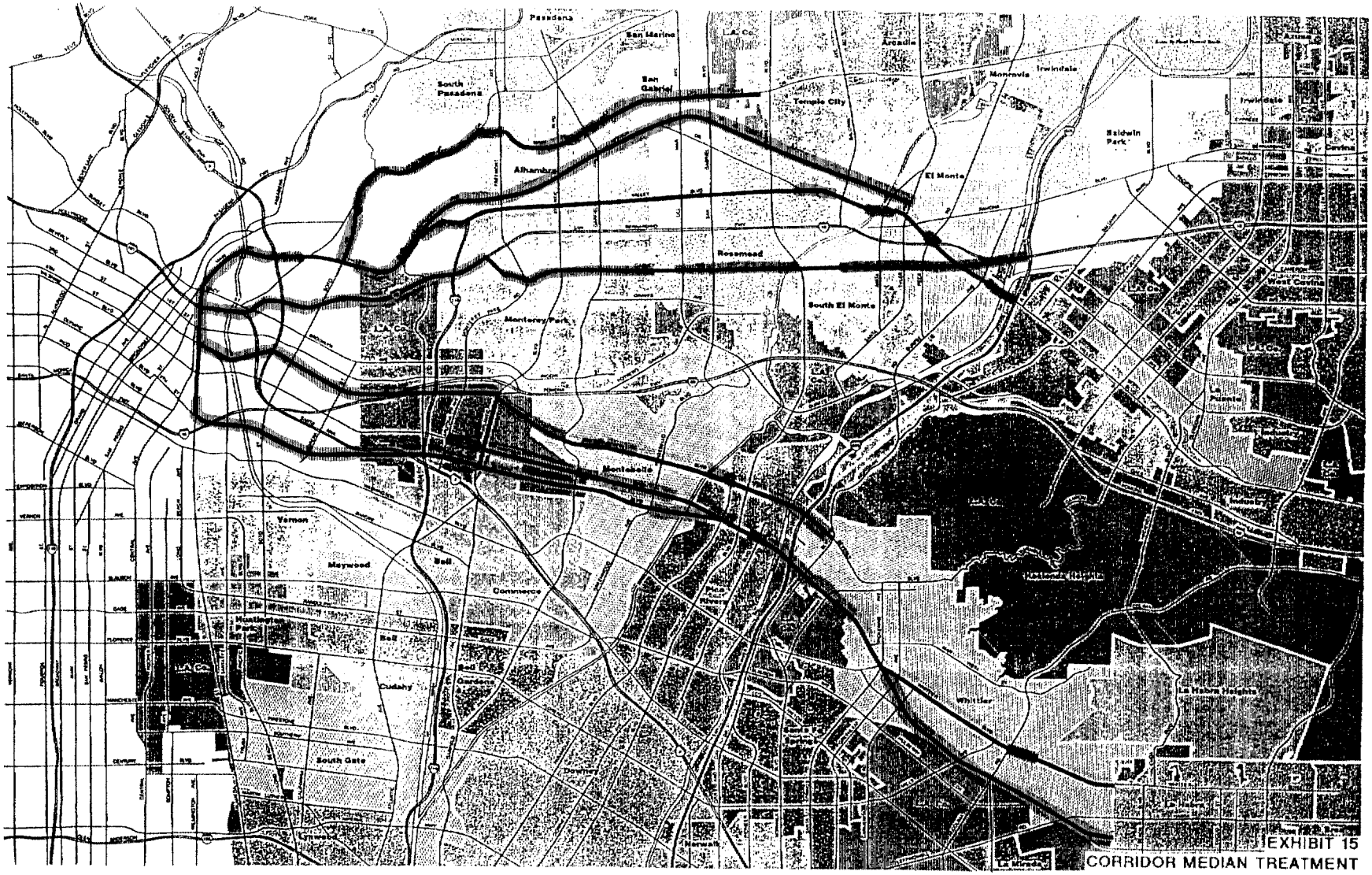

EXHIBIT 15
CORRIDOR MEDIAN TREATMENT

Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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NONE PAINT LANDSCAPE

EXHIBIT 16A
Alternatives Evaluation Analysis – Task 1

Route	Length (miles)	Parking [1]			Traffic			Median [3]			Construction Impacts [3]			Engineering Constraints [4]	ROW Constraints [3]		
		Low	Med	High	Daily Vol. (1,000's)	LOS [2] Existing	LOS [2] After LRT	None	Paint	Lands	Low	Med	High		Low	Med	High
1. Huntington Dr/Las Tunas																	
Huntington Dr/Las Tunas	8.78	5.20	10.79	1.57	25	C	E	3.92	1.06	3.80	4.78	3.55	0.45	5	6.82	1.56	0.40
Main St	1.31	1.12	0.86	0.64				0.76	0.55	0.00	0.48	0.83	0.00	3	0.54	0.77	0.00
Total	10.09	6.32	11.65	2.21				4.68	1.61	3.80	5.26	4.38	0.45	8	7.36	2.33	0.40
2. Mission Dr																	
Mission Dr	10.45	20.90	0.00	0.00	0	NA	NA	10.45	0.00	0.00	5.84	1.70	2.91	6	1.32	8.69	0.44
Main St	1.31	1.12	0.86	0.64				0.76	0.55	0.00	0.48	0.83	0.00	3	0.54	0.77	0.00
Total	11.76	22.02	0.86	0.64				11.21	0.55	0.00	6.32	2.53	2.91	9	1.86	9.46	0.44
3. Valley Bl																	
Valley Bl	12.47	5.74	15.91	3.29	25	C	E	2.23	7.14	3.10	8.89	3.15	0.43	15	8.47	4.00	0.00
Main St	1.31	1.12	0.86	0.64				0.76	0.55	0.00	0.48	0.83	0.00	3	0.54	0.77	0.00
Total	13.78	6.86	16.77	3.93				2.99	7.69	3.10	9.37	3.98	0.43	18	9.01	4.77	0.00
4. Garvey Av																	
Garvey Av	13.16	11.18	4.26	10.88	20	C	D	4.09	1.13	7.94	4.50	8.07	0.59	5	8.06	5.10	0.00
5. Beverly Bl																	
Beverly Bl	10.65	7.79	10.93	2.58	28	D	F	5.56	2.82	2.27	4.36	4.97	1.32	10	7.67	2.98	0.00
6. Whittier Bl																	
Whittier Bl	11.82	8.56	7.18	7.90	28/38	D/F	F	4.49	4.31	3.02	2.96	5.69	3.17	4	1.86	6.05	3.91
Atlantic Bl	0.82	0.00	0.00	1.64	40	F	F	0.00	0.00	0.82	0.00	0.00	0.82	1	0.00	0.82	0.00
Total	12.64	8.56	7.18	9.54				4.49	4.31	3.84	2.96	5.69	3.99	5	1.86	6.87	3.91
7. Olympic Bl																	
Olympic Bl	7.70	2.64	8.00	4.76	28	D	F	5.02	2.68	0.00	0.00	4.57	3.08	6	1.24	6.01	0.38
Whittier Bl	3.93	4.68	2.18	1.00	28	D	F	1.41	1.30	1.22	0.73	3.24	0.00	2	0.97	1.86	1.16
Lambert Rd	3.55	7.10	0.00	0.00	0	NA	NA	3.55	0.00	0.00	3.56	0.00	0.00	1	3.56	0.00	0.00
Total	15.18	14.42	10.18	5.76				9.98	3.98	1.22	4.29	7.81	3.08	9	5.77	7.87	1.54

Notes:
[1] Number of lineal miles of curb parking impacts. Total distance equals twice the corridor length because parking impacts are measured along curbs on both sides of the street.
[2] LOS - Level of Service.
[3] Number of lineal miles of impact.
[4] Number of specific locations or number of stations.

- Shaded numbers indicate evaluation result judged to be an area of concern to the Task Force.

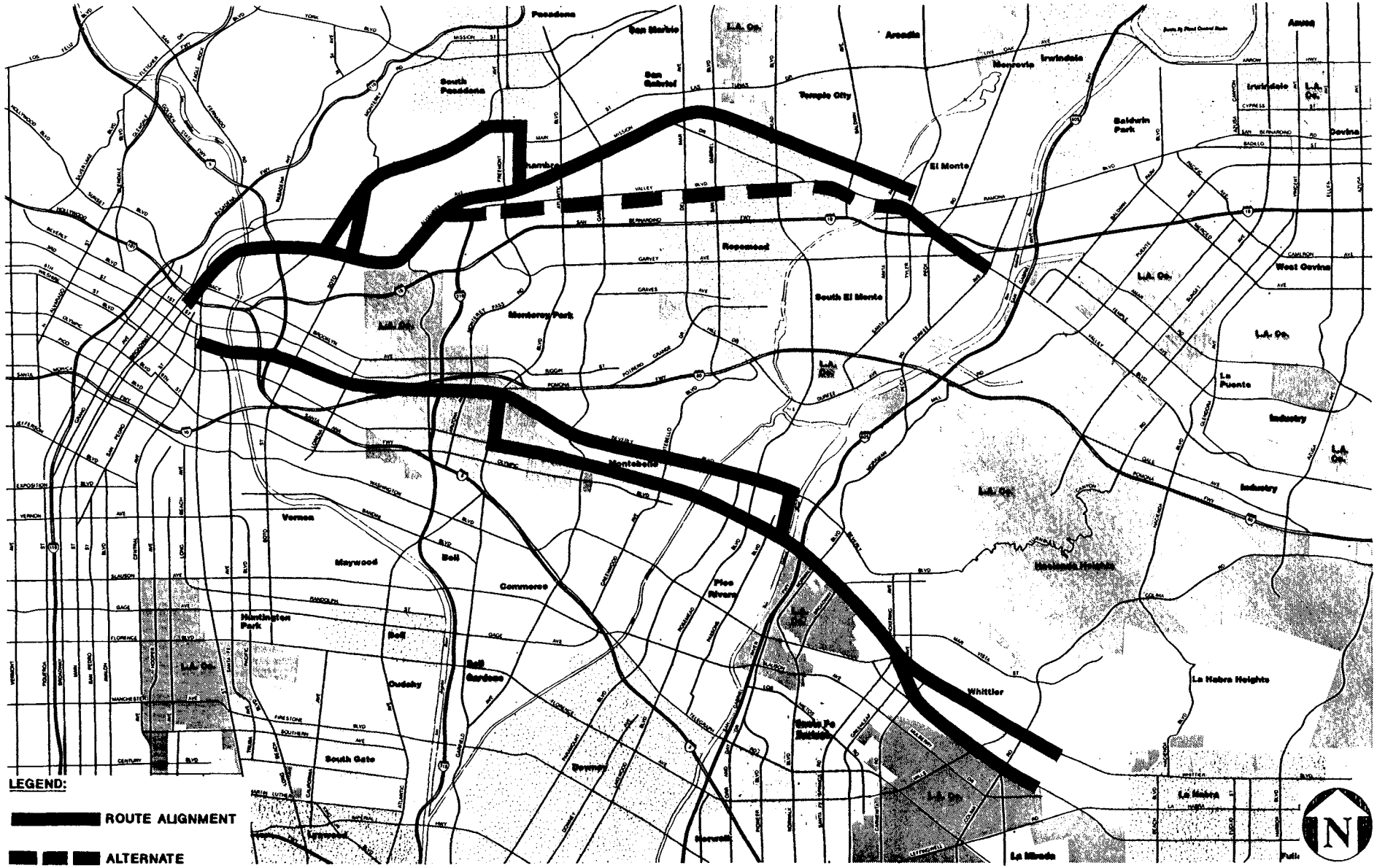
EXHIBIT 16B
Alternatives Evaluation Analysis – Task 1

Route	Stations							
	Number of Locations [1]	Redev. Areas [1]	Transit Service [1]			Population & Employment [1]		
			Low	Med	High	Low	Med	High
1. Huntington Dr/Las Tunas								
Huntington Dr/Las Tunas	8	4	1	2	5	2	6	0
Main St	2	0	0	0	2	0	1	1
Total	10	4	1	2	7	2	7	1
2. Mission Dr								
Mission Dr	9	3	1	3	5	3	5	1
Main St	2	0	0	0	2	0	1	1
Total	11	3	1	3	7	3	6	2
3. Valley Bl								
Valley Bl	12	2	2	4	6	2	8	2
Main St	2	0	0	0	2	0	1	1
Total	14	2	2	4	8	2	9	3
4. Garvey Av								
Garvey Av	9	4	0	3	6	1	3	5
5. Beverly Bl								
Beverly Bl	7	2	1	1	5	3	3	1
6. Whittier Bl								
Whittier Bl	8	5	2	2	4	2	5	1
Atlantic Bl	2	0	0	0	2	1	1	0
Total	10	5	2	2	6	3	6	1
7. Olympic Bl								
Olympic Bl	6	2	1	1	4	3	1	2
Whittier Bl	2	1	0	1	1	1	1	0
Lambert Rd	3	0	1	1	1	1	2	0
Total	11	3	2	3	6	5	4	2

Notes:

[1] Number of specific locations or number of stations.

▒ - Shaded numbers indicate evaluation result judged to be an area of concern to the Task Force.



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PARSON, BRINCKERHOFF, QUADE & DOUGLAS and BARRIO PLANNERS, INC.

EXHIBIT 17

CORRIDOR LEVEL ANALYSIS RECOMMENDED ROUTES

Retaining the westerly portion of the alignment would serve an under-served transit dependent area of El Sereno in northeast Los Angeles.

- Mission Drive/SPRR Right-of-Way – This alignment utilizes the existing SPRR right-of-way. The proposal involves the LRT line sharing the right-of-way (but on separate, parallel tracks) with the existing freight service. The Task Force decided that this alignment should be retained for further study and, in fact, extended from the proposed terminus at the Metrolink station in order to reach the I-605 area where a more logical park-and-ride facility could be developed.

- Valley Boulevard – The Valley Boulevard in-street operation alignment was dropped from consideration unless the Mission Drive/SPRR ROW corridor proved to be financially infeasible. Therefore, Valley Boulevard was to be considered as an alternate to the Mission/SPRR ROW alignment.

  The basic reasons for dropping Valley Boulevard were the impacts on business districts that would result from the loss of the center turn lane and the high impact of on-street parking removal. Both of these impacts appear solvable if the Mission Drive/SPRR ROW alignment proves infeasible.

- Garvey Avenue – The Garvey Avenue in-street operation alignment was dropped from further consideration. While this corridor does have some of the highest density station areas, it also has the highest parking impacts and the most amount of landscaped median that would have to be removed in order to accommodate on-street light rail transit. In addition, the westerly portion of this route would operate along the I-10 Freeway right-of-way which would either replace the existing carpool/bus lanes, usurp freeway capacity, or cause substantial land use displacement. This alignment would also traverse some very difficult topography making LRT construction very expensive. This proposed alignment location would put the stations a very long walking distance from any employment or residential centers.

  Finally, the Garvey Avenue corridor, like the Valley corridor, closely parallels the San Bernardino Freeway high occupancy vehicle lanes and the Metrolink alignments. Therefore, it was felt that significant regional transit money has already been spent in this immediate corridor.

- Beverly Boulevard – The Beverly Boulevard corridor was recommended as an in-street operation. The Task Force selected this route for further study although adjustments were made at the easterly end of the initially proposed route. On the eastern end, the Beverly alignment, instead of crossing the San Gabriel River and the I-605 Freeway, should turn southerly west of the freeway in order to meet the Whittier alignment. This modification would save a significant amount of money in that the river, freeway and rail crossing would be very expensive in this alignment.

- Whittier Boulevard – The Whittier in-street operation alignment was retained for further study with the understanding that integration with the Metro Red Line be considered. The Task Force chose to retain both the Whittier Boulevard and the Lambert corridor in the east end of the study area so that traffic impacts and station area considerations could be further studied.

- Olympic Boulevard – The Olympic Boulevard corridor was dropped from any further consideration. The Olympic alignment was proposed as an in-street, at-grade operation which turned out to be inferior in almost all respects to the Beverly alignment. West of Atlantic Boulevard, Olympic serves a very low density industrial area that, because of high infrastructure costs, does not appear to be an area that will intensify in development levels.

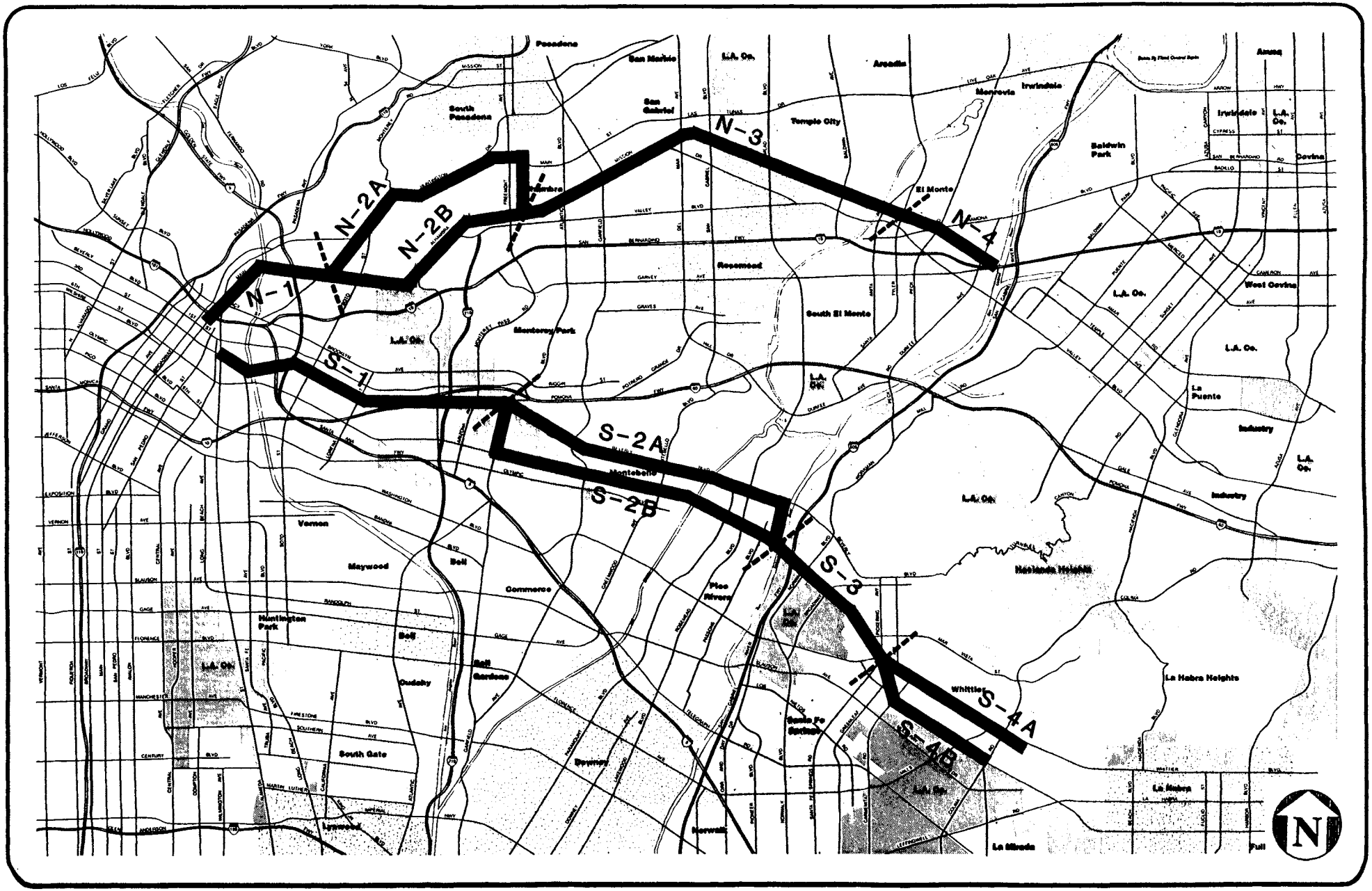
3.4 SCREENING OF CORRIDOR OPTIONS – SEGMENT LEVEL ANALYSIS

This section of the report presents the results of the more detailed segment level analysis of the routes selected for further study during the corridor level analysis described above. The primary areas of analysis included conceptual engineering, whereby the physical implications of constructing light rail transit in each of the alignments were tested, environmental impact assessment, and traffic impact analysis.

Exhibit 18 shows the two basic routes selected during the corridor level analysis. Each route is divided into segments for the purpose of detailed analysis. Exhibit 18 shows a North and a South alignment, each identified by segment. Both the North and South Lines are divided into four basic segments. The North Line has one set of segments that should be treated as alternate alignments (N-2A and N-2B) while the South Line has two such subalternates (S-2A and S-2B, S-4A and S-4B).

3.4.1 Segment Level Evaluation

Each of the route segments shown in Exhibit 18 was evaluated in the areas of conceptual engineering, environmental impacts, and traffic impacts. Chapter 5 presents the detailed quantitative and descriptive evaluation of each segment in each of these evaluation categories. The following paragraphs summarize the segment level evaluation results that lead to the second-tier narrowing of the alignment alternatives.



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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EXHIBIT 18

CORRIDOR LEVEL ANALYSIS RECOMMENDED ROUTES BY SEGMENTS

Conceptual Engineering

Aerial photographs, at a scale of one inch equals two hundred feet, were used to plot LRT alignments, station locations and configurations, right-of-way impacts, and grade separation locations for all the route segments shown in Exhibit 18. The aerial photos themselves showed the following information:

- LRT Track Alignments and Location
- Station and Park-and-Ride Right-of Way Impacts
- Station Location
- Station Platform Size and Configuration
- Street Right-of-Way Impacts
- Aerial Track Sections

The segment level evaluation showed that, from a conceptual engineering standpoint, Segment S-1 is the most problematic of all of the segments reviewed. The LRT tracks would have to cross four freeways -- none of which have sufficient vertical or horizontal clearance under the existing underpasses to accommodate the LRT. Therefore, four freeway main lines plus ramp termini would all have to be rebuilt in order to implement the LRT along this alignment. A second major construction problem involves two major swales which both have grades too steep for satisfactory LRT operation.

Right-of-way in one section of this segment is constrained by cemeteries on both sides of the street. Therefore, street widening to accommodate two light rail lines plus existing travel lanes would be almost impossible.

Segment S-1 also has 3.7 miles of serious right-of-way impacts where more than ten feet of right-of-way has to be purchased along one or both side of the street. From a construction standpoint alone, this segment of the South Line would be extremely costly to build.

Segment S-2B would begin at the intersection of Beverly/Atlantic and traverse southerly on Atlantic to Whittier where it would turn to the east and travel to Interstate 605. Because of existing narrow right-of-way along Whittier Boulevard in the Cities of Montebello and Pico Rivera, this segment has the highest right-of-way impacts of all the segments studied. This 6.6 mile segment has 3.5 miles of significant right-of-way impacts and 5.4 miles of high impact on-street

curb parking loss. In addition, left turns would be lost at thirty-nine minor streets along this segment.

From the Five Points intersection in the City of Whittier, Segments S-4A and S-4B traverse easterly to the Whittier city limits. Segment S-4A would end in front of an existing shopping center while S-4B would end in the vicinity of the Colima Road intersection. The major difference between these two segments would be the in-street operation for Segment S-4A and operation in the railroad right-of-way for Segment S-4B. Neither segment presents any significant construction problems, although S-4A does have a higher right-of-way impact than does the southerly choice.

Of all the segments tested, three segments appear to be particularly costly in terms of construction costs. Segment S-1 along Third and Fourth Streets through Boyle Heights has four freeway crossings and two major swales which would all require significant amounts of money to be spent to construct the LRT alignment. Segment S-2B would result in significant construction impacts due to the extensive amount of right-of-way that would have to be purchased.

Segment N-3 requires a significant expenditure for the reconstruction of the Southern Pacific Railroad trench through the City of Alhambra.

Environmental Impact Assessment

A comparison of route segments in terms of their potential environmental impacts was conducted to identify each segment's impacts in the following categories:

- Sensitive Land Use Impacts
- Resource Impacts
- Air Quality
- Safety and Security
- Displacement
- Circulation
- Construction

Chapter 5 contains a detailed matrix highlighting the results of the environmental assessment. From the standpoint of the segment level analysis, the environmental impact assessment did not indicate any impacts that could not be reasonably mitigated except along Segment S-1. The high construction impacts coupled with the impacts on residential and other sensitive land uses and the historic and cultural impacts make this route segment a very difficult one to mitigate from a variety of environmental impacts standpoints.

Traffic Impact Assessment

Only Segment N-2A has any significant curb parking loss impacts among the northern segments. The primary area of this loss is along Mission Road adjacent to Lincoln Park and along Palm Avenue in the City of Alhambra.

Segments S-1, S-2A and S-2D all have significant amounts of high and medium curb parking loss impacts. These occur primarily in the business districts along 3rd/4th, Beverly and Whittier Boulevards.

In-street light rail operations will likely result in minor side streets and median openings being closed in order to limit the number of at-grade rail crossings. This will result in a number of minor streets being changed to right-turn in and out only whereas in all likelihood they now have full access at the arterials. In addition, virtually all driveways in the corridors will be limited to right-turn in and out.

Because of the predominance of rail right-of-way operation in the North Line segments, very few minor streets that have not already been closed will be affected by the development of a light rail transit line.

In the South Line segments however, 3rd/4th Street, Beverly Boulevard and Whittier Boulevard will all face significant revisions to existing side street and driveway access. Because of the large number of business districts located in these segments, commercial driveway access will also be dramatically changed from full accessibility to right-turns in and out only.

The number of at-grade major intersections that must be crossed by the LRT line indicates a potential for interference with LRT efficiency and a potential for safety problems. Two segments of the North Line (Segment N-2A and N-3) have an average of one at-grade crossing per one-half mile of distance.

Virtually all of the South Line segments, with the exception of S-2A, average three major intersection crossings per mile. This higher number of at-grade major intersection crossings will likely affect the potential operating speed along the south segments.

The impacts of automobile, bus, and pedestrian traffic around the various station areas has been rated as high, medium, or low. A high impact ranking means that the combined activity around the station could potentially have a significant impact on the operation of the street and intersections in the vicinity of the station.

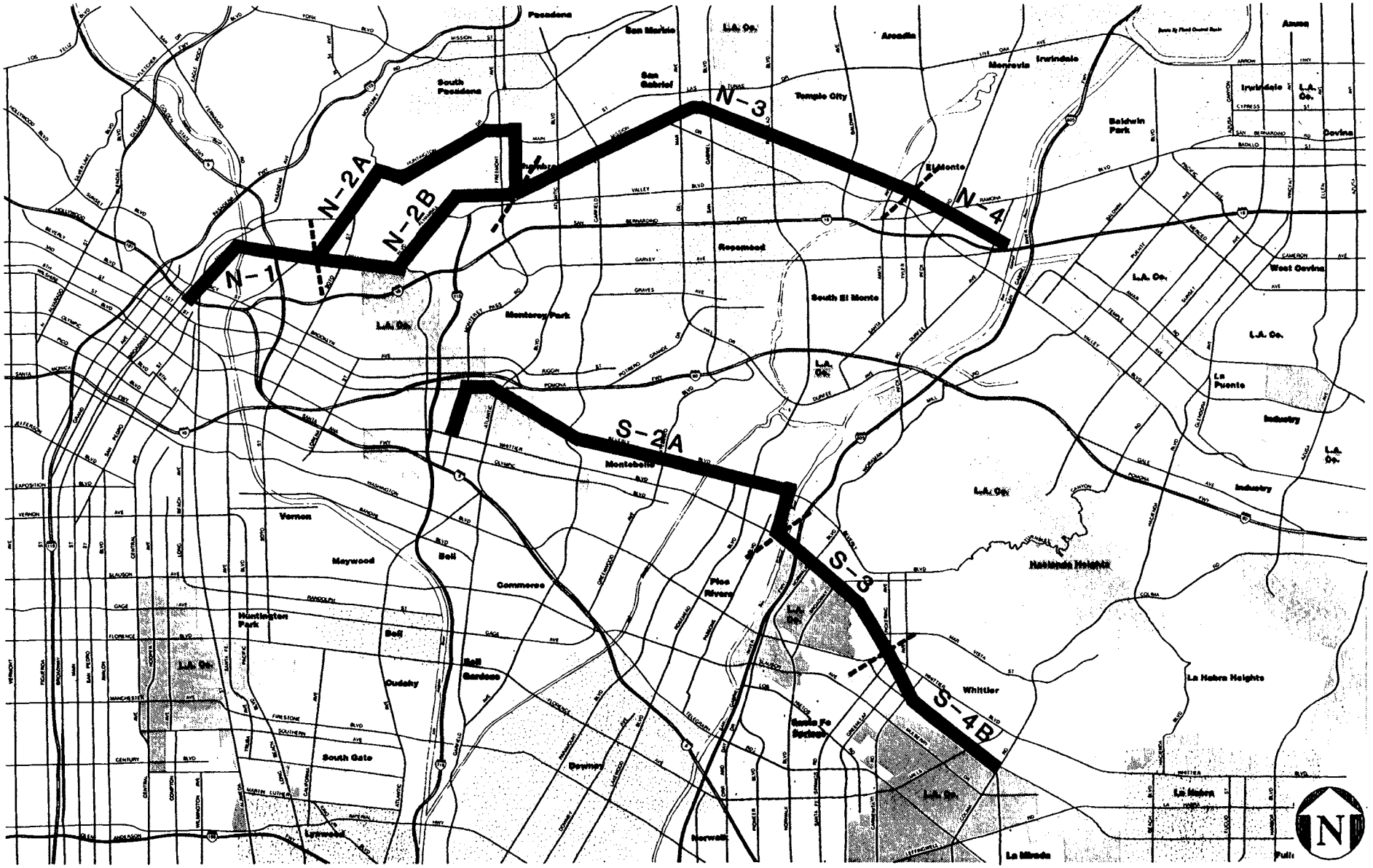
The North Line segments have been ranked as low or medium circulation impacts except for Segment N-2A. All three stations along this segment have the potential to impact the operation of adjacent streets and intersections.

In the South Line segments, only Segment S-4B has been rated as having low circulation impacts. Other segments, primarily due to the at-grade, in-street station locations, have the potential to impact at least the major intersections adjacent to the stations.

A more detailed discussion of circulation impacts in the vicinity of the proposed stations may be found in Chapter 5 of this report.

3.4.2 Segment Level Evaluation Recommendation

Exhibit 19 shows the route segments recommended for detailed analysis. The Route 10/60 Corridor Task Force recommended that all of the North Line segments be carried into the next level of detailed analysis. The focus of the detailed evaluation will be the comparison of patronage, costs and operating conditions along Segments N-2A and N-2B.



Route 10/60 Corridor

Ⓜ Los Angeles County Metropolitan Transportation Authority

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EXHIBIT 19

SEGMENT LEVEL ANALYSIS RECOMMENDED ROUTES FOR DETAILED ANALYSIS

Along the South Line segments, it was recommended that Segments S-1, S-2B and S-4A be dropped from further consideration. The construction and land use impacts of Segment S-1 makes it prohibitively costly to construct. Segment S-2B is also being dropped from further consideration because of its land use impacts (right-of-way requirements and parking loss) and traffic impacts. In the far eastern end of the South Line, the Task Force felt that Segment S-4B produced similar light rail transit service at a lower cost and a lower land use/parking/traffic impact than Segment S-4A.

Segment S-2A will be reconfigured as part of the detailed analysis to utilize Mednick Avenue and Arizona Avenue to reach the Arizona/Whittier Metro Red Line station. This alignment change will allow the South Line to connect to the rest of the regional rail system by transferring passengers at the Metro Red Line station.

IV. ANALYSIS OF SELECTED ALTERNATIVES

This chapter presents the detailed evaluation of the two basic recommended alignments shown in Exhibit 19 – the North Line which follows Mission Road and the SPRR rail right-of-way, and the South Line which begins at the Whittier/Atlantic Metro Red Line station and follows Beverly Boulevard, Whittier Boulevard, and Lambert Road easterly through the City of Whittier. Conceptual engineering, operations planning, station designs, patronage estimates and cost estimates are all presented.

4.1 CONCEPTUAL ENGINEERING

The primary tool used during the detailed evaluation of Conceptual Engineering was a set of aerial photographs flown specifically for this project in December, 1992. These aerials, at a scale of one inch equals two hundred feet, were used to plot LRT alignments, station locations and configurations, right-of-way impacts, and grade separation locations. A complete set of aerial photos showing both the segment level and the detailed analysis recommended alignments is presented in a separate report titled: *Route 10/60 Corridor Preliminary Planning Study – Alignment Configurations.* The aerial photos in that report show the following information:

- LRT Track Alignments and Location
- Station and Park-and-Ride Right-of-Way Impacts
- Station Location
- Station Platform Size and Configuration
- Street Right-of-Way Impacts
- Aerial, Trench, and At-grade Track Sections

4.1.1 Design Criteria and Typical Cross Sections

Exhibit 20 shows the basic design criteria used in this study. Two-car trains (potentially expanding to three in the future), station platform size, allowable radius curvature, etc. all combine to establish the basic design of the system.

Exhibit 20 shows the result of applying the design parameters to an at-grade operating condition. A two-track LRT system requires a minimum of thirty feet of cross section when operating in traffic. In-street operations along a four-lane street, for example, would require a minimum of eighty-eight feet of total right-of-way in order to accommodate sidewalks, two LRT tracks, and two travel lanes in each direction with no on street parking. The conceptual engineering study assumed cross sections as shown in Exhibit 21 in order to determine right-of-way requirements. Along those routes where more than four through-lanes exist today, the total number of through-lanes was retained.

Along the north route, significant portions of the alignment will share the Southern Pacific Transportation Company rail trench, unless the SPTC relocates its freight service, which is not currently in their plans. The typical cross section in the trench is shown in Exhibit 22. As can be seen, the existing trench will have to be reconstructed in order to accommodate both the existing rail freight service and light rail passenger service.

4.1.2 Alignment Descriptions by Segment

North Route (N. Main - Mission - Huntington - Palm - SPTC RR; or N. Main - Valley – SPTC RR)

Segment N-1 (Union Station to Mission Drive via N. Main St.)

This segment generally follows an alternative alignment studied by MTA for the Pasadena-Los Angeles Rail Transit Project ("North Main Street Alternative", Pasadena-Los Angeles EIR, 1989). The segment is approximately 2.4 miles long leaving Union Station and traversing northerly along the Los Angeles River where it crosses the river in the vicinity of Main Street. The LRT alignment proceeds easterly along Main Street to the intersection of Main/Mission/Valley near Lincoln Park.

EXHIBIT 20
LIGHT RAIL PLANNING PARAMETERS

Rail Vehicle Planning Parameters	
Vehicle	
Length (feet)	87
Width (feet)	8.7
Height (feet)	12.3
Weight loaded (lbs.)	144,000
Vehicle Capacity [1]	
Design	114
Maximum	152
Train Size	
Minimum (cars)	1
Maximum (cars)	3
Minimum (feet)	90
Maximum (feet)	270
Maximum Speed	
Speed (mph)	55
Acceleration (ft/sec/sec)	3
Deceleration (ft/sec/sec)	3
Gradient (percent)	6
Power	Electric 750-Volt Overhead
Noise Levels	
Exterior (dBA)	75
Interior (dBA)	70

Service Planning Parameters	
Nature of Service	Medium capacity/speed/ distance
Typical Route Distance	20-30 miles
Right-of-Way	Exclusive/shared/ In-street
Highway Crossings	Partially grade separated
Typical Station Spacing	1-2 miles
Tracks	Double
Stations	High-level platform
Speed	Up to 55 mph
Propulsion	Electric Overhead Power; Self-propelled cars
Passenger Coaches	Single-level; 76 seats & 76 standing
Consists	1-2 cars initially; 3 maximum
Typical Peak-Hour Headways	6-10 minutes
Service Hours	All day
Passenger Capacity Per Hour	1,520 - 4,560
Parking	Most stations

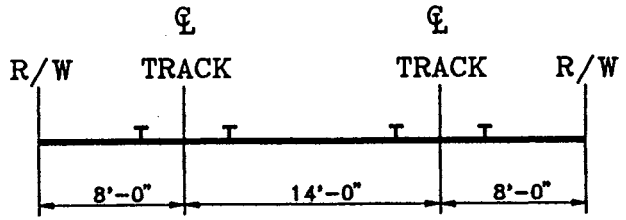
Station Planning Parameters	
Platform Length (feet)	200
With Future Expansion (feet)	300
Platform Width Minimum (feet)	12-15
Minimum Right-of-Way	
Single Track	NA
Double Track	40
Maximum Superelevation	0
Maximum Grade	1%
Minimum Grade	0.5%

Alignment Planning Parameters	
Maximum Design Speed (mph)	50
Maximum Superelevation (inch.)	
In Track	4
Unbalanced	3
Minimum Horizontal Curvature Radius	
Design (feet)	300
Minimum (feet)	100
Maximum Gradient (percent)	6.0
Vertical Curvature	
Minimum curve length (feet)	300
Change of Grade (percent per 100 feet)	0.66
Track Centers (feet)	14
In-Street (feet)	12
Right-of-Way Width (feet)	
Double Track	
At Grade	30
Minimum	30
Above/below grade	28/35
Station	40
Single Track	NA

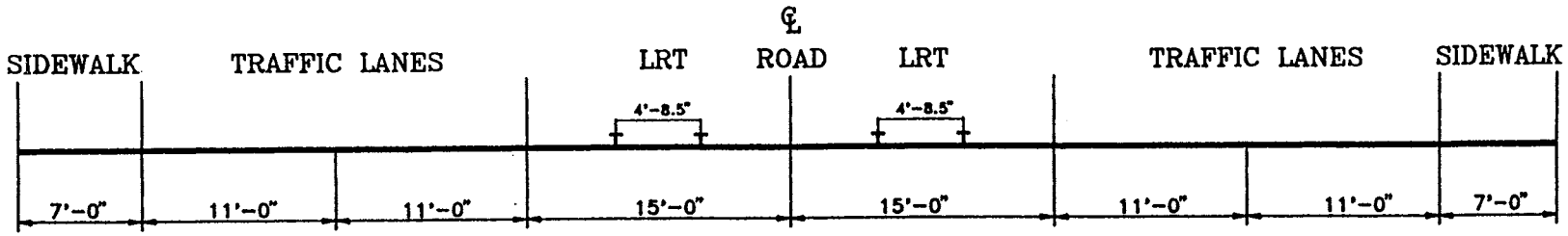
Notes:
[1] Seating capacity of each car is 76 passengers. Design service load, with standees, is 114 with a crush load capacity of 152.

LACMTA standards allow 82-foot radius if track is embedded in pavement.

TYPICAL



EXAMPLE (4-LANE ROADWAY; NO PARKING)



Route 10/60 Corridor

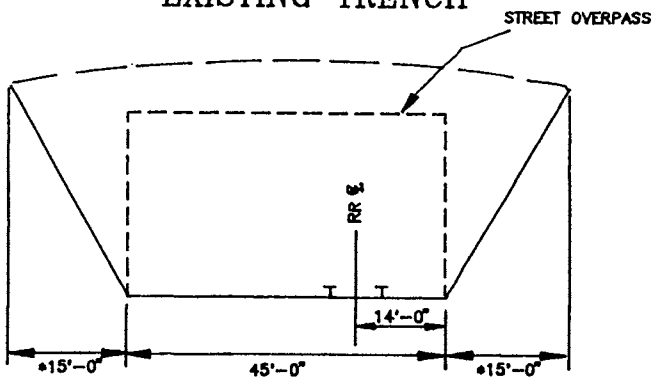
Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

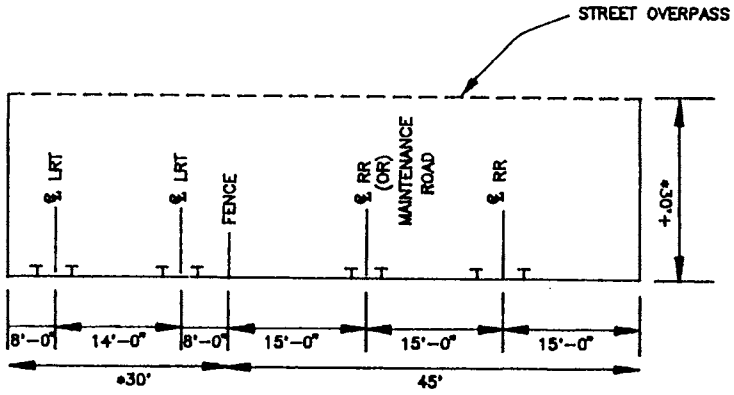
EXHIBIT 21

AT-GRADE OPERATION CROSS SECTION

EXISTING TRENCH



RECONSTRUCTED TRENCH



Note:

- Trench dimensions vary
  Gauge = 4.75'
  Reconstructed section based on SPTC requirements.

Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 22

TYPICAL CROSS SECTIONS: SPTC RAILROAD TRENCH

Because of the large number of railroad facilities in this area and the constraints imposed on the roadway system by topography and the Los Angeles River, the City of Los Angeles was concerned about the traffic impacts that could result from in-street LRT operations. Therefore, this section of LRT operation along Main Street is being evaluated as an aerial section. The City has further requested that the aerial structure be offset against one curb so that the columns holding up the aerial light rail guideway do not restrict left-turn access through the Main Street business district.

The primary constraints in this section involve getting access into the crowded Union Station passenger platforms, crossing the Los Angeles River, and crossing the Interstate 5 Freeway.

Segment N-2A (Lincoln Park to SPTC RR via Mission Rd.-Huntington Dr.-Main St.-Palm Ave.)

A majority of this segment was also studied in the above-referenced Pasadena-Los Angeles Rail Transit Project. This portion of the alignment is approximately 5.5 miles long and it travels northeasterly along Mission Road from the Lincoln Park area, and joins Huntington Drive to Main Street where it turns easterly along Main Street to Palm Avenue. At the intersection of Main/Palm, the alignment turns south along Palm, then east to join the Southern Pacific Railroad (SPRR) alignment in the vicinity of Mission Road. This alignment variation better serves the Lincoln Heights and El Sereno areas of the City of Los Angeles and it serves a portion of the commercial district in Alhambra.

In-street operations along Mission Road can be accomplished without significant right-of-way impacts although curb parking would be eliminated in this section. Wide medians along portions of Huntington Drive would tend to reduce the traffic and parking impacts of in-street operations along Huntington Drive. In the section of Huntington Drive between Soto Street and Eastern Avenue, both Huntington Drive and Huntington Drive South could be utilized in a short one-way couplet operation to reduce the traffic and right-of-way impacts of in-street LRT operation. In concept, the LRT would operate in the existing eastbound lanes on Huntington Drive while the eastbound automobile traffic would utilize the existing Huntington Drive South travel lanes as a one-way eastbound street.

Right-of-way impacts along this section are minimal except at the intersection of Palm/Main and Palm/Mission where the LRT alignment must turn the corner. Detailed analysis of the Palm corridor indicates that the light rail line would have to be elevated from west of the intersection of Main/Poplar to south of the intersection of Lemon/Palm. Detailed evaluation of this area lead to the grade separation conclusion for the following reasons:

1. At-grade light rail operation through the complex intersection of Main/Raymond/Palm would have significant negative impacts on both traffic conditions and LRT operations.

2. Right-of-way impacts on the commercial center on the northwest corner of Main/Palm would be severe. Both direct land impacts and loss of access would dramatically increase right-of-way costs.

3. Heavy truck activity along the industrial portion of Palm will be incompatible with the operation of at-grade light rail.

The recommended grade separated section will not only solve the auto/LRT and truck/LRT conflicts, it will also improve pedestrian safety. A station at Commonwealth/Palm would now be an aerial station so patrons could cross over auto and truck traffic en route to the station platform.

An additional grade separation would be required where Mission Road, Soto Street and Huntington Drive join. The Soto Street to Huntington Drive bridge would be removed or reconstructed so that the LRT line could be aligned along the center of Mission Road to the median in Huntington Drive. Modifications would be made to the streets at grade to implement the proposed one-way couplet on Huntington Drive.

Segment N-2B (Lincoln Park to Palm Ave. via Valley Blvd.-SPTC RR)

As an alternate to the Mission/Huntington/Palm alignment, the LRT operation could cross Mission Road at Main Street and go directly on to the Southern Pacific Railroad right-of-way paralleling Valley Boulevard and Mission Road in this section.

Three grade separations would be required. The first would take the LRT tracks from the aerial Main Street section over Mission Road and Valley Boulevard and to grade level prior to Soto Street. The second grade separation would take the LRT tracks over Valley Boulevard in the

vicinity of Alhambra Avenue and Marianna Avenue. The third grade separation would take the LRT operation from the south side of the tracks to the north side where more room is available.

This third grade separation would occur in the vicinity of Alhambra's western city limits.

This segment has the advantage of being shorter and more direct than the Segment N-2A (4.1 miles versus 5.5 miles). However, it is immediately adjacent to primarily low density industrial land uses rather than the northerly alternate that traverses residential and commercial/retail uses.

Segment N-3 (Palm Ave. to Santa Anita Ave. via SPTC RR)

At 7.0 miles, this is the longest segment being considered in the study. The westerly portion of this segment (i.e., that portion in Alhambra) is in a trench which is seventy-five feet wide at the top and tapers to a forty-five foot wide base. Exhibit 22 shows that in order to retain the existing freight rail track and add two LRT tracks, the trench will have to be reconstructed. The base of the trench must be made wider to accept both the double LRT tracks and the single freight track. In addition, the street overpasses will all have to be rebuilt because the columns that now support the street overpasses must be relocated. The eastern portion of this segment (from San Gabriel to El Monte) will operate at-grade alongside the existing freight track.

Grade separations will be required along this route to shift the light rail operation from the north to the south side of the freight track in order to take advantage of existing available right-of-way. Because this segment runs virtually entirely in railroad right-of-way, the traffic and right-of-way impacts of this segment are small.

Segment N-4 (Santa Anita Ave. to the San Gabriel River via SPTC RR)

The final section of the northern alignment is located between Santa Anita Avenue and the San Gabriel River/Interstate 605. The light rail tracks would be grade separated over the Rio Hondo and Santa Anita Avenue as well as over Tyler Avenue. Sufficient width and height exist to construct the light rail tracks under Interstate 10, the San Bernardino Freeway.

This segment would end west of the San Gabriel River at the proposed maintenance facility east of Durfee Avenue between Valley Boulevard and the SPTC RR. The maintenance facility would cover 13 acres and have capacity to serve 50 LRT vehicles. An end of the line station and park-and-ride lot would also be constructed in this end section.

South Line (Beverly - Whittier - UPRR La Habra Branch)

Virtually all of the segments of the South Line would involve in-street, at-grade light rail operation. The street cross section shown in Exhibit 21 would be the predominant design in the south route.

Segment S-2A (Metro Red Line Station at Whittier/Arizona to San Gabriel River via Beverly)

This segment begins in the proximity of the Metro Red Line's Whittier/Arizona station and proceeds north on Arizona Boulevard to Beverly Boulevard turning east towards Atlantic Boulevard. There would be several hundred feet of significant right-of-way impacts as the alignment turns easterly onto Beverly Boulevard due to the radius of the curve required for the LRT.

The precise location of the Metro Red Line station is not established at this time. Thus, further consideration should be given to the LRT interface as more detailed information becomes available regarding the Metro Red Line Eastside extension.

The segment then traverses Beverly Boulevard from Atlantic Boulevard easterly to Interstate 605. This segment has 2.5 miles of significant right-of-way impacts primarily along the business district in the City of Montebello. Business district impacts are compounded by the loss of curb parking and the loss of left-turns at thirty intersections in this segment.

This segment crosses the San Gabriel River and proceeds south along the east side of the river to Whittier Boulevard.

Segment S-3 (San Gabriel River to Five Points via Whittier Blvd.)

This 2-mile segment is located between Interstate 605 and the Five Points intersection in Whittier. Approximately fifty percent of the alignment length would require right-of-way acquisition of ten feet or more.

At the beginning of this segment the line crosses the San Gabriel Freeway on Whittier Boulevard. Modifications will be required to Whittier Boulevard and the 605 Freeway overpass to provide adequate clearance for the LRT.

Segment S-4B (Five Points to Colima Road via UPRR and Lambert Rd.)

From the Five Points intersection in the City of Whittier, this segment traverses easterly to the Whittier city limits, sharing the Union Pacific rail right-of-way. Segment S-4B would end in the vicinity of the Lambert/Colima Road intersection.

At the intersection of Whittier and Washington Boulevards (5-points) the line proceeds east over the intersection on an elevated structure toward the Union Pacific Railroad (UPRR) tracks. The alignment continues along the south side of the UPRR to Lambert Street. There would be significant right of way impacts along this segment to the residential properties on the south side of the UPRR. There would also be impacts to the commercial properties along Lambert Road as the line proceeds east towards Colima Road.

4.1.3 Freight Operations & Shared Right of Way Considerations

The SPTC railroad tracks along the North Corridor presently host an average of 13 freight operations per day. The UPRR tracks along the South Corridor presently host an average 13-15 freight operations per day. These operations represent through train traffic and do not account for local freight and industrial services.

Projected freight operations on specific lines are not available due to the potential for consolidation of the existing rail corridors and numerous other uncertainties. However, freight

traffic is expected to increase in future years due to the expansion in shipping activity at the Ports of Los Angeles and Long Beach.

Under Federal Railroad Administration Guidelines, concurrent operations of freight trains and light rail on the same track is prohibited. As such, the route and service alternatives analyzed in this study assume exclusive light rail operations with no freight service. However, there will be several segments along both alternative alignments where the right-of-way may host light rail and adjacent freight operations. On the North Line, this includes Segment N-2B, Segment N-3 and Segment N-4. On the South Line, this includes Segment S-4B.

In general, sufficient right-of-way is available to accommodate both light rail (double track) and freight operations. However, on the North Line, the SPTC tracks are located in a trench section through the City of Alhambra. The SPTC has no plans to relocate its current freight service from the trench, which is their only remaining freight line in the San Gabriel Valley. The trench will require extensive reconstruction to accommodate the LRT in addition to the existing freight operations. On the South Line, additional right of way will be required along some section of the UPRR.

The Southern Pacific Transportation Company (SPTC) has expressed the following concerns regarding Light Rail Transit (LRT) operations in the Alhambra trench along with existing freight operations:

- Based on SPTC standard design and operational requirements (i.e., space between tracks, maintenance road, space to trench walls, etc.) the entire existing trench bottom (45 feet) is needed for existing freight operations.
- Reconstruction of the trench to provide for Light Rail Transit operations must allow for continued freight operations without interruption.
- Trench reconstruction must allow for adequate separation of LRT and freight operations.

Based on these concerns, reconstruction of both sides of the trench would be required to allow for LRT operations and temporary tracks would be required to allow for freight operations during construction. The construction cost estimate for the trench section includes provisions to meet the SPTC requirements and concerns.

If in the future circumstances change with regard to placement of LRT in the SPTC railroad right of way, further consideration should be given to Valley Boulevard as an alternative alignment in the North Corridor.

4.1.4 Engineering and Station Refinements

The major change between the segment level analysis and the final evaluation presented in this chapter involves the recommendation for an elevated section of light rail track in the Palm Avenue corridor in Alhambra (Segment N-2A). A grade separated section has been recommended here because of pedestrian, traffic, truck, and right-of-way impacts.

Other minor changes to the conceptual engineering drawings involve slight adjustments to the locations of several stations. In all cases, these adjustments were made at the request of the local cities who felt that the revised locations better served potential redevelopment opportunities. Adjustments were made to the San Gabriel Boulevard and Ramona Street stations in the City of San Gabriel and to the Tyler Avenue and Durfee stations in the City of El Monte. These stations were merely moved from one side of the intersection to the other or moved 100-200 feet east or west to better serve existing/proposed land uses. The cost of these relocations, if any, is reflected in the cost estimates presented later in this report.

4.1.5 Key Engineering Conclusions and Issues

The conceptual engineering analysis identified several key engineering issues in both the North and South corridors. The issues are listed below and discussed in the segment descriptions above. The project cost estimates include the necessary engineering improvements to mitigate the design issues at each of these locations.

North Corridor

Union Station Interface
Los Angeles River Crossing
North Main Street Aerial Section and I-5 Crossing
Mission Road/Soto Street/Huntington Drive Intersection
Main Street and Palm Avenue Aerial Section

Transition from Palm Avenue to SPTC Railroad Trench
SPTC Railroad Trench Reconstruction

South Corridor

Metro Red Line Interface
Arizona Boulevard/East 3rd Street Intersection
San Gabriel River Crossing
San Gabriel Freeway (I-605) Crossing
Whittier Boulevard/Washington Street Intersection (5-points)

No insurmountable design problems were identified in the study segments described in this chapter. Many of the locations listed above present difficult (and oftentimes expensive) design solutions, but solutions are available and the cost of these solutions has been included in the project cost estimates.

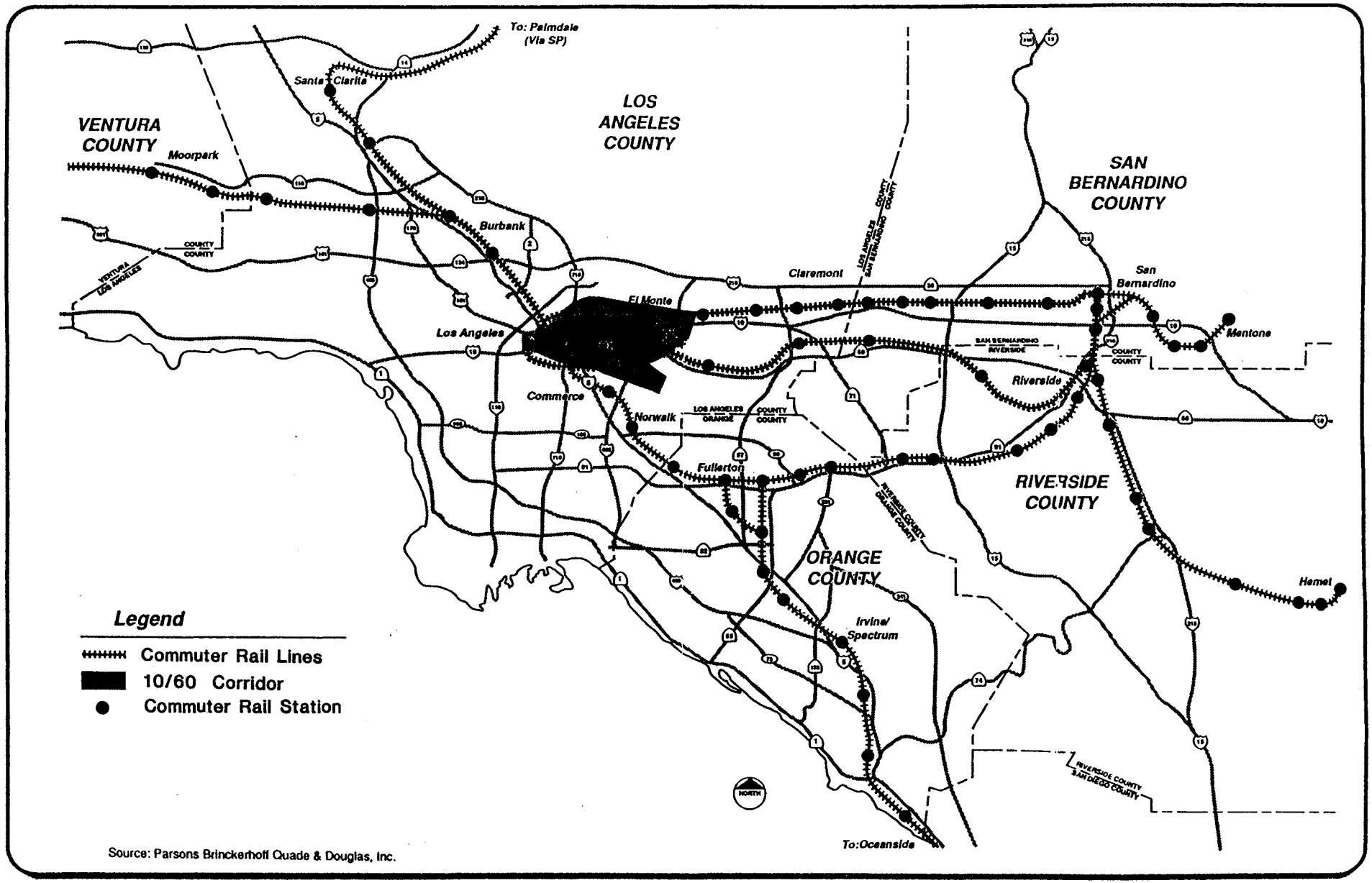
4.2 OPERATIONS PLANNING

A conceptual rail operations plan has been prepared for the north and south alignment alternatives. This section of Chapter 4 discusses conceptual operating plan for light rail service in the Route 10/60 Corridor.

4.2.1 Baseline Regional Rail System

The MTA's 30 Year-Plan rail component proposes the development of a 400 mile rail system. This system is comprised of heavy rail such as the Red Line, light rail similar to the Blue Line and commuter rail operated by Metrolink. This system is briefly described below and is illustrated in Exhibits 23A and 23B.

- The Blue Line opened in July 1990 and runs between Long Beach and Los Angeles. This line is 22 miles long and carries about 40,000 passengers per day.
- The Red Line opened in January 1993 and runs between Los Angeles Union Station and the Westlake District. This first segment is about 4.4 miles long. Future segments under construction will extend service to three branches: to North Hollywood, Mid-City, and East Los Angeles by about the Year 2001. Future extensions west across the San Fernando



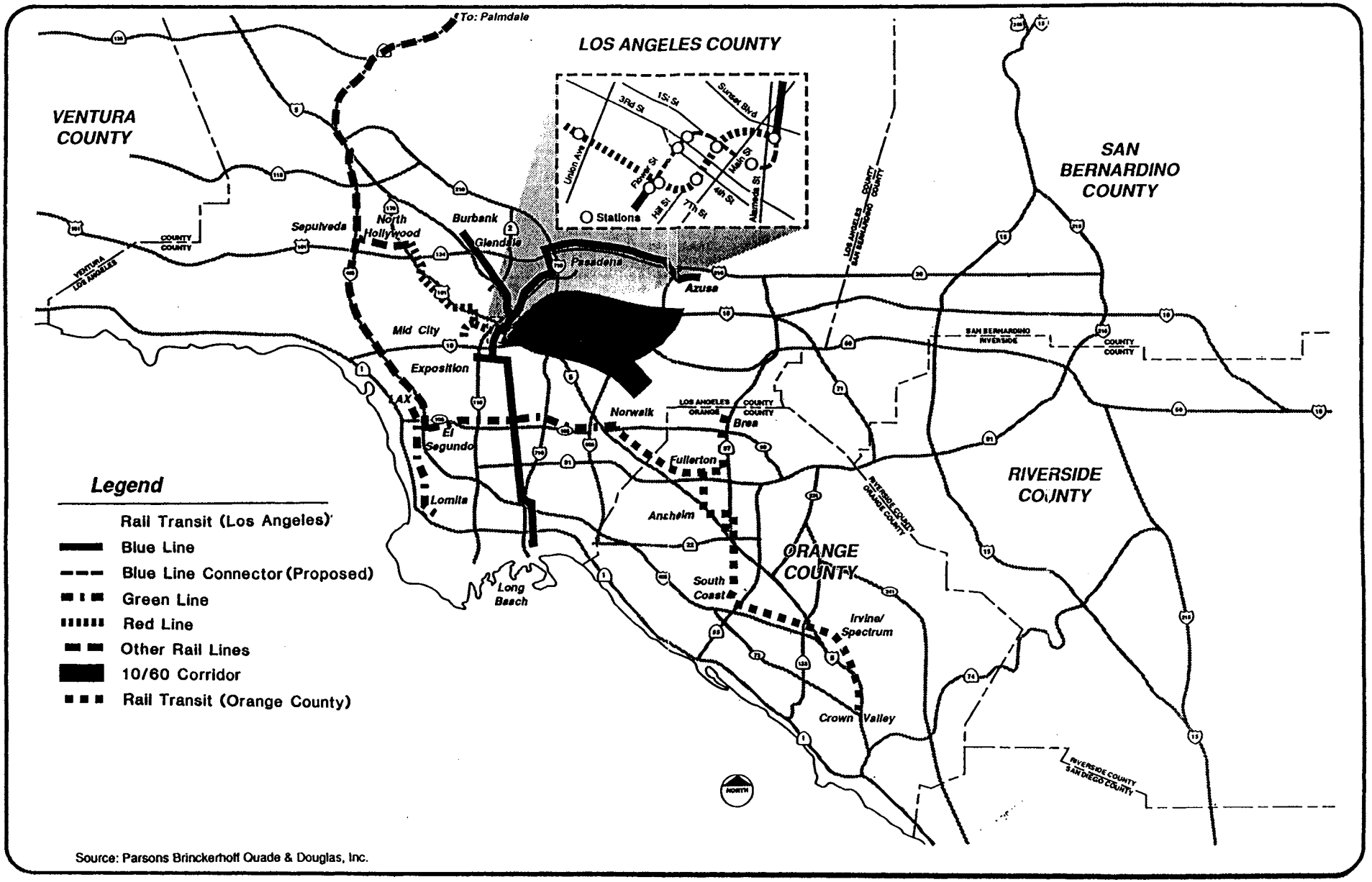
Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 23A

YEAR 2010 REGIONAL COMMUTER RAIL NETWORK



Source: Parsons Brinckerhoff Quade & Douglas, Inc.

Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 23B

YEAR 2010 URBAN RAIL TRANSIT NETWORK

Valley are in the planning stages and await decisions on type of system and final alignment selection.

- The Green Line is a 19.5 mile, 14 station light rail line. It is currently under construction and will connect the El Segundo area with Norwalk via an alignment that runs in the median of the I-105 Freeway also under construction. This line is scheduled to begin operation in 1995. Additional extensions of this line are also being considered.

- The Metro Pasadena project is a 13.5 mile, 14 station line that extends from Union Station in Los Angeles to Eastern Pasadena. This line is currently in final engineering and is scheduled to begin operating in late 1997 or early 1998. A ten mile easterly extension to Azusa is also being evaluated.

- Metrolink began operating in October 1992 and runs from Los Angeles to Ventura, San Bernardino and Riverside Counties. Future service calls for expansion into Orange and North San Diego Counties.

- The Exposition Line is a proposed 12 to 13 mile route that would connect the Exposition Park area with Santa Monica and the LACBD via a proposed Blue Line "connector".

- The Glendale Line is a proposed 9.1 mile, 9 station light rail line that would extend from Union Station to northwest Glendale. An extension of this line would run from northwest Glendale to Burbank Airport. This extension would be about 4.5 miles and have three stations.

- An alignment for the Blue Line Downtown Connector in downtown Los Angeles has recently been adopted by MTA. The Downtown Connector would link the Long Beach/Los Angeles Blue Line to the Pasadena Blue Line in the vicinity of Union Station.

4.2.2 Operating Assumptions

The Route 10/60 Corridor Project could become a key element of the regional rail transit system, linked to the Red and Blue Lines and Metrolink via connections made at Union Station. In this analysis the baseline assumptions include the following light rail lines coming into Union Station:

- The Blue Line extension to Pasadena operating on 4 minute headways during the peak hour.

- A Glendale/Burbank extension operating on 8 minute headways during the peak hour.

- A downtown Blue Line "Connector" that runs south of Union Station operating on 8 minute headways during the peak hour.

- The 10/60 line will operate on 6 minute headways during the peak hour.

At the east end of the North Line, the 10/60 light rail line would have a transfer station with Metrolink trains (at Tyler Avenue). It should also be noted that in terms of system connectivity, both the north and south alignments have the opportunity for excellent regional connections on the west (through the Metro Red Line or through Union Station). However, eastern areawide connections are also possible. The Cities of Baldwin Park and West Covina have already expressed an interest in extending the North Line into their cities. The South Line terminus near the eastern boundary of the City of Whittier is ideally suited for regional connections if Orange County extends its light rail transit system up the Beach Boulevard corridor. However, at this time Orange County has no short term plans to serve the Beach Boulevard Corridor.

Service Periods

On both the north and south alignments, double track operations will be used. Special trackwork configurations will include a pair of double (scissors) crossovers in front of each terminal station. A pair of single crossovers should also be provided at the midpoint of each route in order to protect train headways in the event a train breaks down or other lengthy delays develop. The line is designed to operate 20 hours per day, seven days per week, but will be able to operate 24 hours per day if required. The operating hours for initial service segments may be fewer than 20 hours per day based upon the characteristics of the line and the availability of resources. For this study, weekday operations were established at twenty hours per day and sixteen hours per day on Saturday, Sunday, and Holidays.

Train Characteristics

Trains will consist of two electrically powered light rail vehicles and will be similar to those currently operating on the Blue Line between Long Beach and Los Angeles. Each car is 87 feet in length and is articulated in the middle. There are four doors on each side of the train, with access from high-level platforms. Seating capacity is for 76 passengers. Two seats at each end of the car can be folded up to provide space for passengers in wheelchairs. The service load is 114 passengers with a crush load of 152 passengers.

For this analysis, two car trains were assumed during the morning and evening peak periods. During the off-peak and on weekends and holidays, one car trains were assumed.

4.2.3 Operating Plans

This section discusses the operating plan assumptions that were used to help develop the patronage forecasts. This included the development of train frequencies, fleet requirements and maintenance facility needs. The data derived from the operating plans, such as running times, were used to calculate capital and operating costs.

LRT Run Times

The peak period headway for the north and south corridors was established at six minutes. Exhibit 24 summarizes the LRT run time statistics on the North Line Alternative 1. As the exhibit shows the average running speed is estimated to be approximately 34 miles per hour with an end to end running time of about 30 minutes. The average station spacing is about 1.5 miles.

Exhibit 25 summarizes the LRT run time statistics on the North Line Alternative 2. As the exhibit shows the average running speed is estimated to be approximately 40 miles per hour with an end to end running time of about 23 minutes. The average station spacing is 1.4 miles.

Exhibit 26 summarizes the LRT run time statistics on the South Line. As the exhibit shows, the average running speed is estimated to be approximately 31 miles per hour with an average station spacing of about 1.5 miles. The end to end running time is approximately 24 minutes.

The running speed is wholly dependent upon:

a) the number of in-street, at-grade running segments;
b) route profile such as superelevation;
c) the number of stations; and
d) other operating parameters, such as station dwell time.

Operating Statistics

Exhibit 27 summarizes the operating statistics for the North and South Lines. The data shown in the exhibit are based on the running times and train assumptions discussed above. On the North Line Alternative 1, annual car hours are about 65,000 and annual vehicle miles are

EXHIBIT 24
RUNNING TIME STATISTICS
NORTH LINE — ALTERNATIVE 1 VIA MAIN/HUNTINGTON/PALM

Station	Maximum Speed (MPH)	Distance (Miles)	Cumulative Distance (Miles)	Running Time (Minutes)	Station-Station Time [1]	Elapsed Run Time Minutes
Union Station			0.0			0.0
	55	1.3		2.1	2.4	
Griffin/Main			1.3			2.4
	55	2.1		3.9	4.2	
Monterey Rd/Huntington Dr			3.4			6.6
	55	2.9		5.5	5.8	
Commonwealth/Palm			6.3			12.4
	55	1.3		2.3	2.6	
Atlantic			7.6			15.0
	55	0.7		0.8	1.1	
Garfield			8.3			16.1
	55	1.0		1.2	1.5	
Ramona			9.3			17.6
	55	1.0		1.2	1.5	
San Gabriel			10.3			19.1
	55	1.4		1.6	1.9	
Encinita			11.7			21.0
	55	1.1		1.4	1.7	
Baldwin			12.8			22.6
	55	1.1		1.4	1.7	
Tyler			13.9			24.3
	55	2.8		5.4	5.7	
Durfee			16.7			29.9

Notes:
[1] - including station dwell time of 20 seconds.

Average Station Spacing = 1.52 Miles
Average Running Speed = 33.6 MPH

Source: Parsons Brinckerhoff, June 1993

EXHIBIT 25
RUNNING TIME STATISTICS
NORTH LINE — ALTERNATIVE 2 VIA MAIN/VALLEY/MISSION

Station	Maximum Speed (MPH)	Distance (Miles)	Cumulative Distance (Miles)	Running Time (Minutes)	Station-Station Time [1]	Elapsed Run Time Minutes
Union Station			0.0			0.0
	55	1.5		1.9	2.2	
Griffin/Main			1.5			2.2
	55	1.8		2.4	2.7	
Valley Blvd./Vineburn			3.3			4.9
	55	2.0		2.7	3.0	
Mission Rd./Date Ave.			5.3			7.9
	55	1.3		1.7	2.0	
Atlantic			6.6			9.8
	55	0.7		0.8	1.1	
Garfield			7.3			10.9
	55	1.0		1.2	1.5	
Ramona			8.3			12.4
	55	1.0		1.2	1.5	
San Gabriel			9.3			13.9
	55	1.4		1.8	2.1	
Encinita			10.7			16.0
	55	1.1		1.4	1.7	
Baldwin			11.8			17.6
	55	1.1		1.4	1.7	
Tyler			12.9			19.3
	55	2.5		3.5	3.8	
Durfee			15.4			23.0

Notes:
[1] - including station dwell time of 20 seconds.

Average Station Spacing = 1.40 Miles
Average Running Speed = 40 MPH

Source: Parsons Brinckerhoff, June 1993

EXHIBIT 26
RUNNING TIME STATISTICS
SOUTH LINE — ALIGNMENT VIA BEVERLY/WHITTIER

Station	Maximum Speed (MPH)	Distance (Miles)	Cumulative Distance (Miles)	Running Time (Minutes)	Station-Station Time [1]	Elapsed Run Time Minutes
Arizona/Whittier			0.0			0.0
	55	1.3		2.3	2.6	
Atlantic/Beverly			1.3			2.6
	55	1.2		2.1	2.4	
Garfield/Beverly			2.5			5.0
	55	1.4		2.5	2.8	
Montebello/Beverly			3.9			7.8
	55	1.4		2.1	2.4	
Rosemead/Beverly			5.3			10.2
	55	2.2		3.5	3.8	
Norwalk/Whittier			7.5			14.0
	55	1.3		2.3	2.6	
Penn/Whittier			8.8			16.6
	55	1.0		1.7	2.0	
Greenleaf			9.8			18.6
	55	2.5		4.7	5.0	
Colima			12.3			23.6

Notes:
[1] - including station dwell time of 20 seconds.

Average Station Spacing = 1.54 Miles
Average Running Speed = 31.3 MPH

Source: Parsons Brinckerhoff, June 1993

EXHIBIT 27
LRT OPERATING STATISTICS

North Line – Alternative 1		
Service Type	Daily Car Hours	Annual Car Hours
Weekday Peak	122	30,988
Weekday Off-Peak	90	22,860
Sat/Sun/Holidays	98	10,878
		64,726

Notes:
Weekdays per year = 254
Sat/Sun/Holiday per year = 111
Total days of operation per year = 365
Weekday Car Hours = 212
Annual Weekday Car Hours = 53,848
Sat/Sun/Holiday Car Hours = 98
Annual Sat/Sun/Holiday Car Hours = 10,878
Average daily car miles = 5,730
Annual car miles = 2,091,574
Peak Vehicles = 20, Fleet Size = 24

North Line – Alternative 2		
Service Type	Daily Car Hours	Annual Car Hours
Weekday Peak	101	25,654
Weekday Off-Peak	70	17,780
Sat/Sun/Holidays	80	8,880
		52,314

Notes:
Weekdays per year = 254
Sat/Sun/Holiday per year = 111
Total days of operation per year = 365
Weekday Car Hours = 171
Annual Weekday Car Hours = 43,434
Sat/Sun/Holiday Car Hours = 80
Annual Sat/Sun/Holiday Car Hours = 8,880
Average daily car miles = 3,975
Annual car miles = 1,450,781
Peak Vehicles = 16, Fleet Size = 20

EXHIBIT 27 (continued)
LRT OPERATING STATISTICS

South Line		
Service Type	Daily Car Hours	Annual Car Hours
Weekday Peak	102	25,908
Weekday Off-Peak	71	18,034
Sat/Sun/Holidays	82	9,102
		53,044

Notes:
Weekdays per year = 254
Sat/Sun/Holiday per year = 111
Total days of operation per year = 365
Weekday Car Hours = 173
Annual Weekday Car Hours = 43,942
Sat/Sun/Holiday Car Hours = 82
Annual Sat/Sun/Holiday Car Hours = 9,102
Average daily car miles = 3,183
Annual car miles = 1,161,850
Peak Vehicles = 18, Fleet Size = 22

Source: Parsons Brinckerhoff, June 1993

approximately 2,091,574. On North Line Alternative 2, annual car hours are about 52,300 and annual revenue car miles approximately 1,450,781. On the South Line Alternative, annual revenue car miles are about 1,161,850 and annual car hours approximately 53,000.

Fleet Size

The fleet size is based on the estimated peak period service frequency, the length of peak period trains, and the round trip time for each corridor.

On the North Line Alternative 1, the total peak fleet requirements is 24 cars. This includes 20 vehicles for service and four spares. The North Line Alternative 2 total peak fleet requirement would be 20 vehicles (16 peak vehicles and four spares).

On the south corridor the total peak fleet requirements is 22 cars. This includes 18 vehicles for service and four spares.

4.2.4 Yard and Shop Facilities

The purpose of yards and shops is to house and support certain operations and maintenance functions that are required to support the operation of a light rail line. The following functions are normally performed at these facilities:

- Storage of light rail vehicles, maintenance equipment and materials as required to operate the system;
- Minor inspection and servicing of vehicles;
- Servicing, overhaul and major repair of vehicles;
- Interior and exterior cleaning of vehicles;
- Support of route maintenance activities;
- Control of yard operations and personnel activities.

All of the existing and planned rail lines in the Metro system have a dedicated maintenance facility either along their respective alignment or in the general vicinity of it. This analysis initially considered the shared use of existing or proposed maintenance facilities at Del Amo, Midway,

Exposition Park or Burbank. However, analysis of these locations subsequently rejected these sites for the following reasons:

- By locating a maintenance yard along the Route 10/60 LRT line, the time spent deadheading equipment is reduced, which in turn minimizes potential service delays to this and other lines. For example, if the Blue Line Yard in Long Beach were used to service 10/60 route vehicles and a vehicle on the Long Beach Line broke down, or the Long Beach Line experienced some type of major delay shutting it down, then the 10/60 Line would be out of service until the delay was ameliorated.

- In addition, deadheading vehicles over long distances increases the operating and maintenance costs due to excess wear and tear on vehicles and track as well as non-revenue producing labor hours.

- Finally, by sharing the yards with other lines, the ability to expand service in the future as demand increases may be inhibited by a lack of space, since these yards have been programmed to service a specific line size.

On the North Line, a potential site for the yard facilities is located on the west side of the San Gabriel River in an area that it is currently comprised of vacant lots. On the South Line, a potential site for the yard facilities is on the east side of the San Gabriel River between Beverly and Whittier Boulevards in an area that it is currently undeveloped. For both the north and south alternatives, it is estimated that a minimum of 13 acres will be required for yard facilities. This will allow the storage of up to 50 light rail vehicles.

4.2.5 System Connectivity Issues

This section discusses the interconnectivity of the north and south alternatives with other elements of the regional rail transit system.

Union Station Platform Capacity Issues

There is the potential for the four LRT lines that might potentially utilize Union Station to operate 41 trains per hour during the peak period into Union Station. This represents a train approximately every 87 seconds. Since these four lines are proposed to share two tracks there may be an operating conflict due to limited track capacity. In order to accommodate a greater number of light rail trains at Union Station, the platform will have to be lengthened considerably.

However, train operations will become considerably complex and awkward. Metrolink is proposing to expand their track capacity at Union Station, thus limiting the availability to expand the number of tracks available for light rail. Track space at Union Station may become so limited that another downtown Los Angeles terminal may have to be found for the North Line.

Whittier/Arizona Red Line Station

The South Line alternative would have its western terminus in the vicinity of Whittier Boulevard and Arizona Avenue which is also the proposed site of a Metro Red Line Station. Passengers would transfer from the light rail line operating at grade, to the Metro Red Line operating in subway via a system of stairs, elevators and escalators.

Metrolink Station

The North Line alternative would allow for passenger transfers in El Monte between the light rail line and Metrolink. The light rail line would be elevated at this station and would require the construction of a bridge over the tracks and a system of stairs, escalators and elevators to bring passengers down to ground level to access the at-grade Metrolink platforms.

4.2.6 Future Extensions from Termini

On the North Line, the cities of Baldwin Park and West Covina were not part of the initial evaluation of light rail service. However, they have expressed interest in light rail service, and, any future evaluations of this alignment should consider its extension further east through these two cities.

Orange County is now putting together its rail systems plan. Any future lines extending north connecting with the South Line alternative would enhance its attractiveness and subsequently increase patronage. The Beach Boulevard Corridor has been discussed as the most likely candidate corridor for a north-south light rail line. However, at this time Orange County has no short term plans to develop the Beach Boulevard Corridor to include light rail service.

4.2.7 Freight Operations

Under Federal Railroad Administration Guidelines, concurrent operations of freight rains and light rail on the same track is prohibited. As such, the route and service alternatives analyzed in this study assume exclusive light rail operations with no tracks shared by LRT and freight service. The alternatives tested include instances where LRT and freight operations share common right-of-way, but not common trackage. In all instances of shared right-of-way, designs have been proposed that provide acceptable separation between freight and LRT tracks.

4.3 PATRONAGE ESTIMATES

The patronage estimates for the northern and southern alignments in the Route 10/60 Corridor were developed using the Metro Rail Red Line model as the basis for projections. The Metro Red Line patronage model is a recently-developed mode split model that has been used to forecast the anticipated ridership for the proposed easterly extension of the Metro Red Line subway. The model has been the subject of extensive peer review and, in fact, has been accepted as the model that will be used for all MTA corridor planning work. The model has been developed to include all the commuter rail, light rail, and heavy rail lines proposed in MTA's 30-Year Integrated Transportation Plan. The model also includes the major bus lines in the county so that transfers from one transit mode to another can be accounted for in the model.

The model also has the capability to account for park-and-ride activities at stations. The model does not distinguish among various sizes of park-and-ride lots, but instead assumes an unlimited supply of parking at each location where park-and-ride lots are proposed. In this way, the model results can offer some indication of the level of park-and-ride demand at each station.

A brief description of the Metro Red Line model methodology may be found in the Task 3 Report.

4.3.1 Patronage Forecast Process

Initial Model Run

The Metro Red Line model was coded to add the north and south Route 10/60 Corridor light rail alignments to the year 2010 base network. The assumptions for LRT stations, travel frequency, travel speed, park-and-ride locations, etc. were derived from the operating plan described above.

Background travel patterns and mode split characteristics were assumed to be the same as other LRT corridors in the County. In other words, no special adjustments were made to any mode split assumptions that might artificially increase the model's estimate of patronage for the LRT alignments.

The North Line was modelled to meet the regional system at Union Station in downtown Los Angeles. Likewise, the South Line was assumed to come all the way into downtown and meet the regional system at Union Station. For both tests, the Route 10/60 alignment was assumed to be a free-standing alignment. It was not linked as a through line with any other regional LRT line. Any patron on one of the Route 10/60 Lines who wanted to travel to Long Beach, for example, would have to transfer to the Metro Blue Line at Union Station. There certainly is the possibility that the Route 10/60 LRT lines could be linked with another regional line and therefore transfers would not be necessary. However, since a firm operating plan has not been defined, testing the Route 10/60 alignments as "free standing" alignments should yield a conservative patronage estimate.

An initial model run was conducted where no other changes were made to the background road, rail, or bus network. The results of this model run were reviewed to determine what adjustments in assumptions could be made to increase the effectiveness of the LRT alternatives.

Refined Network Model Run

For the purposes of the Route 10/60 Preliminary Planning Study, the model was revised to incorporate the light rail alignment alternatives under study during the detailed analysis portion

of the study. Key bus routes in the study corridor were rerouted, to the extent necessary, so that they served the proposed rail stations under consideration.

The northerly route was run once with Segments N-1, N-2A, N-3, and N-4 as a complete route alignment. A second run was conducted replacing N-2A with N-2B so that any difference in patronage between the two alignments could be determined.

Background Express Bus Adjustments

The results of the Red Line model were modified to account for the unique characteristics of the Route 10/60 Corridor. Because of the linear shape of the corridor and because of the high travel demand levels in an east/west direction along the corridor between downtown Los Angeles and the residential areas of the San Gabriel Valley, the Red Line model assumes significant background express bus service. If the northern or southern alignment were actually constructed as a light rail transit line, it is logical to assume that a significant portion of the parallel, competing express bus service would be reduced. Therefore, some of the passengers assigned to the express bus mode in the Red Line model would likely transfer to the light rail transit service.

As the final adjustment to the patronage model output, an estimate was made of the number of daily patrons that might be expected to shift from express bus to light rail if any of the Route 10/60 LRT alignments were constructed.

Mode of Arrival Data

The Metro Red Line model has the capability to predict the mode of arrival of light rail patrons to the station. This data is useful for a number of reasons. First, it serves as a logic check so that the transportation planner can check the total patronage projected against the various modes of arrival. Very high or very low bus transfers, for example, might suggest that the background bus system is not properly connected to the light rail station.

For the purposes of this study, the mode of arrival data is also very important because it is the data that is used to measure the traffic impact that will be generated by the station. Park-and-ride, kiss-and-ride, and bus trips are quantified by the mode of arrival data. These traffic

estimates are then assigned to the street system so that station impact on the streets and intersections can be measured.

The mode of arrival data will also be useful in the later stages of station design when the bus volumes will be used to estimate the number of bus loading spaces needed and the pedestrian information can be used to size the station platform itself.

4.3.2 Line Ridership Forecast

Exhibits 28 through 30 show the results of the computer model output from the second run of the Red Line model. The model indicates that the northern alignment would attract a total of 26-30,000 passengers per day. The higher end of the range is expected to occur on the Huntington/Main/Palm alignment alternative.

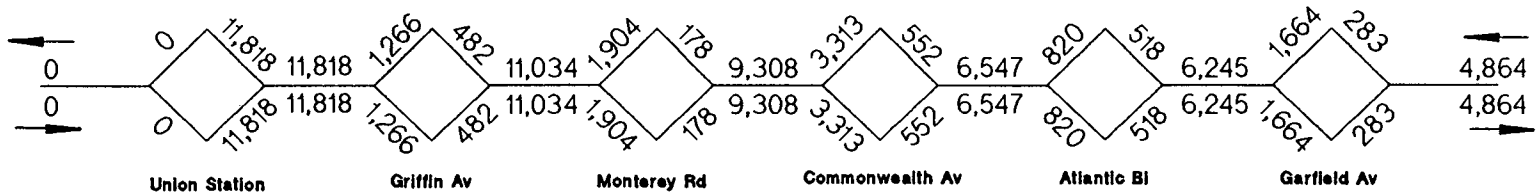
The southern route that would traverse Beverly and Whittier Boulevards between the Arizona/ Whittier Metro Red Line station and the Lambert Rail Line/Colima Road station would attract a total of approximately 11,000 passengers per day.

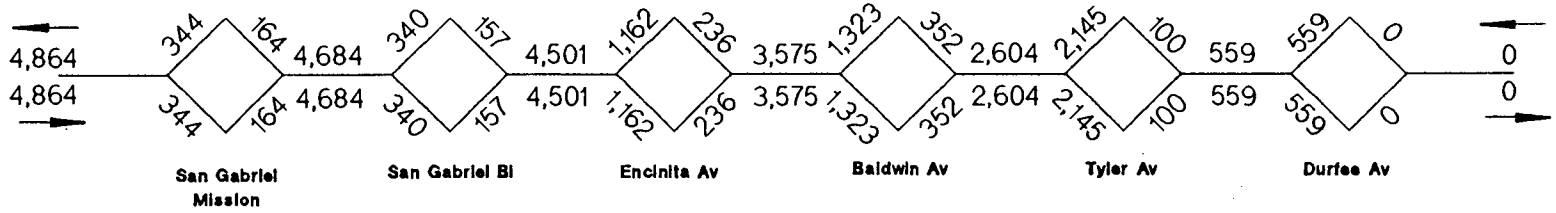
These patronage estimates represent an increase of approximately 25-30% over the initial model runs that did not have the background bus system closely coordinated with the light rail stations. The importance of actually delivering bus patrons to the front door of the light rail station is obvious. The model indicates that the convenience of the bus-to-rail transfer is a critical factor in attracting rail ridership.

The data in Exhibits 28-30 also show the on and off activity at each station and the maximum load point for each alignment. While the numbers indicate that, as expected, most of the trips are destined to or beyond downtown Los Angeles, it is interesting to note the relatively large number of passengers disembarking at the stations along the way. This is especially true along the North Line. This means that the light rail line is not just serving the suburban home-to-downtown work trip. Rather, all of the areas along the light rail route are benefitting from the service provided by the rail.

TOTAL ON'S = 29,680

Headway 6 minutes peak





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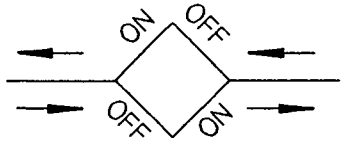


Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

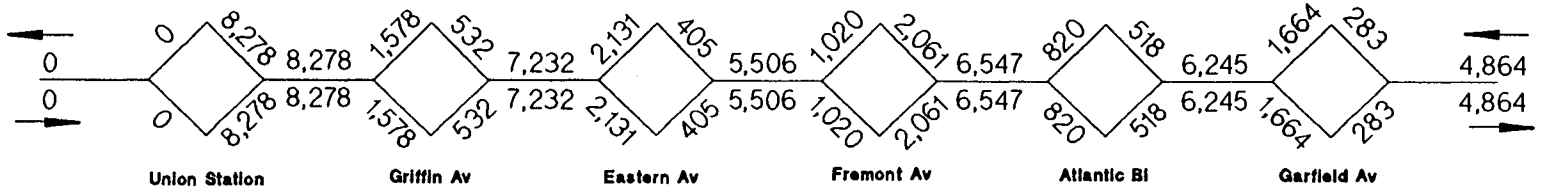
KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

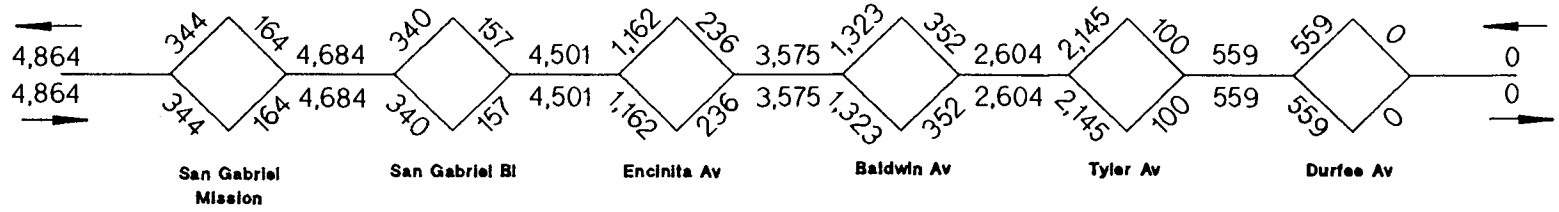
EXHIBIT 28

DAILY TRIPS NORTH LINE: ALTERNATIVE 1 - HUNTINGTON/MAIN/PALM

TOTAL ON'S = 26,172

Headway 6 minutes peak





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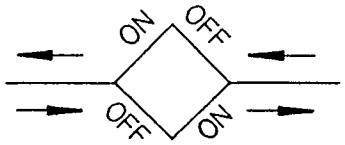


Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

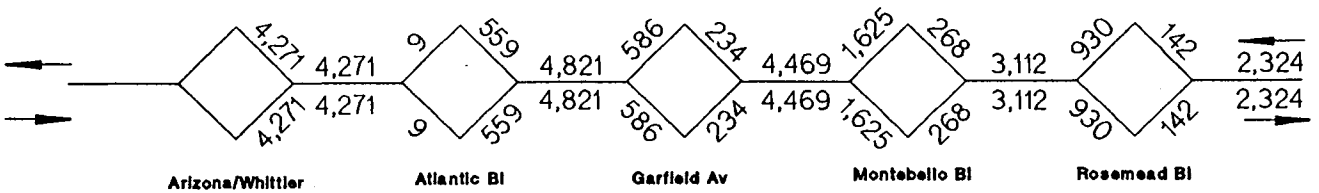
KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

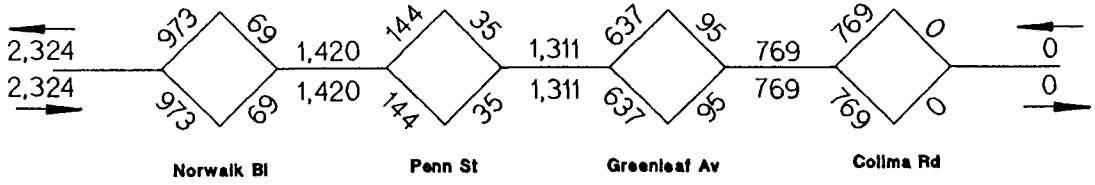
EXHIBIT 29

DAILY TRIPS NORTH LINE: ALTERNATIVE 2 - SP RAIL LINE

TOTAL ON'S = 11,346

Headway 6 minutes peak





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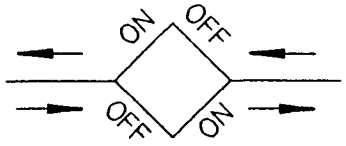


Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 30

DAILY TRIPS - SOUTH LINE

4.3.3 Express Bus Adjustment

Year 2010 projections for the northern portion of the Route 10/60 Corridor indicate that there will be 22 express bus lines running parallel to the light rail transit. These 22 lines would carry 35,100 express bus passengers per day. For the purposes of this study, it was estimated that at least 25-30% of the redundant express bus service would be eliminated upon opening of the light rail line. If the light rail captured only 50% of the former express bus patrons from these deleted lines, an additional 5,250 passengers per day would be added to the light rail transit patronage.

Parallel to the southern route, 14 express bus lines are projected to operate and these 14 lines would carry a total of 18,300 passengers per day. Again, if a similar number of the express bus passengers transferred to light rail, this would add 2,750 passengers per day to the light rail estimates.

4.3.4 Total Patronage Estimate

Exhibit 31 shows the patronage estimate assuming the attraction of express bus patrons. The northerly alignments could be expected to attract between 31,000 and 35,000 per day. The southern alignment could attract a total of approximately 14,000 patrons per day.

4.3.5 Mode of Arrival Data

Exhibits 32-34 show the mode of arrival estimates, by station, for the three alignments tested in Task 3. The data shows the number of passengers who are projected to walk to each station and a summary of those passengers arriving by vehicle (kiss-and-ride drop-off, park-and-ride, and bus). The percentage of vehicular arrivals varies from station to station depending on the amount of bus service, park-and-ride parking lot provision, proximity to major streets, etc.

EXHIBIT 31
PATRONAGE ESTIMATE SUMMARY

Alignment	LRT Patronage Model Projection	Parallel Express Bus Patronage	Expected LRT Capture	Total Potential LRT Daily Patronage
North 1 (Huntington/Main/Palm)	29,700	35,100	5,250	34,950
North 2 (SPRR Trench)	26,200	35,100	5,250	31,450
South	11,350	18,300	2,750	14,100

EXHIBIT 32
MODE OF ACCESS
NORTH LINE - ALTERNATIVE 1

NORTH LINE	Daily Arrivals By:			PM Peak Hour
	Walk	Vehicle [1]	Total	Worst Case [2]
Union Station	1127	12,830	13,957	3,071
Griffin Av	237	1,833	2,070	455
Eastern Av	279	2,204	2,483	546
Fremont Av	250	4,369	4,619	1,016
Atlantic Bl	107	1,458	1,564	344
Garfield Av	104	2,215	2,319	510
San Gabriel Mission	64	542	606	133
San Gabriel Bl	59	529	588	129
Encinita Av	112	1,553	1,664	366
Baldwin Av	135	1,748	1,883	414
Tyler Av [3]	168	2,353	2,522	555
Durfee Av	58	596	654	[4] 433
TOTAL	2,700	32,230	34,930	7,974

Notes:

[1] Vehicle arrivals include passengers arriving by kiss-and-ride, park-and-ride, and bus.

[2] PM Peak Hour worst case estimates based on 22% of daily boardings.

[3] Patrons from this station can use park-and-ride lot for Metrolink Station.

[4] Estimate based on two-thirds of the capacity of park-and-ride lot.

EXHIBIT 33
MODE OF ACCESS
NORTH LINE – ALTERNATIVE 2

NORTH LINE	Daily Arrivals By:			PM Peak Hour
	Walk	Vehicle [1]	Total	Worst Case [2]
Union Station	790	9,194	9,984	2,196
Griffin Av	287	2,266	2,553	562
Eastern Av	340	2,753	3,093	680
Fremont Av	200	3,566	3,766	828
Atlantic Bl	107	1,489	1,596	351
Garfield Av	104	2,267	2,371	522
San Gabriel Mission	64	556	620	136
San Gabriel Bl	59	542	601	132
Encinita Av	112	1,590	1,701	374
Baldwin Av	135	1,777	1,911	421
Tyler Av [3]	168	2,392	2,560	563
Durfee Av	58	609	667	[4] 433
TOTAL	2,421	29,001	31,422	7,199

Notes:
[1] Vehicles arrivals include passengers arriving by kiss-and-ride, park-and-ride, and bus.
[2] PM Peak Hour worst case estimates based on 22% of daily boardings.
[3] Patrons from this station can use park-and-ride lot for Metrolink Station.
[4] Estimate based on two-thirds of the capacity of park-and-ride lot.

EXHIBIT 34
MODE OF ACCESS
SOUTH LINE

SOUTH LINE	Daily Arrivals By:			PM Peak Hour
	Walk	Vehicle [1]	Total	Worst Case [2]
Arizona/Whittier	1226	4,104	5,330	1173
Atlantic Bl	166	567	734	161
Garfield Av	235	809	1,044	230
Montebello Bl	606	1,840	2,446	538
Rosemead Bl	318	1,032	1,350	297
Norwalk Bl	273	1,068	1,340	295
Penn St	7	177	184	[3] 110
Greenleaf Av	114	734	847	186
Colima Rd	78	742	820	[3] 210
TOTAL	3,022	11,074	14,096	3,200

Notes:

[1] Vehicle arrivals include passengers arriving by kiss-and-ride, park-and-ride, and bus.

[2] PM Peak Hour worst case estimates based on 22% of daily boardings.

[3] Estimate assumed two-thirds of trips originated from kiss-and-ride and park-and-ride are PM peak hour commuting trips.

In general, the stations vary from 5-10% kiss-and-ride arrivals except at the far eastern ends of both the North and the South Lines where the kiss-and-ride arrival percentages are in the 20-25% range.

Stations that provide park-and-ride lots attract between 5 and 20% of the patrons via auto. The only exception to this range is the Penn Street station along the South Line where the lack of regional bus service and the large park-and-ride lot proposed yields an 80% auto arrival mode.

LRT patrons arriving by bus make up the largest segment of arrivals at most stations. Typically one-half to two-thirds of the patrons are delivered to the LRT stations by bus.

Many of the South Line stations are well served by residential neighborhoods as is evidenced by the high percentage of walk-in trips to the stations.

The final column of Exhibits 32-34 shows the arrivals at each station during the afternoon peak hour. Estimates for this mode of access will be used in the traffic impact analysis to evaluate the potential traffic impacts of station activity.

4.3.6 Patronage Conclusions

One should understand the level of accuracy of the patronage forecasts. Although sophisticated computer models are used to perform the travel forecasts, the forecasts are by their very nature based on a number of assumptions. Since these assumptions could prove to be liberal or conservative, the reader should review the patronage forecasts to gain an order of magnitude understanding rather than focusing on specific numbers. In this light, the patronage estimates for the two North Line alignments are, for all practical purposes, similar forecasts. Given the level of accuracy of the modelling process, these two forecasts are within approximately 10% of each other and are "indistinguishable".

The real utility of the patronage estimates is the comparison of one alternate to another. The two North Lines show significantly more potential for attracting patronage than does the South Line. Estimates of 31-35,000 patrons per day is significantly greater than the South Line's 14,000

patrons per day such that one may conclude that the North Line will be a significantly higher draw.

While the tested configuration and alignment for the South Line may not at this time indicate high potential patronage attraction levels, it should be remembered that potentially dramatic changes are possible at each end of the South Line. If, for example, the Metro Red Line has a greater ridership level than now anticipated, or if Orange County builds a fixed guideway transit system that links to the Lambert/Colima station, the South Line patronage could change dramatically.

4.4 STATION LOCATION AND SITE PLANNING

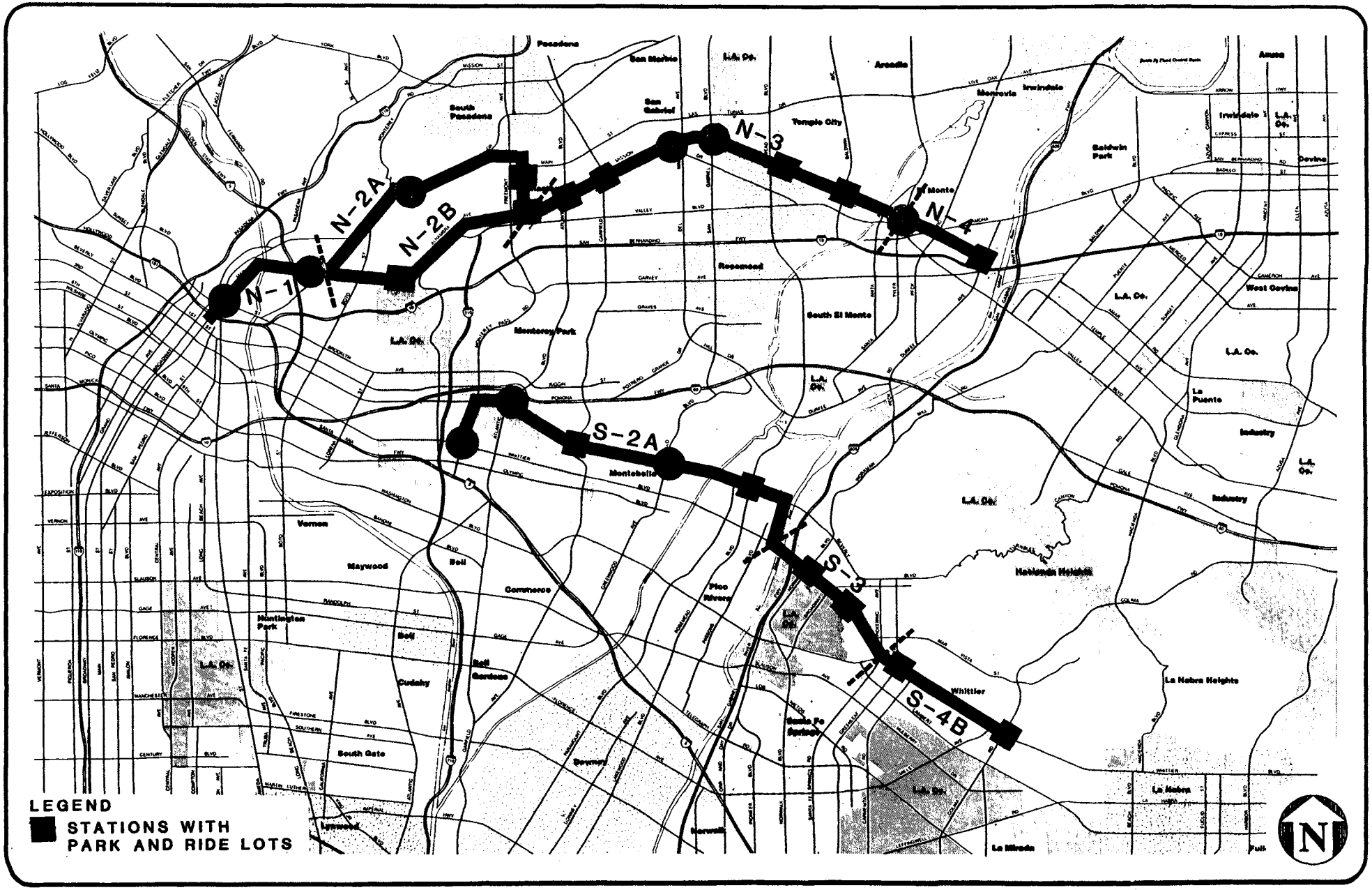
4.4.1 Station Location

Exhibit 35 shows the general location of stations along each of the route segments being studied. These station locations have been reviewed in great detail by the Route 10/60 Corridor Task Force. Meetings with Task Force members have led to minor adjustments of station locations so that the stations would minimize impacts on existing residential development while at the same time supporting redevelopment by the cities and county.

Exhibits 36A and 36B describe in more detail the precise location of the station platforms. As can be seen, the stations on the North Line are all located off-street or elevated above the street. Some are within the railroad trench, four are proposed as aerial stations and the remainder are at-grade stations along the rail line.

By contrast, virtually all of the South Line stations would be located at-grade and in the street. The two stations along the Lambert Line in Whittier (Segment S-4B) would be located at-grade but off-street.

Exhibit 36 also shows the location and the tentative size for park-and-ride lots. To the greatest extent possible, vacant or underutilized land was selected for potential park-and-ride locations.



Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PARSON, BRINCKERHOFF, QUADE & DOUGLAS and BARRIO PLANNERS, INC.

EXHIBIT 35
STATION LOCATIONS

EXHIBIT 36A
STATION LOCATION DESCRIPTION
NORTH LINE

Segment	Station Location	Location	Station Type	Prototype Exhibit	Park-and-Ride (# of spaces)	Comments
N1	Union Station	In station	Off Street	N/A	N/A	Connect to other LRT Lines
	Main/Griffin	West of Main	Aerial	28	0	
N2-A	Huntington/Monterey	East of Monterey	At Grade Off Street	30	0	Coordinate with bus transfer facility
	Palm/Commonwealth	North of Commonwealth	Aerial	28	220	
N2-B	Eastern/Valley	West of Eastern	At Grade Off Street	30	180	
	Fremont/SPRR	West of Fremont	In Trench	27	150	
N3	Atlantic/SPRR	East of Atlantic	In Trench	27	100	
	Garfield/SPRR	East of Garfield	In Trench	27	200	
	Ramona/SPRR	West of Ramona	At Grade Off Street	30	0	City park-and-ride lots located nearby
	San Gabriel/SPRR	East of San Gabriel	Aerial	28	0	
	Encinita/SPRR	West of Encinita	At Grade Off Street	30	250	
	Baldwin/SPRR	East of Baldwin	At Grade Off Street	30	330	
	Tyler/SPRR	West of Tyler	Aerial	28	N/A	Connect to El Monte Metrolink station and park-and-ride lot.
N4	Durfee/SPRR	West of Durfee	At Grade Off Street	30	650	

EXHIBIT 36B
STATION LOCATION DESCRIPTION
SOUTH LINE

Segment	Station Location	Location	Station Type	Prototype Exhibit	Park-and-Ride (# of spaces)	Comments
S2-A	Arizona/Whittier	North of Whittier	At Grade In Street	29	0	
	Atlantic/Beverly	East of Atlantic	At Grade In Street	29	0	
	Garfield/Beverly	East of Garfield	At Grade In Street	29	79	
	Montebello/Beverly	West of Montebello	At Grade In Street	29	0	
	Rosemead/Beverly	West of Rosemead	At Grade In Street	29	150	
S3	Norwalk/Whittier	West of Norwalk	At Grade In Street	29	280	
	Penn/Whittier	West of Penn	At Grade In Street	29	1,250	
S4-B	Greenleaf/SPRR	West of Greenleaf	At Grade Off Street	30	150	
	Colima/SPRR	East of Colima	At Grade Off Street	30	110	

4.4.2 Station Design Prototypes

The typical station has been designed with a two hundred foot long platform. Possible expansion to three hundred feet to allow for three car trains has also been taken into account. The minimum platform width is fifteen feet.

Exhibits 37 through 40 show sketches of four prototypical stations in the Route 10/60 Corridor.

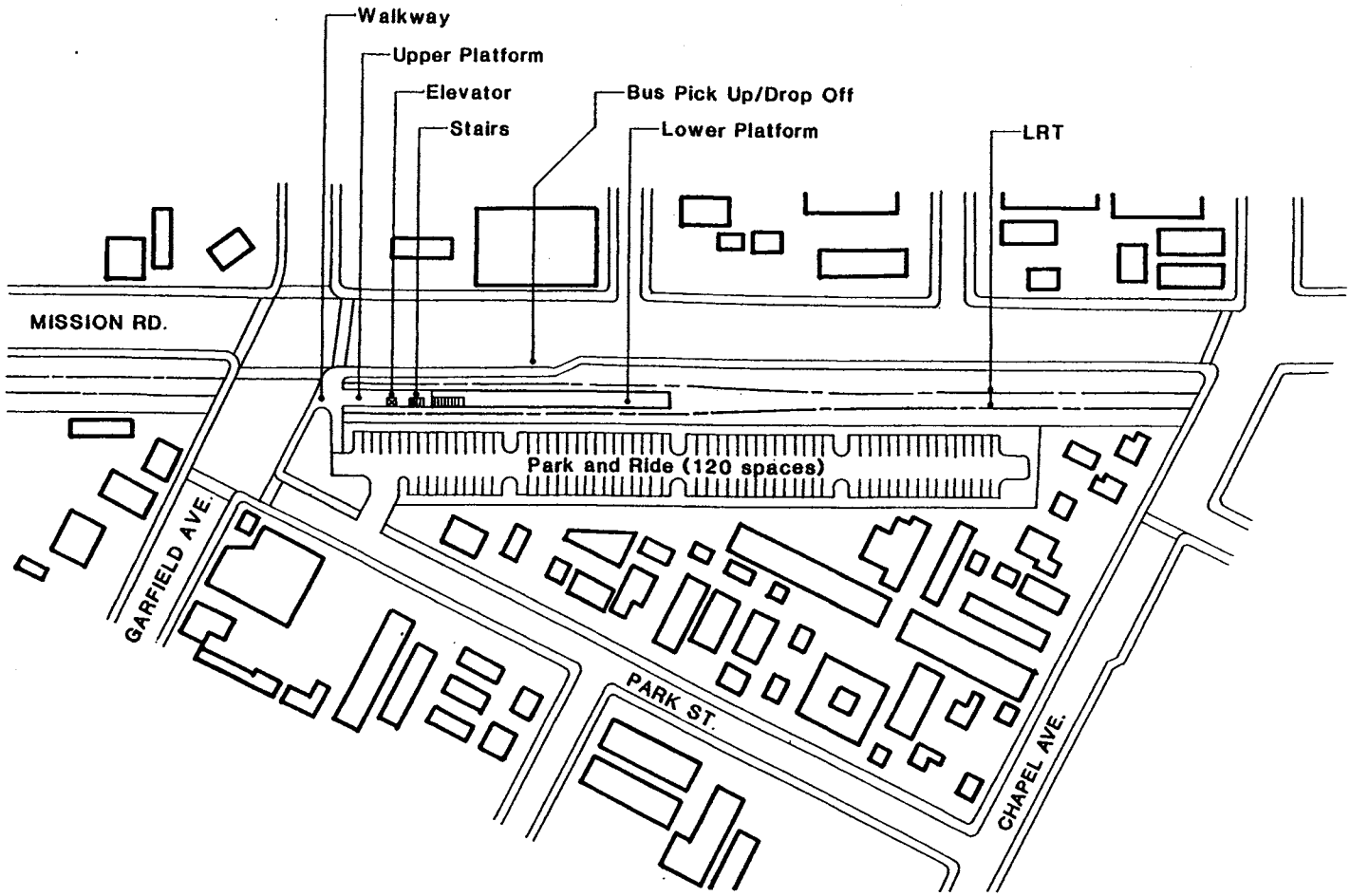
Stations in the SPRR Trench

Exhibit 37 shows the proposed station at Mission Road and Garfield Avenue on the North Line. This station is typical of the stations that will be located in the Southern Pacific Railroad trench. The actual boarding/alighting platform would be located down in the trench. Elevators and stairways would be required to carry passengers from the lower platform up to the street level. At street level, sidewalks would carry passengers to bus loading/unloading areas and to a park-and-ride lot (as shown in Exhibit 37B). Stations that would conform to the trench configuration shown in Exhibit 37 are:

Segment N-2B	Fremont
Segment N-3	Atlantic Garfield

Elevated Stations

Exhibit 38A shows a schematic of the proposed station at Tyler Avenue on the northern alignment. This station would be located immediately adjacent to the existing Metrolink station. The LRT station would be elevated since the LRT tracks must go over Santa Anita Avenue to the west and Tyler Avenue to the east. Therefore, a grade-separated connection could be made between the light rail station and the Metrolink station. Passengers leaving the light rail station could utilize an overpass that would go over the Metrolink tracks and platform. These passengers would have the choice of using an elevator or a stairway to get down to the Metrolink platform or they could continue on the overpass to access the park-and-ride lot. Aerial stations are planned at the following locations:



0 30 60 90 120 240

SOURCE: BARRIO PLANNERS, INC.

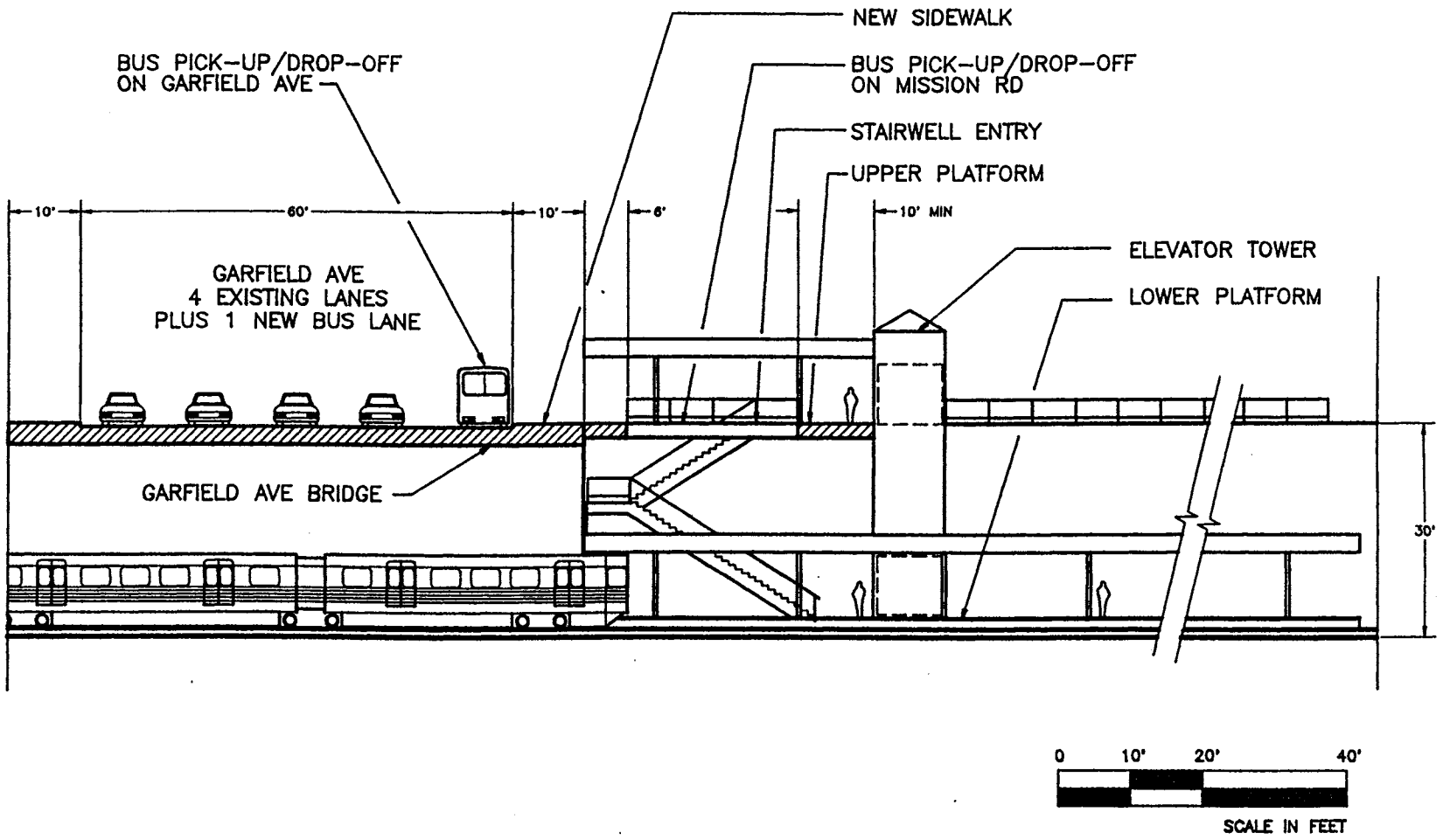
Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 37A

GARFIELD AVENUE AND RAIL STATION: NORTH ALIGNMENT



SOURCE: BARRIO PLANNERS, INC.

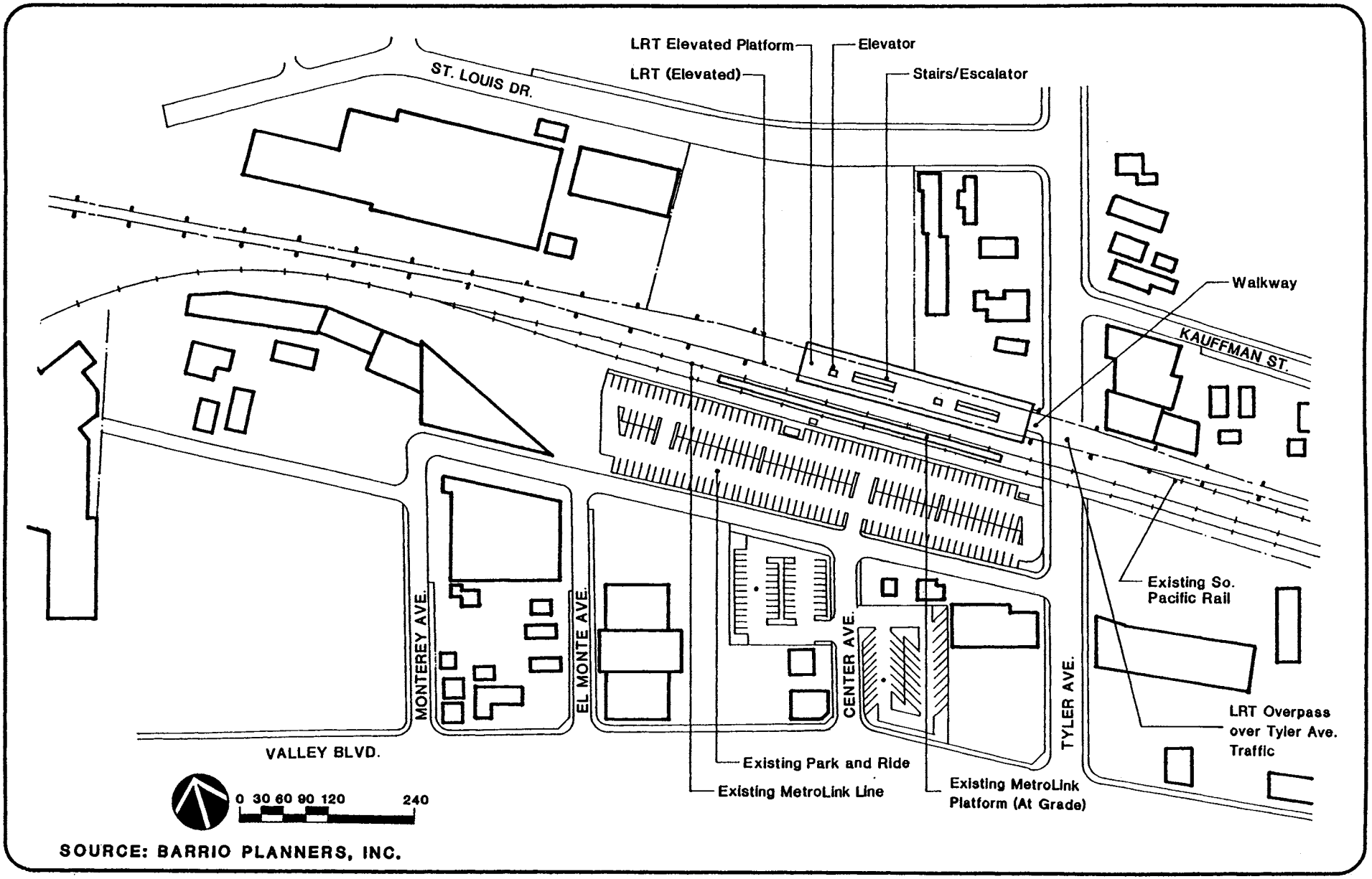
Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 37B

GARFIELD AVENUE AND RAIL STATION: NORTH ALIGNMENT/ELEVATION



SOURCE: BARRIO PLANNERS, INC.

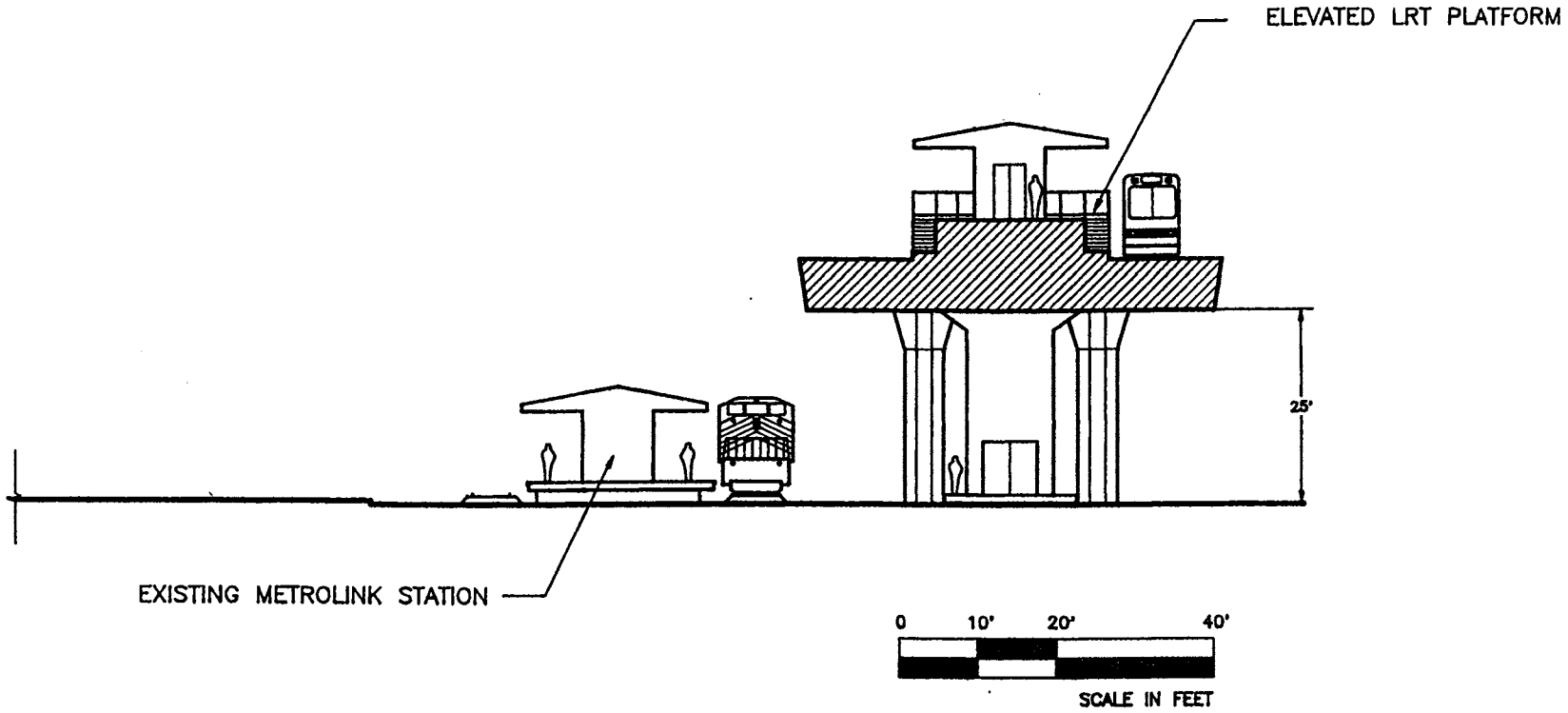
Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 38A

TYLER AVENUE AND RAIL STATION: NORTH ALIGNMENT



SOURCE: BARRIO PLANNERS, INC.

Route 10/60 Corridor

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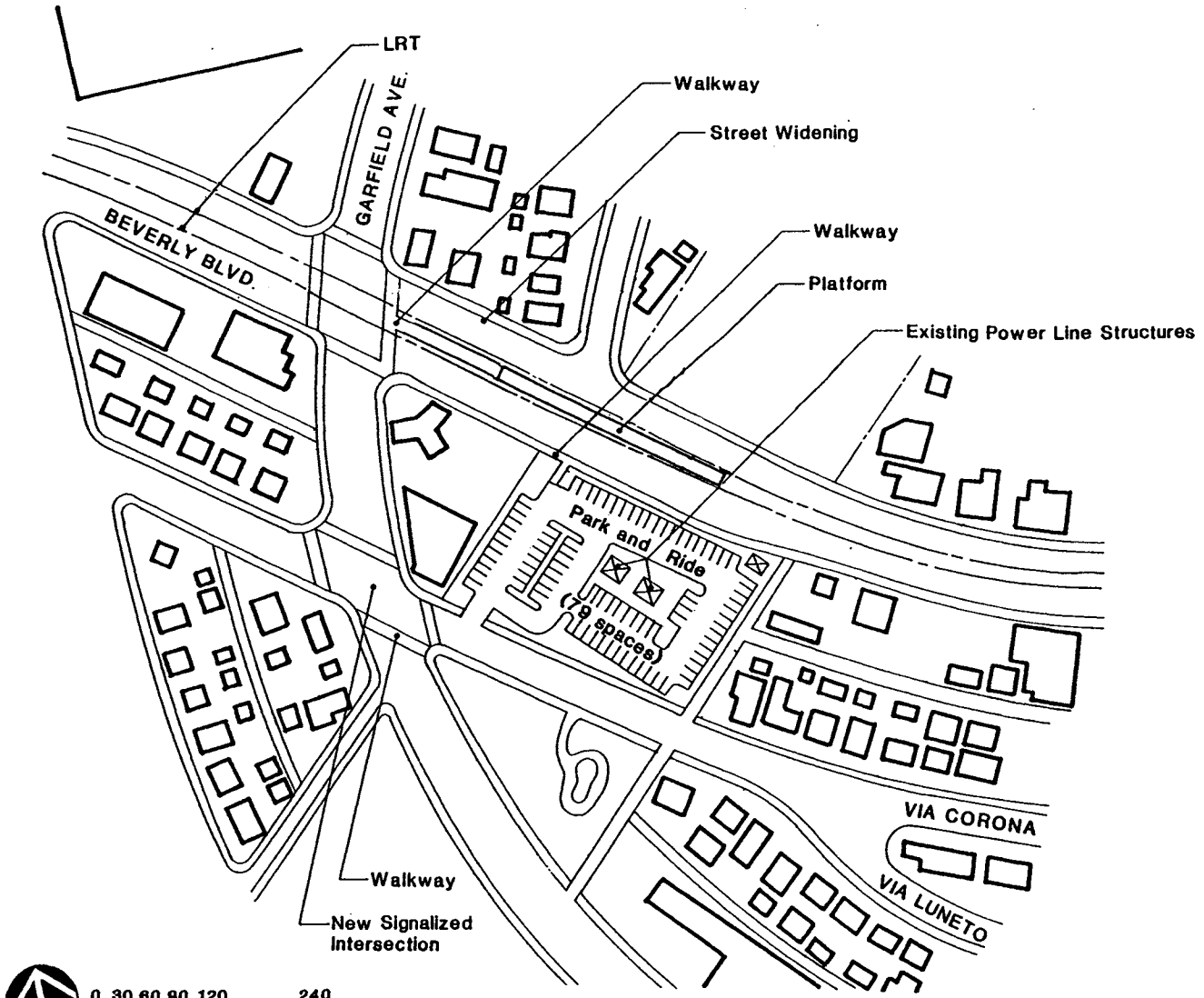
EXHIBIT 38B

TYLER AVENUE AND RAIL STATION: NORTH ALIGNMENT/ELEVATION



SOURCE: BARRIO PLANNERS, INC.

Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

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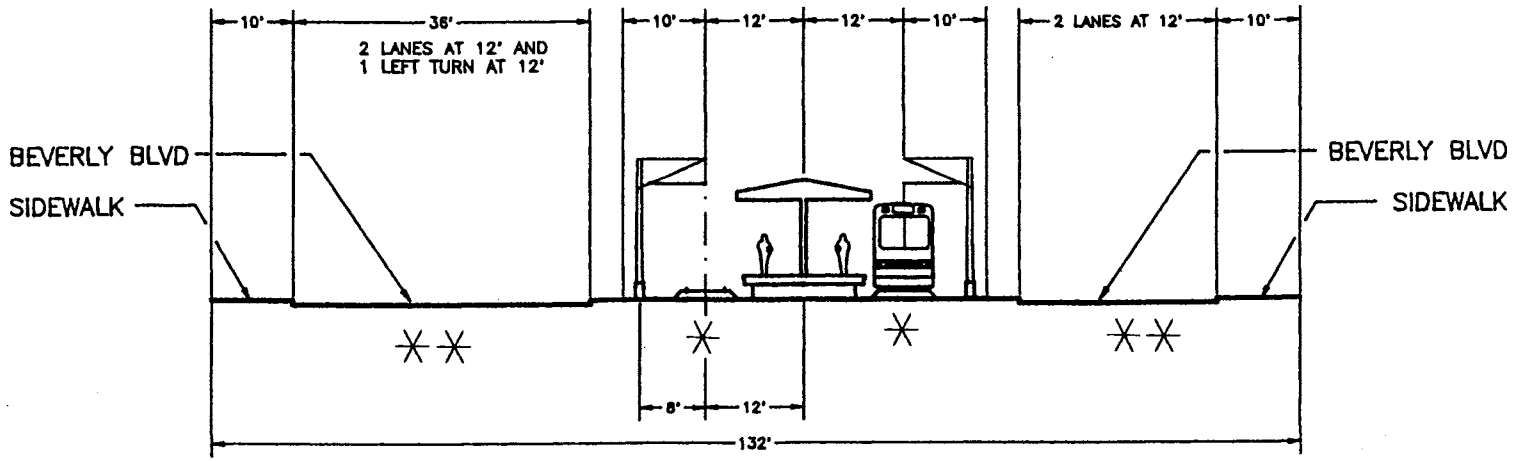
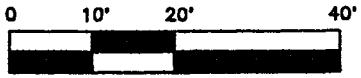
EXHIBIT 39A

GARFIELD AVENUE AND BEVERLY BOULEVARD STATION: SOUTH ALIGNMENT





Legend

✳ Potential Pedestrian/Train Conflict

✳✳ Potential Pedestrian/Auto Conflict

SOURCE: BARRIO PLANNERS, INC.

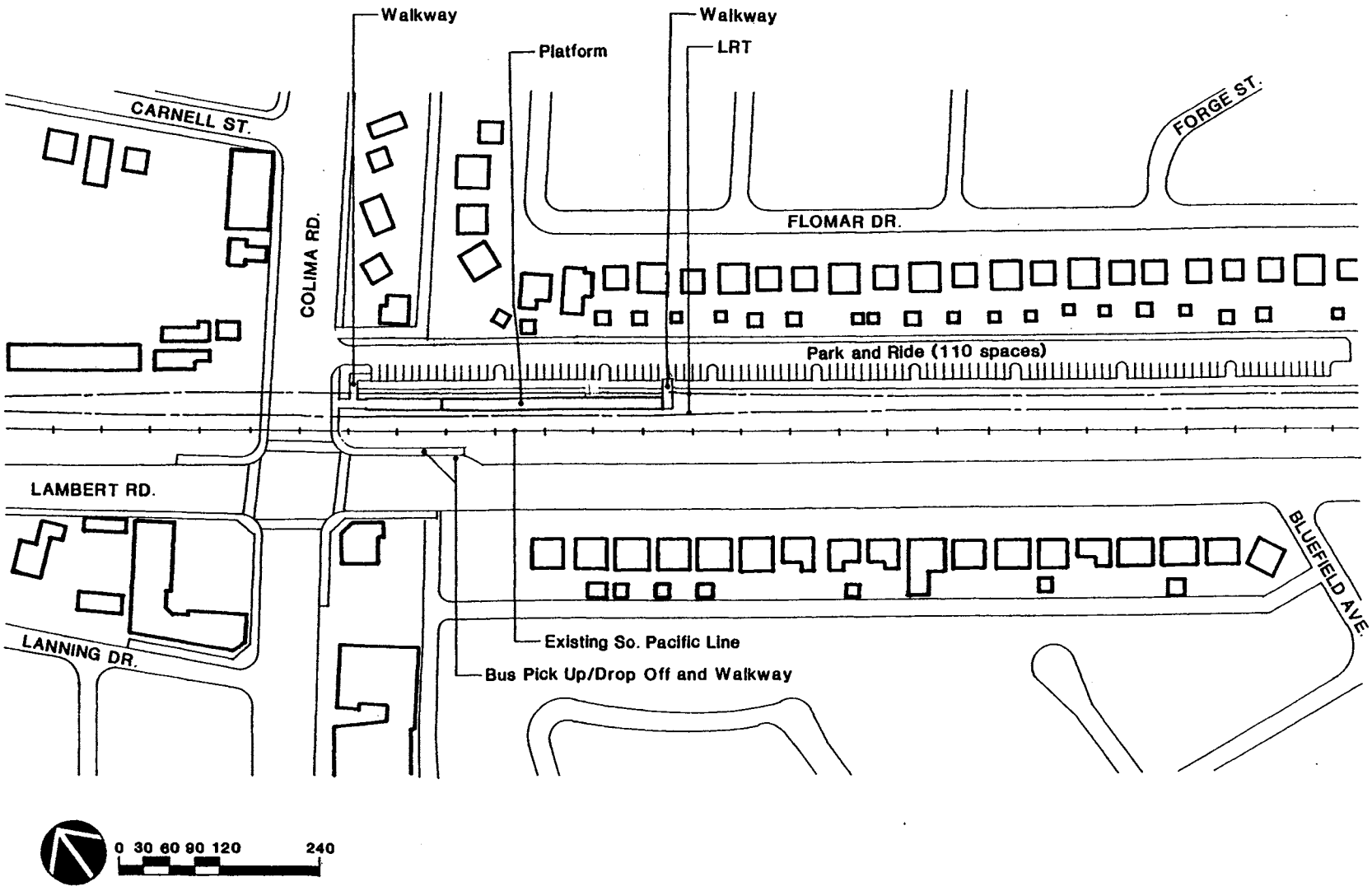
Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 39B

GARFIELD AVENUE AND BEVERLY BOULEVARD STATION: SOUTH ALIGNMENT/ELEVATION



SOURCE: BARRIO PLANNERS, INC.

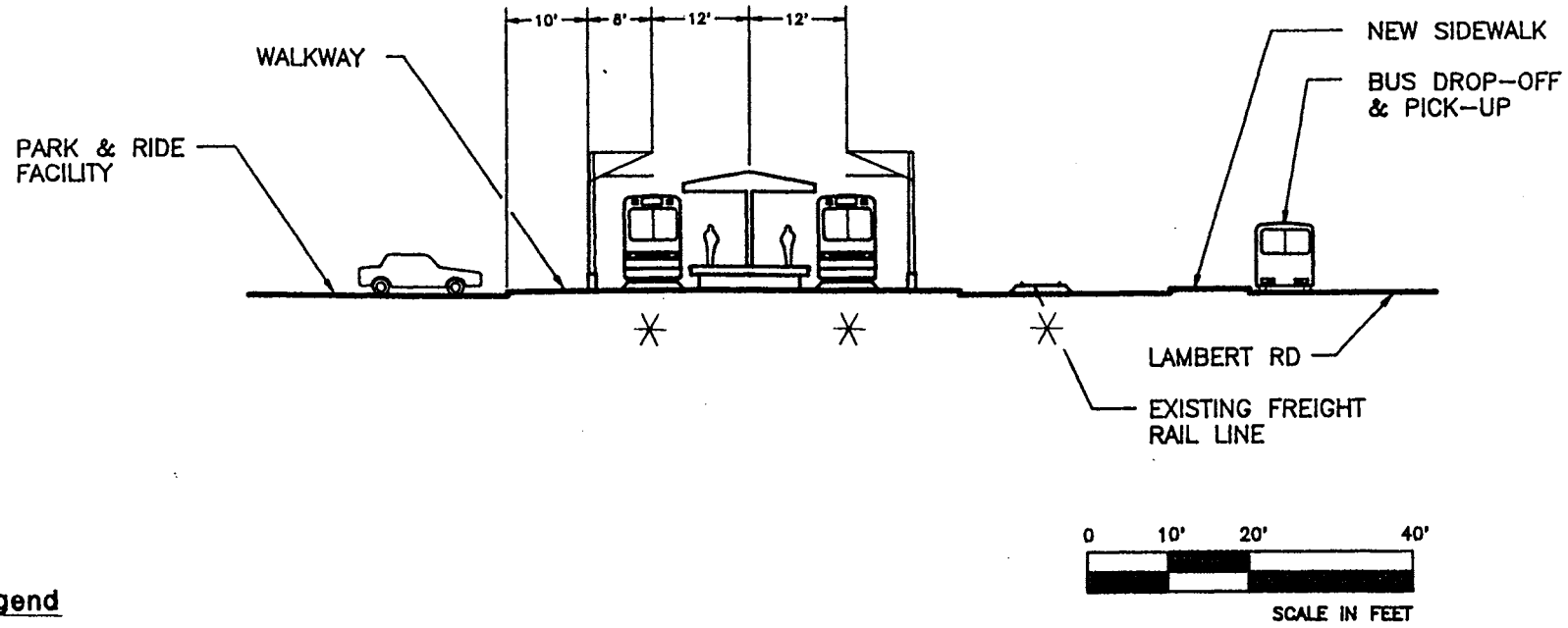
Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 40A

COLIMA ROAD AND RAIL STATION: SOUTH ALIGNMENT



Legend

✳ Potential Pedestrian/Train Conflict

SOURCE: BARRIO PLANNERS, INC.

Route 10/60 Corridor

Los Angeles County Metropolitan Transportation Authority

KAKU ASSOCIATES, INC. in association with PBQD and BARRIO PLANNERS, INC.

EXHIBIT 40B

COLIMA ROAD AND RAIL STATION: SOUTH ALIGNMENT/ELEVATION

Segment N-1	Main/Griffin
Segment N-2A	Palm/Commonwealth
Segment N-3	San Gabriel Boulevard/SPRR Tyler/SPRR

At-Grade, In-Street Stations

Exhibit 39A shows a typical in-street station with the 200-foot long platform located in the center of Beverly Boulevard at Garfield Avenue. In virtually all of these cases, one end of the platform or the other would be located near a signalized intersection so that light rail transit passengers would move to that end of the platform and cross the street using the intersection crosswalk. Exhibit 39A also shows the proximity of the proposed park-and-ride lot to the station platform. At-grade in-street stations are planned only in the southern alignment at the following locations:

Segment S-2A	Arizona/Whittier Atlantic/Beverly Garfield/Beverly Montebello/Beverly Rosemead/Beverly
Segment S-3	Norwalk/Whittier Penn/Whittier

Exhibit 39B points out one of the inherent safety issues with all at-grade light rail stations. With an in-street, at-grade station the passengers gain access to the station platform by crossing automobile travel lanes and one LRT rail line to reach the end of the platform. Stairs or a pedestrian ramp then delivers the passenger up to train level. Thus, in order to reach the platform of a station located in the center of the street, passengers must leave the sidewalk and traverse lanes of traffic and one LRT rail line. These are safety issues that are typically not experienced in the elevated or trench station designs described above.

At-Grade, Off-Street Stations

Exhibit 40A shows a typical off-street, at-grade station. This type of station occurs in numerous locations along the North Line after the light rail tracks come out of the railroad trench.

Pedestrian access to the station would be gained at one or both ends of the platform and sidewalks would be utilized to connect passengers to park-and-ride lots or with signalized intersections that provided access to the bus system. Locations of off-street, at-grade stations are as follows:

Segment N-1	Union Station
Segment N-2A	Huntington/Monterey
Segment N-2B	Eastern/Valley
Segment N-3	Ramona/SPRR Encinitas/SPRR Baldwin/SPRR
Segment N-4	Durfee/SPRR
Segment S-4B	Greenleaf/SPRR Colima/SPRR

Exhibit 40B shows that the at-grade, off-street station also presents pedestrian safety issues, especially for those stations located alongside active freight lines. While passengers to these types of stations typically do not have to cross streets to gain access to the station platform, they will likely have to cross at least one LRT track and, as shown in Exhibit 40B, sometimes a freight track.

4.4.3 Park-and-Ride Station Schematics

Sketches of the stations with park-and-ride lots may be found in the Task 3 report. The sketches show the location of the station platform as well as the location of the park-and-ride lot. The general location of access to the parking lots is also shown as is the pedestrian corridor from the park-and-ride lot to the platform. The park-and-ride lot access point locations were selected to:

1. Minimize impacts on the key intersections serving the station,
2. Protect adjacent residential neighborhoods, and
3. Distribute traffic on the station site in order to avoid congestion.

4.5 TRAFFIC IMPACT ASSESSMENT

During Task 1 of this Corridor Study, 24-hour traffic count data was collected for each of the route segments under study. This route traffic data along with field observations, patronage data at the proposed stations, and input from City and County staff were all used to conduct a qualitative traffic impact assessment of LRT operation in the various segments.

The traffic impact assessment focuses on three areas. First, traffic impacts in the vicinity of proposed stations were evaluated. Second, the corridor impacts resulting from at-grade rail crossings and at-grade rail operation were evaluated. Finally, potential conflicts between light rail operation and truck movements were identified and evaluated. Mitigation measures necessary to address project impacts were also identified.

4.5.1 Station Area Traffic Impacts

Traffic impacts in the vicinity of proposed LRT stations will be affected by the amount of background traffic as well as the amount of automobile, bus and pedestrian traffic approaching the station. Park-and-ride lot provisions at the station will also tend to increase traffic activity in the station area.

Mode of access data (Exhibits 32-34) was analyzed for each of the proposed station locations. The anticipated patronage arrival patterns were converted into likely automobile and bus activity levels which were in turn compared to field observations of existing operating conditions within the station vicinities. A preliminary evaluation was conducted to identify which key intersections in the vicinity of the stations might be impacted by station traffic. The station site plans were reviewed to identify the travel patterns that the buses and autos approaching/departing the station would use. An analysis of these approach patterns helped to determine which of the intersections serving each station might be impacted by station-generated traffic.

Wherever the magnitude of a potential traffic impact was described as "medium" or "high", a more detailed traffic impact analysis was undertaken.

Once the potentially impacted intersections were identified, each city was contacted in order to obtain the most recent available peak hour turning movement count. If no recent count was available, the intersection cross section was inventoried so that a capacity calculation could be performed that at least measured the incremental impact of the new station traffic. In this way, the level of incremental impact caused by station traffic could be quantified and mitigation measures identified commensurate with the magnitude of impact. In actuality, very few recent, usable counts were available from the Corridor Cities, so the calculation of incremental impacts became the standard methodology.

4.5.2 Station Area Traffic Impact Results

Exhibit 41 presents a summary of the incremental impact of station traffic on intersections near the stations. Most impacts are in the range of 0.01-0.03 increase in volume/capacity ratio. In simplistic terms, this means that the traffic added to the street system as a result of the LRT station being open is using between 1% and 3% of the intersection's capacity. Many cities have adopted standards that say if an incremental project impact increases the intersection volume/capacity ratio by 0.02 or 0.03, the impact of the project is deemed to be significant. For the purposes of this study, a project impact of 0.03 or greater was defined as significant.

Intersections with incremental volume/capacity ratio changes larger than 0.03 were field checked to identify possible mitigation measures.

Exhibit 42 presents an assessment of the intersections identified above and the intersections that could be impacted by the operation of the park-and-ride access points at the LRT stations. Potential improvements are identified and other station area planning issues that should be considered are presented.

Based on the potential mitigation measures, there is the possibility that the implementation of the Route 10/60 Corridor light rail line would result in significant, unmitigated impact at the following intersections:

EXHIBIT 41
INTERSECTION IMPACTS IN THE VICINITY OF STATIONS

Station Location	Potentially Impacted Intersections	Estimated Increase in V/C [1]
Segment - N1		
Union Station	Alameda/Macy	0.03
Main/Griffin	Main/Griffin	0.02
Griffin/Rail	Griffin/Mission Rd Griffin/Main	0.01 0.01
Segment - N2-A		
Huntington/Monterey	Huntington/Monterey Huntington S./Monterey	Minimal Minimal
Palm/Commonwealth	Palm/Commonwealth Main/Poplar	0.04 0.02
Segment - N2-B		
Eastern/ Alhambra Rail Line	Valley/Eastern Valley/Alhambra	Minimal Minimal
Fremont/ Alhambra Rail Line	Fremont/Mission	0.03
Segment - N3		
Atlantic/ Mission Rail Line	Atlantic/Mission Atlantic/Front	0.03 0.05
Garfield/ Mission Rail Line	Garfield/Mission Garfield/Park	0.03 0.01
Ramona/ Mission Rail Line	Ramona/Mission Ramona/Junipero Serra Mission/Junipero Serra	Minimal Minimal Minimal
San Gabriel/ Mission Rail Line	San Gabriel/Mission	Minimal
Encinita/ Mission Rail Line	Lower Asuza/Encinita	0.04
Baldwin/ Mission Rail Line	Baldwin/Bessie Baldwin/Valley	0.15 0.05

EXHIBIT 41 (Continued)
INTERSECTION IMPACTS IN THE VICINITY OF STATIONS

Station Location	Potentially Impacted Intersections	Estimated Increase in V/C [1]
Tyler/ Mission Rail Line	Tyler/Valley	0.10
Segment - N4		
Durfee/ Mission Rail Line	Durfee/Valley Durfee/Garvey I-10 ramps	0.04 0.04 0.04
Segment - S2-A		
Arizona/Whittier	Arizona/Whittier	0.04
Atlantic/Beverly	Pomona/3rd/Beverly/ Woods/Via Corona	Minimal Minimal
Garfield/Beverly	Via Corona/Garfield Beverly/Garfield	0.02 0.01
Montebello/Beverly	Montebello/Beverly	Minimal
Rosemead/Beverly	Rosemead/Beverly Rd. Rosemead/Beverly Bl.	0.01 0.02
Segment - S3		
Norwalk/Whittier	Norwalk/Whittier	0.04
Penn/Whittier	Penn/Whittier	0.01
Segment - S4-B		
Greenleaf/ Lambert Rail Line	Greenleaf/Putnam	0.03
Colima/ Lambert Rail Line	Colima/Lambert Colima/La Mirada	0.03 0.02

Note:

[1] Estimated Increase in V/C - Shows expected increase in intersection volume to capacity ratio as a result of LRT station activity. For the purposes of this study, a V/C increase of 0.03 or greater is considered a significant impact.

EXHIBIT 42
TRAFFIC IMPACTS AT STATION SITES

Station Location	Potentially Impacted Arterials	Potentially Impacted Intersections	Recommended Improvements	Other Issues
Segment - N1	(Union Station to Mission Drive via N. Main Street)			
Union Station	Alameda Street - minor increase in volume.	Alameda/Macy	None required	Parking demand may increase slightly; parking lot is sufficient to accomodate.
Main/Griffin	Main Street - minor increase in volume.	Main/Griffin	Consider parking prohibitions to accomodate left-turn lanes. Coordinate aerial LRT structure with bus loading.	Consider shuttle service between station and USC-County Medical Center.
Segment - N2-A	(Lincoln Park to SPTC RR Trench @ Mission/Palm via Mission/Huntington/Main/Palm)			
Huntington/Monterey	Huntington Drive Huntington Drive South Monterey Road	Huntington/Monterey Huntington S./Monterey	Develop one-way couplet system with Huntington Drive and Huntington Drive South. Additional signals may be required on Huntington Drive South to create an acceptable one-way circulation pattern.	Coordinate existing bus center with LRT platform to minimize pedestrian crossings.
Palm/Commonwealth	Palm Avenue Main Street	Palm/Commonwealth Main/Poplar	Grade separate the LRT tracks through the station area. Signalize Pepper/Raymond	Need good pedestrian connections between station and employment areas.
Segment - N2-B	(Lincoln Park to SPTC RR Trench @ Mission/Palm via Valley/SPTC RR Line)			
Eastern/ Alhambra Rail Line	Valley Boulevard Eastern Avenue	Valley/Eastern Valley/Alhambra	Provide additional turn capacity on southbound Eastern Avenue.	Coordinate Park-and-Ride access with Valley Boulevard turn requirements.

EXHIBIT 42 (Continued)
TRAFFIC IMPACTS AT STATION SITES

Station Location	Potentially Impacted Arterials	Potentially Impacted Intersections	Recommended Improvements	Other Issues
Fremont/ Alhambra Rail Line	Fremont Avenue Mission Road	Fremont/Mission	Widen overpass to accommodate pedestrians and buses.	Locate Park-and-Ride access off Meridian Avenue. Provide pedestrian connections between Park-and-Ride and station.
Segment - N3	(Palm/Mission to Santa Anita via SPTC RR Right-of-Way)			
Atlantic/ Mission Rail Line	Atlantic Boulevard	Atlantic/Mission Front/Mission	Widen overpass to accommodate buses and pedestrians.	Access Park-and-Ride lot on Front Avenue.
Garfield/ Mission Rail Line	Garfield Avenue	Garfield/Mission Garfield/Park	Widen overpass to accommodate buses and pedestrians. Signalize Garfield/Park.	Access Park-and-Ride lot on Park Avenue.
Ramona/ Mission Rail Line	Ramona Street Mission Road	Ramona/Mission Ramona/Junipero Serra Mission/Junipero Serra	Widen Ramona to accommodate buses and pedestrians.	Coordinate with city-planned improvements in the San Gabriel Mission area. Coordinate pedestrians connection with city-sponsored Park-and-Ride lot.
San Gabriel/ Mission Rail Line	San Gabriel Boulevard	San Gabriel/Mission	Signalize E. Angeleno/San Gabriel to allow pedestrian crossings of San Gabriel Bl. Provide bus bays on south side of San Gabriel Boulevard.	
Encinita/ Mission Rail Line	Lower Asuza Road Encinita Avenue	Lower Asuza/Encinita	Provide left-turn lane capacity on Encinita Ave.	Locate access of Park-and-Ride lot away from Lower Asuza/Encinita.

EXHIBIT 42 (Continued)
TRAFFIC IMPACTS AT STATION SITES

Station Location	Potentially Impacted Arterials	Potentially Impacted Intersections	Recommended Improvements	Other Issues
Baldwin/ Mission Rail Line	Baldwin Avenue	Baldwin/Bessie Baldwin/Valley	Improve signal and geometrics at Baldwin/Bessie. Coordinate signal timing with LRT on Baldwin Avenue. Extend Bessie Avenue to serve Park-and-Ride	Orient Park-and-Ride access to Bessie Avenue. May need to extend Bessie Avenue to connect to Park-and-Ride lot.
Tyler/ Mission Rail Line	Tyler Avenue	Tyler/Valley	Provide pedestrian coordination with Metro Link Station.	
Segment - N4	(Santa Anita Ave. to San Gabriel River via SPTC RR Right-of-Way)			
Durfee/ Mission Rail Line	Durfee Avenue Valley Boulevard Garvey Avenue	Durfee/Valley Durfee/Garvey I-10 ramps	Widen to increase southbound left-turn and northbound right-turn capacities at Durfee/Garvey.	Locate Park-and-Ride access points away from signals.
Segment - S1	(Downtown Los Angeles to Atlantic/Beverly via 3rd and 4th Streets)			
Soto/4th	4th Street	Soto/4th		
Indiana/4th	Indiana Street 4th Street 3rd Street	Indiana/4th	Widen Indiana to provide left-turn lanes.	
Eastern/3rd	Eastern Avenue 3rd Street	Eastern/3rd		Severe ROW constraints at this intersection.
Segment - S2-A	(Whittier/Arizona Metro Red Line Station to San Gabriel River via Beverly Blvd)			
Atlantic/Beverly	Beverly Boulevard Atlantic Boulevard 3rd Street Pomona Boulevard	Pomona/3rd/Beverly/ Woods/Via Corona	Restrict some turn movements at the 5-leg intersection.	

EXHIBIT 42 (Continued)
TRAFFIC IMPACTS AT STATION SITES

Station Location	Potentially Impacted Arterials	Potentially Impacted Intersections	Recommended Improvements	Other Issues
Garfield/Beverly	Garfield Avenue Beverly Boulevard Via Corona	Via Corona/Garfield Beverly/Garfield	Signalize Via Corona/Garfield	Potential neighborhood impact to the east along Via Corona.
Montebello/Beverly	Montebello Boulevard Beverly Boulevard	Montebello/Beverly	Provide dual left-turn lanes on Montebello Boulevard.	
Rosemead/Beverly	Rosemead Boulevard Beverly Boulevard	Rosemead/Beverly Rd. Rosemead/Beverly Bl.		Provide pedestrian connection to Park-and-Ride location.
Segment - S2-B	(Whittier/Atlantic Metro Red Line Station to San Gabriel River via Whittier Blvd)			
Atlantic/Repetto	3rd Street 4th Street Atlantic Boulevard Beverly Boulevard Repetto Street	Beverly/Atlantic 4th/Atlantic Atlantic/Repetto Pomona/3rd/Beverly/ Woods/Via Corona	Restrict some turn movements at the 5-leg intersection. Requires traffic signal to control eastbound Beverly traffic and southbound Atlantic traffic to allow train to cross. Provide signal coordination at Beverly/ Atlantic.	Potential neighborhood intrusion along 4th Street and Repetto Street.
Goodrich/Whittier	Whittier Boulevard Atlantic Boulevard Goodrich Boulevard	Goodrich/Whittier Atlantic/Whittier	Signals needed to control northbound Atlantic and westbound Whittier traffic to allow train to cross. Relocate crosswalk to east side of Whittier Boulevard at Whittier/Goodrich.	
Garfield/Whittier	Garfield Avenue Whittier Boulevard	Garfield/Whittier		

EXHIBIT 42 (Continued)
TRAFFIC IMPACTS AT STATION SITES

Station Location	Potentially Impacted Arterials	Potentially Impacted Intersections	Recommended Improvements	Other Issues
Montebello/Whittier	Whittier Boulevard Montebello Boulevard	Montebello/Whittier	Adjust left-turn lanes on Montebello Boulevard to coordinate with Park-and-Ride access.	
Rosemead/Whittier	Whittier Boulevard Rosemead Boulevard	Rosemead/Whittier	Provide dual left-turn lanes on Rosemead Boulevard at Rosemead/Whittier.	
Segment - S3	(San Gabriel River to Five Points via Whittier Blvd)			
Norwalk/Whittier	Norwalk Boulevard Whittier Boulevard	Norwalk/Whittier	Widen Norwalk Boulevard for left-turn lanes.	Coordinate pedestrian connection to Park-and-Ride lot.
Penn/Whittier	Whittier Boulevard	Penn/Whittier	Signalize Penn/Whittier. Extend Penn St to connect with Park-and-Ride.	Coordinate Park-and-Ride access with intersection signal.
Segment - S4-A	(Five Points to Santa Gertrudes via Whittier Blvd)			
Painter/Whittier	Whittier Boulevard	Whittier/Central	Orient Park-and-Ride access to Central Avenue. Widening south leg of Central.	Coordinate with shopping center access.
Cole/Whittier	Whittier Boulevard Cole Road Colima Road	Cole/Whittier Colima/Whitter	Signalize Cole/Whittier. Coordinate signals at Colima/Whittier and Cole/Whittier. Provide pedestrian crosswalks to Park-and-Ride lots.	
Santa Gertrudes/ Whittier	Whittier Boulevard Santa Gertrudes Avenue	Santa Gertrudes/Whittier	Widen south leg of Santa Gertrudes (access for shopping center).	Coordinate with Whitwood Mall access.

EXHIBIT 42 (Continued)
TRAFFIC IMPACTS AT STATION SITES

Station Location	Potentially Impacted Arterials	Potentially Impacted Intersections	Recommended Improvements	Other Issues
Segment - S4-B	(Five Points to Colima Road via UPRR Lambert Rail Line Right-of-Way)			
Greenleaf/ Lambert Rail Line	Greenleaf Avenue	Greenleaf/Putnam	Signalize Greenleaf/Putnam. Coordinate Park-and-Ride access with new signal. Add bus bays to Greenleaf Ave.	
Colima/ Lambert Rail Line	Colima Road Lambert Road La Mirada Boulevard	Colima/Lambert Colima/La Mirada	Widen Colima adjacent to Park-and-Ride lot. Provide dual left-turn lanes at Lambert.	Restrict access from Park-and-Ride lot as right-turn in and right-turn out only.

North Line:	Atlantic/Front Baldwin/Valley Tyler/Valley Durfee/Valley Durfee/I-10 Ramps
South Line:	Arizona/Whittier

The DEIR work for the Route 10/60 Corridor should concentrate on these intersections with detailed traffic counts and operational analyses.

4.5.3 At-Grade Crossing Operational Impacts

At-grade crossings of rail across automobile/bus/truck/pedestrian traffic produce two potential problems: safety and capacity. These same concerns surface when light rail operates at-grade in mixed traffic.

From a capacity standpoint, studies of light rail transit crossings in Los Angeles County have shown that the actual direct impacts caused by LRT crossings are minimal. LRT crossing gates are typically only down in the range of thirty to forty seconds per train crossing, as opposed to the three to five minutes that freight trains sometimes block an intersection. A typical traffic signal cycle in Los Angeles County is in the range of 60-90 seconds. Thus, if the LRT gates are down for 30-40 seconds, this would be approximately the same amount of time that motorists in Los Angeles typically wait for a red light. If properly coordinated with traffic signals, light rail crossings in midblock locations typically do not cause any noticeable traffic capacity loss or impact. Capacity losses are more noticeable when the LRT tracks cross a major intersection or, even worse, cross the intersection at an angle.

The most severe capacity impact is often felt by the LRT vehicle itself. At-grade, mixed flow in traffic generally results in a severe degradation of the performance of the light rail operation. The Metro Blue Line operation along Washington Boulevard in Los Angeles, for example, results in LRT operating speeds of less than 20 miles per hour.

The primary concern in terms of Los Angeles County experience with at-grade rail crossings comes in the area of traffic safety. Drivers along the Metro Blue Line have shown a tendency to drive around crossing gates that are down. This action has led to automobile/train accidents. Mid-block at-grade rail crossings are typically not a safety or capacity problem because the amount of time lost is equivalent to time lost due to nearby traffic signals. From a safety standpoint, the mid-block crossing can be controlled by constructing a barrier median in the center of the street. This median makes it much more difficult to drive around the down gates and therefore dramatically increases the effectiveness of these gates.

At-grade, in-street light rail operation down the center of the street can have both a safety and capacity impact at major intersections crossed by the LRT tracks. The safety of the location and the capacity of the street can be preserved by requiring the LRT vehicle to obey train signals that are closely coordinated with the intersection traffic signals. While varying degrees of priority can be given to the LRT vehicles, this type of operation generally results in slower train operation and therefore loss of LRT efficiency. Those locations where the LRT vehicle is required to turn at an intersection or cross diagonally across an intersection generally require that all four directions of the traffic be stopped while the LRT vehicle traverses the intersection. To the extent that all of the traffic vehicles can be stopped and controlled, the safety issues here are not significant. However, the traffic capacity impacts of this type of operation can be quite significant.

Exhibit 43 presents an inventory of the at-grade crossings along the various LRT segments. The crossings are classified as those that go through or are essentially at the intersection, those that are near enough to the intersections to affect operations, and those that are mid-block crossings. The more at-grade crossings at/through/near intersections, the greater the chance for capacity and/or safety problems.

Exhibit 44 shows a summary of the primary operating characteristics along each of the segments under study. Based on the operating characteristics and the level of street and pedestrian traffic, a predominant level of transit priority has been estimated. Finally, the last column of Exhibit 44 shows the resulting traffic impacts that would be caused by each segment's operating characteristics and transit priority strategies.

EXHIBIT 43
AT-GRADE CROSSING INVENTORY

Segment	Map No. [1]	Crossing Location	Type of Crossing	Estimated 1990 Two-Way ADT [2]	Estimated 2010 Two-Way ADT [2]
N-2A	4	Turquoise St	at/thru	NA	NA
		Esmeralda St	at/thru	NA	NA
		Topaz St	at/thru	NA	NA
		Monterey Rd	at/thru	35600	46800
		Collis Av	at/thru	NA	NA
	5	Eastern Av	at/thru	NA	NA
		Pueblo Av	at/thru	NA	NA
		Maycrest Av	at/thru	NA	NA
	6	Main St	at/thru	29050	32500
		Hamden Terrace	at/thru	NA	NA
		Fremont Ave	at/thru	32100	44100
		Elm St	at/thru	NA	NA
		Primrose Av	at/thru	NA	NA
		Cedar St	at/thru	NA	NA
		Orange St	at/thru	NA	NA
		Chestnut St	at/thru	NA	NA
N-2B	3A	Boca Av	at/thru	NA	NA
N-3	9	Mission Rd/Mission Dr/Junipero Serra Dr	near int.	NA	NA
		Del Mar Av	mid-block	14700	16650
	10	Walnut Grove Av	mid-block	NA	NA
		Encinita Av	mid-block	NA	NA
		Lower Azusa Rd	mid-block	NA	NA
	11	Temple City Bl	mid-block	NA	NA
		Baldwin Av/Bessie Av	near int.	39900	41800
		Arden Dr	mid-block	NA	NA
	12	Cypress Av	at/thru	NA	NA
S-2A	19	Beverly/Arizona	at/thru	NA	NA
		Atlantic Bl	at/thru	42450	48450
		Hillview Av	at/thru	NA	NA
		Margaret Av	at/thru	NA	NA
		Sadler Av	at/thru	NA	NA
		Gerhart Av	at/thru	NA	NA
		Bradshawe St	at/thru	NA	NA
		Hendricks St	at/thru	NA	NA
	20	Findlay Av	at/thru	NA	NA
		Via San Clemente	at/thru	NA	NA
		Garfield Av	at/thru	31050	42650
		Hay St	at/thru	NA	NA
		Concourse Av	at/thru	NA	NA
		Via Val Verde	at/thru	NA	NA
		Wilcox Av	at/thru	26200	37600
		21st St	at/thru	NA	NA
		20th St	at/thru	NA	NA
		19th St	at/thru	NA	NA
		18th St	at/thru	NA	NA
		Maple Av	at/thru	NA	NA
	21	Montebello Bl	at/thru	32700	50250
		7th St	at/thru	NA	NA
		6th St	at/thru	NA	NA
		4th St	at/thru	NA	NA
		1st St	at/thru	NA	NA
		Poplar Av	at/thru	NA	NA

EXHIBIT 43 (Continued)
AT-GRADE CROSSING INVENTORY

Segment	Map No. [1]	Crossing Location	Type of Crossing	Estimated 1990 Two-Way ADT [2]	Estimated 2010 Two-Way ADT [2]
S-2A	22	Paramount Bl	at/thru	17100	24350
		Los Torros Av	at/thru	NA	NA
		Rosemead Bl	at/thru	27500	47750
		Lindell Av	at/thru	NA	NA
		Deland Av	at/thru	NA	NA
	22	Durfee Av	at/thru	NA	NA
	23	I-605 SB Off-Ramp	at/thru	NA	NA
		Rockne Av	at/thru	NA	NA
S-3	28	Norwalk Bl	at/thru	13250	19700
		Broadway	at/thru	22000	29450
		Western Av	at/thru	NA	NA
		Hadley St	at/thru	NA	NA
	29	Pacific Pl	at/thru	NA	NA
		Washington Bl/Whittier Bl/Santa Fe Springs Rd	at/thru	19550	33500
		Greenleaf	mid-block	29250	42600
S-4B	33	Painter Av	mid-block	NA	NA
		Laurel Av	near int.	NA	NA
		Calmada Av	near int.	NA	NA
		Gunn Av	near int.	NA	NA
		Colima Rd	at/thru	43150	57450

Notes:

[1] Map No. - Refers to aerial photo number in Route 10/60 Corridor Preliminary Planning Study -- Alignment Configurations, June 1993.

[2] ADT - 24-hour Average Daily Traffic Volumes. Source: SCAG model forecasts for 1990 and 2010 conditions.

EXHIBIT 44
TRAFFIC IMPACTS BY SEGMENT

ROUTE SEGMENT	PRIMARY LRT OPERATING MODE	LRT PRIORITY TREATMENT [1]	TRAFFIC IMPACTS OF LRT
N 1	Aerial	Grade Separated	Low
N 2-A (West)	At Grade, In Street	LRT Priority / Traffic Signal	Low
N 2-A (East)	Palm-Aerial	Grade Separated	Low
N 2-B	In RR Trench	Grade Separated	Low
N 3 (West)	In RR Trench	Grade Separated	Low
N 3 (East)	At Grade, In RR ROW	LRT Priority	Low/Medium
N 4	At Grade, In RR ROW	LRT Priority	Low/Medium
S 2-A	At Grade, In Street	Traffic Signal	High
S 3	At Grade, In Street	LRT Priority/ Traffic Signal	Medium/High
S 4-B	At Grade, In RR ROW	LRT Priority	Low/Medium

Notes:

[1] - "Grade Separated" indicates sections where autos/trucks will not encounter an at-grade rail crossing.

"LRT Priority" indicates locations where the approach of an LRT vehicle will actuate a crossing arm or change the phase on a traffic signal independent of street traffic conditions.

"Traffic Signal" indicates sections where LRT approaches will be coordinated with intersection traffic signals and LRT vehicles will be given preference whenever possible. However, LRT vehicles may be delayed by signal phasing due to high volumes of traffic.

Since many of the segments along the north alignment will be aerial (Segment N-1 and the eastern portion of Segment N-2A) or in the existing railroad trench (Segment N-2B and the western portion of Segment N-3), there will be little traffic impact caused by the grade-separated operation. The eastern portion of Segment N-3 and Segment N-4 are characterized by mid-block crossings where the LRT operation can be given priority. In these segments, the traffic impacts caused by LRT operation, even under LRT priority operation would be low to medium.

In most of the segments in the south alignment, the LRT will operate at-grade and in the street. In Segments S-3 signalized intersections on minor streets essentially can be controlled through LRT priority. However, this segment has major streets crossing the LRT line. At these locations, the LRT vehicles will be subject to being stopped by the intersection traffic signals. While train priority strategies can be implemented, it is likely that the heavy volume of automobile/truck traffic through these major intersections will adversely affect LRT operations. Similarly, LRT operation in Segment S-2A will likely be controlled more by the operation of traffic signals than by LRT priority. Therefore, medium to high traffic impacts can be expected in the south route due to the impacts of at-grade rail crossings.

4.5.4 Truck Impacts

Truck and LRT operations are difficult to mix because trucks need so much room to maneuver around corners, in and out of loading docks, etc. Therefore, LRT alignments through industrial areas need special reviews. Three major industrial areas are traversed by the alignments under study. Main Street near the Los Angeles River (Segment N-1) services the Southern Pacific Piggyback Yards. The Eastern/Valley/Marianna crossing is not only a complex intersection, but it also processes a large number of trucks. Finally, Palm Avenue from Main Street to Mission Road serves a major light industrial area with significant truck activity.

All three of these sections have been recommended for aerial light rail treatment so that the LRT will be grade separated from the truck movements. After grade separation, the Main Street area and the Eastern/Valley/Marianna locations would be fully mitigated. The trucks would have no impact on the LRT operation, and, because these locations primarily involve simple rail flyovers over cross streets, the LRT structures would have little or no impacts on truck operations.

The impact of the LRT/truck conflict through the Palm Avenue industrial area in Alhambra is not quite so clear cut. The recommended elevated LRT grade separation will certainly remove any potential impacts of the trucks on the LRT operations. However, the construction of the elevated LRT tracks will result in columns being placed in the center or along one side of Palm Avenue. These columns could have an impact on the operation of the industrial park because they may limit truck access to certain parcels and columns may block access to existing loading docks. The design of the elevated structure along Palm Avenue should carefully consider the truck maneuvering requirements in this industrial park.

4.5.5 Traffic Mitigation Measures

The recommended mitigation measures to accommodate the traffic impacts of the LRT operations are listed in the fourth column of Exhibit 42. The predominant mitigation measure involves the installation of new traffic signals or the coordination/interconnection of existing signals. These new signals have been recommended primarily as a means to provide adequate access to park-and-ride lots or adequate pedestrian safety to station platform locations. The next most frequent mitigation measure called for the provision of dual or single left turn lanes -- again primarily to serve traffic destined for stations.

4.6 CAPITAL, OPERATING AND MAINTENANCE COSTS

4.6.1 Capital Costs

The unit costs for construction and equipment of light rail transit for the Route 10/60 Corridor Study were derived from actual construction costs of the Metro Blue Line (Long Beach to Los Angeles), the Generic Unit Cost Guide of the Rail Construction Corporation (RCC), and other light rail projects. The contingency and add-on costs are consistent with the RCC's guidelines.

Exhibit 45 shows the results of the cost estimates for the three routes under consideration. The costs range from $798 million to over $1 billion, and the average cost per mile ranges from $60.4 million to $64.8 million per mile if the cost for maintenance yard is included. Without including

Exhibit 45
Cost Estimate Summary
Route 10/60 Corridor Study

Corridor	Length (miles)	Including Cost for Maint. Yard		Excluding Cost for Maint. Yard	
		Total Cost (1) ($million)	Cost/Mile ($million)	Total Cost (1) ($million)	Cost/Mile ($million)
North Corridor					
w/ Segment N-2A	16.74	$1,011 (2)	$60.4	$968 (2)	$57.8
w/ Segment N-2B	15.36	$952 (3)	$62.0	$910 (3)	$59.2
South Corridor	12.31	$798	$64.8	$751	$61.0

Notes:
(1) Estimated Costs in 1993 Dollars.
(2) Estimated costs would be approximately $147 million less if freight operations were removed.
(3) Estimated costs would be approximately $206 million less if freight operations were removed.

the cost for maintenance yard, the costs would decrease and range from $751 million to $968 million.

Detailed breakdowns of the cost estimates are presented in Exhibits 46-48. The Exhibits show that the northern routes have a comparatively small amount of budget allocated to right-of-way. However, the reconstruction of the trench in the northern alignments adds to the cost of these two routes.

The most expensive part of the southern route is the acquisition of right-of-way. Even assuming that a total of 25% of the right-of-way costs can be recovered by selling excess right-of-way back on the private market, the right-of-way costs for the southern alignment still total over $205 million dollars.

Construction costs for the North Lines would be substantially less if freight operations were removed from the SPTC line. Without freight operations, no reconstruction of the existing railroad trench would be required and the cost of the North Line with Segment N-2A and N-2B would be $864 and $746 million, respectively.

Guideway Construction

The predominant type of construction for the North Line is at grade on railroad right of way. Through the City of Alhambra the railroad is located in a trench section which would require reconstruction to allow for the both light rail transit and freight operations. Also, the first segment of the North Line would be constructed as aerial guideway to avoid unacceptable traffic impacts on Main Street in the City of Los Angeles.

The South Line would be constructed primarily at-grade,and in an in-street right of way with the exception of one segment which is aligned in the UPRR right of way north of Lambert Road.

The main cost items for each type of guideway construction are listed below.

At-grade in Railroad Right of Way

Excavation and haulaway
Compacted base

EXHIBIT 46

10/60 CORRIDOR 17-Jun-93

COST ESTIMATE SUMMARY

NORTH CORRIDOR W/SEGMENT 2A

(Union Station to San Gabriel River – via Mission/Huntington/Main/Palm & SPTC)

	DESCRIPTION	UNIT COST*	UNIT	AMOUNT	TOTAL COST*
	Guideway @ grade (RR)	$5.46	mile	7.95	$43.41
	Guideway @ grade (in street)	$8.87	mile	3.57	$31.67
	Guideway Sub-grade (in RR trench)	$57.37	mile	1.69	$96.96
	Aerial guideway	$22.64	mile	2.94	$66.55
	Bridges	$25.87	mile	0.59	$15.26
1	GUIDEWAY COST			16.74	$253.84
	At grade stations (RR)	$2.25	each	4	$9.00
	At grade stations (st. median)	$2.25	each	1	$2.25
	Stations (elevated or in trench)	$6.50	each	6	$39.00
	Parking spaces	$0.00	each	1750	$3.50
2	STATION COST				$53.75
3	YARDS & SHOPS	$26.00	each	1	$26.00
4	VEHICLE COST	$2.40	each	24	$57.60
	Trackwork	$2.22	mile	16.74	$37.21
	Train Control (sta.)	$0.16	sta.	11	$1.76
	Train Control (line)	$2.64	mile	16.74	$44.19
	Traction Power (sta.)	$1.10	sta.	11	$12.10
	Traction Power (line)	$1.43	mile	16.74	$23.87
	Communications	$1.06	mile	16.74	$17.68
	Fare Collection	$0.25	sta.	11	$2.75
	Signs & Graphics	$0.10	sta.	11	$1.10
5	EQUIPMENT COST				$140.67
	Bridge Reconstruction:	$0.50	LS	7	$3.50
6	RECONSTRUCTION COST				$3.50
	Utility Relocation	(segments 1 & 2A only)			$9.53
A	*SUBTOTAL FACILITIES & EQUIPMENT*				*$541.38*
7	Testing & Pre-operations	2.5%	x(A)		$13.53
8	Insurance	8.0%	x(A)		$43.31
9	Master Agreements	2.5%	x(A)		$13.53
B	*SUBTOTAL TEST, INSUR. & AGRMTS:*				*$70.38*
	Total Property Cost **		LS	$86.04	
	Acquisition Cost & Contingency	30.0%		$25.81	
	Railroad R/W Purchase or Lease	$1.00	mile	8.75	$8.75
C	*SUBTOTAL RIGHT-OF-WAY COST*				*$120.60*
10	Art for Transit	1.0%	x(A)		$5.41
11	Contingency/Project Reserve	11.0%	x(A+B)		$67.29
12	Professional Services	34.0%	x(A)		$184.07
13	Prof. Services Contingency	10.0%	x(12)		$18.41
	SEGMENT CAPITAL COST				*$1,011.05*

** Costs are in millions of dollars.*

*** Property costs are net values assuming 25% cost recovery for excess property.*

EXHIBIT 47
10/60 CORRIDOR
COST ESTIMATE SUMMARY
NORTH CORRIDOR W/SEGMENT 2B
(Union Station to San Gabriel River – via SPTC)

17-Jun-93

	DESCRIPTION	UNIT COST*	UNIT	AMOUNT	TOTAL COST*
	Guideway @ grade (RR)	$5.46	mile	9.93	$54.22
	Guideway @ grade (in street)	$8.87	mile		$0.00
	Guideway Sub-grade (in RR trench)	$57.37	mile	2.39	$137.11
	Aerial guideway	$22.64	mile	2.70	$61.11
	Bridges	$25.87	mile	0.34	$8.80
1	GUIDEWAY COST			15.36	$261.24
	At grade stations (RR)	$2.25	each	6	$13.50
	At grade stations (st. median)	$2.25	each		$0.00
	Stations (elevated or in trench)	$6.50	each	5	$32.50
	Parking spaces	$0.00	each	1750	$3.50
2	STATION COST				$49.50
3	YARDS & SHOPS COST	$26.00	each	1	$26.00
4	VEHICLE COST	$2.40	each	24	$57.60
	Trackwork	$2.22	mile	15.36	$34.15
	Train Control (sta.)	$0.16	sta.	11	$1.76
	Train Control (line)	$2.64	mile	15.36	$40.55
	Traction Power (sta.)	$1.10	sta.	11	$12.10
	Traction Power (line)	$1.43	mile	15.36	$21.90
	Communications	$1.06	mile	15.36	$16.22
	Fare Collection	$0.25	sta.	11	$2.75
	Signs & Graphics	$0.10	sta.	11	$1.10
5	EQUIPMENT COST				$130.53
	Bridge Reconstruction	$0.50	LS	8	$4.00
6	RECONSTRUCTION COST				$4.00
	Utility Relocation	(segment 1 only)			$3.78
A	*SUBTOTAL FACILITIES & EQUIPMENT*				*$528.65*
7	Testing & Pre-operations	2.5%	x(A)		$13.22
8	Insurance	8.0%	x(A)		$42.29
9	Master Agreements	2.5%	x(A)		$13.22
B	*SUBTOTAL TEST, INSUR. & AGRMTS:*				*$68.72*
	Total Property Cost **		LS	54.06	
	Acquisition Cost & Contingency	30.0%		16.218	
	Railroad R/W Purchase or Lease	$1.00	mile	12.56	$12.56
C	*SUBTOTAL RIGHT-OF-WAY COST*				*$82.84*
10	Art for Transit	1.0%	x(A)		$5.29
11	Contingency/Project Reserve	11.0%	x(A+B)		$65.71
12	Professional Services	34.0%	x(A)		$179.74
13	Prof. Services Contingency	10.0%	x(12)		$17.97
	SEGMENT CAPITAL COST				*$952.93*

** Costs are in millions of dollars.*
*** Property costs are net values assuming 25% cost recovery for excess property.*

EXHIBIT 48
10/60 CORRIDOR
COST ESTIMATE SUMMARY
SOUTH CORRIDOR TOTAL
(Metro Red Line Station Connection to Whittier/Colima)

17-Jun-93

	DESCRIPTION	UNIT COST*	UNIT	AMOUNT	TOTAL COST*
	Guideway @ grade (RR)	$5.46	mile	3.45	$18.84
	Guideway @ grade (in street)	$8.87	mile	8.36	$74.15
	Guideway @ grade (in RR trench)	$57.37	mile		$0.00
	Aerial guideway	$22.64	mile	0.21	$4.75
	Bridges	$25.87	mile	0.29	$7.50
1	GUIDEWAY COST			12.31	$105.25
	At grade stations (RR)	$2.25	each	2	$4.50
	At grade stations (st. median)	$2.25	each	7	$15.75
	Stations (elevated or in trench)	$6.50	each		$0.00
	Parking spaces	$0.00	each	2176	$4.35
2	STATION COST				$24.60
3	YARDS & SHOPS	$26.00	each	1	$26.00
4	VEHICLE COST	$2.40	each	21	$50.40
	Trackwork	$2.22	mile	12.31	$27.37
	Train Control (sta.)	$0.16	sta.	9	$1.44
	Train Control (line)	$2.64	mile	12.31	$32.50
	Traction Power (sta.)	$1.10	sta.	9	$9.90
	Traction Power (line)	$1.43	mile	12.31	$17.55
	Communications	$1.06	mile	12.31	$13.00
	Fare Collection	$0.25	sta.	9	$2.25
	Signs & Graphics	$0.10	sta.	9	$0.90
5	EQUIPMENT COST				$104.91
	Bridge Reconstruction:		LS	11.56	
	R/W & Traffic Contingency	50.0%		5.78	
6	RECONSTRUCTION TOTAL				$17.34
	Utility Relocation	5.0%	x(1+2+3+6)		$17.32
A	*SUBTOTAL FACILITIES & EQUIPMENT*				*$328.47*
6	Testing & Pre-operations	2.5%	x(A)		$8.21
7	Insurance	8.0%	x(A)		$26.28
8	Master Agreements	2.5%	x(A)		$8.21
B	*SUBTOTAL TEST, INSUR. & AGRMTS:*				*$42.70*
	Total Property Cost **		LS	$205.07	
	Acquisition Cost & Contingency	25.0%		$51.27	
	Railroad R/W Purchase or Lease	$1.00	mile	3.15	$3.15
C	*SUBTOTAL RIGHT-OF-WAY COST*				*$259.49*
10	Art for Transit	1.0%	x(A)		$3.28
11	Contingency/Project Reserve	11.0%	x(A+B)		$40.83
12	Professional Services	34.0%	x(A)		$111.68
13	Prof. Services Contingency	10.0%	x(12)		$11.17
	SEGMENT CAPITAL COST				*$797.63*

** Costs are in millions of dollars.*

*** Property costs are net values assuming 25% cost recovery for excess property.*

Sub ballast
Drain rock
Filter fabric
Grade lines & level
OCS Pole foundations
8'-0" Steel picket fence
Duct bank
Temporary traffic control
Allowances
    sound walls
    retaining walls and fill
    street crossing
    turnouts and tail track
    landscaping
    At-grade pedestrian crossing

At-grade in Street

Demolition
Excavation and haulaway
Compacted base
Slab on grade
Crossing pads
Street construction
Replace sidewalks
Grade lines & level
OCS Pole foundations
Concrete barrier
Duct bank
Allowances
    sound walls
    temporary traffic control
    landscaping
    At-grade pedestrian crossing

Railroad Trench

Same items as at-grade in railroad right of way, and
Trench wall reconstruction (both sides)
    Removal of existing walls
    Excavation and haulaway
    Retaining walls (tieback w/piles)
    Railroad track relocation

Aerial Guideway

Foundations
Guideway
OCS Pole Foundations
Duct bank

Allowances
- sound walls
- landscaping
- temporary traffic control

The bridge sections are similar to aerial guideway; however, the unit costs are higher to account for potentially longer and higher spans.

Station Construction

The station costs vary from $2.25 to $6.5 million for at grade and elevated stations, respectively. The station located in the railroad trench along the North Line are assumed to be the same cost as the elevated station.

Yards and Shops

The cost of yards and shops for this study is $25 million per facility. This is less than the Blue Line's Del Amo facility ($30.4 million) because the Del Amo facility includes a heavy repair and paint shop which is not required in other LRT maintenance facilities in the Los Angeles County system.

Vehicle Costs

It is assumed that the vehicles will be a part of the LA Car procurement package, which is currently being developed by RCC. Based on discussions with RCC we assumed a unit cost of $2.4 million per vehicle.

Utility Relocation

A contingency factor was applied to sections of aerial guideway and guideway in street to account for potential utility conflicts which may arise from foundation construction and/or street reconstruction.

Right of Way

The right-of-way (R/W) costs are based on the unit costs used in the Eastside Corridor Alternatives Analysis for the extension of the Metro Red Line. These unit property costs were based on past sales, current properties for sale and surveys of local commercial and residential real estate brokers in the Eastside Corridor area. The Eastside Corridor consists of portions of East Los Angeles between Union Station on the west, Atlantic Boulevard on the east, Brooklyn Avenue on the North and Whittier Boulevard on the South. It is assumed for the purposes of this preliminary estimate that the average property values in this area are similar, in general, to the property values throughout the rest of the Route 10/60 Corridor.

A contingency factor of 25% was applied to the estimated property costs for each corridor alternative to account for acquisition costs, local variations in property values and the preliminary nature of this estimate.

For in-street operation, where additional R/W would be required for street widening, the R/W costs were estimated according to the depth of impact into street-front properties. To limit impacts the widening was assumed to take place on one side of the street only. Impacts of less than ten feet were assumed to only require store-front reconstruction and not purchase of the entire lot. Purchase of the entire street-front lot was assumed for impacts of ten feet or greater. In the latter case a cost recovery factor of 25% was assumed for property which had joint development or resale potential.

In segments where the light rail transit is aligned in the railroad right of way an additional cost of $1 million per mile was included to account for purchase or lease agreements for use of the right of way.

Professional Services and Contingencies

A factor of 34% was applied to all construction and equipment costs to estimate the cost of professional services throughout the design and construction of the corridor. The 34% factor was used according to the direction of RCC based on their experiences with development of the Blue Line.

A contingency allowance of 11% was applied to all construction and equipment costs and 10% was applied to the professional services according to RCC policy.

Quantities

Based on the engineering analysis at 1" = 200' scale, lengths of guideway segments were obtained according to type of construction (i.e., in street, in railroad right of way, aerial, etc.) and applied in the cost calculation. Most of the cost items including guideway, track and equipment are calculated on a per mile basis. For instance, segment N-2A has more length of guideway in aerial section than in trench section and the quantities reflect those proportions.

The costs associated with the construction of stations were calculated on a per station basis according to the station locations developed as part of this study. Parking quantities were based on preliminary site plans developed as part of this study. Vehicle quantities were based on the preliminary operating plans prepared as part of this study.

4.6.2 Operation and Maintenance Costs

The operations and maintenance costs for the North and South Line Alternatives were derived from the patronage forecast summaries and are based on the following operating parameters:

- The 10/60 line will operate on 6 minute headways during the peak hour.
- The line will operate seven days a week, initially for 20 hours per day on week days and 16 hours per day on weekends.
- The LRT operating cost in 1993 is $413 per car hour. This rate is based on the actual operating costs for the Metro Blue Line as calculated by the MTA. Thus, these cost estimates are based on actual local operating experience.

Exhibit 49 summarizes the operating costs for the North and South Line Alternatives. The costs shown are based on the running times and train parameters discussed above.

On the North Line Alternative 1, the annual operating and maintenance cost is estimated to be approximately $26,731,838. The cost per car mile on this alignment is about $13. These figures

EXHIBIT 49
OPERATING AND MAINTENANCE COSTS

North Alternative - 1				
Service Type	Daily Car Hours	Daily Cost	Annual Revenue Car Hours	Operating & Maintenance Annual Costs
Weekday	212	$87,556	53,848	$22,239,224
Sat/Sun/Holidays	98	$40,474	10,878	$4,492,614
			64,726	$26,731,838

Notes:
Cost per Train Hour = $413 (Blue Line Actual)
Cost per Car Mile = $12.78
Cost per Passenger = $2.55
Peak Vehicles = 20, Fleet Size = 24
Annual Passengers = 10,485,000
Weekdays = 254; Weekends = 111

North Alternative - 2				
Service Type	Daily Car Hours	Daily Cost	Annual Revenue Car Hours	Operating & Maintenance Annual Costs
Weekday	171	$70,623	43,434	$17,938,242
Sat/Sun/Holidays	80	$33,040	8,880	$3,667,440
			52,314	$21,605,682

Notes:
Cost per Train Hour = $413 (Blue Line Actual)
Cost per Car Mile = $10.33
Cost per Passenger = $2.29
Peak Vehicles = 16, Fleet Size = 20
Annual Passengers = 9,435,000
Weekdays = 254; Weekends = 111

South Alternative				
Service Type	Daily Car Hours	Daily Cost	Annual Revenue Car Hours	Operating & Maintenance Annual Costs
Weekday Peak	173	$71,449	43,942	$18,148,046
Sat/Sun/Holidays	82	$33,866	9,102	$3,759,126
			53,044	$21,907,172

Notes:
Cost per Train Hour = $413 (Blue Line Actual)
Cost per Car Mile = $10.47
Cost per Passenger = $5.18
Peak Vehicles = 18, Fleet Size = 22
Annual Passengers = 4,230,000
Weekdays = 254; Weekends = 111

Source: Parsons Brinckerhoff, July 1993

are based on an annual patronage of about 10,485,000 passengers and annual revenue car hours of about 65,000. On the North Line Alternative 2, the annual operating and maintenance cost is estimated to be approximately $21,605,682. The cost per car mile on this alignment is approximately $10. These figures are based on an annual patronage of about 9,435,000 passengers and annual revenue car hours of about 52,300. On the South Line, the annual operating and maintenance cost is estimated to be approximately $21,907,172. The cost per car mile on this alignment is about $10. These figures are based on an annual patronage of about 4,230,000 passengers and annual revenue car hours of about 53,000.

4.7 ENVIRONMENTAL ASSESSMENT

A detailed comparison of route segments in terms of their potential environmental impacts was conducted as a part of Task 2 of this Corridor study. This section of Chapter 4 presents the results of a comparison of route segments in terms of their potential environmental impacts. For ease of reference, all corridor segments evaluated during both Task and Task 3 are summarized here. Exhibits 50A-50D present the summary of the environmental assessment. The paragraphs below describe the summary table entries in terms of comparative impacts in the following categories:

- Sensitive Land Use Impacts
- Resource Impacts
- Air Quality
- Safety and Security
- Displacement
- Circulation
- Construction

4.7.1 Sensitive Land Use Impacts

Impacts to sensitive land use, natural and landscape resources, air quality, and safety and security were assessed to provide guidance to decision-makers regarding relative differences between project alternatives. The various route segments were designated as having high, moderate, low, or no impact, depending on the number of resources and receptors to be

EXHIBIT 50A
ENVIRONMENTAL ASSESSMENT SUMMARY
NORTH ALIGNMENT

ROUTE SEGMENT	DESCRIPTION	LENGTH (MILE)	SENSITIVE LAND USE IMPACTS (NOISE, VIBRATION, VISUAL)			RESOURCE IMPACTS			AIR QUALITY (H,M,L)	SAFETY & SECURITY (H,M,L)
			RESIDENTIAL		OTHER SENSITIVE LAND USE (H,M,L & DESCRIPTION)	NATURAL RESOURCES (H,M,L)	HISTORIC & CULTURAL (H,M,L)	OPEN SPACE (H,M,L)		
			ELEVATED SECTIONS (# MILE)	AT GRADE ADJ. TO RESIDENTIAL (# MILE)						
N 1	Main St. Aerial	2.40		0.04	NONE	LOW Crosses concrete-lined LA River	LOW	NONE	NONE	NONE
N 2-A	Mission Rd./ Huntington Dr./ Palm Av.	5.49	0.22	0.94	LOW Borders Lincoln Park; 2 elementary schools & residential areas in close vicinity	LOW Borders Lincoln Park	LOW	LOW Tree lined streets in some areas	LOW 1 elementary school	LOW Borders Lincoln Park, 2 elementary schools & residential areas
N 2-B	SPRR	4.11		0.41	LOW Borders Lincoln Park; residential areas & 1 church in close vicinity	LOW Borders Lincoln Park	LOW	NONE	NONE	LOW Borders Lincoln Park, & residential areas
N 3	SPRR Trench	7.00	0.17	1.68	MEDIUM 2 elementary schools, 1 HS, San Gabriel Mission, 1 hospital, & residential areas in close vicinity	NONE	LOW	LOW Borders Ahmanson Golf Course	HIGH 2 elementary schools, 1 HS, San Gabriel Mission & 1 Sanitarium	MEDIUM 3 elementary schools, 1 HS & residential areas
N 4	SPRR from Metrolink to I-605	1.72	0.49	0.17	LOW 1 elementary school & 1 HS in close vicinity	LOW Crosses concrete-lined San Gabriel River	LOW	NONE	LOW 1 elementary school & 1 HS	LOW 1 elementary school & 1 HS

EXHIBIT 50B
ENVIRONMENTAL ASSESSMENT SUMMARY
NORTH ALIGNMENT

ROUTE SEGMENT	DESCRIPTION	LENGTH (MILE)	DISPLACEMENT IMPACTS						CIRCULATION IMPACTS					CONSTRUCTION IMPACTS (H,M,L)
			R-O-W ACQUISITION			PARK & RIDE ACQUISITION								
			LAND USE	<10 FT (# MILE)	> 10 FT (# MILE)	# PARK & RIDE	LAND USE	SIZE (# AC.)	CURB PARKING LOSS IMPACTS (H,M,L)	PARK RIDE ADDED	MINOR ST LT TURN PROH.	NO. OF AT-GRADE MAJOR INT.	STATION IMPACTS (H,M,L)	
N 1	Main St. Aerial	2.40	COM. RES. IND.		0.80	NONE			NONE	0	0	0	LOW	HIGH
N 2-A	Mission Rd./ Huntington Dr./ Palm Av.	5.49	COM. RES. IND.	 0.19	0.25 0.34 0.30	1	IND. COM. PUBLIC VACANT	1.83	HIGH: 2.54 MEDIUM: 1.97 LOW: 6.47	220	8	13	MEDIUM/ HIGH	MEDIUM
N 2-B	SPRR	4.11	COM. RES. IND.	 0.07		2	IND. COM. PUBLIC VACANT	2.66	NONE	330	0	3	MEDIUM	LOW
N 3	SPRR Trench	7.00	COM. RES. IND.	 0.09	 0.15	4	IND. COM. PUBLIC VACANT	1.83 0.82 2.02 2.73	NONE	880	0	16	LOW/ MEDIUM	HIGH(TRENCH) LOW
N 4	SPRR from Metrolink to I-605	1.72	COM. RES. IND.	 0.08	 0.66	1	IND. COM. PUBLIC VACANT	 5.22	NONE	650	0	2	MEDIUM	LOW

EXHIBIT 50C
ENVIRONMENTAL ASSESSMENT SUMMARY
SOUTH ALIGNMENT

ROUTE SEGMENT	DESCRIPTION	LENGTH (MILE)	SENSITIVE LAND USE IMPACTS (NOISE, VIBRATION, VISUAL)			RESOURCE IMPACTS			AIR QUALITY (H,M,L)	SAFETY & SECURITY (H,M,L)
			RESIDENTIAL		OTHER SENSITIVE LAND USE (H,M,L & DESCRIPTION)	NATURAL RESOURCES (H,M,L)	HISTORIC & CULTURAL (H,M,L)	OPEN SPACE (H,M,L)		
			ELEVATED SECTIONS (# MILE)	AT GRADE ADJ. TO RESIDENTIAL (# MILE)						
S 1	Third/Fourth St.	4.99		1.91	HIGH 5 elementary schools, 2 JHS, 2 HS, 2 Rec. Centers, 2 parks, 1 home for aged, & 1 church in close vicinity	MEDIUM Borders 1 river; 2 parks in close vicinity	HIGH	LOW 2 cemeteries in close vicinity	HIGH 2 elementary schools, 1 JHS & 2 HS	HIGH 5 elementary schools, 2JHS, 2 HS & 1 Rec. Ctr.
S 2-A	Beverly Bl.	6.13		1.19	HIGH 1 elementary school, 2 JHS, 3 parks, 1 hospital, 3 churches, & 1 mortuary in close vicinity	MEDIUM Borders 2 river; 2 parks in close vicinity	LOW	LOW Grounds of mortuary in close vicinity	NONE	HIGH 2 JHS
S 2-B	Atlantic/Whittier Bl.	6.59		0.06	HIGH 2 elementary schools, 1 JHS, 1 HS, & 3 parks in close vicinity	MEDIUM Borders 2 river; 2 parks in close vicinity	MEDIUM	NONE	LOW 1 elementary school & 2 HS	HIGH 2 elementary schools, 1 JHS, 3HS & 2 parks
S 3	Whittier Bl.	2.01		0.47	HIGH 1 elementary school, 1 HS, 2 parks, & 1 hospital in close vicinity	LOW Borders 2 parks	LOW	NONE	LOW 1 elementary school	MEDIUM 1 elementary school, 1 HS, 1 park & 1 hospital
S 4-A	Whittier Bl.	3.32		0.39	HIGH 1 elementary school, 1 hospital, 1 mortuary, and residential areas in close vicinity	NONE	LOW	LOW Grounds of mortuary in close vicinity	LOW 1 hospital	MEDIUM 1 elementary school, 1 hospital & residential areas
S 4-B	Lambert Rd.	2.89	0.17	2.20	MEDIUM 2 elementary schools & residential areas in close vicinity	NONE	LOW	NONE	NONE	LOW 1 elementary school & residential areas

EXHIBIT 50D
ENVIRONMENTAL ASSESSMENT SUMMARY
SOUTH ALIGNMENT

ROUTE SEGMENT	DESCRIPTION	LENGTH (MILE)	DISPLACEMENT IMPACTS						CIRCULATION IMPACTS					CONSTRUCTION IMPACTS (H,M,L)
			R-O-W ACQUISITION			PARK & RIDE ACQUISITION			CURB PARKING LOSS IMPACTS (H,M,L)	PARK RIDE ADDED	MINOR ST LT TURN PROH.	NO. OF AT-GRADE MAJOR INT.	STATION IMPACTS (H,M,L)	
			LAND USE	<10 FT (# MILE)	> 10 FT (# MILE)	# PARK & RIDE	LAND USE	SIZE (# AC.)						
S 1	Third/Fourth St.	4.99	COM. RES. IND.	0.45	1.82 1.34 0.53	NONE			HIGH: 3.06 MEDIUM: 2.31 LOW: 4.61	0	32	14	MEDIUM/ HIGH	HIGH
S 2-A	Beverly Bl.	6.13	COM. RES. IND.	0.05 0.02	1.94 0.37 0.10	2	IND. COM. PUBLIC VACANT	 0.73 1.41 0.45	HIGH: 2.57 MEDIUM: 1.54 LOW: 8.15	326	30	12	MEDIUM/ HIGH	MEDIUM
S 2-B	Atlantic/Whittier Bl.	6.59	COM. RES. IND.	0.72	3.53	1	IND. COM. PUBLIC VACANT	 0.52 0.40	HIGH: 5.35 MEDIUM: 1.61 LOW: 6.22	115	39	19	HIGH	MEDIUM
S 3	Whittier Bl.	2.01	COM. RES. IND.	0.12	0.93 0.06	2	IND. COM. PUBLIC VACANT	 2.31 10.05	HIGH: 0 MEDIUM: 0.77 LOW: 3.25	1530	6	7	MEDIUM	MEDIUM
S 4-A	Whittier Bl.	3.32	COM. RES. IND.		1.78	2	IND. COM. PUBLIC VACANT	 1.92 1.60	HIGH: 0 MEDIUM: 1.70 LOW: 4.93	440	8	9	MEDIUM/ HIGH	MEDIUM
S 4-B	Lambert Rd.	2.89	COM. RES. IND.	0.03 0.15	0.77 0.32	2	IND. COM. PUBLIC VACANT	 1.23 1.37	NONE	320	0	6	LOW	LOW

potentially impacted. Low impact segments had one or two affected sites. Moderate impact segments had three to four affected sites. High impact segments had five or more affected sites. Residential properties occurring along a segment were counted as a single receptor/resource. Similarly, streets lined with trees were considered a single receptor/resource.

United States Geological Survey (USGS) topographic maps and *Thomas Bros. Guide* road maps were reviewed and preliminary resources and receptors were identified. A field survey was conducted to verify these locations and to identify any locations not shown on the maps. Schools, parks, churches, hospitals, sanitariums, recreation centers, elderly homes, cemeteries, mortuaries, residential areas, historic sites, and other areas requiring peace and quiet, a safe environment, and/or good air quality were the types of land uses investigated for this analysis.

Residential

The light rail system will have potential impact to residential land uses in terms of noise, vibration, or visual impact. The amount of impact will vary depending on the proximity of adjacent residential uses and whether the light rail system is at-grade or in an elevated structure.

The northerly segments include a total of 3.2 miles of at-grade residential adjacency and .9 miles of elevated light rail residential adjacency. Segment N-4 includes .17 miles of adjacent light rail impacts and .5 miles of impacts from elevated rail. Segment N-3 includes 1.7 miles and .2 miles of impacts from adjacent and elevated light rail, respectively. Segment N-2A includes .9 miles of adjacent impacts. All other northerly segments include less than .5 miles of potential impact.

The southerly segments include a total of 6.2 miles of at-grade residential adjacency and .2 miles of elevated light rail sections. Three segments of the southerly route include at-grade impacts of over one mile. These are Segments S-4B (2.2 miles), S-1 (1.9 miles) and S-2A (1.2 miles). All other southerly segments include .5 miles or less of at-grade impacts.

Other Sensitive Land Uses

Sensitive land uses that abut the light rail track and stations were considered for the likelihood of being impacted by noise, vibration and visual intrusion. Stations proposed with park-and-ride

lots were assumed to generate higher levels of noise and vibration. Sites in close proximity, but not abutting the light rail track or stations, were also considered if the site was considered to be especially sensitive, e.g., schools and hospitals.

Exhibits 50A and 50C rank the segments according to how many sensitive land uses might be affected by LRT operation.

4.7.2 Resource Impacts

Natural Resource and Landscape/Open Space

Resource impacts were divided into two sub-categories: natural resources and landscape/open space. Resource impacts were identified as either bordering the track or being in the near vicinity. Natural resources consisted of river beds and designated recreation areas such as public parks. It was also noted if the river bed was in a natural state or lined with concrete. Landscape/open space resources identified were those features that did not fall into the natural resources category but were visually appealing--urban greenbelts such as tree lined streets, cemeteries, and golf courses.

Historic and Cultural

The potential impact of the light rail system to historic and cultural resources was determined by the potential right-of-way impact on existing or assumed historic and cultural resources. These impacts are shown in Exhibit 51. Also, the segments were evaluated as to how the light rail system might negatively conflict with the redevelopment or revitalization plans of local jurisdictions. The negative impact on resources and local plans was rated as high, medium or low depending on the number of resources impacted.

All of the northerly segments were rated as having low impact because of the absence of historic and cultural resources adjacent to the route segments and because the light rail system did not conflict with local redevelopment or revitalization plans. It should be noted, however, that a

EXHIBIT 51
HISTORIC & CULTURAL IMPACTS SUMMARY

ROUTE SEGMENT	DESCRIPTION	HISTORIC & CULTURAL IMPACTS (HIGH, MEDIUM, LOW)
N1	Main St. Aerial	LOW
N2-A	Mission Rd./Huntington Dr./ Palm Av.	LOW • ROW impact on Lincoln Park/Plaza de La Raza.
N2-B	SPRR	LOW
N3	SPRR Trench	LOW
N4	SPRR from Metrolink to I-605	LOW
S1	Third/Fourth St.	HIGH • ROW impact on historic residences, commercial buildings and church. • ROW impact on two cemeteries. • ROW impact on three parks. • Conflict with local plans to revitalize street and structures.
S2-A	Beverly Bl.	LOW • ROW impact to Pio Pico State Historic Park.
S2-B	Atlantic/Whittier Bl.	MEDIUM • Conflict with local plans to revitalize streetscape (L.A. County). • Conflict with local plans to revitalize commercial structures and streetscape (Montebello). • ROW impact to Pio Pico State Historic Park.
S3	Whittier Bl.	LOW • ROW impact on historic Ficus Tree.
S4-A	Whittier Bl.	LOW
S4-B	Lambert Rd.	LOW • ROW impact to one church.

portion of Segments N-2A and N-2B could require additional right-of-way at the Lincoln Park/Plaza De La Raza Center in Lincoln Heights.

The southerly route segments contained a mixture of low, medium and high ratings. Segments S-2A, S-3, S-4A and S-4B were rated as low. Right-of-way acquisition along these segments would impact a State Historic Park (S-2A), a historic ficus tree (S-3) and one church (S-4B).

Segment S-2B was rated as having medium impact. The right-of-way acquisition would conflict with plans by Los Angeles County to improve the street scape and with plans by the City of Montebello to revitalize the commercial structure along Whittier Boulevard. This segment would also impact Pio Pico State Historic Park due to additional right-of-way acquisition.

Segment S-1 was rated as having a high impact. A total of 3.7 miles right-of-way acquisition, which is over ten feet in depth, would negatively impact potentially historic residences and commercial structures in the Boyle Heights community. It would also impact three older parks, two older cemeteries, two elementary schools and a historic church. The potential impact would also negatively affect local plans to revitalize existing commercial and residential structures.

4.7.3 Air Quality Impacts

Air quality was evaluated by noting sensitive receptors close to light rail station locations. Hospitals, schools, a sanitarium, and the San Gabriel Mission were listed as sites that could be affected by poor air quality. The San Gabriel Mission was included in this category due to the deteriorating effects of vehicular emissions on older structures, and because the Mission has a variety of activities on-site, including a private education program.

4.7.4 Safety and Security Impacts

Safety and security issues were considered for sites near the light rail track. Resource and receptor sites that children may frequent were especially noted. These included schools, parks, hospitals, and residential areas.

4.7.5 Displacement Impacts

Right-Of-Way Acquisition

The route alternatives within the Route 10/60 Corridor will have varying degrees of impact on existing streets and adjacent land uses depending on the need for additional right-of-way acquisition. Some of the factors that necessitate the need for additional right-of-way include the following:

- Existing street right-of-way is less than 90 feet.
- Existing street right-of-way is less than 104 feet and there is a need to accommodate left-turn lanes where light rail stations are proposed.
- Additional right-of-way to accommodate appropriate turning radius for light rail system.
- Inability to use existing street or bridge crossings and a separate structure is required for the light rail system.

Segments of the northerly route requiring the greatest amount of right-of-way acquisition greater than ten feet include N-1 (.8 miles) and N-4 (.7 miles). Right-of-way acquisition on Segment N-2A would impact residential, commercial and industrial properties. Segment N-1 would impact only commercial properties and Segment N-4 would impact only industrial properties.

In contrast, all segments of the southerly routes have greater impacts caused by the need to acquire sections greater than ten feet in depth. The most significant impact is Segment S-1 requiring 3.7 miles of acquisition and impacting residential, commercial and industrial properties including several school and park facilities. Segment S-2B requires impacting 3.5 miles of commercial properties. Segment S-2A would impact 2.4 miles of residential, commercial and some industrial properties. Segments S-4A and S-3 would impact 1.8 miles and 1.0 miles of both commercial and residential properties.

Park-And-Ride Acquisition

Park-and-ride locations were selected to compliment proposed station locations and for convenient access to major bus transfer points and for potential ridership.

A total of eight park-and-ride facilities are proposed along the northerly route and nine facilities along the southerly route. The park-and-ride facilities vary in size and accommodate from 100 parking spaces to 1,500 spaces with the average at about 200 parking spaces.

All of the park-and-ride facilities require land acquisition in order to develop the park-and-ride facilities. In order to minimize the impact to existing land uses, many of the proposed locations include existing vacant land, vacant structures, or public-owned properties. None of the park-and-ride facilities require the acquisition of residential properties.

Park-and-ride facilities along the northerly segment would require 6.3 acres of industrial, .8 acres of commercial, 2 acres of public and 7.9 acres of vacant properties.

Park-and-ride facilities along the southerly segment would require 4.3 acres of commercial, 3.7 acres of public and 14 acres of vacant properties.

4.7.6 Circulation Impacts

Curb Parking Loss

The number of miles of high, medium, and low curb parking loss impacts were measured along each segment. High impact curb parking loss represents lost curb parking in business districts or residential areas that is highly utilized and difficult to replace. Medium curb parking loss impacts are categorized as a loss of curb parking spaces that are well utilized but sufficient off-street parking adjacent to the curbs already exist to accommodate the vehicles that now park along the curb. Low curb parking loss impacts occur along those street sections that have very light curb parking usage.

Exhibit 50B shows that only Segment N-2A has any significant curb parking loss impacts. The primary area of this loss is along Mission Road adjacent to Lincoln Park and along Palm Avenue in the City of Alhambra.

Exhibit 50 shows that Segments S-1, S-2A and S-2D all have significant amounts of high and medium curb parking loss impacts. These occur primarily in the business districts along 3rd/4th, Beverly and Whittier Boulevards.

Park-and-Ride Additions

Exhibits 50B and 50D show the amount of park-and-ride spaces that could be added to the various segments adjacent to proposed stations. In both the north and the south segments, no park-and-ride lots are added in the segments closest to downtown Los Angeles.

Minor Street Left-Turn Prohibitions

In-street light rail operations will likely result in minor side streets and median openings being closed in order to limit the number of at-grade rail crossings. This will result in a number of minor streets being changed to right-turn in and out only whereas in all likelihood they now have full access at the arterials. In addition, virtually all driveways in the corridors will be limited to right-turn in and out.

Exhibits 50B and 50D show the number of minor streets where left-turn and through movement access will be prohibited. Because of the predominance of rail corridor operation in the north segments, very few minor streets that have not already been closed will be affected by the development of a light rail transit line. Again, only minor intersections along Mission Road and Palm Avenue will likely be affected.

In the south segments however, 3rd/4th Street, Beverly Boulevard and Whittier Boulevard will all face significant revisions to existing side street and driveway access. Because of the large number of business districts located in these segments, commercial driveway access will also be dramatically changed from full accessibility to right-turns in and out only.

At-Grade Major Intersections

The number of at-grade major intersections that must be crossed by the LRT line indicates a potential for interference with LRT efficiency and a potential for safety problems. Two segments

of the north alignment (Segment N-2A and N-3) have an average of one at-grade crossing per one-half mile of distance.

Exhibit 50D shows that virtually all of the south segments, with the exception of S-2A, average three major intersection crossings per mile. This higher number of at-grade major intersection crossings will likely affect the potential operating speed along the south segments.

Station Impacts

The impacts of automobile, bus and pedestrian traffic around the various station areas have been rated as high, medium or low. A high impact ranking means that the combined activity around the station could potentially have a significant impact on the operation of the street and intersections in the vicinity of the station.

Circulation impacts on the northern route segments have been ranked as low or medium except those on Segment N-2A. All three stations along this segment have the potential to impact the operation of adjacent streets and intersections.

In the south sections, only Segment S-4B has been rated as having low circulation impacts. Other segments, primarily due to the at-grade, in-street station locations, have the potential to impact at least the major intersections adjacent to the stations.

4.7.7 Construction Impacts

Construction of a light rail transit line is expected to result in varying degrees of adverse environmental impacts. The criteria used to determine construction impacts were the predicted level of traffic disruption, reduced access, visual intrusion and business disruption. The construction impacts for the two routes are shown in Exhibit 52.

The potential construction impacts were qualitatively estimated based on the following factors:

- Type of light rail cross-section (aerial, at-grade);
- Location of alignment (in-street ROW, in-railroad ROW);

EXHIBIT 52
CONSTRUCTION IMPACTS ASSESSMENT

ROUTE SEGMENT	DESCRIPTION	CONSTRUCTION IMPACTS	TYPE OF CONSTRUCTION	MAJOR CONSTRAINTS
N1	Main St. Aerial	HIGH	Aerial	LA River crossing Aerial section on Main St.
N2-A	Mission Rd./Huntington Dr./Soto St. Palm Av./Main St. Palm Av./Mission Rd./SPRR Trench	HIGH HIGH HIGH	Aerial Aerial Street/Trench	Complicated grade-separated intersection. Aerial construction through business district. Transition from aerial to at-grade to trench.
N2-B	SPRR	LOW	Railroad	Railroad grade separations (2)
N3 N4	SPRR Trench	HIGH (Trench) LOW	Railroad	Railroad trench reconstruction Railroad relocation Grade separations (8) Reconstruct crossings (10)
S2-A	Beverly Bl.	MEDIUM	Street	Grade separations (2) Reconstruct crossings (3)
S3	Whittier Bl.	MEDIUM	Street	Grade separations (2)
S4-B	Lambert Rd.	LOW	Railroad	Grade separations (3)

- Type and intensity of adjacent land uses;
- Number and length of bridges required;
- Number of at-grade street crossings; and
- Number of existing facilities requiring reconstruction.

Based on these factors, the alternative segments were ranked from low to high construction impact on a relative scale. The predominant type of light rail cross-section and the major construction constraints are listed for each segment.

In general, construction of a light rail guideway in the street (aerial or at-grade) would result in a relatively high level of disruption due to the close proximity of potentially sensitive high intensity land use and interruption of traffic flows. Construction along existing railroad facilities would have relatively less impact due to less sensitive land uses and more space for construction activities. Reconstruction of existing facilities (e.g., freeway overpasses and trenched railroad lines) to accommodate light rail transit and construction of bridges over existing facilities (e.g., flood control channels, freeways) significantly increase the level of construction related disturbance, and would generally constitute a higher ranking of potential construction impacts.

Along the northern alignment, construction impacts have been rated as high in Segment N-1, N-2A and Segment N-3. Impacts in the N-1 segment have been rated high because of the difficulty of constructing the aerial portion of LRT tracks along Main Street. Segment N-2A is also considered to have high construction impacts due to the aerial construction through the business district and the transition from aerial to at-grade to trench operations. Construction impacts on Segment N-3 have been rated as high because a significant amount of work needs to be done to reconfigure the existing railroad trench. Not only will both walls have to be reconstructed but all of the arterial street overpasses over the existing trench will need to be completely reconstructed.

Along the south alignment, Segment S-1 has been rated as having high construction impacts because of the freeway crossings and because of the two large swales that will require elevated LRT guideways to be built in order to reduce the operating grades along this route segment.

4.7.8 Environmental Assessment Conclusion

The environmental impact assessment summarized in Exhibit 50 did not indicate any impacts that could not be reasonably mitigated except along Segment S-1, which was deleted from detailed study after Task 2 of the study. The high construction impacts coupled with the impacts on residential and other sensitive land uses and the historic and cultural impacts make this route segment a very difficult one to mitigate from a variety of environmental impacts standpoints.

Other impact areas to be considered include the loss of circulation and side street accessibility in Segments S-1, S-2A and S-2B. Curb parking loss impacts in these three segments will also have to be addressed in the design of any light rail transit in these segments.

V. COMPARATIVE EVALUATION

A comparison of the key evaluation factors is presented in Exhibit 53 and a brief summary of the major evaluation points follows.

5.1 DAILY PATRONAGE

The North Lines are projected to serve 31-35,000 passengers per day, assuming a transfer of patrons from parallel express bus service. The South Line, even with similar capture of express bus patronage, would attract 14,000 daily passengers.

The analysis clearly shows that either of the North Line alignments would attract more patronage than the South Line. Further, the analysis indicates that, within the level of accuracy of the patronage modelling process used in this study, the two North Lines would attract very similar patronage levels.

Patronage levels on the South Line could change dramatically from the projections stated in this report if the Metro Red Line Eastern Extension generates greater patronage demand than is now projected, or if the Orange County rail system intersects with the South Line at its eastern terminus. Thus, the patronage potential of the South Line should be reviewed after the Metro Red Line is in operation and/or after Orange County finalizes its rail corridor plan.

5.2 TRAFFIC, PARKING, AND STATION IMPACTS

The South Line would have fewer total stations and fewer stations with park-and-ride lots, but because of the availability of one large land parcel, the South Line actually has the potential to develop more park-and-ride spaces than could be developed along either of the North Line alignments.

EXHIBIT 53
COMPARATIVE EVALUATION OF ROUTE 10/60 ALIGNMENTS

Alignment	Distance (miles)	One-Way Travel Time (minutes)	Daily Potential Patronage (# of riders)	Station Types (# of Stations)				Park-and-Ride		Traffic Impacts			
				At-Grade On-Street	At-Grade Off-Street	Aerial/ Trench	Total	# Stations Served	# Spaces	# Impacted Intersections After Mitigation	# At-Grade Crossings	Medium or High On-Street Parking Impacts	
												# miles	% of Corridor
North Line (Mission/Huntington/Main/Palm)	16.74	30	35,000	0	6	6	12	6 [1]	1,750 [1]	5	25	4.5	14
North Line (SPTC RR Right-of-Way)	15.36	23	31,500	0	6	6	12	7 [1]	1,860 [1]	5	9	0	0
South Line	12.30	24	14,000	7	2	0	9	6	2,019	1	46	4.9	20

Note:
[1] Does not include park-and-ride spaces at Union Station, El Monte Metrolink Station, or downtown San Gabriel (Ramona Blvd) Station.

EXHIBIT 53 (Continued)
COMPARATIVE EVALUATION OF ROUTE 10/60 ALIGNMENTS

Alignment	Land Use Impacts					Cost ($ mil)		Cost Effectiveness		
	Residential Adjacency		# Sensitive Land Use Receptors	Significant Right-of-Way Impacts [2]		Construction	Annual Operation and Maintenance	Construction Cost per Mile ($ mil)	Operating & Maintenance Cost per Car Mile ($)	Total Cost per Passenger ($)
	# miles	% of Corridor		# miles	% of Corridor					
North Line (Mission/Huntington/Main/Palm)	2.83	18	10	2.50	16	1,011	26.7	60.4	12.78	2.55
North Line (SPTC RR Right-of-Way)	2.30	16	9	1.61	11	952	21.6	62.0	10.33	2.29
South Line	3.86	32	17	4.49	37	798	21.9	64.8	10.47	5.18

Note:
[2] Defined as right-of-way purchases greater than 10 feet in frontage depth.

The most significant difference between the alignments in this evaluation category comes in the area of traffic impacts. While Exhibit 53 shows that the South Line would have only one major intersection significantly impacted after LRT implementation (versus 5 on the North Line), the South Line would result in 7 at-grade, on-street stations (versus none for the North Line) and 46 at-grade intersections which would result in at-grade crossings or in minor street closures with the resulting traffic reroutings.

The South Line also has many more curb parking impacts than do either of the North Line alignments. A total of 20% of the lineal curb face along the South Line would experience curb parking loss in areas where it would be very difficult and costly to replace the parking. The North Line alignment along Mission/Huntington/Main/Palm would experience serious parking loss impacts along 14% of its curb face length, while the other North Line alignment would experience no serious parking impacts.

From traffic, parking, and right-of-way impact standpoints, the North Line alignment that stays along the SPRR rail alignment is better than the other two choices, and the South Line is the alternate with clearly the highest level of impacts.

5.3 LAND USE AND RIGHT-OF-WAY IMPACTS

The South Line would have almost one-third (32%) of its alignment adjacent to residential neighborhoods with the corresponding impacts on noise, vibration, visual impacts, and potential pedestrian safety (due to children playing near the tracks). By contrast, the North Line alignments have only about one-half of the impact of the South Line in this category.

The North Line alignments pass 9 or 10 sensitive land use receptors (schools, hospitals, parks, etc.) as compared to 17 for the South Line.

The South Line would have significant right-of-way impacts along 37% of its length as compared to 11% or 16% for the North Line alignments. A significant right-of-way impact is defined as a required purchase of frontage that would be more than ten feet in depth into the existing

properties. Given the built-up nature of the corridors under study here, this level of right-of-way impact virtually always required building purchase and demolition.

From the standpoint of land use and right-of-way impacts, either of the North Line alternatives had far less impacts than did the South Line, and again the two North Line alignments were similar in impact.

5.4 COST IMPLICATIONS

The South Line, as the shortest of the three alignments has the lowest total capital cost, but the highest cost per mile. On the basis of cost per mile, the three alignments are within 6% of each other, which at this level of analysis means that they are very similar.

Likewise, based on operating and maintenance costs per hour of train operation, the three alignments have similar O&M costs. However, when the cost analyses are compared to costs per passenger or other such effectiveness measures, the North Line alignments show a better return on the dollar invested.

5.5 PRINCIPAL CONCLUSIONS

The comparative analysis presented in Exhibit 53 reveals that:

1. From an engineering, system connectivity, operational, traffic impact, and patronage perspective, light rail transit seems to be feasible and supportable in either of the North Line alignments.

2. The North Line alignment that utilized the Mission/ Huntington/Main/Palm routing should be explored due to its potential to more directly serve the Alhambra business area and the major bus transfer point at Eastern Avenue. The North Line alignment that stays along the SPRR rail right-of-way also represents an acceptable alignment and it too should be pursued during subsequent design and environmental analyses.

3. Light rail transit along the South Line (Beverly/Whittier/Lambert) is an unlikely proposition in the near-term future. This conclusion is based primarily on the relatively low patronage projections, traffic and parking impacts, and right-of-way impacts.

4. The South Line patronage analysis should be revisited if the Metro Red Line patronage levels are higher than now expected and/or if Orange County selects a rail corridor that would connect to the Lambert/Colima station.

5.5.1 Future Design Issues

Both North Line alignments depend on the reconstruction of the SPRR rail trench and on the ability to share the at-grade SPRR right-of-way in other sections of the North Line. This study has worked with the SPRR design conditions, has met all the design issues presented by the Southern Pacific Transportation Company, and has included appropriate solutions in the cost estimates presented in this report. Nevertheless, the MTA does not now own or control the SPRR right-of-way along the North Line alignments. Freight activity on Southern Pacific's transcontinental Alhambra-Yuma mainline will continue to be heavy because SPTC has few other options since selling off their State Street Line/Baldwin Park Branch. In the event that pursuing the SPTC Alhambra Branch becomes infeasible, the Valley Boulevard route alignment should be re-introduced for further consideration.

The second future design issue that should receive further consideration involves the connectivity of the North Line to the remainder of the Los Angeles County system. The linkages to the other LRT lines and the service into Union Station should be continually reviewed as the Countywide rail system becomes more defined. Union Station platform capacity is limited and it may be more appropriate to join the North Line with the regional system at a different downtown station. Some of these options should become more clear after the Downtown Blue Line Connector Study selects route and station locations.

5.6 NEXT STEPS

The Study findings and conclusions described above will be presented to the Los Angeles County Metropolitan Transportation Authority Board for its consideration. The next step toward implementation of a light rail transit project would be the preparation of a Draft Environmental Impact Report (DEIR) for the desired alignment.