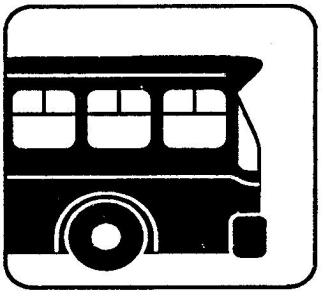
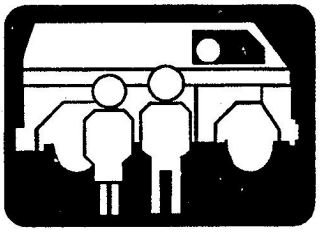








Exposition Right-of-Way Preliminary Planning Study

Final Report

Prepared for the
Los Angeles County Transportation Commission

Prepared by
BRW, Inc.

in Association with
KATZ, OKITSU & ASSOCIATES
DAVID EVANS & ASSOCIATES
ROSE & KINDEL

May 1992



LOS ANGELES COUNTY TRANSPORTATION COMMISSION

FINAL REPORT

EXPOSITION RIGHT-OF-WAY
PRELIMINARY PLANNING STUDY

Prepared for:

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

Prepared by:

BRW, Inc.
DAVID EVANS & ASSOCIATES
KATZ, OKITSU & ASSOCIATES
ROSE AND KINDEL

May 1992

MTA LIBRARY

Table of Contents

Chapter		Page
S.0	**Executive Summary**	S–1
S.1	Study Background and Purpose	S–1
S.2	Study Alternatives	S–4
S.3	Evaluation Steps and Criteria	S–6
S.4	Public Outreach	S–24
S.5	Recommended Alternatives for Additional Study	S–24
S.6	LACTC's Future Step	S–26
1.0	**Introduction and Recommendations**	1–1
1.1	Recommended Alternatives for Additional Study	1–2
1.2	LACTC's Future Steps	1–5
2.0	**Study Methodology**	2–1
2.1	Project Inception	2–1
2.2	Study Alternatives	2–3
2.3	Decision–Making Process	2–3
2.3.1	Overview	2–3
2.3.2	Guiding Principles	2–6
2.3.3	Initial Evaluation	2–6
2.3.4	Detailed Evaluation of Transportation Alternatives	2–6
2.3.5	Detailed Evaluation of Supplemental Uses	2–7
3.0	**Conceptual Definitions of Alternatives**	3–1
3.1	Conceptual Route Descriptions	3–1
3.2	Conceptual Modal Descriptions	3–4
3.3	Background and Existing Conditions	3–6
3.3.1	Freeway and Arterials	3–6
3.3.2	Transit Service	3–7
3.3.3	Corridor Land Use Inventory	3–8
3.3.4	Land Use Characteristics	3–8
3.3.5	Demographic Characteristics	3–11
3.3.6	Planned Development	3–13

4.0 Initial Screening of Alternatives 4–1
4.1 Identification of Critical Constraints 4–1
4.2 Initial Evaluation of Project Alternatives 4–7
4.3 Summary of Recommendations 4–13

5.0 Evaluation of Most Feasible Alternatives 5–1
5.1 Station, Stops and Access 5–1
5.1.1 Location and Configuration Criteria 5–2
5.1.2 Station Site Analysis 5–2
5.1.3 Routes and Potential Station Areas 5–10
5.2 Traffic Operations Analysis 5–13
5.2.1 Levels of Traffic Control 5–13
5.2.2 Locations of Traffic Analysis 5–14
5.2.3 Transit Operating Assumptions 5–14
5.2.4 Assessment of Transitway Operations 5–16
5.2.5 Summary By Mode 5–16
5.3 Travel Time Comparison 5–21
5.3.1 Assumptions 5–21
5.3.2 Travel Time Analysis 5–22
5.4 Operating Plans and Costs 5–24
5.4.1 Overview 5–24
5.4.2 Conceptual LRT Operating Plans 5–25
5.4.3 Transit Vehicle on Transitway 5–26
5.4.4 Trolley–bus on Exclusive Lanes 5–27
5.4.5 Summary of Plans and Costs 5–28
5.5 Capital Cost Estimates 5–28
5.5.1 Assumptions 5–29
5.5.2 Support Costs 5–29
5.5.3 Capital Cost Estimates 5–29
5.6 Links to Downtown Los Angeles and Santa Monica 5–29
5.6.1 Overview 5–31
5.6.2 Evaluation of Downtown Linkages 5–32
5.6.3 Vermont/Expo to LACBD 5–32
5.6.4 Cloverfield to Santa Monica CBD 5–34
5.6.5 Summary of CBD Linkages 5–37
5.7 Overview of Environmental Inventory 5–40
5.7.1 Corridor Overview 5–40
5.7.2 Conclusions 5–41
5.8 Detailed Screening Conclusions 5–57

6.0 Additional Considerations for Further Study 6–1
6.1 Summary of Supplemental Uses 6–1
6.2 Corridor Surplus Property 6–6
6.2.1 Assumptions 6–6
6.2.2 Surplus Property Identification 6–7
6.2.3 Feasibility of Sales or Leasing 6–7
6.3 Regional Linkages 6–9
6.3.1 Purpose of Linkages 6–9
6.3.2 Regional Linkages East/West 6–10
6.3.3 Summary 6–13
6.4 Staging Options 6–13
6.4.1 Planning Considerations 6–14
6.4.2 Staging Concepts 6–14

7.0 Public Suggestions 7–1
7.1 Responses to Public Suggestions for Additional Route or Mode Options 7–1

8.0 Acknowledgments 8–1

List of Tables

Table		Page
S-1	Summary of Modal Characteristics	S-3
S-2	Conceptual Station Site Analysis Table	S-9
S-3	Potential Traffic Control Actions	S-1
S-4	Corridor Travel Times	S-2
S-5	Summary of Modal Option Operating Costs	S-3
S-6	Conceptual Capital Cost Estimates	S-4
S-7	Summary of Potential Linkages	S-15
S-8	Sensitive Land Uses	S-16
2.1	Key Questions in Decision Making Process	2-5
3.1	Summary of Modal Characteristics	3-5
3.2	Demographic Statistics	3-14
3.3	Population Figures by Route	3-14
5.1	Conceptual Station Site Analysis Table	5-11
5.2	Potential Traffic Control Actions	5-20
5.3	Corridor Travel Times	5-23
5.4	Travel Time Summary	5-25
5.5	Summary of Operating Cost	5-28
5.6	Capital Cost Estimates	5.30
5.7	Summary of Downtown Linkages	5-39
5.8	Summary of Land Uses	5-42
6.1	Surplus Property	6-7

List of Figures

Figure		Page
S-1	Corridor Study Routes	S-4
S-2	Matrix of Initial Alternatives	S-5
S-3	Summary of Comparisons	S-23
1-1	Phases of Project Development	1-3
2-1	Corridor Study Area - Exposition Branch	2-2
2-2	Decision-Making Process	2-4
3-1	Corridor Study Routes	3-2
3-2	Initial Matrix	3-3
3-3	Study Segments	3-10
4-1	Initial Screening Results	4-8
5-1	Corridor Station Sites	5-3
5-2	Arterial LRT/Trolley-bus Stations	5-5
5-3	LRT Center Platform Layout	5-6
5-4a	Arterial Transitway Station (Farside)	5-7
5-4b	Arterial Transitway Station (Nearside)	5-8
5-5	Transit Center Station	5-9
5-6	Traffic Analysis Sites	5-15
5-7a	Assessment of Transitway Operation	5-17
5-7b	Assessment of Transitway Operation	5-18
5-8	Linkages to Los Angeles CBD	5-35
5-9	Linkages to Santa Monica CBD	5-38
5-10	Potential Impacts - A	5-49
5-11	Potential Impacts - B	5-50
5-12	Potential Impacts - C	5-51
5-13	Potential Impacts - D	5-52
5-14	Potential Impacts - E	5-53
5-15	Potential Impacts - F	5-54
5-16	Potential Impacts - G	5-55
5-17	Potential Impacts - H	5-56
5-18	Summary of Comparisons	5-59
5-19	Final Recommendations	5-60
6-1	Supplemental Uses: A	6-2
6-2	Supplemental Uses: B	6-3
6-3	Supplemental Uses: C	6-4
6-4	Supplemental Uses: D	6-5

List of Appendices

A Conceptual Descriptions of Exposition Corridor Study Routes

B Conceptual Descriptions of Exposition Corridor Study Modes

C Detailed Environmental Analysis

D Plan/Profile

E Public Outreach Report

1.0 Introduction and Study Findings

This document is the culmination of a study initiated by the Los Angeles County Transportation Commission (LACTC) to examine potential uses of the Exposition Railroad Right-of-Way. It is a preliminary planning study to examine ways in which the corridor can be used to improve regional transportation and is the first step towards a full Environmental Impact Report (EIR) of identified alternatives. The study was initiated by the LACTC in August, 1991, and was conducted by a consulting team of the following firms:

- ***BRW, Inc.*** – Engineering/Planning
- ***Katz, Okitzu & Associates*** – Traffic
- ***David Evans & Associates*** – Environmental
- ***Rose and Kindel*** – Public Outreach

The corridor, a 12 to 13-mile railroad right-of-way built in 1875 and used for rail transit into the mid-1950's as the Santa Monica Air Line, was purchased by the LACTC in 1990. The corridor was sold by the Southern Pacific Transportation Company (SP) as one element of a package of nearly 300 miles of railroad properties and operating rights throughout the region for $450 million. The Exposition Right-of-Way has been integrated into the LACTC's 30-Year Integrated Transportation Plan which covers the region with a funding scenario for many different types of transportation improvements by 2020.

In evaluating the mobility improvement potential in a transportation corridor, a body of information must be available to transit planners and public officials. The purpose of the Exposition Right-of-Way Preliminary Planning Study is to provide the initial indicators of transit development feasibility and cost-effectiveness to LACTC Commissioners and staff, local jurisdictions, interested agencies and the community.

Consistent with LACTC planning policies, this Preliminary Planning Study analyzes issues in several key areas, such as:

- Engineering feasibility of the alignment and modal options.
- Estimated capital costs, as well as operating and maintenance costs.
- Projected ridership and mobility improvement/congestion relief potential.
- Technology alternatives and service characteristics.
- Potential environmental and community concerns.
- Alternative and supplemental property uses.

Technical analyses of these topics were performed as part of the Study, with guidance and approval from LACTC staff and the Project Review Team (PRT), composed of approximately twenty representatives from interested agencies, organizations, and cities and transit operators along the Corridor.

As illustrated in Figure 1-1, the issuance of this Report is merely the first step in a potentially lengthy and complex development process. The Exposition Preliminary Planning Study was funded by LACTC and the City of Santa Monica. Technical advice was provided by SCRTD, LADOT, the Cities of Culver City, Santa Monica, and Los Angeles, and CALTRANS. Public participation was provided by hundreds of citizens, both in writing and at structured meetings in areas along the Corridor such as the Exposition Park Area, Crenshaw District, Culver City, Rancho Park, Venice and Santa Monica. Figure 1-1 shows the transit development process which the LACTC uses in developing major corridor projects.

This Report presents the numerous technical analyses prepared by the Project Team. The Report is designed to be useful to a spectrum of potential readers, and contains both text summaries and illustrations of key issues. The findings of the Study are presented in the next sections, along with potential future steps by LACTC.

1.1 RECOMMENDED ALTERNATIVES FOR ADDITIONAL STUDY

The Study covered sixteen potential alignment and mode alternatives. In addition, a number of suggestions were received from the public which were also reviewed. The evaluation and screening methodology were also reviewed by the Project Review Team representatives. Based on this process, the following options are recommended for further study in an EIR.

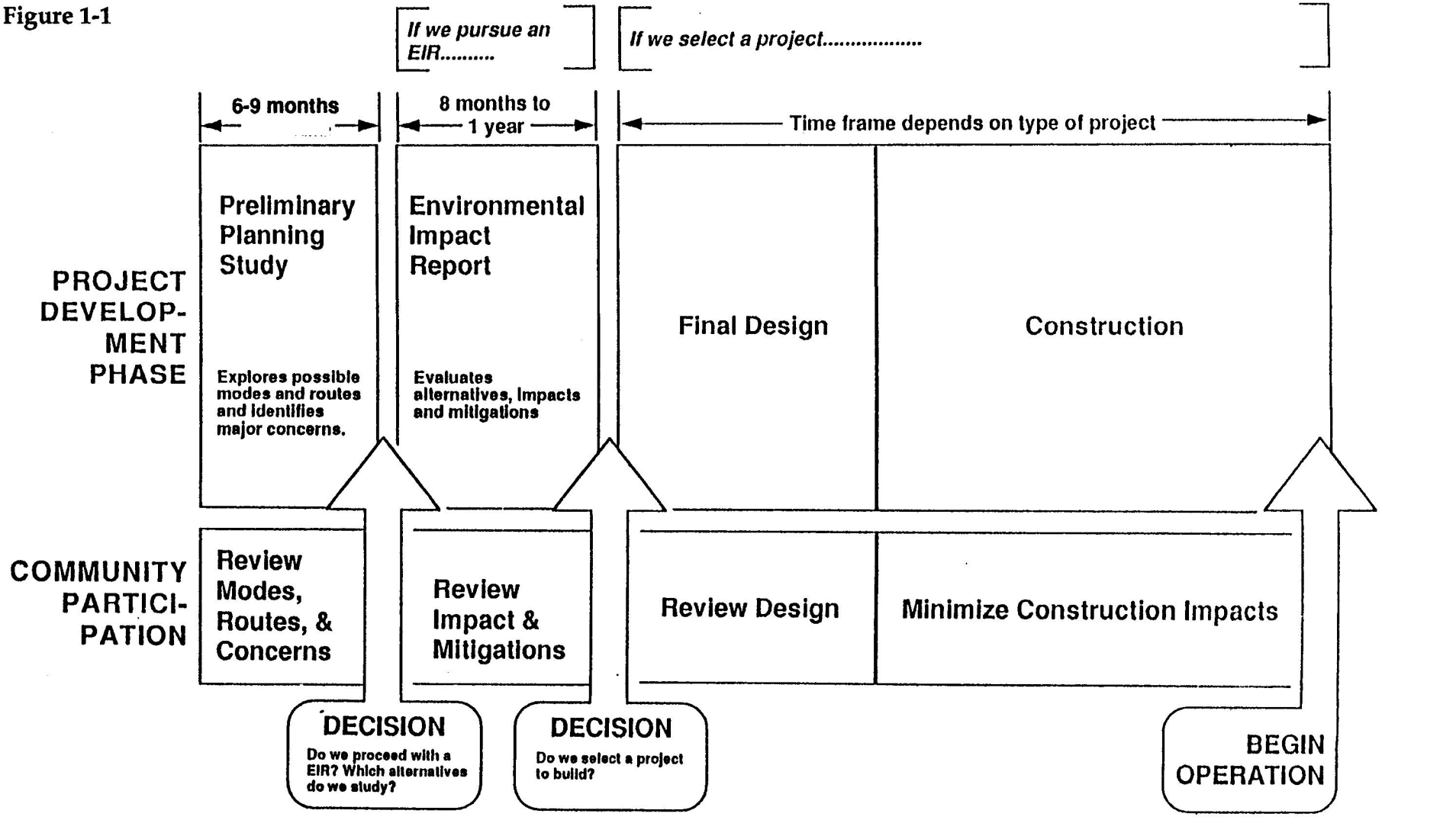
- ***Route 1: The Exposition R.O.W. from Vermont Ave. to Santa Monica***
  Light Rail Transit
  Trolley Bus
  Bicycle Path (as a supplemental use)
- ***Route 2: The R.O.W. from Vermont Ave. to Venice/Robertson, then Venice and Sepulveda back to the R.O.W to Santa Monica***
  Trolley Bus (operating in mixed-flow on Sepulveda Boulevard)
- ***Route 4: The R.O.W. from Vermont Ave. to Motor, then I-10 to I-405 back to the R.O.W. to Santa Monica***
  Light Rail Transit
- ***Route 5: The R.O.W. from Vermont Ave. to Venice/Robertson, then Venice to the Coast then on Main/Pacific to Santa Monica***
  Trolley Bus

The alternatives listed above are recommended for further study for these reasons:

- ***Transportation Investment*** – Each alternative offers the opportunity to provide additional transportation capacity to move transit riders in an efficient fashion, with the potential to provide at least some congestion relief to the corridor, while greatly improving service over current levels.

Phases of Project Development

Figure 1-1



Source: LACTC

- ***Mobility Improvement*** – Each alternative provides an improvement in travel time and community access. Travel time reductions are expected to enhance ridership. Improved access through station sites and feeder bus services will attract a sizable group of users.

- ***Cost Efficiency*** – Each alternative provides a reasonable level of estimated capital and operating expense given the current travel demand and related travel needs in the Corridor. Specific cost elements, such as environmental mitigations, grade separations, structures, or parking lots may further increase cost estimates in the future.

- ***Community Acceptance*** – Some neighborhoods such as Rancho Park and East Culver City have expressed concerns about adjacent residential areas. Other areas such as Santa Monica, the Crenshaw District, West Adams, and the Baldwin Hills area have expressed support for major transit improvements due to enhanced service, travel time, and transit network integration. The Environmental Impact Report can address many specific neighborhood concerns through design and mitigation review.

- ***Regional System Integration*** – Given both the funded and proposed system of transportation improvements currently under study by LACTC and other agencies, the Exposition Corridor service would provide an additional east–west linkage between the Metro Blue Line (mainline and USC extension), the Crenshaw Corridor, the LAX–Palmdale service, and the regional trolley bus network currently being defined, plus additional 30–Year Plan projects.

- ***Supplemental Uses*** – The Exposition right–of–way varies from one hundred to two hundred feet wide in most areas. The Bikepath alternative is recommended as a supplemental use in order to enhance non–motorized travel opportunities. Other supplemental uses such as adjacent parks or greenbelts within the right–of–way, or nearby in conjunction with the appropriate locality, could be feasible and would enhance the attractiveness of the property. The Exposition right–of–way has sufficient width in over half of the twelve mile length to include landscaping treatments or other environmental mitigation measures. Much of this "extra" width is in those areas where mitigation issues have been raised.

- ***Property Maintenance*** – Since the cessation of service by Southern Pacific, some areas have experienced dumping or other unattractive, inappropriate use of the property. Development of the property for a transportation improvement could alleviate or even erase these unattractive conditions due to security and frequent use. If any segments of the property are not developed or used, they may be sold or leased for revenue enhancement, with the lessee held responsible for custodial property services in these areas.

1.2 LACTC's FUTURE STEPS

As mentioned in this Final Report, a detailed study of these recommended alternatives has been identified by Commission staff as the next phase in developing the Exposition property into a useful transportation corridor. This next study should take the form of an Environmental Impact Report (EIR) to satisfy California's state guidelines, which require compliance with the California Environmental Quality Act (CEQA). Many of the specific requirements of CEQA are addressed in Appendix C. Other elements are required to complete a comprehensive project description which provides sufficient detail to conduct the environmental impact analyses required for certification. The subsequent study, once initiated by LACTC, must focus on the following elements at a minimum:

- ***Capital Improvement Plans and Costs*** – The facilities required to implement one or more of the alternatives must be identified and costed. Elements such as grade separations or other structural needs must be identified. Appropriate contingencies for hazardous waste removal other unforseen issues must be included. Any economies resulting from integration with regional or connecting services, such as using a joint trolley bus maintenance base, should be included as well.

- ***Operating Plans and Costs*** – The transit services to be offered must be specified, along with probable travel times, station stops, speed restrictions, and terminal arrangements. After the length of the alternative is specified, along the daily hours of service, daily and annual costs based on miles or hours can be developed.

- ***Implementation Staging Options*** – Since funding opportunities may be constrained in the future, and since the results of the analysis indicate the ease or difficulty of implementing route segments and/or modal types, the EIR study must address the concept of staged implementation. For instance, the right-of-way might be built as a rail project as far as Venice/Robertson, where trolley buses on one or more routes could connect at the proposed transit center there. Or, if trolley bus becomes the more desired alternative, using Routes 2 and/or 5, the remaining right-of-way could be converted to a bike trail or parkway until funding is available to develop rail in the longer term future.

- ***Ridership*** – The demand for service is critical to the success and cost effectiveness of any improvement, and is a function of several elements, including vehicle and service capacity, station access, feeder bus integration, and the results of the simulations which are being developed as a task in the Orange Line West studies to ensure that federal guidelines are met and that the relationship between the two projects are clearly established. The subsequent EIR will build upon results in refining the parameters of each station, related connections and access, as well as elements such as travel time, mode split, and fare structure.

An EIR study will provide one or more recommended alternatives which the LACTC may select after the appropriate hearing and public review period and process. All recommendations must be thoroughly documented by technical and field analyses which receive the concurrence of the appropriate technical staff designated to guide the Study. Once certified, engineering and design efforts may begin to implement the desired project dependent on funding and staff commitments.

2.0 Study Methodology

This section summarizes the methodology used to conduct the Exposition Right-of-Way Preliminary Planning Study. The milestones of this study were:

- Initial definitions of conceptual route and modal alternatives.
- Establishment of initial evaluation criteria.
- Initial screening to set aside inferior alternatives
- Conduct detailed technical analysis of remaining alternatives.
- Develop information on related issues, such as supplemental property uses, regional transit linkages, and implementation options.
- Recommend promising alternatives for a follow-up EIR Study.
- Prepare final report

2.1 PROJECT INCEPTION

In November 1990, the LACTC acquired a group of SP properties in the Los Angeles Basin with the intent of developing transit improvements on those alignments. The Exposition Right-Of-Way, consisting of approximately fourteen miles of inactive trackage between the Metro Blue Line at Long Beach Boulevard and the eastern edge of Santa Monica at 17th Street, was considered potentially useful for transit development.

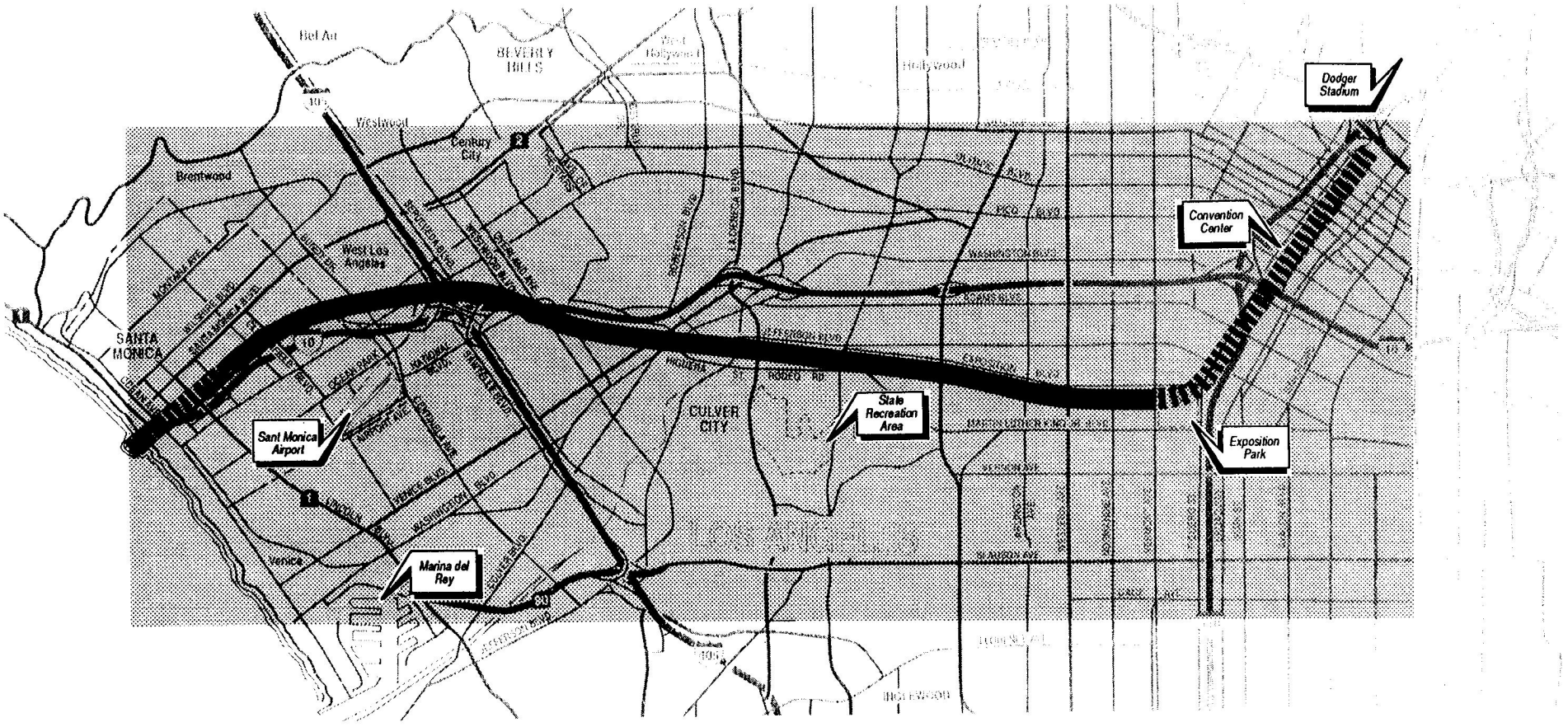
In early 1991, the LACTC's Westside Area Team began the process of initiating a Preliminary Planning Study to define and evaluate the route and modal alternatives which could apply to both the property and the I-10 Corridor. Since the westside of Los Angeles suffers from extremely congested conditions and contains the nation's busiest freeway and freeway interchange (I-10 and I-10/I-405, respectively), local interest already was running high prior to the Study's inception. The City of Santa Monica had previously conducted a study focusing on technology options for a guideway serving its City, and a citizen's group formed a committee to promote certain modal uses for the property. Other districts had continuing organized opposition to transit use of the right-of-way through their neighborhood.

Residential community groups in some areas also contributed their concerns, and Westside Area Team staff utilized all available input to design a set of alternatives sufficiently broad to include a full spectrum of modal and route analysis. The Exposition Corridor Study Area was defined as extending from Vermont Avenue to 17th Street in Santa Monica, as shown in Figure 2-1.

The eastern portion of the Corridor was separately studied as part of a connecting Blue Line Light Rail Transit (LRT) link between USC/Expo Park and the Los Angeles CBD.

Corridor Study Area - Exposition Branch

Figure 2-1



Source: BRW, Inc., 30 April 1992

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Exposition Branch

Links to Downtown Los Angeles and Santa Monica

0 1 2 miles

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

2.2 STUDY ALTERNATIVES

The Exposition Right-of-Way Preliminary Planning Study initially consisted of a matrix of sixteen route and modal alternatives. Five distinct segments were proposed between Vermont Avenue and Santa Monica, with four generally following the right-of-way and a fifth using the eastern portion of the right-of-way, then branching southwest on Venice Boulevard to the coast, with a southerly entry into Santa Monica. The route adjustments in the other alternatives generally occurred between the midpoint of the Corridor, at the intersection of Venice, Robertson and I-10, and the intersection of I-10 and I-405 several miles to the west. (See Figure 3-1.)

The modal alternatives consisted of both rail and non-rail technologies, consistent with the multi-modal nature of the LACTC's 30-Year Integrated Transportation Plan. The specific alternatives included Light Rail Transit, Transitway (an exclusive paved roadway carrying a varied group of multi-occupant vehicle users), Trolley Bus (an electric transit vehicle similar to transit buses, also using exclusive lanes), and a bicycle path. (See Figure 3-2.)

2.3 DECISION-MAKING PROCESS

This section outlines the decision-making process used during the Exposition Right-of-Way Preliminary Planning Study. The section is organized into three parts:

- Overview of Decision-Making Process
- Guiding Principles to Define Alternatives
- Evaluation Steps and Criteria

2.3.1 Overview of Decision-Making Process

The objective of the Exposition Right-of-Way Preliminary Planning Study was to evaluate a range of options for future transportation use of the property. The study provides information to enable the LACTC to narrow the options to a manageable number for further consideration in an Environmental Impact Study.

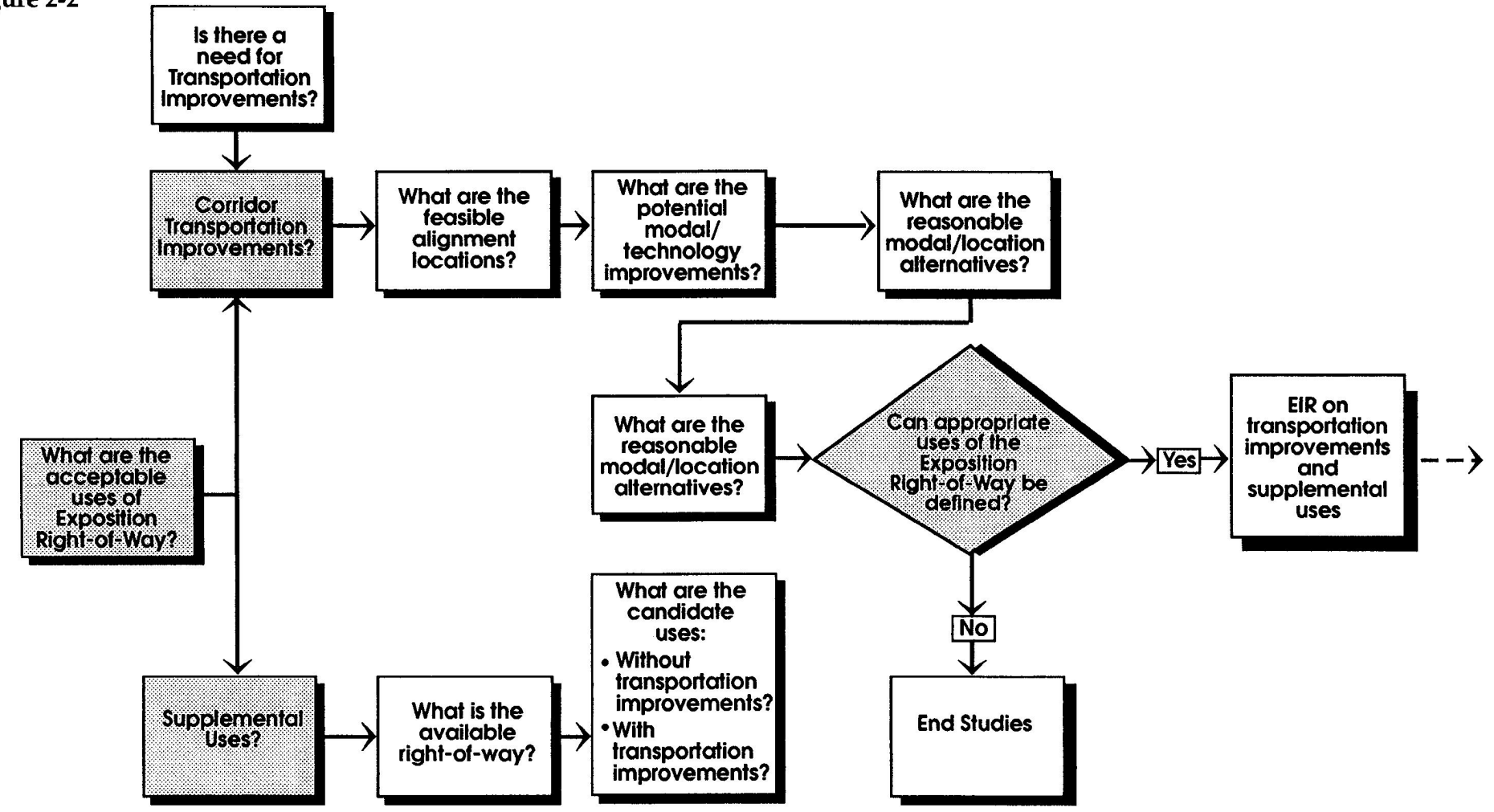
The study of the Exposition Right-of-Way and the assessment of key issues were driven by two major considerations:

- The right-of-way is available and can play a role in lessening Westside congestion and providing mobility options.
- Mobility improvements are needed to reduce congestion on the adjacent Santa Monica Freeway.

The Study was conducted on two levels. Figure 2-2 presents the decision-making process used to address questions associated with the transportation improvements and the supplemental uses levels. The alternatives were fully defined at the outset. Technical

Decision Making Process

Figure 2-2



Source: BRW, Inc., 30 April 1991

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

BRW

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

TABLE 2.1

KEY QUESTIONS AND CONSIDERATIONS IN DECISION-MAKING PROCESS

1. Will the Improvement Fit?

- Width dimension
- Height (overhead)
- Interim or Long-Term Use

2. Will the Improvement Be Acceptable to the Community?

- Land Use Impacts
- Environmental Sensitivity
- Compatible with Community Plans

3. Is the Improvement Complex?

- Cost
- Disruption, Displacement of Land Uses
- Over- or Undercrossings

4. Is the Improvement Compatible with Other Transportation Modes/ Improvements?

- Freeway
- Arterial - displace, disrupt traffic flows
- Crossings
- Bus Routes
- Regional System - redundant, network continuity

And for the transportation improvement category only:

5. Does the Improvement Enhance East/West Transportation Capacity?

- Enhance Transit Services
- Add to Person-Trip Capacity
- Reduce End-to-End Travel Time
- Improve Community Access to Services

Source: BRW, Inc.; 21 August 1991.

studies of the alternatives were conducted and the results reviewed before continuing to the next steps. A significant level of public interest and input occurred, and input was obtained through addressing a number of key questions. Five questions have been identified along with the types of considerations which were important in answering the questions. Table 2.1 presents these questions.

2.3.2 Guiding Principles To Define Alternatives

A set of guiding principles was needed to define the study alternatives. The following principles were developed to maintain or enhance the current environment of the corridor:

- Transportation improvements should result in a net increase in corridor capacity.
- Transportation improvements should not reduce adjacent roadway or transit capacity.
- Transportation improvements should be consistent with local objectives and plans.
- Transportation improvements should link successfully with regional system and help relieve regional congestion.
- Transportation and supplemental uses should be compatible with and, if possible, enhance adjacent land uses.
- Combinations of supplemental and transportation uses should complement each other.
- Combinations of supplemental and transportation uses should result in safe operations.

2.3.3 Initial Evaluation Steps and Criteria

A two step process was used to identify alternatives for further study. As the alternatives were developed, the Guiding Principles were applied. The key issues used as initial screening criteria were employed to determine the feasibility of each alternative.

During the process, it was determined that in some cases, alternatives were not feasible because of critical constraints. The potential of combining options and integrating supplemental uses was also considered. The physical and operational constraints of modal options were quantified and reviewed for technical solutions. Once the initial review process was complete, more detailed steps were initiated.

2.3.4 Detailed Evaluation of Transportation Alternatives

An evaluation process was designed and conducted to screen the EIR options to determine which to carry into the EIR process. Evaluation criteria composed of qualitative and quantitative factors were reviewed by the Project Review Team (PRT).

These criteria included:

- Transportation Improvement
  - Mobility Enhancement (travel time)
  - Accessibility Improvements (origin/destination links)
  - Congestion Relief (Demand/Capacity)
- Environmental Sensitivity
  - Land Use Compatibility
  - Impacts to Sensitive Uses
- Compatibility with Supplemental Uses
- Community Acceptance
- Engineering Feasibility
  - Grade/Alignment Acceptability
  - Right-of-Way Requirements
  - Traffic Impacts
- Cost Considerations
  - Capital Costs
  - O&M Costs
  - Cost-Effectiveness

The alternative rating process was designed to expose critical problems and identify those issues which could affect the feasibility of the alternative. The alternatives which appeared to be the most feasible were identified and these results reviewed with LACTC staff and the PRT. Public review followed with a series of community meetings.

2.3.5 Detailed Evaluation of Supplemental Uses

Similar to the transportation improvements, the evaluation of supplemental uses included qualitative and quantitative factors. These criteria included:

- Environmental Sensitivity
  - Land Use Compatibility
  - Impacts to Sensitive Uses
- Compatibility with Community Plan
- Cost Considerations
  - Capital Costs
  - On-going Maintenance Costs

- Public Safety
  - Hazard Potential
  - Security Enforcement
- Community Acceptance
- Compatibility with Transportation Improvements

A comparative evaluation was made and the reasonable supplemental uses were reviewed by the LACTC and the Project Review Team.

3.0 Conceptual Definitions of Alternatives

This section defines the route and modal study alternatives in a conceptual manner, and presents an inventory of existing transportation and land use conditions. The Study examined the four modes listed below, along with five potential routings between Vermont Avenue and Santa Monica:

- Light Rail Transit (LRT)
- Trolley Bus Technology
- Transitway Facility
- Bicycle Path

The routes and modal descriptions are presented in Appendices A and B. Figure 3–1 displays the five distinct routes within the Exposition Corridor, while Figure 3–2 displays the Initial Matrix of Conceptual Alternatives. All five routes share a common alignment between Vermont Avenue and Venice/Robertson, with each route taking a separate path west of this halfway point. Several routes re–converge at Sepulveda/I–405 to continue using the right–of–way to Santa Monica.

3.1 CONCEPTUAL ROUTE DESCRIPTIONS

The detailed conceptual descriptions of each route appear in Appendix A, and the five routes are summarized below:

- ***Route 1*** – The Exposition right–of–way all the way from Vermont Avenue to 17th Street, Santa Monica.

- ***Route 2*** – The right–of–way to Venice/Robertson, then Venice Boulevard to Sepulveda, then Sepulveda to the right–of–way, then west to 17th.

- ***Route 3*** – Identical to Route 2, except using I–405 between Venice and the right–of–way.

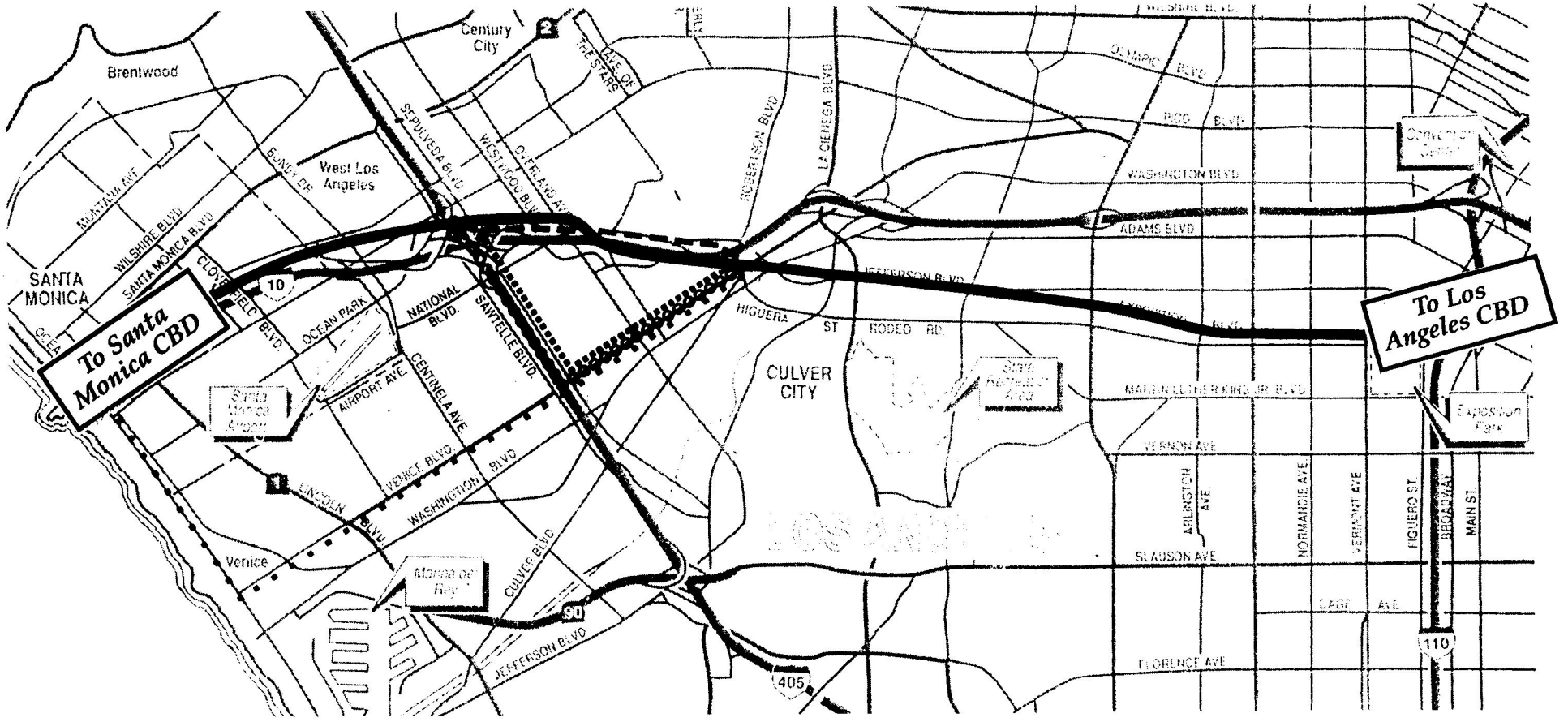
- ***Route 4*** – The right–of–way to Motor, then along I–10 to I–405, then back to the right–of–way.

- ***Route 5*** – The right–of–way to Venice/Robertson, then Venice Boulevard to approximately Venice Way, then Main and/or Pacific/Nielsen/Ocean to 4th and Colorado in Santa Monica.

The potential conceptual linkages from Vermont Avenue to downtown Los Angeles and from 17th St to downtown Santa Monica are described in Section 5.6.

Corridor Study Routes - Exposition Branch

Figure 3-1



Source: BRW, Inc., August 1991

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Route Options

1 — 4

2 · · · · 5

ooooo 3

0 1 2 miles

BRW

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Initial Matrix of Conceptual Alternatives

Figure 3-2

Location Options
Downtown Los Angeles/Downtown Santa Monica

Mode Options	Route 1 Exposition: Vermont to 17th	Route 2 Exposition via Venice, Sepulveda	Route 3 Exposition via Venice, I-405	Route 4 Exposition via I-10, I-405	Route 5 Venice to the Coast North/South
LRT	•	•	•	•	•
Trolley-Bus	•	•	•	•	•
Transitway	•	•	•	•	•
Bikeway	•				

X 3A 3D X 3B 3E X 3G X 3F

Source: BRW, Inc., 20 April 1991

EXPOSITION
RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

3.2 CONCEPTUAL MODAL DESCRIPTIONS

The detailed conceptual descriptions of each mode appear in Appendix B, with brief summaries of the four modal alternatives below:

- ***Light Rail Transit*** – Similar to the Metro Blue Line, with high capacity, multi-car electric trains providing service to stations every 1 to 2 miles along a secure rail line.
- ***Trolley Bus*** – A quiet, electrified bus which draws power from twin overhead wires and operates primarily along exclusive lanes making local or limited stops.
- ***Transitway*** – A separate roadway available to various users including transit buses, multi-occupant vehicles, and shuttles with intermediate vehicle access points and bus stops.
- ***Bicycle Path*** – A paved trail intended for the use of non-motorized bikes.

Each modal option considered has unique characteristics and may generate specific concerns about impacts. Since existing traffic conditions on the Westside reveal a need for improvement in transit capacity and a need to reduce automobile trips, Table 3-1 offers a brief comparison between the capacity of the transit modes.

- ***LRT*** – Light Rail Transit is assumed to operate every three minutes with a two-car train with approximately 190 seats per train plus 110 standees, totaling 300 riders per train, making all stops in both directions. Once platforms are lengthened on the entire system, three car trains may become the standard peak-hour train size.

- ***Trolley Bus*** – The Trolley Bus, irrespective of route, is assumed to operate every five minutes within street-running and every three minutes in exclusive right-of-way with an articulated 64-seat vehicle making all stops in both directions. Up to 32 additional standees may also be carried.

- ***Transitway*** – The Transitway, from end to end, is assumed to use a 64-seat articulated bus (a lengthened coach with a flexible center joint) every three minutes at full seated load plus standees, or 8-person vanpool and three 2.5-person carpools in one direction, in both directions. This includes trips which do not travel end-to-end.

- ***Bikeway*** – Operating bicycles on exclusive right-of-way, a theoretical headway of 14 to 30 seconds results in about 1,000 riders per hour. The only current examples of this frequency of usage are in parts of Asia and the orient. Given existing travel behavior, it is assumed that actual usage would be significantly less than capacity.

Table 3-1
Summary of Modal Characteristics

Alternative Mode	Right-of-Way		Motive Power	Maximum Operating Speed	Vehicle Capacity	Maximum Frequency	Peak Hour Person-Trip Capacity (one-way)	Notes/Comments
	Type	Width						
Trolley-Bus	In Street or Exclusive Lanes	12 -14 ft. one-way	Electric Overhead	up to 45 mph	64 seated 96 total	5 minutes	1,150	Subject to tavel-time delays without priority
	Separate ROW	40-50 Ft. two-way	Electric Overhead	up to 55 mph	96 total	3 minutes	1,920	Theoretical - Frequency shown not currently in practice
Transitway	Separate Street ROW Exclusive Lanes	40 - 50 ft. two-way	Fuel (or Trolley-Bus)	up to 55 mph	96/bus 8/vanpool 2.5/car pool	3 minutes	2,240	Assumes platoons of vehicles on 3 minute intervals, 1 bus, 1 van pool, 3 car pool per cycle
LRT	Separate Street ROW	30 ft. two-way	Electric	up to 60 mph	94 seated 56 standees 150 total/veh. 2 vehicles/train	3 minutes	5,600	Train length depending on block and station lenght.
Bikeway	Separate ROW	10 - 20 ft. two-way	Human	up to 25 mph	1 person	15 - 30 seconds	500 - 1,000	The only current examples exist in parts of Asia and the Orient.

Source; BRW, Inc., 30 April 1992

3.3 BACKGROUND AND EXISTING CONDITIONS

The westside communities of Santa Monica, Culver City, and sections of Los Angeles City and unincorporated County include a diverse group of land uses and socio-economic characteristics. The potential service area of the Exposition alignment extends nearly 15 miles from east to west and several miles north and south of the right-of-way. Like most of the Los Angeles Basin, traffic congestion and air pollution are key issues on the westside. Jobs, schools, and shopping are disbursed over a large area, and improved mobility for both transit and auto users is a long-term goal of the LACTC.

In evaluating modal alternatives and routing options, it is essential to understand the existing conditions for transportation within and along the corridor. One potential improvement, the *Metro Orange Line West* along the Wilshire Boulevard Corridor (several miles north of the Exposition property) offers a planned high-capacity facility link in the regional rail system. The *Orange Line* project may not be implemented until the next decade. A potential primary benefit of Exposition Corridor development is the possibility of faster service initiation, either through construction phasing or technology allowing prompt implementation. Also, the Exposition Corridor has unique characteristics which justify a distinct improvement project.

3.3.1 Freeways and Arterials

The Exposition Right-of-Way service area contains two heavily used freeways and numerous arterials, as follows:

- ***I-10*** - The Santa Monica Freeway extends nearly 14 miles from the southern portion of downtown Los Angeles to the Highway 1 transition at Santa Monica Beach. The CALTRANS right-of-way contains eight lanes and shoulder at most points, with additional frontage or weaving lanes at interchanges near downtown Los Angeles. The I-10 experiences heavy traffic all day and evenings, as well as on weekends since the freeway represents the only high-speed link between the westside and eastern points in the Basin.

  The I-10 carries 337,000 vehicles daily and congested conditions exist for seven hours per day. Automobile and bus travel times are slow, with average peak-hour speeds well below the freeway design speed. Automobile travel times of over 30 minutes from downtown Los Angeles to downtown Santa Monica are common even at off-peak hours, with peak hour times ranging from 40-60 minutes. Transit vehicle times between downtown Los Angeles and downtown Santa Monica range from 40 to 50 minutes. Travel times are also affected by congestion at nearly 200 arterial intersections along or near the freeway, many of which operate at Levels of Service E (capacity) or F (severe congestion).

- ***I-405*** - The San Diego Freeway serves both short- and long-distance users. Long-haul travelers utilize the freeway as a bypass around downtown Los Angeles, while Westside residents, commuters, and locally employed workers use I-405 to move north and south near the coast between areas such as Long

Beach, Redondo Beach, Venice, and Santa Monica/Westwood/UCLA. The San Fernando Valley, north of Sepulveda Pass, also contributes to commuter congestion on I-405. Like I-10, I-405 experiences congestion at all hours of the day and operates at LOS E and F much of the time, including evenings and weekends, with six to eight lanes available within a relatively narrow, older right-of-way envelope. The San Diego and Santa Monica freeways interchange at a large complex near Pico and Sepulveda Boulevards, with nearly 550,000 estimated daily vehicles using the interchange. According to City of Los Angeles 1990 traffic counts, 20,400 vehicles passed the Venice Boulevard interchange during the average peak hour. There is no express bus service parallel to the I-405 freeway; however, RTD Route 576 uses the freeway as part of a lengthy South Bay/LAX-San Fernando Valley run.

- ***Arterials*** - The Exposition alignment is paralleled by several four- to six-lane east-west arterials, such as Venice Boulevard, Washington Boulevard, Olympic Boulevard, Pico Boulevard, and Exposition Boulevard. In the western portion of the Study area, major north-south arterials, such as Sepulveda Boulevard, Sawtelle Boulevard, Bundy Avenue, Centinela Boulevard, and Lincoln Boulevard (CA 1) provide alternatives to I-405 towards the Coast. Each arterial contains one or more bus routes and numerous traffic lights which often lack left-turn facilities or sequential timing, with peak-hour congestion typical.

3.3.2 Transit Service

The following transit providers serve the Exposition alignment area with local, limited, and express bus services.

- ***Santa Monica Municipal Bus Line (SMMBL)*** - The Santa Monica Municipal Bus Line has a 36-square mile service area with 12 routes and a fleet of 125 coaches. The system provides regional connections at several Transit Centers, such as Pico-Rimpau (several miles north of the Exposition right-of-way), LAX Transit Center, and Westwood/UCLA. Express Route 10 operates between downtown Los Angeles and Santa Monica during both peak and off-peak weekday hours. The system carries approximately 1.5 million riders per month. According to the 1990 Short Range Transportation Plan (Page 248), Route 7 along Pico Boulevard has experienced overcrowding in several areas, including those closely parallel to the Exposition alignment.
- ***Culver City Transit (CCT)*** - Culver City's system includes six routes serving a 25-square mile service area containing nearly 200,000 residents, as defined by SCAG's Sub-Region 3. Culver City Transit carries approximately 340,000 riders monthly with a fleet of 28 buses. Culver City Transit connects with other carriers at regional transit centers such as West Los Angeles, Westwood, and LAX Transit Centers. Route 1, a local Washington Boulevard route from West LA Transit Center to the coast, carries the heaviest ridership of the six routes, and parallels Venice Boulevard to the south. Route 6, a north-south local along Sepulveda, parallels the I-405 and Sepulveda north-south alignments.

- ***Southern California Rapid Transit District (SCRTD)*** – The Southern California Rapid Transit District is the largest of 17 transit operators in Los Angeles County and provides service to nearly every corner of the region. Overall, the SCRTD rosters over 2,000 buses based in nearly 24 divisions. On the Westside, SCRTD operates approximately twelve local and limited stop routes, as well as three express routes, with most runs operating in an east–west pattern. About half of these routes, including express routes 434 and 436 on I–10 and or Venice Boulevard, parallel one or more route options of the Exposition Corridor. SCRTD facilities on the Westside include the 1.2 acre West Los Angeles Transit Center north of the Exposition alignment near Venice and Fairfax; the LAX Transit Center, and the Division 6 coach yard on Main Street in the northern coastal portion of Venice.

3.3.3 Corridor Land Use Inventory

The land use inventory of the study corridor was conducted at two levels—existing land uses were first noted, followed by the identification of the planned land use designations as indicated by the existing local and general plans.

The demographic analysis was completed to provide an estimate of the Study area's population, housing, and employment. Information collected during this task included the planning area's existing population (using 1990 Census data), the existing population living in housing units immediately adjacent to the study alignments, and projections of the planning area's future population.

3.3.4 Land Use Characteristics

The objectives of the land use analysis included the following:

- An identification of the land uses and development adjacent to the study alignments in order to characterize potential displacement impacts.
- A generalized identification of development within the vicinity of the transit corridor to assist in projecting future patronage.
- An identification of sensitive land uses that might be adversely affected by construction and operational impacts.
- An identification of major development adjacent to the alignments that could benefit from an operational transit system within the study area.

The study corridor was divided into eight segments (referred to as Segments A through H). As shown in Figure 3–3, each segment is bounded by major thoroughfares and includes some overlapping of the adjacent segment. Various land use, demographic and related project information have been recorded for each of the study segments, with overlapping segment data adjusted to eliminate duplication.

Study Segment A *(Harbor Freeway to Arlington)* is characterized by institutional and specialized land uses at the most eastern portion of the segment, and a mix of single- and multiple-family neighborhoods in the western portion of the segment. Commercial uses are located along several of the major thoroughfares. Industrial uses front Exposition Boulevard at the western portion of the Segment. The Exposition right-of-way alignment in this segment begins at the Figueroa Street and Exposition Boulevard intersection. The right-of-way separates the University of Southern California campus from Exposition Park and is located in close proximity to the Shrine Auditorium and the University Village Mall.

Study Segment B *(Arlington to Venice)* contains a mix of multi-family and industrial uses. The eastern portion of the segment includes smaller single-family neighborhoods interspersed among multi-family, public/institutional and open space uses. The western portion of the segment is characterized by large industrial areas located near multi-family developments. Smaller amounts of highway commercial, public/institutional, and open space uses are found along Venice and Exposition Boulevards. West of Crenshaw, single-family homes dominate the south side of the alignment, and multi-family units dominate the north side. Rancho La Cienega Recreation Center and Dorsey High School are located east of La Brea Avenue and surrounded by industrial uses to the north and west, and multi-family residential units south of Exposition Boulevard.

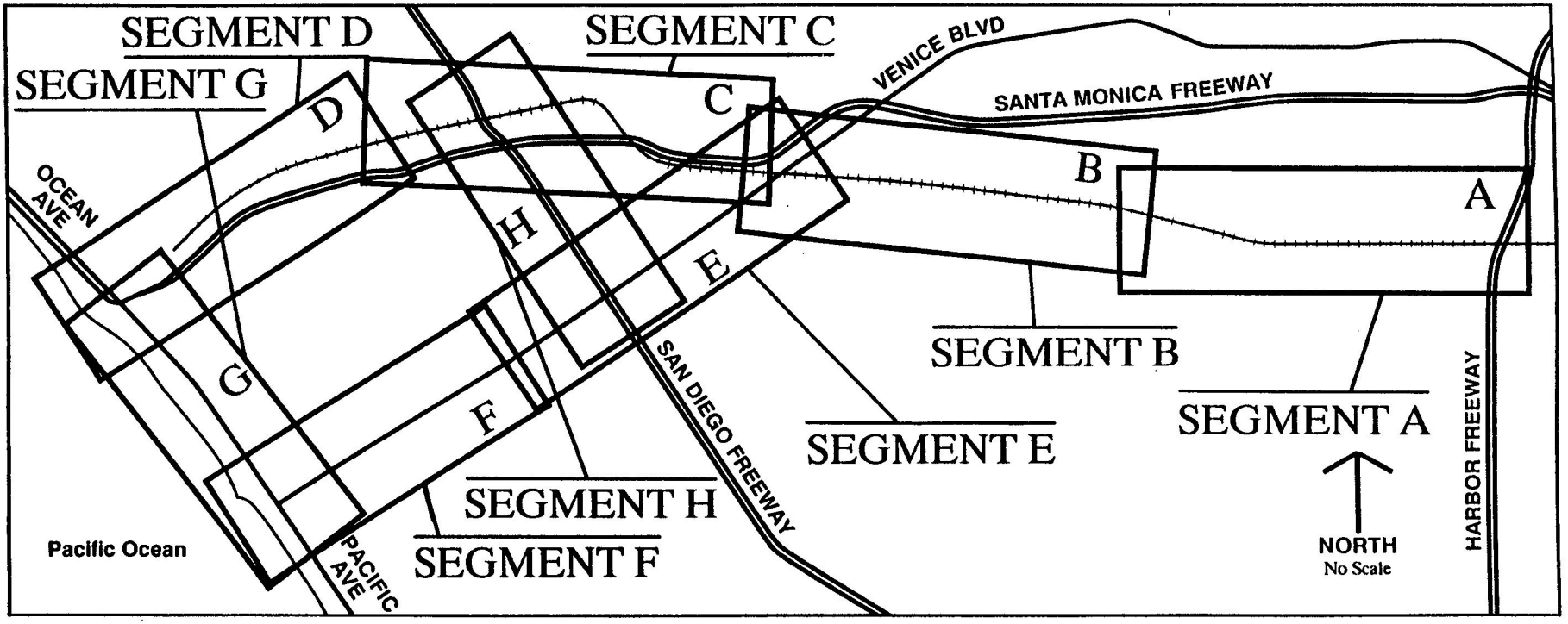
Study Segment C *(Venice to Bundy)* in the eastern portion of the segment, contains multiple-family residential development. Further west, the communities of Rancho Park and Cheviot Hills (west of Motor Avenue and continuing to Sepulveda Boulevard), is characterized by single-family homes. West of Sepulveda Boulevard, industrial and warehousing activities front the north side of Exposition Boulevard, while the south side contains single- and multi-family uses and highway commercial developments. Public/institutional uses are interspersed throughout this portion of the segment.

Study Segment D *(Bundy to Santa Monica's CBD)* is characterized by industrial/warehousing and office/professional uses which comprise the majority of the segment. Single-family neighborhoods and a combination of multi-family and community commercial uses are located at the eastern and western portions of the segment, respectively. Throughout Segment D, the alignment is narrow and travels between industrial and commercial uses, except where crossing arterials and thoroughfares.

Study Segment E *(Robertson to Sawtelle)* contains a variety of development. Industrial uses at the Venice Boulevard/Robertson Boulevard intersection are surrounded by multi-family uses. Three of the five proposed routes use Venice Boulevard and are surrounded by multi-family developments and commercial/retail east of Sepulveda Boulevard, and single-family neighborhoods west of Sawtelle Boulevard. Segment E includes the San Diego Freeway. Multi-family uses are located adjacent to the freeway and single-family uses are located further away from the proposed transit corridor. Public/institutional uses are interspersed throughout Segment E.

Study Segments

Figure 3-3



Source: David Evans and Associates, Inc.

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Study Segment F *(Sawtelle to Main)* contains Route 5, the Venice Boulevard/Pacific and Main Street route options. Land uses in Segment F are characterized by multi-family uses fronting Venice Boulevard, and the multiple-family development, in turn, is surrounded by single-family neighborhoods west of Lincoln Boulevard and north and south of the Venice Boulevard/Pacific Avenue intersection. Public institutional facilities are also interspersed throughout the segment. In a typical portion of this segment, commercial uses are found along major thoroughfares, while multiple-family units, including UCLA married student housing located along Sawtelle and Sepulveda Boulevards. Single-family neighborhoods are located to the east and west of these thoroughfares.

Study Segment G *(Venice to Colorado)* includes the proposed Main and Pacific Avenue routes. The City of Los Angeles boundary line separates the Venice community from the City of Santa Monica, dividing the segment into nearly equal halves. The Venice portion contains a large number of multi-family neighborhoods separated by single-family neighborhoods, clusters of highway commercial developments and public/institutional uses, all south of Washington/Abbott Kinney Boulevard. In the City of Santa Monica, multi-family uses are located west of Neilson Way, highway commercial is present east of Neilson Way and the Santa Monica Civic Center is located at the most northern portion of the segment.

Study Segment H *(Venice to Pico)* includes all 5 of the routes and presents the greatest diversity of development. Multi and single-family uses dominate the eastern and western areas of the Venice Boulevard segment, respectively. Multi-family uses are located adjacent to the San Diego Freeway with single-family neighborhoods located in the interior areas. Single-family uses predominate east of Sepulveda Boulevard with industrial/warehousing uses comprising a majority of the land southwest of this major arterial.

3.3.5 Demographic Characteristics

A second task of the project team was to identify the existing and future population and housing characteristics within the corridor. The following objectives were completed during this task:

- An estimation of the planning area's existing population using 1990 Census data.
- An estimation of the existing population living in housing units immediately adjacent to the study alignments.
- A projection of the planning area's future population, housing, and employment characteristics using projections obtained from the Southern California Association of Governments (SCAG).

The Southern California Association of Governments (SCAG), the designated areawide planning agency for the Southern California region, is responsible for the preparation and adoption of the Growth Management Plan (GMP). The GMP presents the regional forecasts and policies to guide anticipated growth between today and 2010. The GMP

forecasts the amount of population and employment figures, and housing units expected in Southern California in the future. The project team used these projections in estimating future population, housing, and employment within the corridor.

Census figures were obtained for the entire study corridor and catalogued according to the eight segment boundaries. Census tract population and housing unit figures were first obtained and recorded. Total population of the census tract was divided by total housing units to yield an average household size. Dwelling units adjacent to the proposed routes were obtained through a combination of consulting aerial photographs and conducting site visits. Multiplying the average household size by the number of dwelling units adjacent to the proposed route provided an estimate of the population living adjacent to the proposed routes.

Employment figures are highest within Segments C and H, which includes portions of West Los Angeles and Culver City. Land uses in these segments include large areas of commercial uses. Segments F and G, which include the cities of Culver City and Santa Monica and the community of Venice show the smallest employment figures relative to the other segments. Large portions of these segments are designated as residential, with the bulk of commercial activities located at the beach access point.

All segments but one are projected to experience population increases of between 1987 and the year 2010. The largest population increases are expected for the fourth and seventh segments, both within the City of Santa Monica and the Venice community. In all segments, tracts that predominately contain multiple-family uses are predicted to have higher growth rates compared to those tracts containing single-family dwellings.

Segments A and B are located closer to the downtown Los Angeles central business district and represent a well-established area consisting of older single-family neighborhoods and multi-family neighborhoods. These segments include large populations, the highest household sizes of the eight segments and large numbers of persons living adjacent to the Exposition right-of-way.

Portions of the City of Santa Monica and the Venice community are located in Segments D, F and G. Segment D roughly encloses Santa Monica's industrial and office/professional district, with a small amount of single- and multi-family housing units. Segments F and G represent the fifth route alternative and contain a majority of low/medium density multiple-family housing units along Venice Boulevard and Pacific Avenue.

Demographic statistics indicate that Segments C and E contain the greatest number of housing units. These larger numbers may be attributed to the proportion of the land devoted to residential uses. Although Segments A and B show large populations, both have lower totals of housing units, perhaps indicating a greater number of medium and high density residential units, and more persons on the average, inhabiting each unit. All four of the above mentioned segments (A, B, C, E) comprise the bulk of housing units found along the study corridor.

The demographic statistics and projections for the eight study segments are summarized below in Table 3-2. Employment figures for 2010 have been compiled and are also shown in Table 3-2. Population figures by route number are shown in Table 3-3. The Tables do not contain overlapping data common to Segments A-H boundaries.

3.3.6 Planned Development

This task focused on identify future development along the study corridors. This effort focused on completing the following:

- The identification of major development in the planning area that may benefit from the future transit alternatives.
- The identification of future development immediately adjacent to the study alignments that may be adversely affected by the proposed transit alternatives.
- The identification of opportunity areas within the project corridor for both interim and long-term development.

The Project Team began this task by identifying *major projects* within the project area. The Project Team reviewed local general plans for Los Angeles, Culver City, and Santa Monica. In addition, major projects that are proposed, planned, approved, or under construction were identified. Following a review of the general plans, the planned land uses were mapped for each of the eight segments. The planned uses are summarized in the following sections.

Segment A. The City of Los Angeles General Plan (South Central Community Plan) governs land uses within this study segment. The general plan designations largely correspond to existing development found within the study area. Major specialty land uses including Exposition Park and the University of Southern California are reflected in the Community Plan designations. Higher density residential land uses are proposed along the western end of the corridor while lower density (single-family) residential is the predominant land use designation between Western Avenue and Crenshaw Boulevard, largely reflecting existing development.

Segment B. The City of Los Angeles General Plan (West Adams-Baldwin Hills-Leimert District and South Central Community Plans) and the City of Culver City govern land uses within this study segment. There is a considerable mix in the plan designations that apply to this segment which is largely a reflection of the distribution of existing development. A large portion of the segment is designated for industrial activities, including most of the parcels immediately adjacent to the alignment. South of Exposition Boulevard and east of La Cienega Avenue, the majority of the interior residential neighborhoods are designated for lower density residential development (again, a reflection of existing land uses).

TABLE 3-2

Demographic Characteristics

Segment	1990 Pop.	2010 Pop.	Population % Growth	2010 Employment
A	48,975	50,958	2.73%	25,830
B	48,263	45,036	-12.93%	20,709
C	51,469	61,730	15.67%	45,658
D	17,185	22,592	24.71%	27,648
E	68,127	78,403	11.18%	35,229
F	29,045	36,107	20.36%	12,014
G	19,527	24,969	22.53%	8,726
H	22,598	28,575	14.32%	40,020

Sources: 1990 U.S. Census.
1990 Southern California Association of Governments (SCAG) Projections.

TABLE 3-3

Population Figures by Route

Route	Change	1990	2010	% Growth
Route 1 (A, B, C,D)	23,065	165,891	188,956	14%
Route 2 (A, B, D,E, H)	29,057	205,147	234,204	14%
Route 3 (A, B, D,E, H)	29,057	205,147	234,204	14%
Route 4 (A, B, C, D)	23,065	165,891	188,956	14%
Route 5 (A, B, E,F,G)	30,177	213,936	244,113	14%

Sources: Bureau of the Census, 1991.
SCAG Small Area Forecasting Data, 1991.

Segment C. The City of Los Angeles General Plan (West L.A. and Palms–Mar Vista–Playa Del Rey Community Plans) governs land uses within this study segment. Multi–family uses are the dominant planned land use east of Motor Avenue, while single–family neighborhoods are shown between Motor Avenue and Sepulveda Boulevard. West of Sepulveda Boulevard, industrial uses comprise the majority of land north of Exposition Boulevard. A mix of single– and multi–family neighborhoods with highway commercial uses are planned along arterials and thoroughfares. South of Exposition Boulevard planned land uses closely reflect existing development patterns.

Segment D. The City of Los Angeles General Plan (West Los Angeles Community Plan) governs land east of Centinela Avenue and the City of Santa Monica governs land west of the arterial. The eastern portion of the segment is an even mix of office/professional and industrial/warehousing uses, with small areas of single– and multi–family neighborhoods located at the most eastern portion of the segment. West of 20th Street, industrial/warehousing uses surround the right–of–way, and multi–family neighborhoods and highway commercial uses are planned towards the outskirts of the established study corridor. Planned land uses closely parallel existing development in this segment.

Segment E. The City of Los Angeles General Plan (West Adams Baldwin Hills–Leimert District Community Plan) and the City of Culver City governs land uses within this study segment. There is a considerable mix in the plan designations that apply to this segment. Higher density residential development and commercial development fronts Venice Boulevard. West of the San Diego Freeway, the interior neighborhoods are designated for higher density residential development while lower density (single–family) designations are located west of the San Diego Freeway.

Segment F. The City of Los Angeles General Plan (Venice Community Plan) governs land uses within this study segment. The study area follows route alignment number five which travels along Venice Boulevard to Main and Pacific Avenue where the alignment turns in a northwesterly direction. The general plan designations generally correspond to the character and location of existing development in the area. Planned land uses immediately adjacent to the corridor include a mix of multiple–family residential development and highway commercial uses.

Segment G. The Santa Monica General Plan and the City of Los Angeles General Plan (Venice Community Plan) were consulted to identify the planned land uses along the route alternative number five. The general plan land use designations along the route (Venice Boulevard to Ocean Avenue and then northwest) correspond very closely with the types and mix of existing land uses. Multiple–family residential designations front the alignment along Venice Boulevard and along both sides of Pacific Avenue and Neilson Way between Venice Boulevard and City of Santa Monica Boundary. Continuing in a northwesterly direction, the areas to the east of Pacific Avenue are designated as highway commercial and multiple–family residential designations are located along the western side of Pacific Avenue and Neilson Way.

Segment H. In general, the land use designations contained in the City of Los Angeles General Plan (Palms–Mar Vista–Del Rey Community Plan) for this area correspond to the existing types and distribution of development. Higher density residential uses are permitted along Alternative Route 2 (Sepulveda Boulevard), Alternative Route 3 (Venice Boulevard to the San Diego Freeway), and Alternative Route 5 (Venice Boulevard). Along the Exposition right–of–way, lower density residential development is planned north of Sepulveda Boulevard, and industrial/warehousing uses are planned south of this thoroughfare.

4.0 Initial Screening of Alternatives

Agreement was reached on the definition of the sixteen initial alternatives, and an initial screening step was conducted. The purpose of the screening was to identify "fatal" flaws or significant defects in an alternative that were unrealistic, infeasible, or truly inferior to other potential alternatives. These unpromising alternatives were deferred from further study at this point. The screening process was intended to:

- Analyze each route and modal alternative identifying critical problems and highlighting significant differences to select the options that best fit the criteria established by the LACTC.
- Note major cost or operational differences that show some alternatives to be inferior.

4.1 IDENTIFICATION OF CRITICAL CONSTRAINTS

Constraints which would affect implementation or operation/utility of project alternatives were identified. While all modal options can be implemented in the route alternatives, key areas of physical constraint were identified using cross-sections. A summary for each alternative is below:

ROUTE 1: *Exposition ROW, Vermont to 4th/Colorado, Santa Monica*

LRT (Light Rail Transit)

- Physical Constraints at Ballona Creek Bridge, I-10 Railway Tunnel.
- Community Concern Over Noise, Safety, Traffic Issues in Segment Between I-10 and I-405.
- Grade Separation or Traffic Control Systems Required at Numerous Arterial Streets Along the Alignment.
- Electrified LRT Requires Overhead Catenary System and Substations, Which May Cause Visual Impacts.

Transitway (Paved HOV Roadway)

- Physical Constraints at Ballona Creek Bridge, I-10 Railway Tunnel.
- Community Concern Over Noise, Safety, Traffic Issues in Segment Between I-10 and I-405.
- Grade Separation or Traffic Control Systems Required at Numerous Arterial Streets Along the Facility.
- Capacity is Less Than Half of LRT.
- Periodic Roadway Connections for Access Required at Major Crossings.

- Does Not Provide Linkage to Regional HOV System.
- Difficult design at intersections to provide for transit stops and HOV left turns.

Trolley Bus (Electrified Vehicle On Exclusive Roadway)

- Physical Constraints at Ballona Creek Bridge, I–10 Tunnel.
- Electrified Facility Requires Overhead Catenary and Substations Which Could cause Visual Impacts.
- Capacity is Approximately One–Third of LRT.
- Exclusive Roadway Facility Requires Need for Grade Separation or Traffic Control system at Numerous Key Arterials Along the Facility.
- Community Concern Over Noise, Traffic, Safety Issues in the Segment Between I–10 and I–405.

Bicycle Path (Paved Facility for Cyclists)

- Bike Path is Not a High–Capacity Improvement given current travel behavior; Does Not Significantly Improve Mobility or Provide Congestion Relief.
- Traffic Control Strategies Required for Safe Crossing of Numerous Arterials Along the Route.

ROUTE 2: *Venice Boulevard/Sepulveda Boulevard Between I–10 and I–405*

LRT

- Traffic Impacts at Numerous Street Crossings Along Venice and Sepulveda (Approximately 15 more Potential Crossings than Route 1).
- Gradient Near Palms Boulevard May Cause Slight Loss of Travel Time.
- Requires Either Property Acquisition of 10 Feet Or Loss of Lane Width/Parking on Sepulveda Boulevard Between Venice Boulevard and Exposition ROW.
- Potential Noise, Visual, Safety Impacts to Residential Areas Along Venice and Sepulveda.
- Travel Time Approximately Four Minutes Longer than Route 1 Assuming Priority at Intersections.
- Bike Lane Lost on Venice Boulevard Due to Expanded Median.
- Elevated Facility Could Resolve Problems but Adds Comparable Cost and Could Present Other Types of Impacts (Noise, Visual, etc.).
- Overhead Catenary Could Cause Visual Impacts Along Venice and Sepulveda Segments.

Transitway

- Periodic HOV Access Requires Traffic Lanes and Signal Priority for Effective, Safe Ingress/Egress.
- Width Limited to Two Lanes Which Inhibits Operations Flexibility for By-Pass of Stopped Vehicles.
- Alignment Turns Between Venice and Sepulveda Boulevards, and Sepulveda/Exposition ROW, Creates Traffic Impacts.
- Transit Bus Travel Time Slower than Route 2 LRT by 1 Minute, Route 1 LRT by 5 Minutes Assuming Intersection Priority and Efficient Vehicle Travel Groupings.
- Exclusive Lanes Require Loss of Traffic Lanes on Sepulveda Boulevard and/or Widening by at Least 10 Feet.
- Bike Lane Lost on Venice Boulevard Due to Expanded Median.
- Mixed Flow is a Possible Resolution but Would Add Approximately 10 Minutes to Travel Time and Reduce Reliability.
- Elevated Facility is Possible but Would Add $40 to $60 Million and Present Other Types of Impacts (Noise, Visual, etc.).

Trolley Bus

- Travel Time About 3 Minutes longer than LRT on Same Route, 5 to 6 Minutes Longer than LRT or Trolley Bus on Route 1 Assuming Priority at All Intersections.
- Potential Visual Impacts to Residential Areas Due to Catenary.
- Alignment Turns Between Venice/Sepulveda and Sepulveda/Exposition Boulevards Would Cause Traffic Impacts.
- Service Overlaps Existing Routes on Both Venice and Sepulveda Boulevards.
- Exclusive Facility Must Cross approximately 15 Additional Intersections Which Could Cause Traffic Impacts.
- Bike Lane Lost on Venice Boulevard Due to Expanded Median.
- Mixed Flow is a Possible Resolution But Would Add over 10 Minutes to the Travel Time.
- Elevated Facility is Possible but Would Add Considerable Costs and Could Present Other Impacts (Noise, Visual, etc.).
- Overhead Catenary Could Cause Visual Impacts Along Venice and Sepulveda Segments.

ROUTE 3: *Venice Boulevard/I-405 Between I-10 and Exposition Right-Of-Way*

LRT

- Transitions To/From I-405 Alignment Would be Costly and Complex With Potential Land Use Impacts.
- Space Constraints Along I-405 Will Require Property Acquisition of Multi-Family and Single-Family Uses North of Palms Boulevard or Use of Aerial Structure Adding Considerable Cost.
- LRT on Venice Boulevard Segment Must Cross Nearly 15 Intersections, with Potential for Traffic Impacts.
- Travel Time About 3 Minutes Longer than Route 1.
- Potentially Incompatible with Proposed I-405 HOV Lane System and Elevated LAX/Palmdale Line in Median.
- Overhead Catenary Could Cause Visual Impacts Along Venice and I-405 Segments.
- Bike Lane Lost on Venice Boulevard Due to Expanded Median.

Transitway

- Constrained Space Along I-405 Causes Narrow Facility, Thus Limiting Operational Flexibility, Especially at Transit Loading Areas.
- No Feasible Vehicular Access Points Between Venice Boulevard and Exposition ROW.
- Transitions To/From I-405 Segment Costly and Complex to Design and Implement With Land Use Impacts.
- Transitway Potentially Incompatible with Proposed LAX/Palmdale (via I-405) Fixed Guideway Project.
- Transitway on Aerial Structure Possible Resolution, but More Costly with Complex Design Issues Adding Considerable Cost and Design Integration Issues with HOV Lanes and LAX/Palmdale Line on I-405.
- Travel Time, Like LRT, Slightly Faster Than Route 2, but about 5 Minutes Slower Than Route 1.
- Bike Lane Lost on Venice Boulevard Due to Expanded Median.

Trolley Bus

- Transitions To/From I-405 Segment Costly and Complex to Design/Build.
- Trolley Bus Potentially Incompatible with LAX/Palmdale Project.
- Elevated Structure Possible Resolution but Adds in Cost and Design Integration

with HOV Lanes and LAX/Palmdale Line.

- Travel Time about 5 Minutes Slower Than Route 1.
- Overhead Catenary Could Cause Visual Impacts Along I-405 and Venice Boulevard Segments.

ROUTE 4: *I-10 Between Motor Avenue and I-405*

LRT

- Requires Aerial Structure Above I-10 Involving Additional $50 to $70 Million Cost and Complex Construction.
- Alignment Must Run Along North or South Sides to Allow for Future Elevated HOV Lane in Median of Freeway.
- Alignment Passes Above or Through Residential Areas; Potential Noise and Visual Impacts.
- Relatively Few Transit Connections for Stations Available in This Segment.
- Travel Time Comparable to Route 1.
- Property Acquisition of Residential Uses Required Near Sepulveda for West End Transition of northside alternative alignment.

Transitway

- Requires Aerial Structure Over I-10 Involving Additional $60 to $80 Million.
- Transitions To/From I-10 Segment are Both Costly/Complex to Design and Build and Must be Integrated as First Stage in Elevated HOV Lanes in Freeway Median.
- Travel Time Comparable to Route 1.
- No Vehicular Access Feasible in Freeway Segment.
- Traffic and Land Use Impacts Likely at Western Access Point Near Pico/Sepulveda/Exposition ROW.
- Property Acquisition of Commercial Uses Required for West End Transition Area.
- Potential Additional Noise and Visual Impacts from Elevated Structure.

Trolley Bus

- Requires Aerial Structure over I-10 Median Involving Additional Considerable Cost. This is Not as Cost Effective As the Transitway or LRT, Which Would Allow More Vehicles and Greater Capacity Per Dollar Spent.
- Travel Time Comparable to Route 1.

- Potential Noise and Visual Impacts From Elevated Facility.
- Transition Areas To/From I-10 Segment Costly and Complex to Design/Build.
- Property Acquisition of Commercial Uses Required for West End Transition Area.

ROUTE 5: ***Venice Boulevard and Main/Pacific Avenues West of Venice/Robertson***

LRT

- Requires Crossing Over 30 Additional Intersections Along Entire Segment West of Venice/Robertson, Some in Dense Coastal Areas Which Could Cause Numerous Traffic Impacts.
- Travel Time Over 5 Minutes Longer than Route 1 Assuming Priority at All Intersections.
- Route 5 Serves Different Travelsheds Due to Southerly Course Away From I-10 Resulting in Less Congestion Reduction in I-10 Corridor.
- Street Reconstruction Required on Main/Pacific to Implement LRT May Cause Parking Loss or Lane Width Reduction. A Potential Resolution Would be to Split Northbound/Southbound Tracks on the Two Streets as a Couplet. This Would Result in Impacts to One Side of Each Street. Costs Would Increase by 30% to 50%.
- Bicycle Lane on Venice Boulevard Lost Due to Expanded Median.
- Overhead Catenary Could Cause Visual Impacts in Commercial/Residential Areas.
- LRT in Residential Areas Could Cause Safety and Noise Concerns.

Transitway

- Right-of-Way Acquisition or Creation Would be Expensive and Cause Impacts on Coastal Portion of Route.
- Requires Expansion of Venice Boulevard Median and HOV Access Point Design at Key Intersections.
- Transitway Facility Must Cross About 30 Additional Intersections West of Venice/Robertson, With Numerous Traffic Impacts Likely.
- Bike Lane on Venice Boulevard Lost Due to Median Expansion.
- Coastal Commission Approval Would be Required for Route 5.
- Travel Time Over 5 Minutes Longer than Route 1.

Trolley Bus

- Overhead Catenary Could Cause Visual Impacts in Residential and Commercial

Areas Along Venice and Main/Pacific.

- Travel Time Nearly 10 Minutes Longer Than Route 1 LRT.
- Trolley Bus Would Overlap Routes 33/333/436 Along Entire Route 5.
- Exclusive Lanes Along Main and/or Pacific Avenues Would Cause Loss of Parking or Lane Width.
- Bike Lane on Venice Boulevard Would be Lost Due to Expanded Median.

4.2 INITIAL EVALUATION OF PROJECT ALTERNATIVES

The initial screening process identified eight alternatives which are recommended for deferral from further study. Each alternative can be characterized by having either a critical constraint or major short-comings when compared to competing alternatives. Figure 4-1 shows the results of the initial screening analysis, in the original matrix format.

Below is a summary of reasons, by route and mode for deferring those alternatives deemed less feasible:

ROUTE 1: *Bicycle Path as an Exclusive, Long-Term Use*

- A bicycle path does not significantly improve mobility or travel time or provide congestion relief for the general public, given present travel patterns.
- The bicycle path must provide for safe crossings of major arterials requiring traffic signal controls for safe crossing time while minimizing cross street traffic delays.
- The bicycle path, to be adequately secure for users, could require security provisions which are unduly expensive for the mobility benefits provided.

The Bicycle Path should receive further study only as an interim facility or an adjunct use of the right-of-way not needed for other modes.

ROUTE 2: *Light Rail Transit (LRT)*

- LRT would create significant traffic impacts at many crossings on both Venice and Sepulveda Boulevards. Route 1 has 4-5 crossings between Venice Boulevard and I-405, while Route 2 encounters nearly twenty potential street crossings. The intersection of Venice and Sepulveda Boulevards would be especially affected due to the alignment's curvature, which would require appropriate traffic control and would disrupt traffic flow on both roads.

Initial Screening Results

Figure 4-1

Location Options
Downtown Los Angeles/Downtown Santa Monica

Mode Options	Route 1 Exposition: Vermont to 17th	Route 2 Exposition via Venice, Sepulveda	Route 3 Exposition via Venice, I-405	Route 4 Exposition via I-10, I-405	Route 5 Venice to the Coast North/South
LRT	C	S	S	C	S
Trolley-Bus	C	C	S	S	C
Transitway	C	S	S	C	S
Bikeway	CA	-	-	-	-

Source: BRW, Inc., 30 April 1991

EXPOSITION
RIGHT OF WAY PRELIMINARY PLANNING STUDY

Legend

C = Continue Analysis in Preliminary Planning Study

S = Set Aside

CA = Continue Studying Only as Adjunct Facility

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

- At-grade LRT trains would be required to climb a gradient estimated at 5 to 6 percent (which is near the upper limit of LRT performance specifications) on both sides of Palms Boulevard along Sepulveda. This relatively steep gradient also could cause a loss of travel time and increase operating costs.
- In order to maintain existing street capacity, LRT at-grade would require reshaping of Sepulveda Boulevard, either by lane removal, parking loss, or potentially both for nearly two miles in order to maintain existing street capacity. LRT on aerial structure would mitigate street impacts but would add approximately $40-60 million in construction cost for this segment, with increased visual and noise impacts.
- LRT operations in median or side-of-street typically lowers average speeds due to potential conflicts and safety concerns. The Venice/Sepulveda routing is about one mile longer than Route 1, and would include speed restrictions which would increase end to end travel time by nearly four minutes over Route 1.
- LRT implementation in the median of Venice Boulevard would require elimination of the bicycle lane along Venice Boulevard or street widening.

ROUTE 2: *Transitway*

- The Transitway would cause traffic impacts at approximately fifteen additional street crossings, versus Route 1.
- Transitway users must have convenient access to the facility at regular intervals, from parallel or cross streets. In order to provide safe access, lanes must be defined and traffic-control strategies devised to enable these movements in an effective manner.
- The width of the Transitway in most areas is restricted to one lane in each direction due to limited right-of-way availability in median. Unless passing areas were defined and installed, the mixed use nature of the facility, coupled with a lack of passing areas, could cause operational backups due to transit vehicles stopping at loading areas or breakdowns.
- The Transitway would be required to turn from Venice Boulevard to Sepulveda Boulevard at the intersection of these two arterials, creating potential traffic impacts and the need for complex traffic control to prioritize movements at this point. Similar but less difficult impacts can be expected at the Sepulveda/ Exposition alignment intersection. Grade-separation could be employed to minimize impacts, although grade-separation itself may cause visual and construction impacts in a residential area, and could increase costs as much as $25-30 million depending on the length of aerial structure.
- End to end travel time on the Transitway, while available to a variety of users, is approximately one minute slower for transit vehicles than LRT and five minutes slower than Route 1, assuming full prioritization at intersections for transit vehicles on the Transitway. Automobile travel time would vary with the effectiveness of traffic control strategies at the numerous cross streets.

- Implementing the Transitway in the median of Venice Boulevard would require elimination of the bicycle lane on Venice Boulevard, or street widening.

ROUTE 3: *Light Rail Transit (LRT)*

- The transition from Venice Boulevard to I–405 would be costly and complex to design and construct, and have adverse impacts on the northwest corner of Venice and Sepulveda Boulevards. Types of impacts could include construction, visual, traffic, noise, and displacement, with additional cost estimated at $10–15 million.
- The LRT alignment for most of its length could fit within the 405 envelope, although the 405 right–of–way is generally space constrained. The alignment would lie along the eastern property line adjacent to residences, and require property acquisition near the I–10 interchange. The alignment would increase noise levels to adjacent uses and at any stations in the I–405 segment.
- The LRT alignment would require several new bridges in order to parallel the path of the freeway over both streets and a drainage channel, which would add a significant level of cost. LRT at–grade would preclude an at–grade HOV lane if desired by CALTRANS. An aerial structure, if considered to avoid potential conflicts or bridge construction, could cost as much as $35 million more than an at–grade alignment.
- The transition from I–405 to the Exposition alignment on the north end, while not as difficult as the south end, would also require structure or grading to change gradients, and could cause adverse impacts on adjacent residential areas.
- The LRT alignment, similar to Route 2, would traverse a more circuitous route, with median running on Venice Boulevard causing loss of the bicycle lane or street widening. While LRT travel time would be slightly less than Route 2, end to end travel time would still be about three minutes longer than LRT on Route 1, assuming transit priority at all intersections.
- LRT implementation along Route 3 would create noise, visual, and safety impacts along Venice Boulevard, similar to Route 2.

ROUTE 3: *Transitway*

- The Transitway would have no feasible vehicular access points in the I–405 segment, but could have transit vehicle stops adjacent to major streets.
- The Transitway would be narrow due to constrained shoulder right–of–way, thus eliminating room for passing lanes or stopping areas, which would decrease operating efficiency and reliability of the facility.
- A joint facility with a future elevated HOV lane on I–405 would not be feasible due to design and operational issues. The Transitway would need to join the HOV lanes at I–10 and diverge approximately a mile south near Venice Boulevard. This would require a weaving section and ramp on a separate, third level to access Venice Boulevard from the 405.

- Implementation of the Transitway on Venice Boulevard would require elimination of the bicycle lane on Venice Boulevard, or street widening.

ROUTE 3: *Trolley Bus*

- The Trolley Bus facility along I-405 would be narrow due to constrained shoulder right-of-way. Along Venice Boulevard, implementation of the Trolley Bus in the median would cause the loss of the bicycle lane along Venice Boulevard
- An aerial Trolley Bus alignment along I-405 would be infeasible due to design and operational issues at the transition points, similar to Transitway above.
- Trolley Bus on Route 3 is three minutes slower than Trolley Bus on Route 1, and four minutes slower than LRT on Route 1, assuming traffic priority at all intersections.

ROUTE 4: *Trolley Bus*

- The Trolley Bus right-of-way would be narrow due to constrained space within the freeway alignment, with little or no space for passing areas or pull-out stopping areas. Portions of the guideway would be grade separated on aerial structure, with additional construction cost of $60-80 million required to implement structures.
- The travel time for Trolley Bus is slightly slower than Transitway and LRT along this alignment, and three minutes slower than LRT along Route 1, assuming transit priority at all intersections.
- The transition areas at each end of the segment could require extensive structural design and construction to implement an electrified roadway facility to and from the I-10 alignment, which could add significant construction cost. In addition, property acquisition would be required for the west end transition area.
- Given the engineering complexity and probable costs of this Route, the higher capacity LRT and Transitway facilities would be more cost-effective than Trolley Bus.

ROUTE 5: *Light Rail Transit (LRT)*

- LRT must run in the median of Venice Boulevard and side-of-street on Main/Pacific Avenues, thus slowing travel time due to slower average speeds and increasing traffic impacts due to crossing at least thirty additional arterial intersections than Route 1. End-to-end travel time is much longer than Route 1, assuming transit priority at all intersections.

- Street reconstruction would be necessary on Venice Boulevard and all of Main and/or Pacific Avenues, due to median and alignment width requirements. This element would greatly increase costs and impacts along the entire alignment west of Robertson Boulevard. The bicycle lane on Venice Boulevard would be lost as well, unless street widening occurred.
- West of Robertson, LRT on Route 5 would pass through numerous residential areas, including areas with dense housing. By comparison, LRT on Route 1 would pass through several communities with low density housing west of Robertson. Noise, visual, safety, and vibration impacts would be possible along Route 5.
- LRT on Route 5 would generally be more circuitous than other routes and actually serve a different travelshed than the more northerly I-10 Corridor. Service implementation along Route 5 may not improve congestion relief along the regional I-10 Corridor.
- California Coastal Commission approval would be required for any facility implementation along the north-south coastal portion of Route 5, including LRT. By contrast, only a small portion of other routes, near downtown Santa Monica, would be within the Coastal Zone regulatory area.

ROUTE 5: *Transitway*

- The implementation of the Transitway along the north-south coastal segment would be expensive and cause traffic and parking impacts along the coastal strip due to the provision of exclusive lanes at grade.
- The Venice Boulevard median would require expansion with resulting loss of the Venice Boulevard bike lane, or street widening. The periodic access points for HOV's would cause traffic impacts at intersection or other access points.
- The Transitway must cross about thirty arterial intersections west of Venice/ Robertson, with potential traffic impacts at each crossing.
- Reconstruction of the Venice Boulevard median would cause impacts to business and residential areas along the alignment, including noise and access issues west of Robertson Boulevard.
- Travel time for transit vehicles would be nearly ten minutes longer than a Route 1 transitway, and eight minutes longer than for LRT along Route 1, assuming transit priority at all intersections.

4.3 SUMMARY OF INITIAL SCREENING RECOMMENDATIONS

Based on the evaluations conducted in this section and considering the identified major differences and critical constraints the following project alternatives are recommended for deferral from further study at this time:

- **Route 1:** Bikeway (as an exclusive long term use)
- **Route 2:** LRT, Transitway
- **Route 3:** LRT, Trolley Bus, Transitway
- **Route 4:** Trolley Bus
- **Route 5:** LRT, Transitway

The subsequent analysis contained in *Section 5.0* of the Preliminary Planning Study provides a more detailed focus on the following feasible alternatives:

- **Route 1:** LRT, Transitway, Trolley Bus, Bikeway (as an interim/adjunct use)
- **Route 2:** Trolley Bus (in mixed-flow conditions on Sepulveda)
- **Route 4:** LRT, Transitway
- **Route 5:** Trolley Bus (with potential future conversion to LRT)

5.0 Evaluation of Most Feasible Alternatives

This section of the report describes the findings of detailed analyses conducted by the consulting team of the promising options from the initial screening in Section 4. The technical analyses cover the following topics:

- Stations, Stops and Access
- Traffic Impact Analysis
- Travel Time Comparison
- Operating Plans and Costs
- Capital Costs
- Linkages to Downtown Los Angeles and Santa Monica
- Environmental Analysis

Each topic is discussed in this chapter and is based upon technical studies performed during the course of the study.

5.1 STATIONS, STOPS AND ACCESS

This section discusses recommended conceptual sites for stations and other transit boarding areas along the Exposition alignments under detailed study. In addition, this section discusses unique conditions present at sites and illustrates potential station layouts. The station and stop sites were selected primarily by proximity to existing transit routes, arterial streets, and/or land uses which appear capable of generating ridership.

Exact station siting and facilities will be determined in future phases of design of the Exposition Corridor. This initial effort provides both criteria and recommendations for preferred stations and transit boarding areas. The term station is used in conjunction with an LRT alignment, while the term transit boarding area refers to a stop location used by a trolley bus on exclusive right-of-way or transit vehicle on a transitway. While a boarding area contains a ground-level platform with lighting, signage and perhaps a shelter, an LRT station is generally one or two high-level platforms (just over four feet above the ground) with access steps and ramps as well as a roof, lighting, signage, and automatic fare collection equipment.

Those sites identified as Transit Centers, such as Venice/Robertson and I-405/ Exposition could contain more extensive facilities such as bus bays, designated walkways between access areas and modal boarding areas, as well as waiting and convenience facilities.

5.1.1 Station/Transit Boarding Area Location and Configuration Criteria

In assessing potential station sites, several criteria were used in determining the probable success, utility, and accessibility of the facility. These factors help define the most useful size, location, configuration, and any support facilities needed, such as parking spaces. The primary location criteria are as follows:

- What access paths can transit users employ to reach a station, such as cross or parallel streets (major or minor), pedestrian or bicycle paths, or integrated development where a station (or boarding area) is part of another attraction for users? In general, sites with greater and more varied means of access will be more attractive to users than sites which have barriers, such as physical obstacles or inconvenient access, or few access pathway opportunities.
- What feeder bus or other connecting services are available at or very near the site to collect and distribute users? In general, sites with greater connecting services (transit routes, public or private shuttles, parking or ridesharing facilities such as preferred carpool spaces) will develop more volume as users take advantage of linkages provided or inherent at the site.
- What physical constraints are present at a site? The nature of the physical setting of the site, including slope, walls, drainage paths, bridges or tunnels, and even vegetation can influence the size, appearance, utility and cost of developing the site.

Once potential sites have been identified, an estimate of parking capacity, based on right-of-way availability, will be provided.

5.1.2 Station/Boarding Area Site Analysis

In this section, specific sites are proposed and evaluated between Vermont Avenue on the east to Cloverfield in Santa Monica on the west. While the Exposition Corridor Study area ends near 17th Street in Santa Monica, west of Cloverfield, a 17th Street site is unlikely to become a station or terminus, since the alignment may extend farther into Santa Monica.

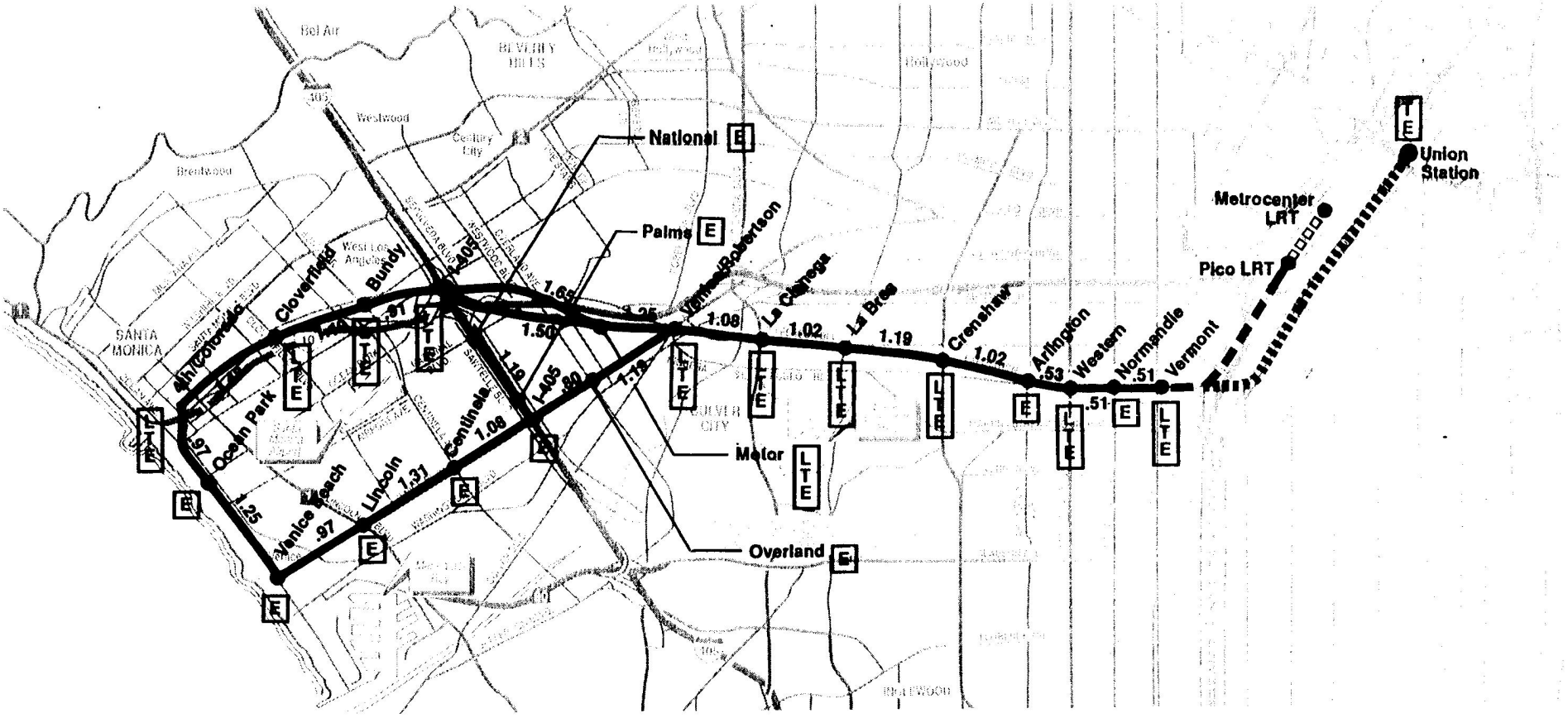
Station/Boarding Area Concept Layouts

This section presents a series of typical station layouts intended to represent prototypical sites along the alignments. Each site layout is briefly described below:

- ***Figure 5-1:*** Illustrates the proposed locations of Exposition Corridor station and boarding area sites, and identifies the modal service to be offered at the site.

Exposition Corridor Station Sites

Figure 5-1



Source: BRW, Inc., December 1991

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

- Existing Metro Blueline
- Proposed Metro Blueline Extension
- Potential Transitway/Trolley-Bus Extension
- .97 Distances shown in miles
- L Light Rail Transit
- T Transitway Transit Stop
- E Electric Trolley-Bus Stop

0 1 2 miles

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

- ***Figure 5-2:*** This layout illustrates a typical LRT station, or trolley bus boarding area, in the median of an arterial street with split far-side platforms. This arrangement allows room for a separate left turn lane within the main roadway, and permits trains to pass through the cross street intersection prior to dwelling at the station and then proceeding on.

- ***Figure 5-3:*** This layout illustrates a typical LRT station in a median (or on a grade separation) with a center platform arrangement. This layout enables all station facilities to be installed on one platform, and is typical or Metro Blue Line stations both at grade and on aerial structure. The adjacent roadway would not be present on an aerial structure, and the intersecting roadway would cross under the alignment with steps and elevators leading to and from the elevated alignment.

- ***Figure 5-4 (A & B):*** This layout illustrates a conceptual transitway bus boarding area in a median setting, with several layout options. Since an assumed feature of transitway design is the provision of bypass lanes so that stopped transit vehicles can be overtaken, the location of boarding areas near intersections is crucial to operational efficiency. In the nearside stopping option, the boarding area is located prior to the left turn lane, so that the platform can be located to the side, allowing other vehicles to continue movement in the primary lane. This layout results in passengers alighting some distance from the intersection, and a mid-block pedestrian crossing would become necessary.

  In the farside option, in order to have the platform in a bypass lane, street reshaping would be required, resulting in either the loss of the left-turn lane or widening which could cause loss of parking, bike lane (if present), or in some cases curbside property.

- ***Figure 5-5:*** This layout illustrates a typical Transit Center in an at-grade location, such as the intersection of I-405 and the Exposition alignment. The Transit Center contains the guideway alignment with platforms, eight bus bays (the number can vary depending on available space and bus bay design), and street access for bus ingress and egress. In this layout, not all bus movements to and from access streets are convenient, but this is often the case with space-constrained facilities. Parking would be located nearby and pedestrians and bicycles would access the site from nearby streets. The Transit Center at Venice Boulevard and Robertson (not illustrated) should be a grade separated facility, typical of several Blue Line stations (such as Del Amo). In this case, guideway service and platforms are offered on an aerial level, while bus and auto activity occurs at street level with stairs/elevators linking the two levels.

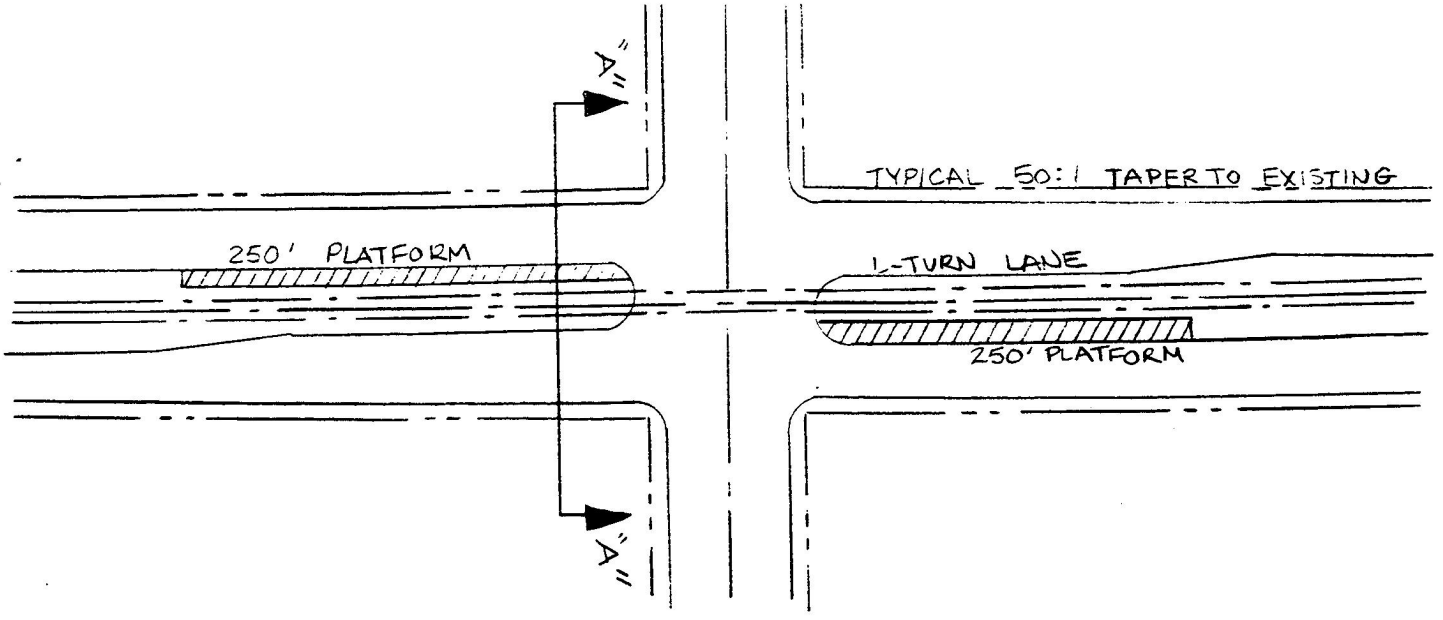
Station/Boarding Area Spacing Assumptions

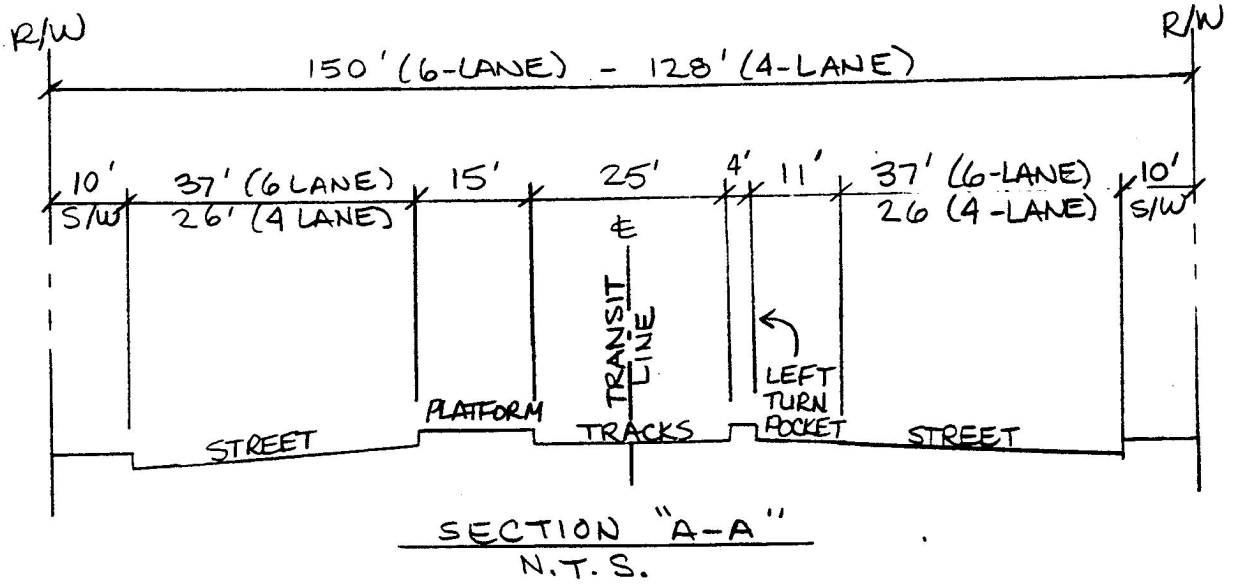
Since travel time is an important factor in maintaining higher average speeds and attractiveness to riders, key parameters have been defined for each modal alternative, as follows:

Exposition Arterial LRT and Trolley-Bus Stations

Split Far-Side Platforms in Medium

Figure 5-2





SECTION "A-A"
N.T.S.

Source: BRW, Inc., 30 April 1992

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

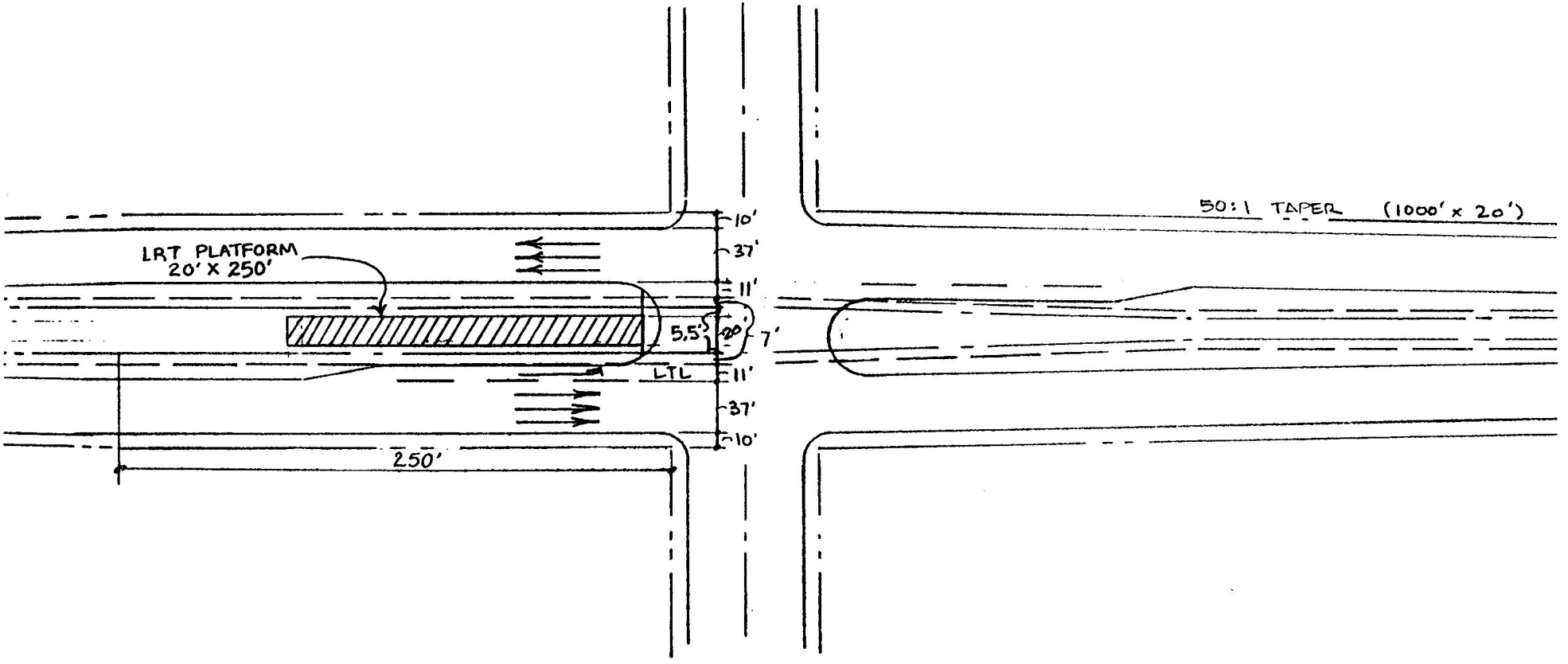
0 50' 100'
feet

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Typical Center Platform Station Layout

LRT Only

Figure 5-3



Source: BRW, Inc., October 1991

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

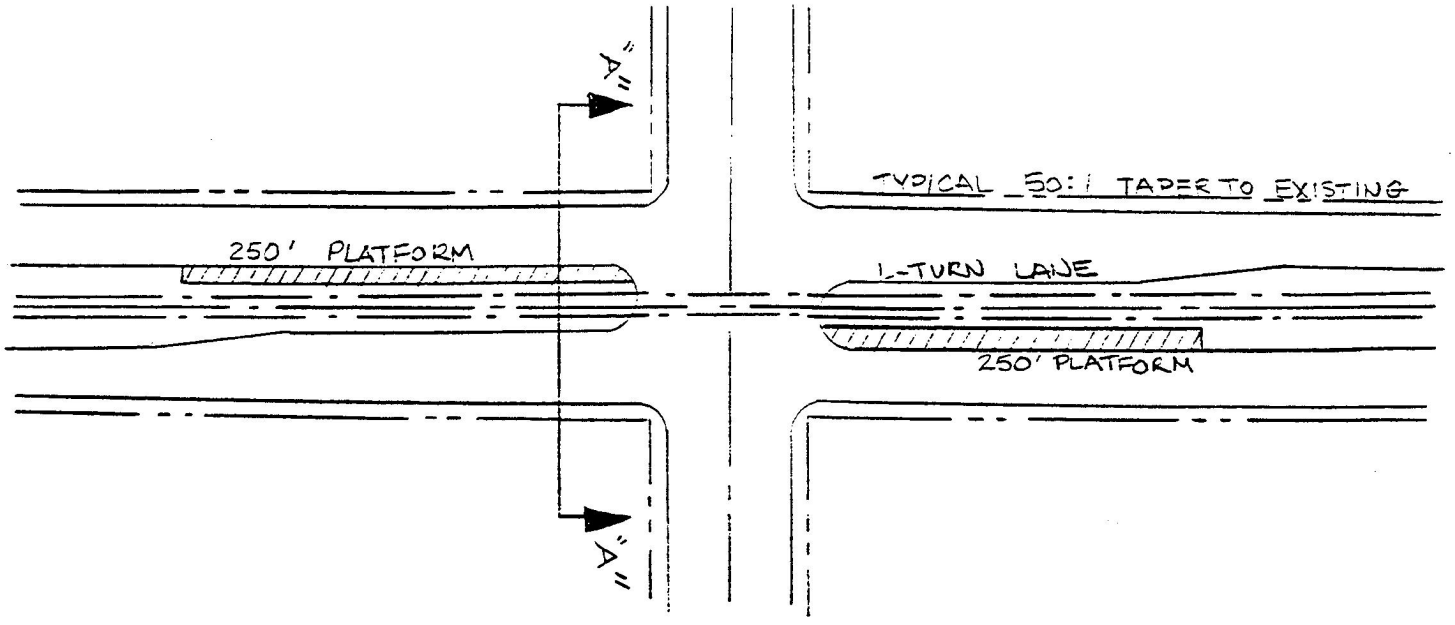
0 50' 100'
feet

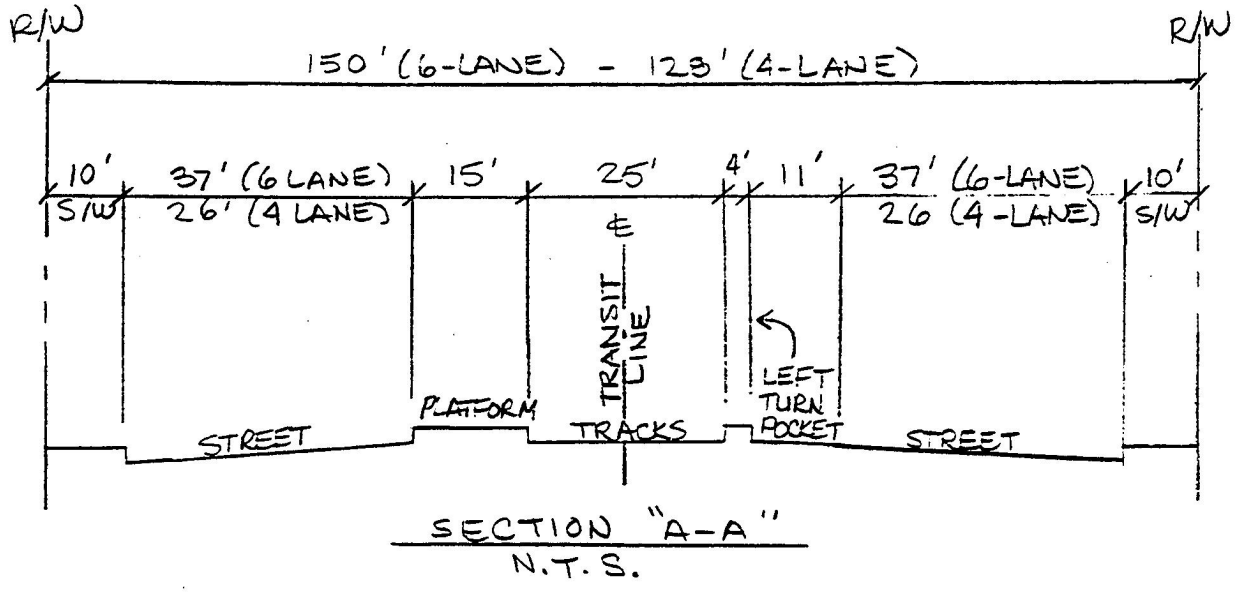
Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Exposition Arterial Boarding Area

Platform in Medium: Farside Platform Options (A & B)

Figure 5-4a





SECTION "A-A"
N.T.S.

Source: BRW, Inc., 30 April 1992

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

0 50' 100'
feet

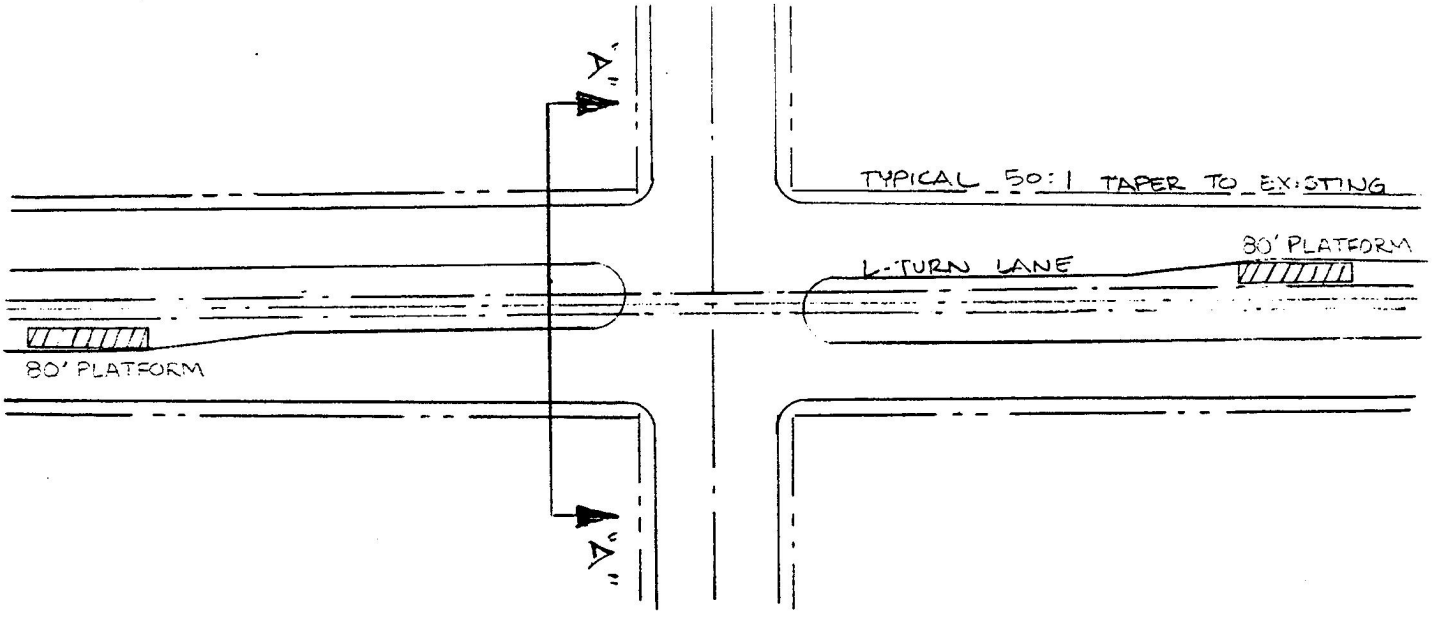
LR

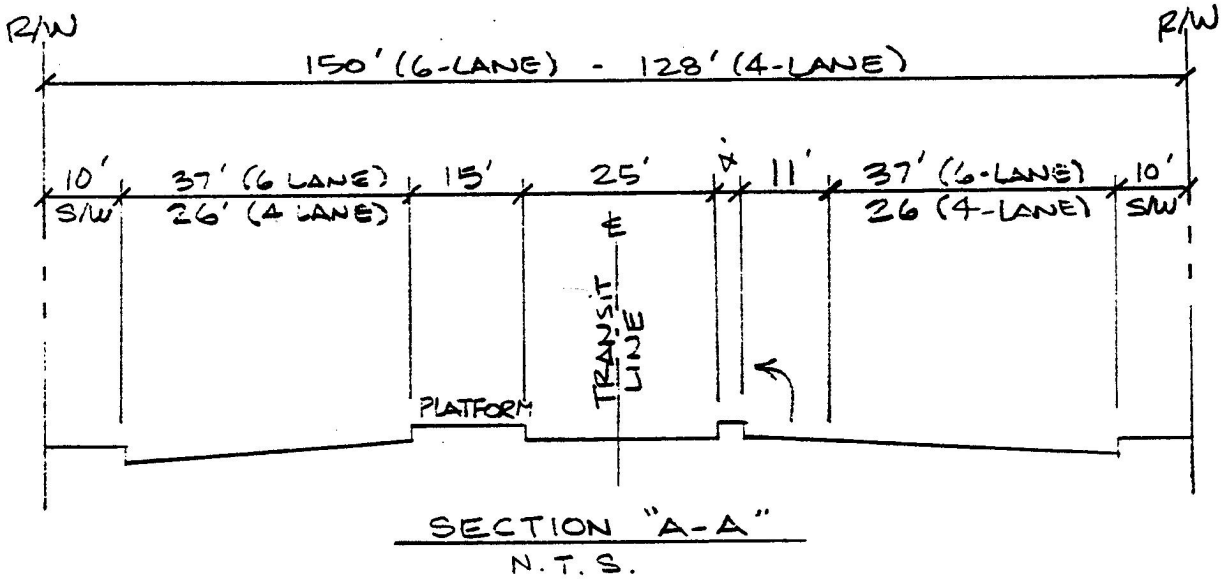
Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Exposition Arterial Transitway Station

Platform in Medium: Nearside Platform Option

Figure 5-4b





SECTION "A-A"

N.T.S.

Source: BRW, Inc., 4 March 1992

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

0 15' 30'

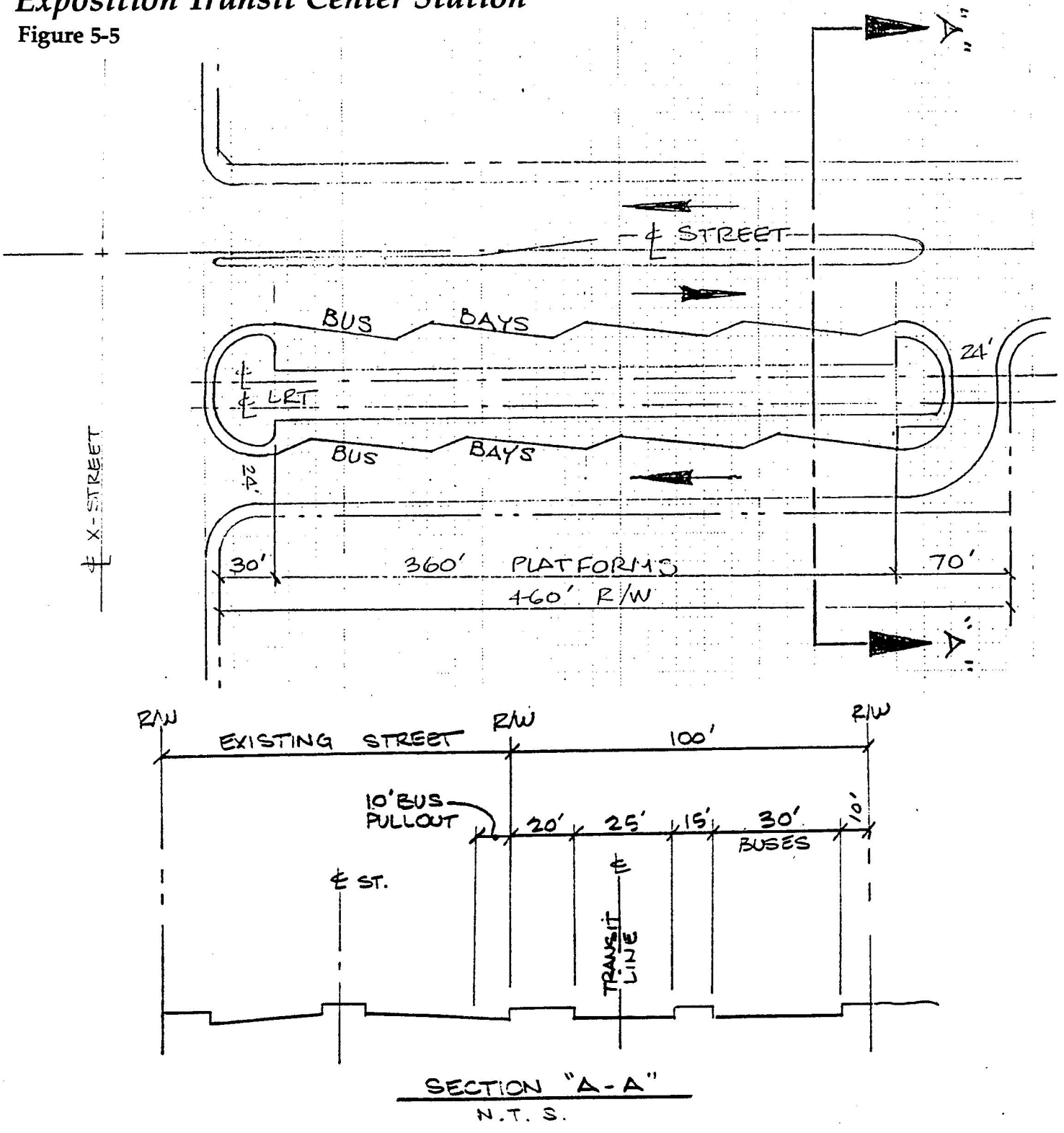
feet

R

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Exposition Transit Center Station

Figure 5-5



SECTION "A-A"
N.T.S.

Source: BRW, Inc., November 1991

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

0 40' 80'
feet

R

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

- **LRT:** Stations should be at least one mile apart and can be up to 2.5 miles apart if appropriate, with average spacing of approximately 1.5 miles.
- **Transit Vehicles (on transitway)/Trolley Bus (on exclusive lanes):** Boarding areas will be at least 1/2 mile apart, and can be up to 2 miles apart, with an average spacing of approximately 1 mile.

Generally, LRT station spacing is longer to take advantage of the higher speed of LRT technology. The Trolley-bus makes several more stops to serve local north-south bus connections.

5.1.3 Routes and Potential Station/Boarding Areas

This section contains a brief station/boarding area site analysis, including unique conditions which may exist for each route and modal combination. Table 5.1 identifies the designated potential station site areas. Generally, center platforms are desirable to minimize facility cost and fit into structure. Split platforms are more useful in areas of constrained right-of-way and near intersections where traffic impacts may occur.

Route 1 - LRT, Transitway, and Trolley Bus

Transit next to I-10 would require protective features at two stations, which also apply to Route 4: Motor Avenue and I-405 Transit Center. The Motor Avenue station could be located on an existing grade separation, with potential sound buffers required to the north due to I-10 noise intrusion. The I-405 Transit Center could be located under the Freeway overpass, and could require overhead noise and falling object protection. Continuous lighting may also be necessary under the freeway, so that users can see and other necessary equipment.

The Transitway and Trolley Bus alternatives would have at-grade transit boarding areas along the outer edge of the alignment. If the boarding area were elevated on a grade-separation, guardrails and fencing would be required for passenger safety. The transit boarding areas along the transitway would be identical sites to LRT on Route 1. The Trolley Bus sites would also be identical to Route 1 LRT, with additional stops at Normandie and Arlington/Van Ness to connect with north-south bus routes. The Transitway bus would not serve these stops due to potential delays to other users.

Route 2 - Trolley Bus

The Trolley Bus alternative on Route 2 would utilize the same alignment as Route 1 between Vermont and Venice/Robertson, and then follow Route 5 as far as Venice/ Sepulveda. The Route 2 trolley bus would operate in mixed-flow traffic along Sepulveda between Venice and the Exposition alignment, making curbside stops at Palms Boulevard and National Boulevard. Both intersections already have marked stops for Culver City Transit Route 6 and Santa Monica Bus Lines Route 12, which also are routed along Sepulveda. No special station facilities or parking would be implemented for the trolley bus and along the Sepulveda Segment.

Table 5.1
CONCEPTUAL STATION SITE ANALYSIS TABLE

STATION ROUTE/MODE	BUS CONNECTIONS	ADJACENT USES	PLATFORM LAYOUT	PARKING
Vermont Avenue (all routes/modes)	RTD 102, 204, 354 DASH C, LRT	USC, Expo Park Residential	Far side split	On street only P-1
Normandie Ave. (T-bus only)	RTD 102, 206	Residential	Far side split	On street only P-1
Western Ave. (all routes/modes)	RTD 102, 207, 357	Residential Highway retail	Far side split	On street only P-1
Arlington/Van Ness (T-bus only)	RTD 102, 209	Residential Industrial	Far side split	On street only P-1
Crenshaw Blvd. (all routes/modes)	RTD 102, 210 Future N-S line	Commercial Retail, mixed	LRT-Center platform T-bus Far side split	P&R desirable P-2
La Brea Ave. (all routes/modes)	RTD 102, 210	Industrial Residential	LRT-Center platform T-bus Far side split	P&R desirable P-2
La Cienega Ave. (all routes/modes)	RTD 102, 105, 439 Culver City 6 Ballona Bikeway	Industrial Commercial Residential	LRT-Center platform T-bus Far side split	P&R desirable P-2
Venice/Rob Sta. (all routes/modes)	RTD 33, 436, 220 CCT 1, 5, replaced West LA T.C.	Commercial Industrial Residential	Transit Center Potential Separation Grade	P&R desirable Wide ROW,P-3
Motor Avenue (1, 4, LRT, Twy)	Santa Mon 12, 13 C.C.3, LADOT 431	Residential	LRT-Center Platform T-bus Far side split	On street only P-1
I-405/EXPO (1, 2, 4 all)	SM 7,CC6,LAX-Palmdale service	Industrial Commercial	Transit Center at-grade	P&R necessary wide ROW,P-3
Bundy Avenue (1, 2, 4 all)	Santa Mon 10, 14	Industrial Residential	LRT-Center Platform T-bus Far side split	On street only P-1
Cloverfield (1, 2, 4 all)	SM 1, 9, 10, 11 shuttles	3 Commercial developments Industrial	LRT-Center platform T-bus Far side split	P&R desirable P-3
Palms (T-bus)	CC6, SM 12	Commercial Residential	Curb	On street only P-1
National (T-bus)	CC6, SM12	Residential/ Commercial	Curb	On street only P-1
Overland Ave. (2, 5, T-bus)	RTD 33, CC 3	Commercial Residential	Far side split	On street only P-1
Sepulveda/405 (2, 5, T-bus)	RTD 33, CC 6	Commercial Residential	Far side split	On street only P-3

PARKING ESTIMATES: P-1 = 0 - 50 spaces
P-2 = 51 - 200 spaces
P-3 = 201+ spaces

Table 5.1 (continued)

STATION SITE ANALYSIS TABLE

STATION (ROUTE/MODE)	BUS CONNECTIONS	ADJACENT USES	PLATFORM LAYOUT	PARKING
Centinela (5, T-bus)	RTD 33, SM 14	Residential	Far side split	On street only P-1
Lincoln Blvd. (5, T-bus)	RTD 33, SM 2 CC 2	Residential Commercial	Far side split	On street only P-1
Venice Beach (5, T-bus)	RTD 33, CC 1 SM 1, 2	Residential Commercial	Center platform near traffic circle	On street only P-1
Ocean Park (5, T-bus)	RTD 33, SM 1, 2	Residential Commercial	Far side split	On street only P-1
4th/Colorado (1, 2, 4, 5, LRT, T-bus)	RTD, SMMBL many routes nearby	Commercial Office Retail	Center Platform on aerial site Terminal of line	P&R desirable P-3

NOTE: If the Route 1, 2 and 4 alignments do not continue to downtown Santa Monica, the western terminus of the existing alignment would be located at 17th Street, Santa Monica, a north-south local street between Olympic Boulevard and Colorado Avenue. This site lies in an industrial area with no transit connections and no available space for parking. The site would contain several tracks and 1-2 platforms to support a terminal function.

PARKING ESTIMATES: P-1 = 0 - 50 spaces
P-2 = 51 - 200 spaces
P-3 = 201+ spaces

Source: BRW, Inc., December 1991.

Route 4 - LRT, Transitway

Route 4, between Motor Avenue and I-405, utilizes a potential alignment along the I-10 freeway. There are no station stops or transit boarding areas proposed for siting in this 1.5 mile segment where Route 1 and 4 differ. Accordingly, the station sites and transit boarding areas proposed for Route 1 in the previous section are identical for Route 4.

Route 5 - Trolley Bus

The Trolley Bus on Route 5 would utilize Route 1 to Venice/Robertson, then continue west in the median of Venice Boulevard on exclusive lanes to Venice Way, turning north along Main Street to 4th and Colorado in Santa Monica. Curbside stops would be employed along the north-south segment.

Transitway Access Points

On Routes 1 and 4, which would include the transitway between Vermont and Cloverfield, transitway vehicle access points could be located at the same points as LRT stations. In each case, the transitway would offer carpools and vanpools the opportunity to enter or exit in both directions, using a traffic signal for protection. In those areas where grade separation is proposed, the access point could be moved to the nearest at-grade cross-street.

5.2 TRAFFIC OPERATIONS ANALYSIS

Traffic capacity analysis was conducted at selected locations along the Exposition Right-of-Way and potential route modifications. Results of the analysis of selected intersections were then applied to the remaining segments of the proposed transit line. This analysis identifies traffic impacts associated with the project which may need further study at the EIR level.

5.2.1 Levels of Traffic Control

Conflicts between transit vehicles and cross traffic can either be avoided by grade separation or controlled with gates, signals, and signs. Four levels of control are identified. They are (1) grade separation, (2) gate protection, (3) signal control, and (4) mixed flow operation. Should the decision be made to construct a bikeway along the alignment, similar methods of control might be implemented. The following is a summary of levels of traffic control:

- ***Grade Separation:*** Cross Traffic on streets are separated from the transit project by means of bridges or tunnels. Grade separation is recommended at existing bridges and tunnels, along any of the route options using freeway right-of-way, and where it is the only mitigation measure for traffic impacts.
- ***Gate Protection:*** Cross Traffic is stopped by gates while transit vehicles cross the street. This is recommended along the Exposition Right-of-Way, except where traffic impacts require grade separation, where the right-of-way is too narrow to

contain gates, or where noise impacts to the neighborhood forbid the use of gates with bells.

- ***Signal Control:*** Street traffic and transit vehicles are both controlled by traffic signals. This is recommended where gate protection is not feasible and where sufficient right-of-way width can be obtained to separate transit vehicles or bicycles from traffic. Possible sites include the Exposition Right-of-Way between Vermont Avenue and Gramercy Place, and the median of Venice Boulevard.
- ***Mixed Flow:*** Transit vehicles operate in the same lanes of traffic as regular street traffic and are controlled by traffic signals. This is recommended where the street right-of-way is too narrow to separate transit vehicles from street traffic, such as Sepulveda Boulevard, Pacific Avenue/Neilson Way, and Main Street.

5.2.2 Locations for Traffic Analysis

The four representative intersections that were selected for analysis are shown in Figure 5-6. They were selected because their roadway configurations represent different typical conditions along the alignment. The four sites were:

1. Western Avenue and Exposition Boulevard
2. Overland Avenue and Exposition Right-of-Way.
3. Cloverfield Boulevard and Olympic Boulevard.
4. Venice Boulevard and Sepulveda Boulevard.

5.2.3 Assumptions in Transit Operation

For the traffic analysis, the following assumptions were made regarding the operation of vehicles along the right-of-way:

- *LRT operations* were governed either by gate control or signal control. Grade separations were also an option. Vehicle headways were assumed to be 5 minutes during the peak periods.
- *Trolley-bus operations* were governed by signal control. Although gate control is feasible, it was not analyzed. Trolley operations under gate control would result in similar traffic impacts as for LRT under gate control. Four minute headways were assumed during the peak periods.
- *Transitway with HOV* was governed by signal control. Although gate control could be feasible, it was not analyzed. Four minute headways were assumed for transit buses during the peak periods. The number of carpools and vanpools was not predicted. Instead, a calculation was made to determine the maximum number of carpools and vanpools allowed on the transitway without impacting traffic.

Traffic Analysis Study Intersections

Figure 5-6



Source: BRW, Inc., June 1991

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Exposition Branch

Links to Downtown Los Angeles and Santa Monica

Study Sites

0 1 2 miles

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

5.2.4 Assessment of Transitway Operations

The transitway options posed a group of difficult operational and policy questions for the feasibility analysis. Operational issues included:

- Vehicle collection and distribution access at end points and leaving to intermediate intersections.
- Facility requirements for operational flexibility during breakdowns, transit vehicle stops, and closures.
- Safety in multi-lane operations given varying vehicle speeds, passing needs, and separations between opposite lanes.

Policy issues centered on the willingness of the City of Los Angeles to accommodate the timing need for the efficient flow of transitway vehicles. This would include potential transit vehicle prioritization, within the City's current signal phasing strategies and system control technologies. Each transit vehicle movement has an effect on intersection delays.

Figures 5-7A and 5-7B illustrate a typical transitway intersection and list several key issues, including:

- Vehicle backups blocking intersections.
- Intermediate point access may be best in mid-block.
- Vehicles may become blocked by buses unless bypass lane exists in middle of facility, which may be bi-directional if only one lane can be built.
- Traffic control in platoon or random configuration.
- Any turning movements may inhibit smooth traffic flow.

5.2.5 Summary By Mode

This section summarizes the segment-by-segment recommendations of the previous section, with sections for each modal option.

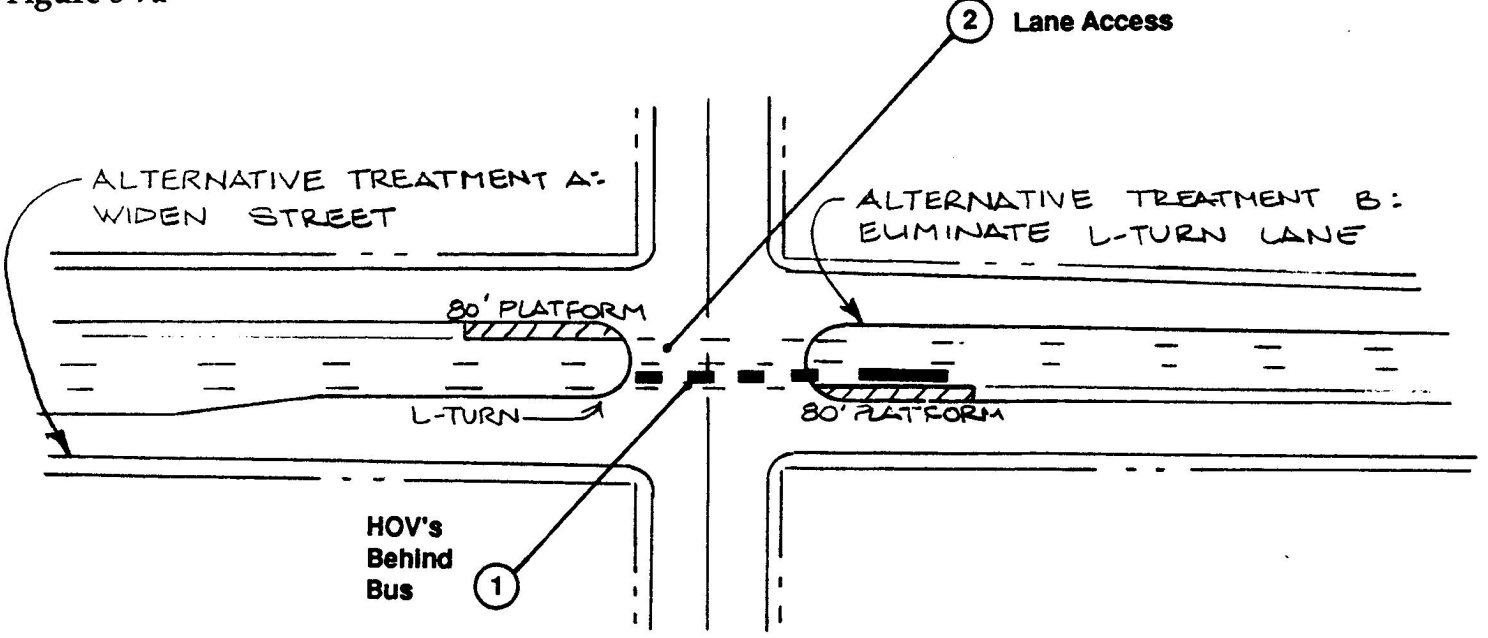
LRT

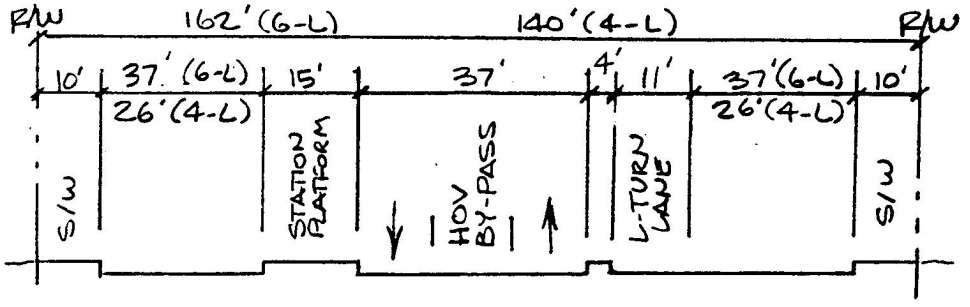
- *Exposition Right-of-Way:* Between Vermont Avenue and Gramercy Place, the LRT should be located in the median of Exposition Boulevard, controlled by signals. Many of the minor street crossings on this segment should be closed, to reduce conflicts with automobiles. West of Gramercy Place, all grade crossings could be controlled by gates. An alternative to gate control is signal control, which may be preferable at residential crossings like Buckingham Road, Farmdale Avenue, and Bagley Street.

  However, a mixture of signal control and gate control will hamper LRT operations. Existing grade separations over National Boulevard (near Palms Boulevard) and

Assessment of Transitway Operations

Figure 5-7a





HOV BYPASS LANE OPTION

3 Right-of-Way Width

CRITICAL ISSUES:

1. **BACKUP OF HOV'S AT STOPS - BLOCK INTERSECTION**
2. **HOV LANE ACCESS - PROBABLY MID-BLOCK**
3. **WIDTH REQUIRED ADDS 8' EACH SIDE**

Source: BRW, Inc., 4 March 1992

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

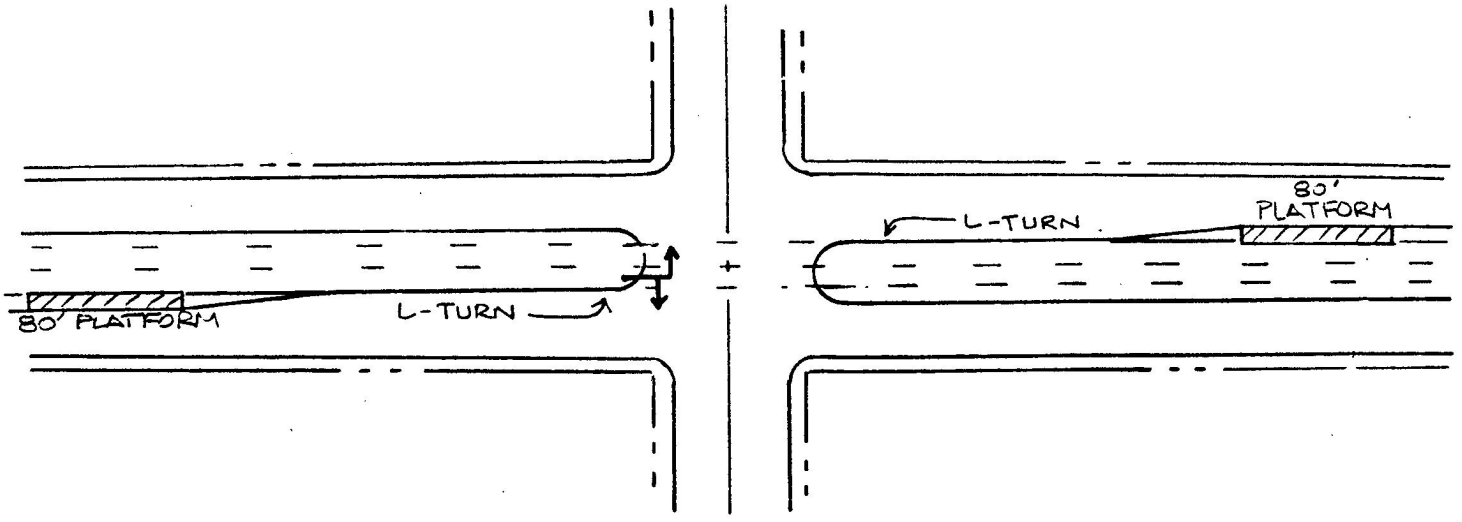
0 15' 30'
feet

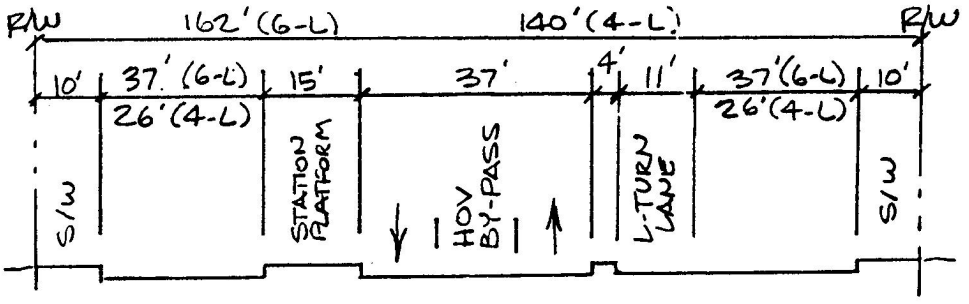
R

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Assessment of Transitway Operations

Figure 5-7b





HOV BYPASS LANE OPTION

Source: BRW, Inc., 4 March 1992

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

0 15' 30'
feet

R

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Motor Avenue should be retained. Possible new grade separations include La Brea Avenue, La Cienega Boulevard, Washington Boulevard, Venice Boulevard, Overland Avenue, Sepulveda Boulevard, Pico Boulevard, Bundy Drive, and Cloverfield Boulevard.

Trolley Bus

- *Exposition Right-of-Way:* Between Vermont Avenue and Gramercy Place, the trolley bus could be located in the median of Exposition Boulevard, controlled by signals. Many of the median cuts on this segment should be closed, to reduce conflicts with automobiles. If these cuts are not closed, then the trolley bus should operate in mixed flow. Between Crenshaw Boulevard and Ballona Creek, all grade crossings should be controlled by signals, with potential grade separations at Crenshaw Boulevard, La Brea Avenue, and La Cienega Boulevard. Then it should travel on an aerial structure over Washington Boulevard and Venice Boulevard. West of Venice Boulevard and extending to Cloverfield Boulevard, all grade crossings should be signal controlled. Existing grade separations over National Boulevard (near Palms Boulevard) and Motor Avenue should be retained. Possible new grade separations include Overland Avenue, Sepulveda Boulevard, Pico Boulevard, and Bundy Drive. At Cloverfield Boulevard, mixed flow operation is feasible.
- *Venice Boulevard and the Coastal Route:* Trolley bus should operate in mixed flow west of Lincoln. However, for the segment between Robertson Boulevard and Lincoln, a median-running signal controlled operation is feasible if traffic impacts or loss of parking and a bicycle lane is acceptable.
- *Sepulveda Boulevard between Venice Boulevard and the Exposition Right-of-Way:* Trolley bus should operate in mixed flow due to the inability of Sepulveda Boulevard to accommodate an exclusive lane for the Trolley-bus.

Transitway

For transit vehicles, the recommendations are the same as trolley bus. For other vehicles, see Section 5.2.4.

Bikeway

Between Vermont Avenue and Gramercy Place, bicyclists would need to ride in mixed flow on a bike route since insufficient width is available for a separate bike route. The bikeway should begin at Gramercy Place and extend westward towards Santa Monica. The bikeway should provide either stop sign control or signal control at all grade crossings. New signals may be needed to help bicyclists cross streets like La Brea Avenue and Overland Avenue. The Bikeway generally will parallel the potential transit alignment as a supplemental facility.

Table 5-2 provides a summary of potential traffic control techniques, along with additional elements such as stations and parking, for all route segments. This table was presented

Table 5.2

POTENTIAL TRAFFIC CONTROL ACTIONS

	GRADE SEPARATIONS	GATE CONTROL	SIGNAL CONTROL	MIXED FLOW	OTHER
LIGHT RAIL					
Vermont – Gramercy Pl.	None	No	Yes	No	Close minor crossings*
Gramercy Pl. – Ballona Creek	Crenshaw, La Brea, La Cienega	Yes	Only in Residential Area near Dorsey High	No	Close minor crossings*
Ballona Creek – Robertson	Venice, National, Washington	Hayden	No	No	Close ped. crossings*
Robertson – Sepulveda Blvd.	Overland, Sepulveda(•)	Bagley, Westwood, Military	No	No	
Sepulveda Blvd. – 4th/Colorado (sm)	Bundy(•) Cloverfield, Pico(•)	Yes	No	No	
TROLLEY BUS					
Exposition R-O-W: Vermont – Gramercy Pl.	No	No	Yes(1)	No	Close minor crossings
Exposition R-O-W Gramercy Pl. – Ballona Creek	Crenshaw, La Brea, La Cienega	No	Yes	No	
Exposition R-O-W Ballona Creek – Venice Blvd.	Venice, National Washington	No	No	No	
Exposition R-O-W Robertson – Sepulveda	Overland, Sepulveda(•)	No	Bagley Westwood Military	No	
Exposition R-O-W Sepulveda Blvd.	Cloverfield, Pico(•) Bundy(•)	No	Yes	No	
Venice Blvd. – Robertson to I-405	No	No	No	No	
Venice Blvd. – I-405 to Main	No	No	No	Yes, west of Lincoln	
Main Street/Pacific – Vehicle Blvd. to Santa Monica	No	No	No	Yes	One-Way Pair

(•) Requires additional study in Environmental Report (EIR)
(1) Depends on U-Turn configuration
* Closed minor street crossing right-of-way would be replaced with a protected crossing at wide intervals

to the PRT and public to help summarize the potential transit and roadway installation in the entire Corridor.

5.3 TRAVEL TIME COMPARISON

This section describes current and estimated future travel times for the modal and route alternatives within the Study area. Travel time provides a useful measure of mobility conditions within the Study area, as follows:

- ***Congestion*** – The existing level of congestion and resultant delay to travellers is a good indicator of the severity of mobility constraints affecting today's users of both freeway and transit facilities.
- ***Attraction*** – The average speed of present and future transit service has a strong impact on the number of riders attracted to use of the service, versus other modal alternatives such as the single–occupant vehicle.
- ***Competition*** – the relative speeds of different modal and service alternatives also influence the choice of the traveller. In general, higher average speeds attract more users, although other elements such as trip length, fare structure, service access (via auto, transit, or walking), and amenities also are part of a trip–making decision.

In analyzing travel time, the primary elements are trip miles, estimated travel time, and the comparison between different modal options for similar trips.

5.3.1 Assumptions

Prior to analyzing travel time, several assumptions and data gathering techniques are described in this section.

- **Existing Transit Travel Times** – The current bus schedules for SCRTD, Culver City Transit, Santa Monica Municipal Bus Lines, and LADOT were utilized. These schedules contained 1991 peak/off–peak travel times which were assumed to be accurate. While the actual performance of any given transit trip may vary slightly due to localized delays, schedules are assumed to represent a valid average or *typical* trip for the affected routes.
- **Existing Automobile Travel Times** – In order to represent auto travel time accurately and fairly, several trips were made by automobile within the Corridor at normal speeds and at varying times of day on weekdays. As with transit trips, specific local problems such as an accident can affect travel time; therefore, multiple trips were made to provide an average and to eliminate localized delays.
- **Future Transit Travel Times** – In order to estimate transit travel times consistently in the future, average speed assumptions were developed based on station spacing, alignment characteristics, vehicle types, and any other potential influences. In general, top speeds were based on today's technology of 55–

60mph, with the alignment design assuming favorable speed conditions except where prohibited by regulation, such as reduced speeds in a non-exclusive right-of-way.

The estimated average speeds for all three modes are:

- 40 mph on exclusive right-of-way
- 35 mph on a fenced or median alignment
- 25 mph on an arterial alignment, where the posted speed governs both transit and adjacent automobile traffic.

In addition to average speeds (based on maximum authorized speed), the effect of station spacing and station dwell time must be included. It was assumed that station spacing of less than one mile (which mainly occurs in the trolley bus modal alternative) reduces average speed by 5 mph. Stations designated as large (such as Transit Centers) receive an additional 5 seconds of dwell time, while LRT dwell time is slightly less than other transit vehicles.

In assessing travel time, the effect of traffic control prioritization must be addressed, since potential alignments may include operations through intersections and varying forms of railroad crossing control ranging from railroad-style gates to highway-type signals. The travel time estimates included in this section were estimated with these additional assumptions for all modes:

- Major intersections have signal phasing where the cross street receives 60% of the cycle's green time, with a cycle length of 120 seconds. Minor intersections have full preemption for the transit alternative.
- *Trolley Bus Only* - Acceleration/deceleration rates adjusted for electric operation.
- *Grade Separations* - Only one facility is included. Implementation of more grade separations could reduce travel time.

5.3.2 Travel Time Analysis

This section provides existing and estimated future peak travel times for the entire Exposition Corridor. Off-peak times are generally 10-20% less, although off-peak conditions on I-10 and Venice Boulevard often are comparable to peak congestion and travel times.

Routings could include several potential transit paths, but the focus will be on trips using I-10, which are shown in the accompanying table. In the future, potential end-to-end Exposition services could include LRT, transit vehicles on transitway, and trolley bus in exclusive lanes along several routes, all of which are described in Table 5.3.

Table 5.3
CORRIDOR TRAVEL TIMES

Current Travel Time - LACBD to Santa Monica CBD (4th/Colorado)

Mode	Routing	Mileage	Travel Time
Auto	I-10	14.0	40 mins.
Bus (434)	I-10	14.0	43 mins.
Bus (SM 10)	I-10, Bundy	14.5	46 mins.
Bus (436)	I-10, Venice, Main	15.0	55 mins.
Bus (33)	Venice, Main	15.0	70 mins.
Bus (333 to O.P.)	Venice, Main	15.0	60 mins.
Auto	I-10, Venice, Main	15.0	55 mins.
Auto	Pico	14.0	50 mins.

Estimated Future Travel Times - LACBD - Santa Monica CBD

Mode	Study Route	Mileage	Estimated Travel Time
LRT (Partial Priority)	1	15.0	38 mins.
LRT (Full Priority)**	1	15.0	34 mins.
Transitway bus	1	15.0	46 mins.
Transitway auto	1	15.0	33 mins.
Trolley Bus	1	15.0	47 mins.
Bicycle	1	15.0	60 mins.
Trolley Bus	2	16.0	52 mins.*
LRT (Partial Priority)	4	15.0	38 mins.
LRT (Full Priority)**	4	15.0	34 mins.
Transitway bus	4	15.0	45 mins.
Transitway auto	4	15.0	32 mins.
Trolley Bus	5	16.0	62 mins.

* Includes mixed-flow street running for two (2) miles with no exclusive lanes.

** Full priority provides green signals for transit at all times, partial priority provides green signals about 50% of the time.

Source: BRW & MPA; February 1992

The analysis demonstrates that LRT along Routes 1 and 4 will have the fastest travel time, including station stops. While the multi-occupant automobile on the transitway also enjoys a fast trip, this assumes that the automobile enjoys priority at all intersections and is not delayed by lights, slower vehicles, or transit vehicle stops along the facility.

5.4 OPERATING PLANS AND COSTS

5.4.1 Overview

This section describes potential operating plans for transit service in the Exposition Corridor, for use both in comparing options and as detailed operating and maintenance cost estimates. Costs of this nature are typically derived by developing proposed operating plans and then annualizing. This section also contains service levels for transit vehicles on each facility (LRT, Transitway, and Trolley Bus on exclusive right-of-way).

The cost of facility maintenance for any exclusive paved roadways, specialized traffic prioritization systems, and landscaping, must also be included. An annualization factor of 310 days was used to allow for reduced service levels on weekends and holidays. This recognizes the need for mobility improvements at off-peak times, such as summer weekends and holidays when beach traffic requires greater transit access due to congestion and parking shortages.

This section covers operating scenarios for each mode on the route options. Light Rail Transit service is described on Routes 1 and 4, while the trolley bus service is described for Routes 1, 2, and 5. The transit vehicle on transitway service is described for Routes 1 and 4. In the case of both LRT and transitway, since Routes 1 and 4 are essentially parallel over the same distance with only minor differences in estimated travel time, the same operating plans apply to each mode on both routes.

In order to provide consistent comparisons, all routes and modes extend from near USC at Vermont Avenue on the east to 4th and Colorado on the west, near the Santa Monica CBD. Since the existing terminus of the Exposition rail alignment is located in eastern Santa Monica where there are few opportunities or facilities to support a transit hub, the downtown terminus is considered more desirable and is consistent with the City of Santa Monica's improved transit service to the downtown core.

Table 5.4 shows a comparison of travel times for the three modes between downtown Los Angeles and Robertson, which follow an identical route. The five options west of Robertson differ by route and mode, as shown. Although each operating plan is intended to cover the entire corridor, potential staged implementation strategies could result in partial transit service implementation at first, with subsequent activations of remaining segments as funding becomes available. The travel time summary illustrates the consistency of the alternatives from the LACBD and Vermont to Venice/Robertson, as well as the diversity of travel times to the west of the Corridor's mid-point and is consistent with earlier sections for travel times and stops.

Table 5.4
SUMMARY OF TRAVEL TIMES

ROUTE SEGMENT	MODE	TRAVEL TIME ESTIMATE
LACBD - Venice/Robertson	LRT	21 minutes
LACBD - Venice/Robertson	Transitway bus	28 minutes
LACBD - Venice/Robertson	Trolley bus	29 minutes
V/R - SMCBD via Rt. 1	LRT	13 minutes
V/R - SMCBD via Rt. 1	Trolley bus	18 minutes
V/R - SMCBD via Rt. 2	Trolley bus	23 minutes
V/R - SMCBD via Rt. 4	LRT	13 minutes
V/R - SMCBD via Rt. 5	Trolley bus	33 minutes

Source: BRW & MPA; March 1992

LEGEND: LACBD = Los Angeles Central Business District
SMCBD = Santa Monica Central Business District
V/R = Venice & Robertson

5.4.2 Conceptual Light Rail Transit Operating Plan

LRT service would be similar to the existing Metro Blue Line, incorporating enhancements to expand service capacity, quality, and mobility improvements in future years. The ultimate proposed headway for the Exposition Light Rail service would be every 4–6 minutes during peak periods, with two or three–car trains provided in both directions. The Blue Line uses two–car trains, train length is dictated by platform length, and expanded platforms (approximately 250 feet in length) allow for three–car trains in the future as planned on the Metro BlueLine. This analysis assumes two–car trains in peak periods.

Vehicle capacity is assumed to be a total of approximately 150 riders (crush load), or 150% of seated capacity. The peak period would extend for six hours per weekday, with three–hour morning and evening periods. The remainder of the 16–hour service day, from 5 a.m. to 9 p.m., would provide base service with one or two vehicles on a 10–minute headway during midday and early evening. Weekend service would ultimately provide a consistent 10–minute headway.

A minimum of 11 train sets, or 33 LRVs, are required to cover this service pattern (Fleet size is actually larger since a 20 percent spare ratio, is required to provide reliable service given vehicle servicing requirements). This equipment would be interchangeable with Long Beach and Pasadena BlueLine operations).

Based on a route length of 13 miles from Vermont Avenue to Downtown Santa Monica, (including a potential layover or turning area beyond the terminal stations), the following service indicators are estimated.

Service Type	Daily Car-Hours	Daily Cost	Annual Car-Hours	Annual Cost
Peak (2 cars)	288	$51.8K	89.3K	$16.07 Mil
Base (1 car)	120	$21.6K	37.2K	$ 6.70 Mil
TOTAL	**408**	**$73.4K**	**126.5K**	**$22.77 Mil**

These costs are stated in 1991 dollars, and are fully allocated based on recent FTA Section 15 Data.

Daily car hours is a function of the number of revenue trips per hour times the number of peak and off-peak hours and applicable train sizes, excluding non-revenue hours. The associated cost is fully allocated and includes facilities and guideway maintenance. These costs are only for planning and comparative purposes. Further LACTC operations policies and potential ridership will be the basis for actual costs.

5.4.3 Transit Vehicle on Transitway

Transit vehicles operating on the transitway would be comparable to high-frequency express service on the El Monte Busway. The vehicles could be standard; articulated diesel coaches; or have advanced design features, alternative fuels/power sources, expanded seating (double-deck or extra width/length) or even a Truck/Trailer concept such as the "SuperBus" operated from Fullerton to Los Angeles. The maximum assumed vehicle capacity is 96 riders both seated and standing. The transit service would operate every four to six minutes during the peak period along Routes 1 and 4, similar to LRT. Base service would be offered every ten minutes, with a total operating day of sixteen hours. Weekend service would offer a consistent ten minute headway throughout the day. If service expansion proved desirable over the years, the headways could be adjusted or increased according to demand.

A minimum of 14 vehicles are required to provide the peak-period service under optimum conditions, with 3 additional vehicles needed as spares. Based on a route length of 13 miles, including a turning route or loop, estimated service indicators along Route 1 are as follows:

Service Type	Daily Bus-Hours	Daily Cost	Annual Bus-Hours	Annual Cost
Peak	144	10.9K	44.6K	$3.39 Mil
Base	120	9.1K	37.2K	$2.82 Mil
TOTAL	**264**	**20.0K**	**81.8K**	**$6.21 Mil**

Transit vehicle operating costs do not include guideway maintenance figures such as platform maintenance. It is estimated that an additional $150,000 per year would be required for these additional transit-related costs, assuming weekly cleaning and occasional repairs or landscaping at each stop location. Since articulated buses would be used, and platform lengths must be capable of accommodating up to two sixty foot vehicles at once, platform length of 120 feet was assumed.

It should be noted that the transitway will carry other multi-occupant vehicles. No tolls or user fees are assumed but since the transitway and associated facilities (such as access paths, traffic signal prioritization, and landscaping) must be maintained, additional facilities maintenance cost must be added. The estimated annual facility maintenance cost for the thirteen mile facility is $65,000, based on a cost of $5,000 per roadway mile.

5.4.4 Trolley Bus (On Exclusive Lanes)

Trolley bus service would operate on exclusive lanes similar to the transitway, but only electric trolley buses would be allowed. This concept allows trolley bus service top priority, and full facility maintenance must be allocated to the service since there are no other users. The trolley bus service would operate on Routes 1, 2, and 5 in exclusive lanes, with the only exception being a segment of Route 2 along Sepulveda Boulevard, where the trolley bus must resort to mixed flow operations similar to normal on-street bus service. Since the trolley bus service and facility would be offered as a competitor to automobile travel, service characteristics would include high frequency operations with articulated vehicles and relatively few stops with operating speeds as high as current technology allows (currently approximately 45-50 mph).

The trolley bus service would operate every four to six minutes in both directions during peak periods and every ten minutes during base periods. If ridership expanded, headways could be adjusted. Vehicle capacity is assumed to be identical to the transit vehicles in the transitway section (90 per vehicle), but costs are slightly lower due to the efficiency of electrical power. Service indicators along Route 1 are:

Service Type	Daily T-Bus Hours	Daily O&M Cost	Annual T-bus Hours	Annual Cost
Peak	144	8.64K	44.6K	$2.68 Mil
Base	120	7.20K	37.2K	$2.23 Mil
TOTAL	**264**	**15.84K**	**81.8K**	**$4.91 Mil**

5.4.5 Summary of Operating Plans and Costs

Table 5.5 summarizes the fleet sizes (for optimum conditions), daily and annual revenue hours by mode and O&M costs to provide comparable service under each option. Also, since ridership data is not yet available, the capacities of each mode must be considered as cost efficiency data develop. For instance, LRT generally can carry three to four times the number of riders as carried by a transit-bus.

Table 5.5

SUMMARY OF MODAL OPTION OPERATING COSTS ALONG ROUTE 1

Option	Fleet Size	Annual Rev. Hours	Annual O&M Cost	Cost Per Place/Mile*
LRT	40	126.5K	$22.771 M+	$.87
Transitway	17	81.8K	$6.21 M+	$.72
Trolley Bus	17	81.8K	$4.91 M+	$.91

Source: BRW, Inc., March 1992 from Section 15 data

NOTE: + = Includes facility maintenance cost for the guideway, but does not include any cost for a maintenance facility or storage yard beyond the turning areas described in text on page 5-27.

* = Place mile is a capacity measure which consists of total seated and standing spaces travelling one mile in the Corridor.

5.5 CAPITAL COST ESTIMATES

This section presents the conceptual cost estimates for the preferred LRT, transitway, and trolley bus options in 1991 dollars.

5.5.1 Capital Cost Assumptions

A methodology was developed to estimate capital costs using data from the Rail Construction Corporation (RCC) of the LACTC and other local sources. Key assumptions used in this work include:

- LRT and trolley bus options begin at Vermont/Exposition Boulevard and terminate at 4th Avenue/Colorado Avenue in Santa Monica.
- Transitway option begins at Vermont/Exposition Boulevard and terminates at 17th Avenue in Santa Monica.
- No hazardous materials appear to be located within the route alternatives.
- The conceptual costs for each option and route location are divided into three categories:
  - Construction costs including vehicle and light maintenance facility and storage yard costs
  - Right-of-way costs
  - Support costs
- Unit cost assumptions were reviewed by the Rail Construction Corporation staff prior to preparation of this estimate.

The estimated acquisition costs for station site areas and minor site refinements were developed based on comparable land values in the adjacent areas obtained from James Wiley, LACTC Manager of Real Estate, recent transactions recorded at the County Assessor's office and on professional judgment.

5.5.2 SUPPORT COSTS

Support costs are allowances for contingencies, engineering design, construction management, project administration and start-up. Since the project design is conceptual, a contingency of 25% is applied to both construction and right-of-way costs for unforeseen expenses. The cost of administration, engineering and construction management is estimated at 25% of the base plus contingency. Start-up costs are estimated to be 2% of the base cost plus contingency. In addition to the items listed above, an allowance for testing and pre-ops, insurance and master agreements are estimated at 20% of the base cost, plus contingency.

5.5.3 CONCEPTUAL COST ESTIMATES

The capital cost estimate for each option by route is displayed in Table 5.6.

5.6 LINKAGES TO DOWNTOWN LOS ANGELES AND SANTA MONICA

This section provides information on potential linkages between the Exposition Right-of-Way Study area and the Central Business Districts of both Los Angeles and Santa Monica, at each end of the Exposition Corridor. The Exposition Corridor Study area

Table 5.6

CONCEPTUAL CAPITAL COST ESTIMATES
(Millions of 1991 Dollars)

OPTION	TOTAL MILES	CONST COSTS	ROW COSTS	SUPP. COSTS	TOTAL COSTS	TOTAL COST PER MILE	TOTAL COST PER PLACE MILE/CAPACITY PROVIDED
LRT							
Route 1	11.9	$326.91	$1.80	$193.81	$522.22	$43.79	$19.72
Route 4 North	11.8	348.09	2.80	212.95	563.84	47.71	22.27
Route 4 South	11.8	351.28	1.80	214.84	567.92	48.05	21.66
TROLLEY BUS							
Route 1	11.9	111.42	1.80	88.12	201.33	16.87	29.33
Route 2	12.9	107.83	1.80	82.22	191.85	14.85	27.95
Route 5	15.1	89.97	21.80	84.06	195.83	12.94	28.53
TRANSITWAY							
Route 1	10.9	56.22	0.80	43.34	100.38	9.22	14.62
Route 4	10.8	95.27	0.80	76.99	173.06	16.06	25.21

Source: BRW, Inc., March 1992

Note: Only one grade-separation at Venice/Robertson is assumed for any of the options. Need for additional grade-separations will be analyzed in the DEIR/FEIR. Approximate typical costs for an overpass are:

- LRT = $9.2 Million
- Trolley Bus = $8.6 Million
- Transitway = $8.6 Million

TUNNEL OPTIONS: If a Tunnel were implemented under Route 1 from Washington to I-405, using cut and cover methods, an additional cost would be $446.4 million, including three stations.

If boring methods were employed, the additional costs would be $323.8 million including three stations.

extends from Vermont Avenue, on the eastern end, to 17th Street in Santa Monica, on the western end.

The ends of the primary study area approach, but do not penetrate, the Central Business Districts (CBD's) of the cities of Los Angeles and Santa Monica. The eastern end of the study area, at Vermont Avenue and Exposition Boulevard, is approximately three miles from the existing Metro Blue Line terminus at Seventh and Flower's Metrocenter Station. The western end of the study area, at the intersection of 17th Street and the existing Exposition rail alignment, is approximately 1.5 miles from the heart of downtown Santa Monica, which is generally considered to include the Civic Plaza and both malls along Third Street, between Wilshire Boulevard on the north and Pico Boulevard on the south.

5.6.1 Overview

In evaluating and describing potential downtown linkages, it is essential to determine the potential route and modal alternatives of each end of the corridor. The assumptions encompass three modal alternatives: LRT, Transitway, and Trolley Bus (on an exclusive alignment). Since each modal alternative can traverse the same distance and access each CBD service area, assumptions will concentrate on modal variations.

- ***Assumption #1*** – The distance between Vermont Avenue/Exposition Boulevard (the eastern end of the study area) and downtown Los Angeles is approximately three miles in length, extending to the vicinity of 7th and Flower in the CBD. For LRT, the assumed linkage is the programmed Metro Blue Line extension from Washington and Flower to Vermont and Exposition at USC. LRT trains would operate as a through service from the Exposition Corridor to the MetroCenter station at 7th and Flower. For the Transitway and Trolley Bus, several potential route options exist. This analysis assumes that the primary route into downtown Los Angeles would lie along Figueroa and Flower, where a surface HOV lane may be implemented by the City. The trolley bus may also utilize a potential route along the eastern end of the acquired Exposition alignment to reach Spring or Main Streets, where the trolley bus would turn north and pass through the east side of the CBD to Union Station and perhaps more distant points. The trolley bus and Transitway alternatives also assume that riders can make a connection with the funded Blue Line LRT extension at Vermont/Exposition, although the trolley bus and transit vehicles on the transitway would also continue into the LACBD.

- ***Assumption #2*** – The linkage between the western end of the Exposition alignment and downtown Santa Monica is assumed to extend approximately 1.5 miles between the Cloverfield Boulevard and Exposition alignment crossing and the Santa Monica CBD. Since the Exposition rail alignment, west of Cloverfield, ends in an industrial area with minimal access to nearby land uses, it is likely that any modal alternative would either end at Cloverfield or divert to other potential alignments west of Cloverfield, such as Olympic Boulevard or Colorado Avenue, to reach the CBD of Santa Monica. The City of Santa Monica has expressed

interest in utilizing the median of Olympic Boulevard as far as Lincoln Boulevard, with an appropriate segment to reach a potential terminus at 4th and Colorado.

- ***Assumption #3*** – All three modal alternatives would have exclusive lanes (in street) or an exclusive guideway, which may include grade separation at key intersections or other points. Operation in mixed traffic will not be included, unless no other reasonable method can be devised to accommodate vehicles in a specific area, such as a turn–around facility or loop in a downtown setting. The transitway alternative may end at the eastern edge of the Santa Monica city limits, near Cloverfield or Bundy, in order to better serve as a collection and distribution facility.

5.6.2 Evaluation Of Downtown Linkages

The assessment of potential linkages into the downtown CBD's of Los Angeles and Santa Monica required the development of practical evaluation criteria, which are:

- **Routing:** What are the potential alignments for each of the three modes?
- **Terminals:** Where would the proposed terminus of each mode be located, and what functions could it serve as a transportation center or hub? Could one or more modes also be continued beyond the CBD as part of a system routing strategy?
- **Constraints:** What issues could each route encounter, such as traffic impacts, land use incompatibility, physical obstacles, and/or community concerns?
- **Implementation:** Would the alternative be unusually costly to design or implement, and would the service be attractive to the universe of potential transit users?

5.6.3 Vermont/Exposition To Los Angeles CBD

- ***LRT:*** Light Rail Transit could be extended to downtown Los Angeles by utilizing the proposed alignment currently under environmental analysis as the USC/Expo Park Extension of the Metro Blue Line. The alignment would proceed east along the south edge of the USC campus, then turn north to follow Flower Street to Washington, where the alignment would join with the existing Blue Line and proceed into the MetroCenter station. Several options are under review to design this connection in another LACTC study.

  This alignment, once refined through the environmental process, would be about 2.5 miles long, with two distinct stations near Jefferson (the northern edge of USC) and 23rd Street, where a connection with the Harbor Freeway Transitway, and related transit services, would be possible. The third proposed station, named Vermont, would most likely be integrated with the Vermont station discussed in this planning project, and would be located near Vermont Avenue and Exposition Boulevard.

  The estimated travel time by LRT to MetroCenter is approximately eleven minutes, from a shared Vermont station. The alignment passes through older industrial and

commercial uses, with several arterial street crossings and one overpass over the I-110 Freeway. The extension would use the same right-of-way as the existing Blue Line north of Washington Boulevard, to reach 7th and Flower Street. The proposed extension is not complex to design or implement. The Blue Line extension will also offer users the opportunity to transfer to southbound Blue Line service at Pico Station, and the Metro Red Line downtown connection will be available, along with numerous bus routes, at MetroCenter Station.

- ***Transitway:*** The transitway could continue into downtown as an exclusive lane facility, and could be integrated with potential projects such as the Harbor Freeway transitway, and the proposed exclusive flow lanes on Figueroa (northbound) and Flower (southbound). The Los Angeles Department of Transportation is currently considering Transportation Systems Management improvements such as exclusive high occupancy vehicle (HOV) lanes into the CBD.

  The transitway could continue in the median of Exposition Boulevard to Figueroa or Flower, then turn north in exclusive lanes in the direction of downtown. This approach would require the loss of at least one lane on the designated street, and traffic prioritization to maintain desired higher speeds. Upon reaching Washington Boulevard, the transitway would split into two one-way lanes on Flower and Figueroa, with one lane of each arterial converted to transitway use.

  Because of the CBD environment, it is expected that HOV's and other vehicles turning right would be allowed access to these lanes. Traffic control strategies would be required at arterial crossings to provide maximum throughput of all multi-occupant vehicles and buses. Transit boarding areas would be located at significant activity centers or cross streets (approximately one mile apart), with pull-out lanes where feasible to allow buses to leave the flow of traffic. Transit users at Vermont/Exposition could continue downtown on the same vehicle or transfer to LRT, the DASH C route or other nearby SCRTD services, depending on their ultimate destination.

  Linkage could be provided with the Harbor Freeway transitway, which is proposed to rejoin existing streets on the south edge of downtown near 23rd Street and Figueroa. Traffic and transit vehicles from the I-110 transitway could use ramps to join the exclusive lanes on Figueroa/Flower to proceed downtown, with the proposed lane terminus at 7th Street.

  Implementation of the transitway would require conversion of at least one lane in each direction on the affected streets, and use of traffic control strategies to maximize travel time and throughput efficiency.
  Since a transitway could shift traffic onto the special lanes, increased traffic, noise, and safety impacts could be perceived by offices and businesses along the route. If grade separation were used at intersections, or the I-110 transitway junction, visual impacts could occur, although traffic flow would be improved as well.

  The transitway would not be costly or complex to design and implement. Transitway travel time to 7th Street would be about ten minutes for automobiles assuming

traffic priority, and thirteen minutes for transit vehicles. Both multi-occupant vehicles and transit vehicles could continue to and from other destinations at the end of the transitway, or utilize parking or available services such as DASH and RTD to circulate within the CBD from 7th Street.

One additional route option for the transitway is to continue east along the Exposition right-of-way to Main or Spring Streets, then turn north into the east side of town. The trolley bus section below contains a discussion of this alignment.

- ***Trolley Bus:*** The trolley bus would continue into downtown Los Angeles on exclusive lanes similar to the transitway along Flower or Figueroa, with lane use restricted to the trolley bus. Trolley buses would make stops at curbside about every mile to maximize travel time efficiency, with travel time to 7th and Flower estimated at about 13 minutes.

  The trolley bus alignment would be electrified with overhead catenary. If additional trolley bus routes are developed in the future serving the LACBD, then a trolley bus service from the Westside could be through-routed with service to another portion of the area.

  Another option for the trolley bus is the Exposition right-of-way further east to Main and/or Spring Streets. This eastern end of the right-of-way is owned by LACTC and passes through an industrial area which the City of Los Angeles has designated as an Enterprise Zone, with the intent of encouraging redevelopment. The right-of-way would be paved over and electrified for trolley bus, and the appropriate portions of Main or Spring Streets would also be electrified north of the alignment.

  The trolley bus could terminate at Union Station, or continue further as part of a larger regional trolley bus network. The estimated travel time for the trolley bus from Vermont to Union Station is approximately 20 minutes, given the additional distance and potential traffic delays, especially if Main Street is used in the CBD.

  The trolley bus is not unusually complex or expensive to design or implement. Since the Blue Line Extension to USC Expo Park is programmed, the trolley bus could connect there with LRT for the convenience of those wanting to ride the Blue Line, while users to and from downtown Los Angeles could either remain aboard the trolley bus or transfer to LRT, DASH C, or SCRTD depending upon their desired destination.

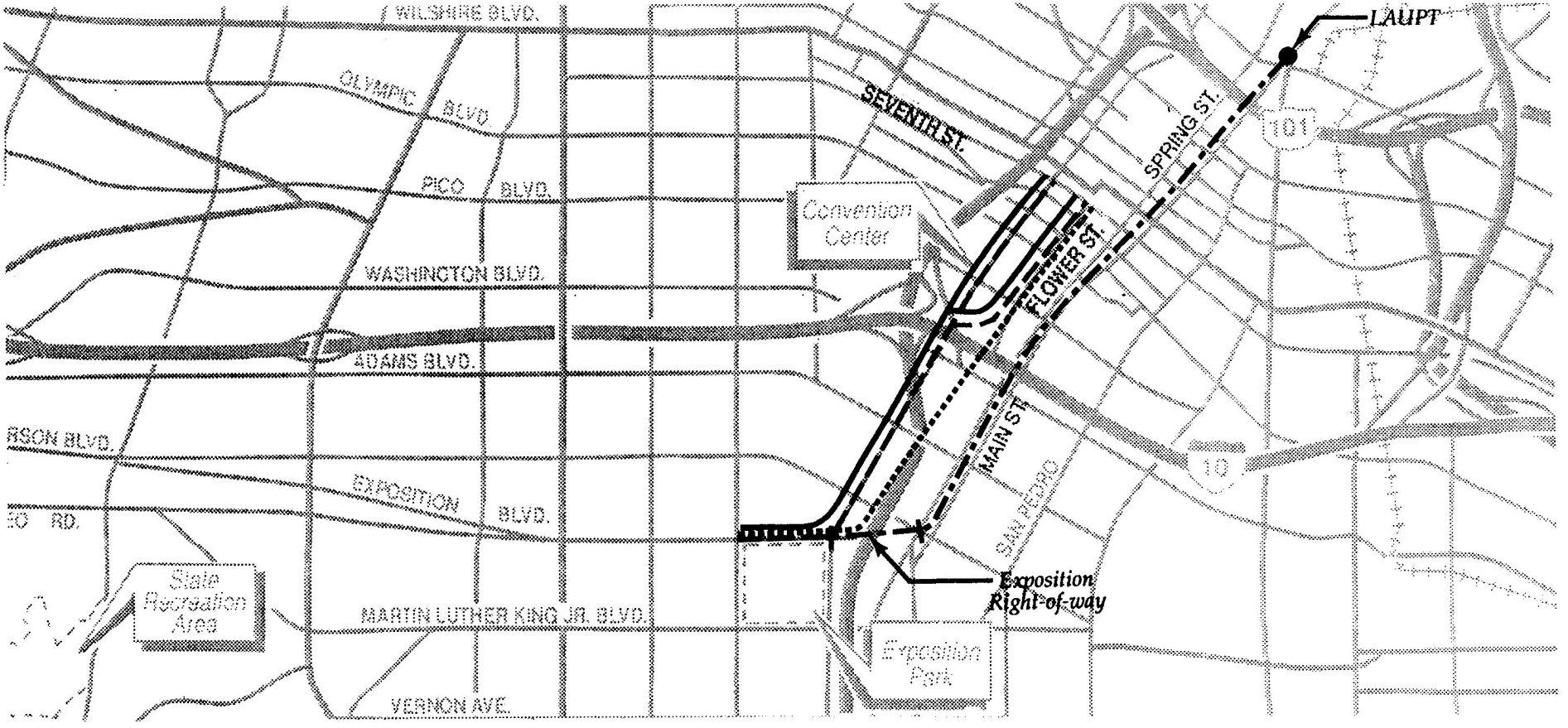
The potential route options are illustrated in Figure 5-8.

5.6.4 Cloverfield To Santa Monica CBD

- ***LRT:*** The City of Santa Monica has already considered a number of routing options for the extension of LRT service into the CBD. For the most part, these options contained variations of an extension from Cloverfield to the CBD via Olympic Boulevard, terminating at either the "Sears" site (at 4th and Colorado),

Linkages to LACBD

Figure 5-8



Source: BRW, Inc., 13 March 1992

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Route Options

- LRT
- Trolley Bus
- Transitway

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Arizona Avenue, or a looping facility in downtown using several streets. While some consideration was also given to using Broadway and/or Colorado Avenue, the Olympic Boulevard alignment was considered in seven out of nine options, due to the route's directness, and minimal impacts by the City along the alignment.

The City has not specifically studied trolley bus or transitway into the CBD, and has expressed concern about both additional automobile traffic (from a transitway) and overhead electric wires in the CBD (required for trolley bus implementation, unless a dual mode vehicle were utilized). Potentially, a transitway could terminate east of the CBD, perhaps near Cloverfield or Bundy, to avoid attracting additional vehicles to the already congested downtown area.

- ***LRT:*** Light Rail Transit would be extended to downtown Santa Monica by utilizing portions of both the Exposition rail alignment and Olympic Boulevard, which contains a median for much of the 1.5 mile distance. Several other streets such as Colorado Avenue, Broadway, and Santa Monica Boulevard parallel the alignment to the north, while Olympic Boulevard and I-10 are parallel facilities to the south. The proposed alignment would utilize Olympic starting at an at-grade crossing just west of the Cloverfield, then use space offered by the Olympic Boulevard median, which is a direct routing in accessing Santa Monica's CBD near 4th and Colorado. West of Lincoln Boulevard, a grade separation and new right-of-way just north of I-10 would be needed to reach the proposed terminus.

  The alignment would not be unusually expensive to design or construct given the current urban setting, although potential grade separations at Lincoln and the terminus could increase design and construction costs. Landscaping along Olympic Boulevard would preserve the attractive nature of the median, which currently hosts trees.

  The estimated travel time of the LRT train over this segment, using exclusive right-of-way with no intermediate stations, is approximately three minutes. The proposed LRT terminus would be near the current Sears property at 4th and Colorado. A grade separated terminal would be costly, but could provide additional parking capacity.

- ***Transitway:*** A transitway could continue into Santa Monica along the same alignment as LRT, with exclusive lanes along Olympic Boulevard in place of the median at least as far as Lincoln Boulevard, a point where the transitway could end and feed both north/south and east/west arterials and the I-10 freeway. The travel time for automobiles and transit vehicles along this segment is approximately two minutes, since the segment is several blocks shorter than the LRT alignment to 4th and Colorado. However, based on the preference of Santa Monica to avoid increased congestion and vehicular movements in the CBD, the transitway could end at or near the Cloverfield crossing of the alignment, where several large mixed-use developments are planned, with parking lots and transit service included in the access plans.

The transitway could end further east near Bundy or I-405, thus serving as a collector facility to eastern points while providing access to I-10, I-405, and nearby arterials. The City of Santa Monica has also purchased a parcel of land (the Bergamot site) near the Cloverfield crossing, which could become a parking facility or an access point to the transitway. The Cloverfield/Exposition intersection could be a useful collection/distribution point for both multi-occupant vehicles and transit riders, since it lies on the eastern edge of the Santa Monica city limits with transit connections available.

Under either scenario, the transitway would not be unusually costly or complex to design or construct, but significant land use or environmental issues are anticipated, possible due to the City's preferences and congestion concerns.

- ***Trolley Bus:*** The trolley bus would access downtown Santa Monica in a similar manner to the transitway and LRT, using Olympic Boulevard west of the Exposition alignment at-grade crossing. Once in downtown Santa Monica, the trolley bus could either serve one specific terminal, or could be routed to circulate through or around the primary destinations in the CBD. Travel time between the Cloverfield boarding area and the first CBD stop (or terminus) would be about 3 minutes, depending on exact boarding area locations.

  In order to maintain travel time, the trolley bus could utilize dedicated lanes or traffic prioritization while circulation through the CBD. The primary potential impact of the trolley bus in the CBD is the introduction of overhead catenary to downtown streets. While LRT would also utilize catenary, LRT would terminate at a site just south of the CBD and north of the Civic Plaza, and enter downtown through a commercial land use area. The trolley bus, on a circulating route through the CBD, could create visual impact issues in retail and office areas.

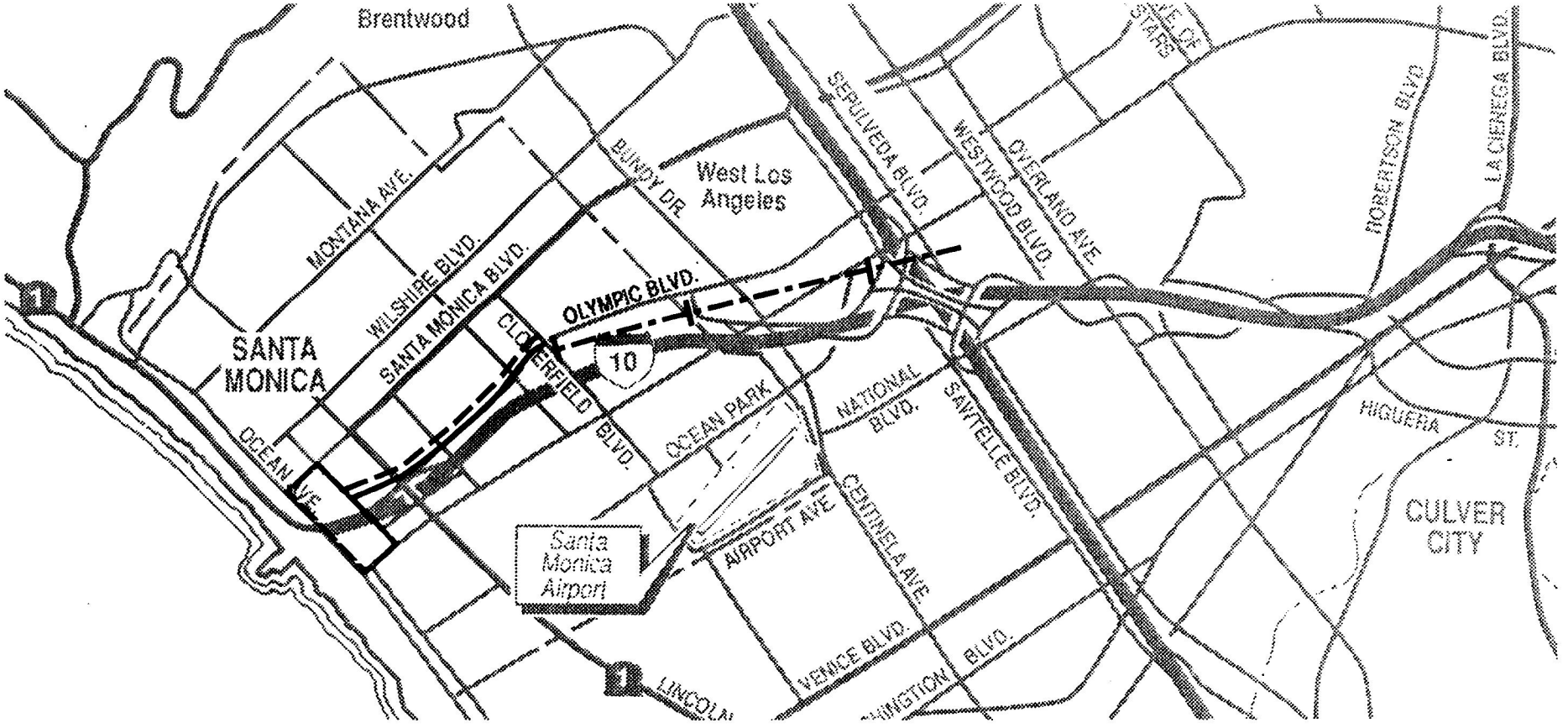
  Alternatively, if the trolley bus only served the 4th and Colorado terminus, with a turning area at that point, then visual impact issues downtown would be avoided for the most part. The trolley bus would not be unusually complex or costly to design or construct. The potential route options are illustrated in Figure 5-9.

5.6.5 Summary of Potential CBD Linkages

In order to realize the full potential benefits of transit access, ridership, and revenue, the Exposition Corridor could access the downtown CBD's of both Los Angeles and Santa Monica, rather than stopping several miles short and requiring a modal transfer. A potential Los Angeles CBD link is already under study with partial or complete funding programming. The potential Santa Monica CBD linkages have been conceptually evaluated. Table 5-7 summarizes the characteristics of each potential link by mode.

Linkages to Santa Monica CBD

Figure 5-9



Source: BRW, Inc., October 1991

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Route Options

- LRT
- Trolley Bus
- Potential Trolley Bus
- Transitway Terminals

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Table 5.7

SUMMARY OF POTENTIAL DOWNTOWN LINKAGES

Modal Option	Possible Route	Distance	Travel Time	Comments
Downtown Los Angeles				
• LRT	Flower to Washington	2.5 miles	11 mins.	Joins Metro Blue Line at Washington.
• Transitway	HOV lanes via Figueroa/Flower	3 miles	10 mins.–Auto 13 mins.–Bus	Converts one lane; Priority needed for HOV's
• Trolley Bus	Exclusive lanes in Flower/Figueroa	3 miles	13 mins.	Converts one lane; Priority needed for Trolley Buses
• Trolley Bus	Expo/Main/Spring/UPT	4.5 miles	20 mins	Regional links – vital to system efficiency
Downtown Santa Monica				
• LRT	Via Olympic to 4th	1.5 miles	2–3 mins.	Potentially Grade Separated from Lincoln west to CBD.
• Transitway	End at Cloverfield or Lincoln or I–405	1 mile	-------	Ends east of CBD to reduce congestion
• Trolley Bus	End at Lincoln or 4th, could circulate in CBD	1 mile	3 mins.	Requires catenary in downtown service area.

Source: BRW, Inc., December 1991

5.7 OVERVIEW OF ENVIRONMENTAL INVENTORY

This section was designed to provide Agency staff, elected officials, and other decision makers with an evaluation of potential environmental impacts that may occur with the construction and operation of the feasible alternatives under consideration.

All of the environmental issue areas listed in the California Environmental Quality Act (CEQA) Law and Guide were evaluated in this task. These issue areas include the following:

- *Earth* – Seismic and Geological Impacts
- *Air Quality* – Mobile and Stationary Emissions
- *Water* – Flooding, Hydrology, and Drainage
- *Plant Life and Animal Life*
- *Noise* – Mobile and Stationary Noise Impacts
- *Light and Glare*
- *Land Use* – Land Use Conflicts, Planned Land Use, and Displacement
- *Natural Resources* – Non–Renewable Resources Used in Construction/ Operation
- *Risk of Upset* – Risk of Explosion or Release of Hazardous Materials
- *Population and Housing* – Growth–Inducing Impacts and Displacement
- *Transportation/Circulation*
- *Public Services* – Police and Fire Services
- *Energy* – Electrical and Natural Gas Consumption
- *Utilities* – Consumption/Generation Rates and Relocation
- *Human Health* – Public Safety Concerns
- *Aesthetics*
- *Recreation* – Demands on Parks and Recreation Facilities/Services
- *Cultural Resources* – Historic, Archaeological, and Cultural Features

No fatal flaws were found during the analysis, but since land uses are a vital part of both this and an subsequent DEIR Study, the assessment was conducted in a manner similar to the CEQA format. Specific elements appear in Appendix C.

5.7.1 Corridor Overview

The project area is located within the Los Angeles metropolitan area. The area is bounded by the Santa Monica Mountains to the north, the San Gabriel Mountains to the east, Baldwin Hills and Palos Verdes Hills to the south, and the Pacific Ocean to the west. The project area is urbanized, with remaining open space generally limited to parks and scattered vacant lots. As an established metropolis, there is considerable variation in land uses. Residential development ranges from single–family neighborhoods to high density multiple–family housing. Commercial uses, likewise, range from small commercial establishments to large scale commercial and employment centers that serve a regional market. Industrial uses are located close to thoroughfares.

5.7.2 Conclusions

Following the completion of the land use surveys, the project team identified those areas that could be adversely impacted by the study alternatives. Table 5.8 summarizes those land uses that could be sensitive to either the construction or operation of the transit projects envisioned in this study. Potential key impacts are illustrated in Figures 5–10 through 5–17.

A summary of constraints noted frequently within Table 5–8 may be useful in anticipating issues which should be addressed in subsequent studies. Potential noise impacts include sensitive receptors (such as residences, hospitals and school facilities) which could be adversely affected by noise generated from the proposed transportation modes. Short–term construction impacts may include both noise generated from construction equipment and pedestrian and vehicular access difficulties encountered during project construction. Potential pedestrian constraints include safety concerns and restricted access following project implementation.

TABLE 5.8
SENSITIVE LAND USES

Location	Land Use	Issue
EXPOSITION ALIGNMENT ONE		
Northeastern corner of Western and Exposition Blvd.	Foshay Junior High School	Potential noise impacts due to transitway operations (LRT, trolley, HOV lane). Short-term construction impacts. Potential pedestrian constraints.
Between 5th Ave. and Crenshaw Blvd.	Industrial Corridor	Rear access may be affected
Exposition Blvd. & Crenshaw Blvd.	Highway & Community Commercial Uses.	Billboard removal.
La Brea Ave. and Exposition Blvd.	Rancho Cienega Recreation Center	Potential impacts are minimal. Short-term construction impacts. Potential pedestrian constraints.
Southwest corner of Farmdale and Exposition Blvd.	Dorsey High School	Potential noise impacts due to transitway operations (LRT, trolley, HOV lane). Short-term construction impacts. Potential pedestrian constraints.
Southwest corner of Hauser and Exposition Blvd.	Baldwin Hills Recreation Center	Potential noise impacts due to transitway operations (LRT, trolley, HOV lane). Short-term construction impacts. Potential pedestrian constraints.
Northwest corner of Jefferson and Exposition Blvd.	McManus Park	Potential noise impacts due to transitway operations (LRT, trolley, HOV lane). Short-term construction impacts. Potential pedestrian constraints.
Southwest corner of National Blvd. and Vinton Ave.	Woodbine Park	Short-term construction impacts.
Southeast corner of Overland and I-10.	Notre Dame Academy/Palms Park and Rancho Park Library	Potential noise impacts. Short term construction impacts.
Pico Blvd. and Overland	Westside Pavilion	Short-term construction impacts.
Between Manning and Edith	Children's Home	Short-term construction impacts.
Northwest corner of Exposition and Overland	Overland Avenue Elementary School.	Potential pedestrian constraints, noise impacts, short-term construction impacts.

TABLE 5.8
SENSITIVE LAND USES

Location	Land Use	Issue
Gateway south of Exposition Blvd.	St. Joan of Arc School and Parish	Potential pedestrian constraints, noise impacts, short-term construction impacts.
20th St. and Colorado	St. Anne's Parish and School	Potential noise impacts, short-term construction impacts.
17th and Colorado	Garfield High School	Potential pedestrian constraints, noise impacts, short-term construction impacts.
2 blocks south of Exposition Blvd. along Stewart	Stewart Street Park	Short-term construction impacts.
Between Sepulveda Blvd. and I-405	Home Junction	Potential pedestrian constraints.
Main Street, between 4th Street and Ocean Avenue	Santa Monica Civic Center	Short-term construction impacts.
Four blocks south of Colorado along 4th Street	Santa Monica High School	Short-term construction impacts.
14th Street and Olympic Blvd.	Memorial Park	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Denker Avenue to Arlington, along Exposition Blvd.	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Vermont Ave. to Dalton Ave. (north side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Arlington to 4th Street, along Exposition Blvd. (north side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Victoria to Potomac, along Exposition Blvd. (South side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Crenshaw Blvd. to Farmdale Avenue (north side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
La Brea to Dunsmuir, along Exposition Blvd.	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.

TABLE 5.8
SENSITIVE LAND USES

Location	Land Use	Issue
Melvil Ave. to Helms Ave. (south side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Livonia Ave. to S. Beverly Dr. (north side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
So. Durango Ave. to Hughes Ave. (south side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Mentone Ave. to Cheriot Vista Pl. (south side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Motor Ave. to Military Ave.	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Military to Sepulveda Blvd. (south side only)	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrain constraints.
Sawtelle Blvd. to Butler Avenue (south side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrain constraints.
Barrington Ave. to Bundy Dr. (south side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
20th St. to 15th St. (north side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
14th St. to 9th St. (north side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Motor Avenue to Camden, along Exposition Blvd. (north side only)	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
26th Street and Colorado.	The Arboretum	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.

TABLE 5.8
SENSITIVE LAND USES

Location	Land Use	Issue
Colorado and Broadway	Colorado Place	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Olympic Boulevard Colorado Avenue Cloverfield Avenue and 26th Street	The Water Garden	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
ROUTE TWO: VENICE BLVD./SEPULVEDA BLVD. DEVIATION		
Venice Blvd. and Canfield	Media Park	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Venice Blvd. and Hughes Avenue	Brotman Medical Center	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Southeast corner of Venice Blvd. and Overland Avenue.	The Culver Center	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Venice Blvd., between Clarington and Jasmine.	St. Augustine Parish and School	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Two blocks south of Venice Blvd. along Washington Blvd.	Sony Studios	Short-term construction impacts.
Sepulveda Blvd. and Charnock	Charnock Road School.	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Along Sepulveda Blvd., between Rose Avenue and National Blvd.	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Midway Avenue to Bentley Avenue (south side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Venice Blvd. to Charnock Road (east side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.

TABLE 5.8
SENSITIVE LAND USES

Location	Land Use	Issue
Venice Blvd. to Palms Blvd. (west side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Rose Avenue to Clover Avenue.	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Sardis Avenue to Brookhaven Avenue (west side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Sardis Avenue to Exposition Blvd. (east side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
ROUTE 4 - I-10/I-405		
Oakhurst to Beverly Drive, adjacent to I-10	Residential Area	Potential noise impacts, short-term construction impacts.
Between Manning and Edith	Children's home	Potential noise impacts, short-term construction impacts.
Along Overland Avenue, one block north of National Blvd.	Notre Dame Academy Elementary and Girl's High School	Short-term construction impacts, potential pedestrian constraints.
Between Motor Ave. to Sepulveda Blvd., north side	Residential Area	Potential noise impacts, short-term construction impacts.
Between Overland Ave. and Sepulveda Blvd., south side.	Residential Area	Potential noise impacts, short-term construction impacts.
ROUTE 5: VENICE BLVD. TO PACIFIC/MAIN AVE.		
I-405 to Albright Avenue (south side only)	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Berryman Avenue to Barrington Avenue (north side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Rosewood Avenue to Lincoln Blvd.	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.

TABLE 5.8
SENSITIVE LAND USES

Location	Land Use	Issue
Walgrove Avenue to Venesia Avenue (south side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Linden Avenue to Shell Avenue (east side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Mildred Avenue (south side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Ocean Avenue to Pico Blvd. (south side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Abbott Kinney to Venice Way (north side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Venice Way to Vernon Avenue (east side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Sunset Avenue to Marine Street (east side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Venice Blvd. to Pico Blvd. (west side only).	Residential Area	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Southeast corner of Venice Blvd. and Walgrove.	Venice High School	Potential noise impacts, short-term construction impacts, potential pedestrian constraints.
Along Main Street, between Pico Blvd., and Colorado Ave.	Santa Monica Civic Center, including Civic Auditorium, Courthouse and City Hall	Short-term construction impacts, potential pedestrian constraints.
Pico Blvd and 4th Street, 4 blocks east of Ocean Avenue	Santa Monica High School	Short-term construction impacts, potential pedestrian constraints.
Between Washington Blvd. & Pacific Ave.	Unused center strip	Debris clearance needed.
Along Main Street between Westminster and Brooks Ave.	Westminster Avenue School	Potential noise impacts. Short-term construction impacts. Potential pedestrian constraints.

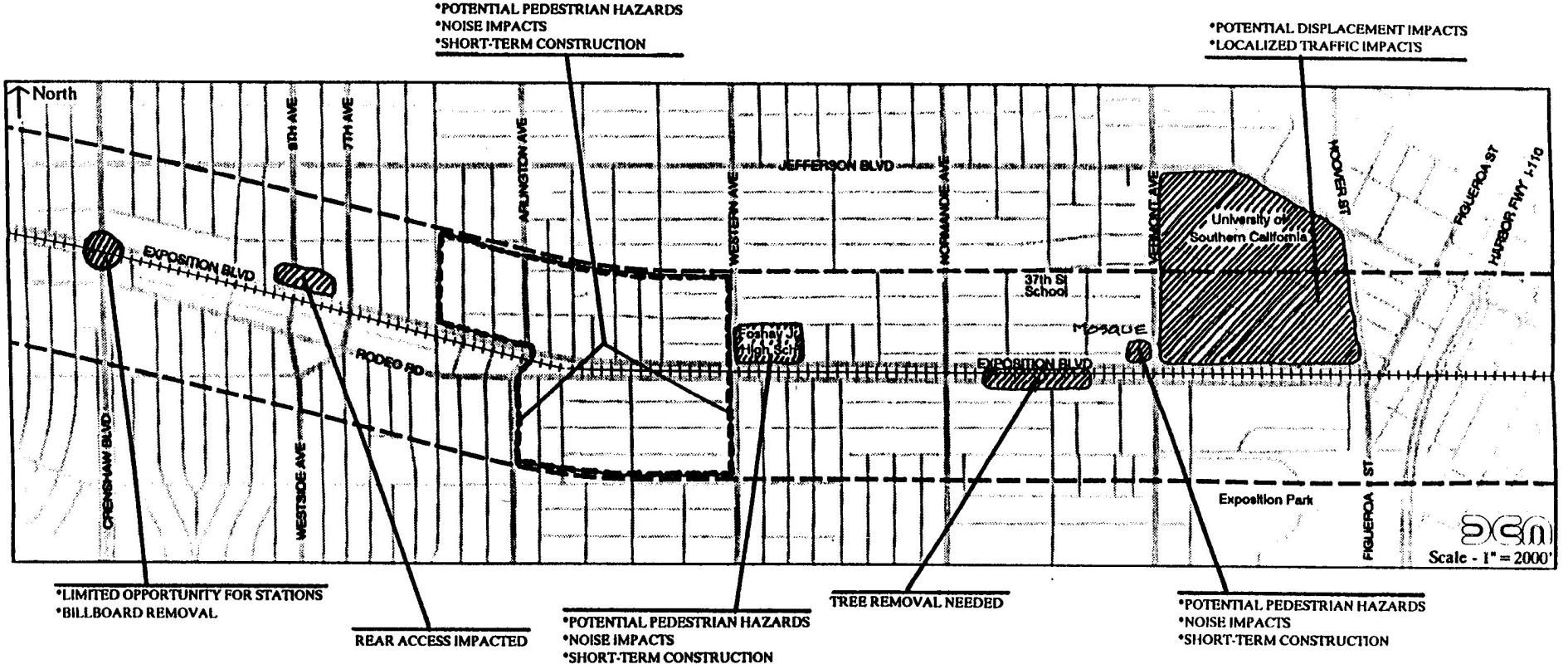
TABLE 5.8
SENSITIVE LAND USES

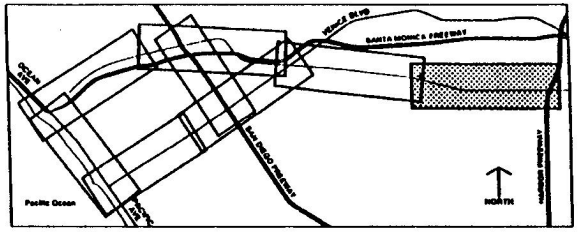
Location	Land Use	Issue
West side of Main Street between Brooks and Thorton Ave.	RTD yard facility	Minimal impacts anticipated.
One block east of Main Street between Marine St. and Ashland Ave.	St. Clement School	Short-term construction impacts. Potential pedestrian constraints.

Source: David Evans and Associates, Inc., 1991.

Potential Impacts: *Segment A*

Figure 5-10





STUDY AREA BOUNDARY

ROUTE NUMBER 1

Source: David Evans and Associates, Inc.

EXPOSITION

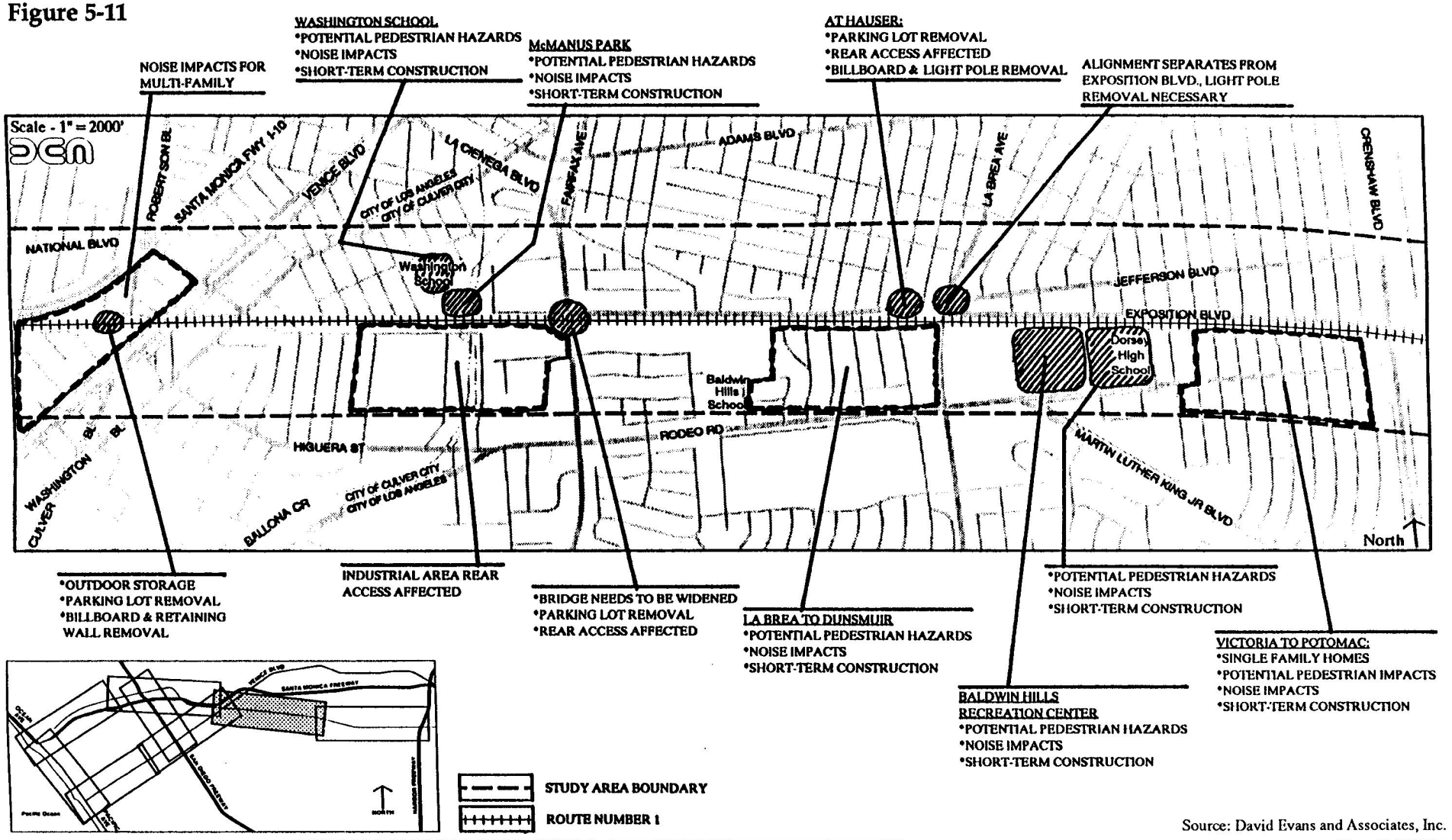
RIGHT OF WAY PRELIMINARY PLANNING STUDY

R

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Potential Impacts: Segment B

Figure 5-11



Source: David Evans and Associates, Inc.

EXPOSITION

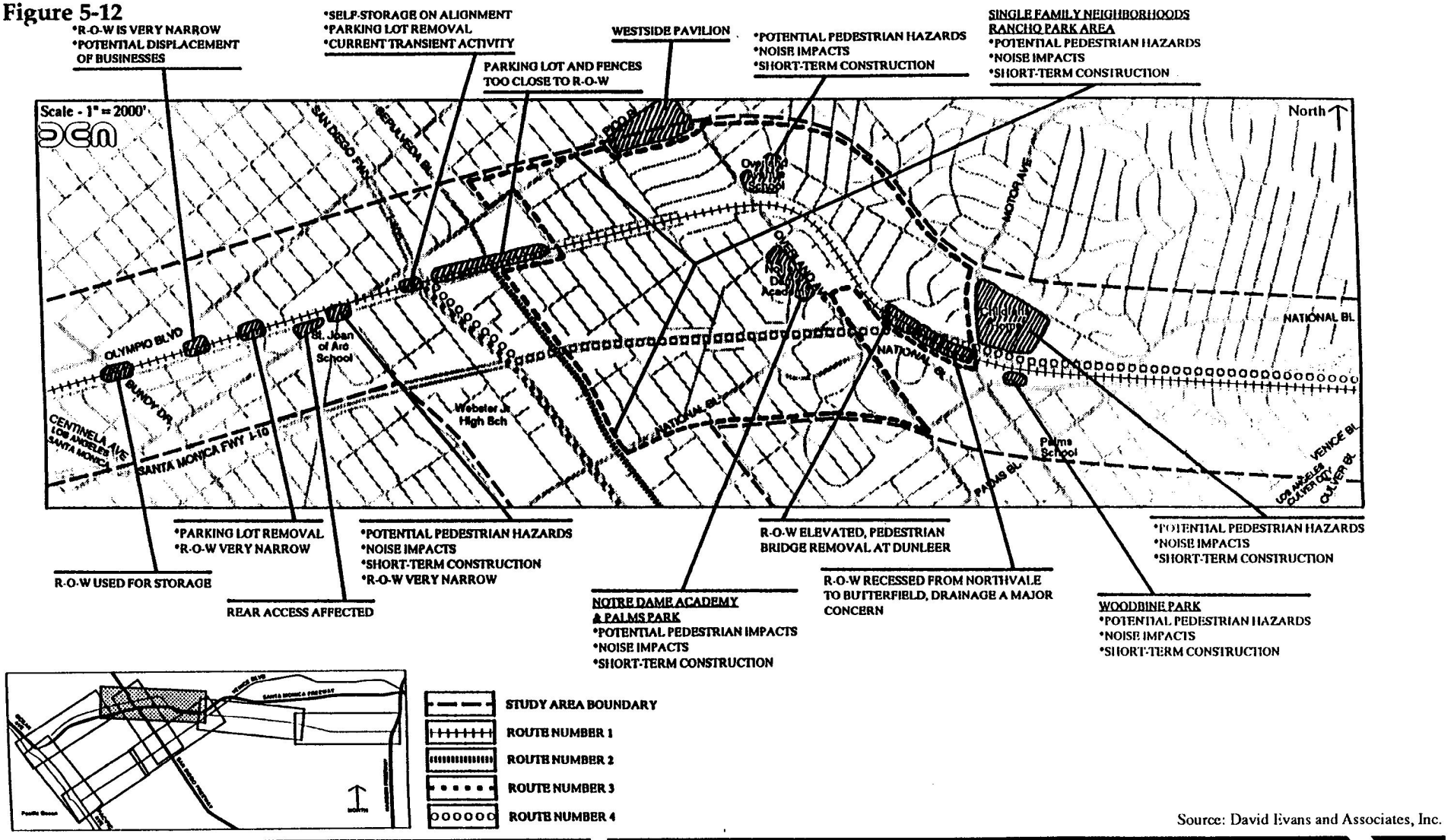
RIGHT OF WAY PRELIMINARY PLANNING STUDY

R

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Potential Impacts: *Segment C*

Figure 5-12



Source: David Evans and Associates, Inc.

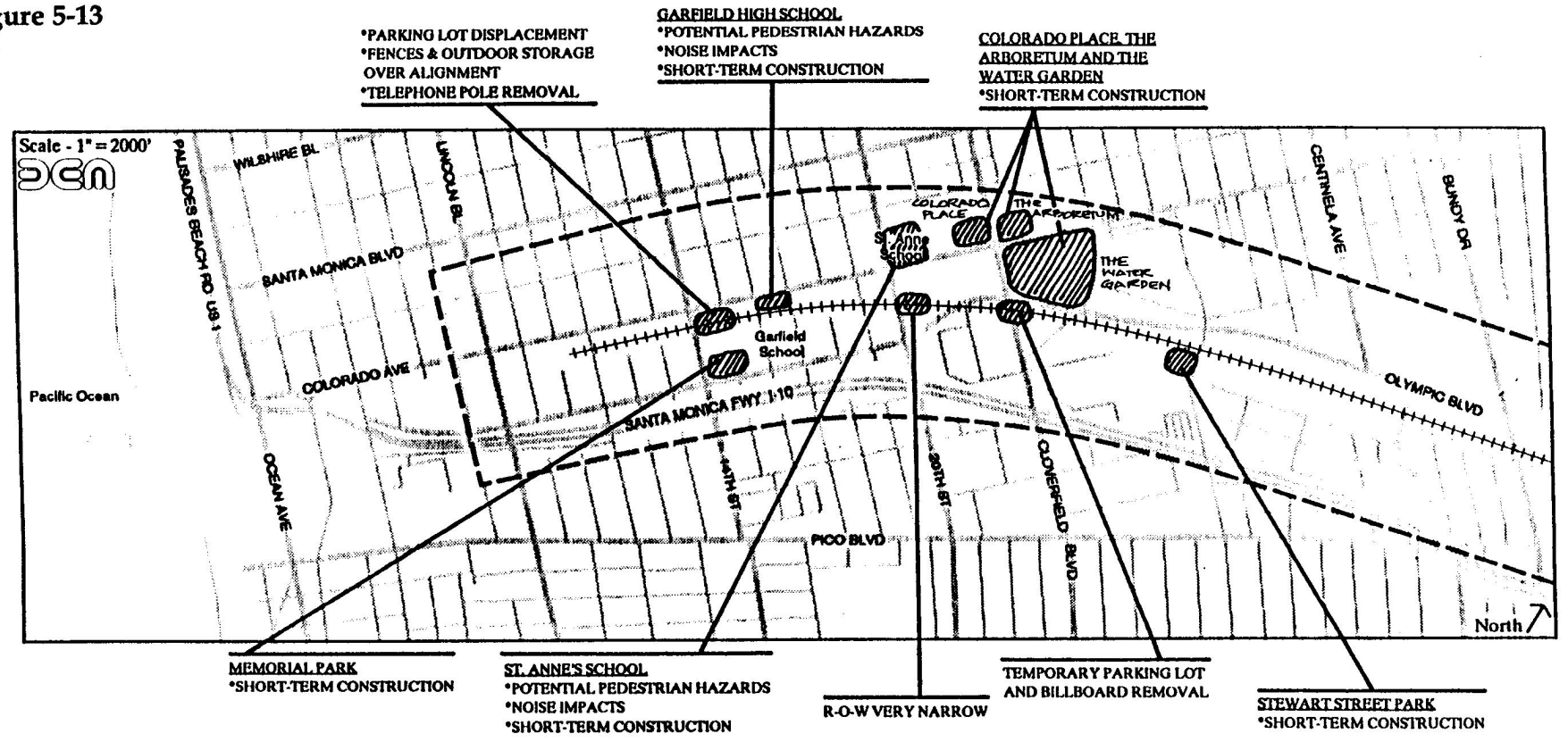
EXPOSITION

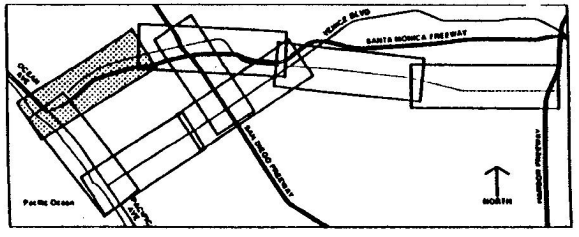
RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Potential Impacts: Segment D

Figure 5-13





STUDY AREA BOUNDARY

ROUTE NUMBER 1

Source: David Evans and Associates, Inc.

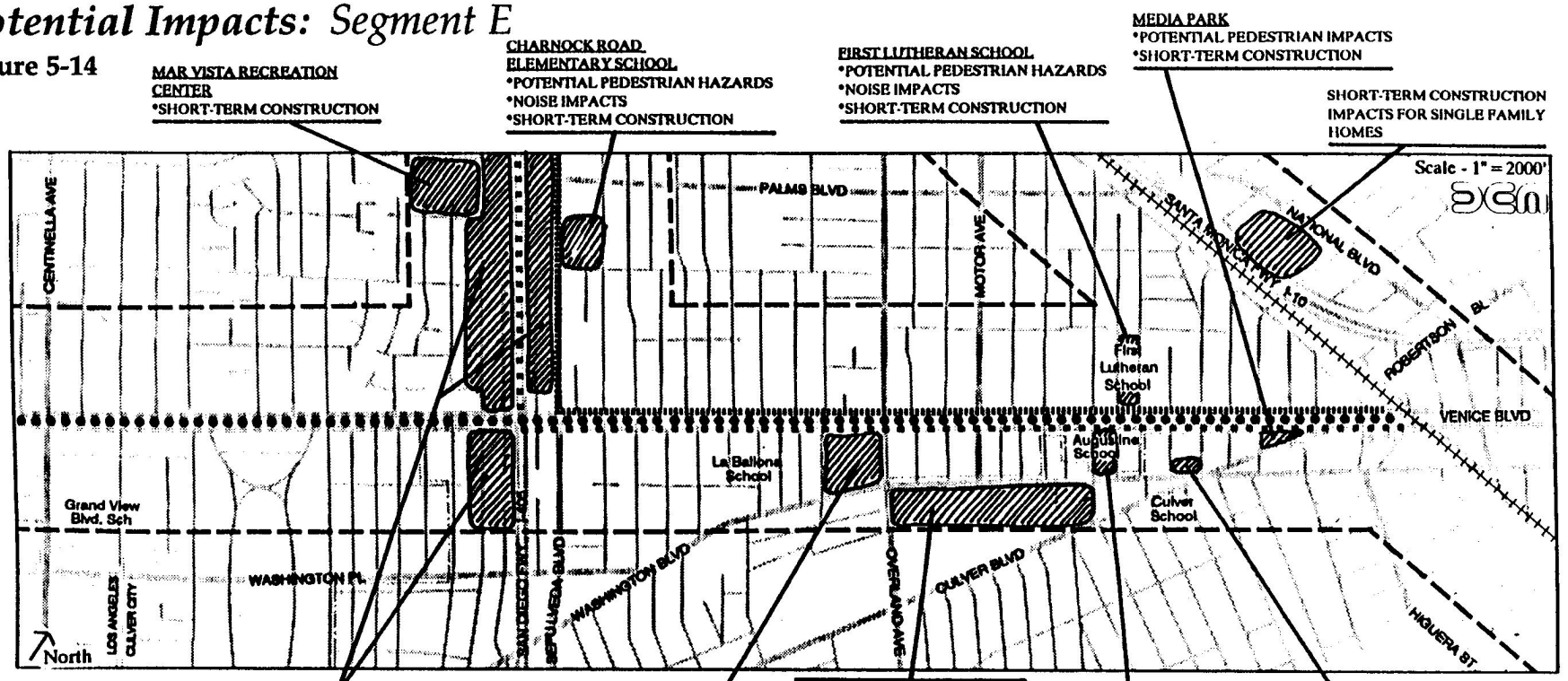
EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Potential Impacts: Segment E

Figure 5-14



Source: David Evans and Associates, Inc.

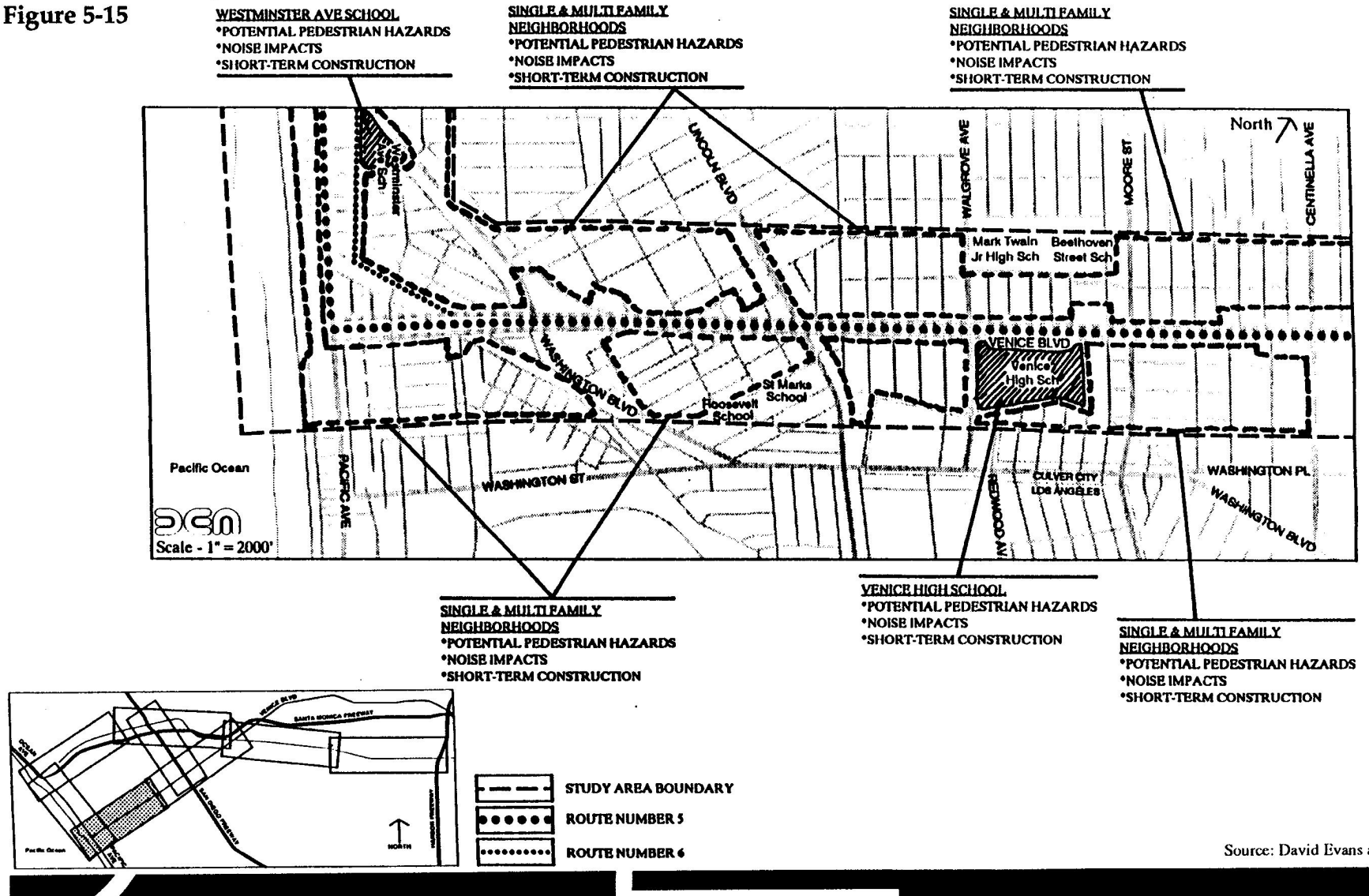
EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Potential Impacts: Segment F

Figure 5-15



Source: David Evans and Associates, Inc.

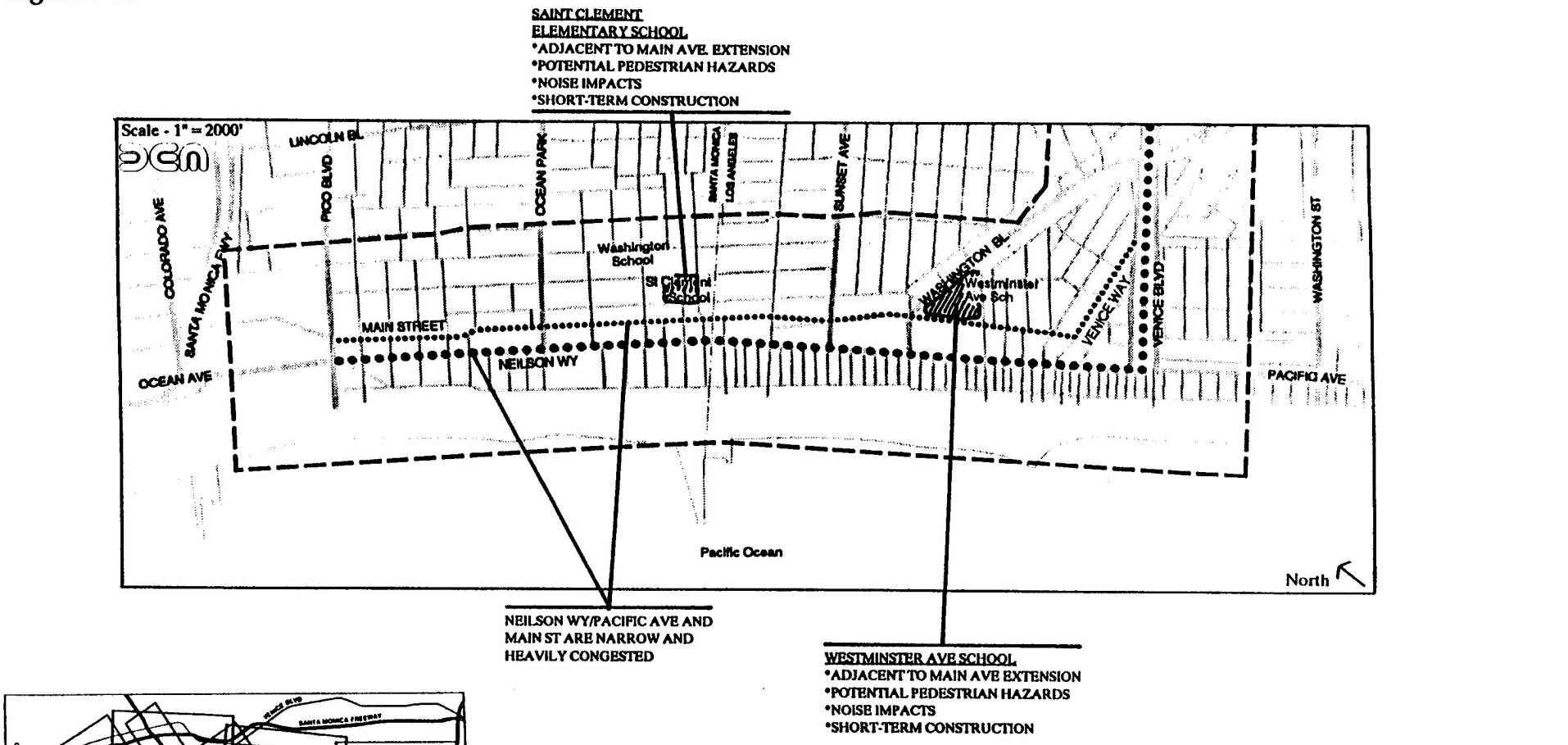
EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Potential Impacts: Segment G

Figure 5-16



Source: David Evans and Associates, Inc.

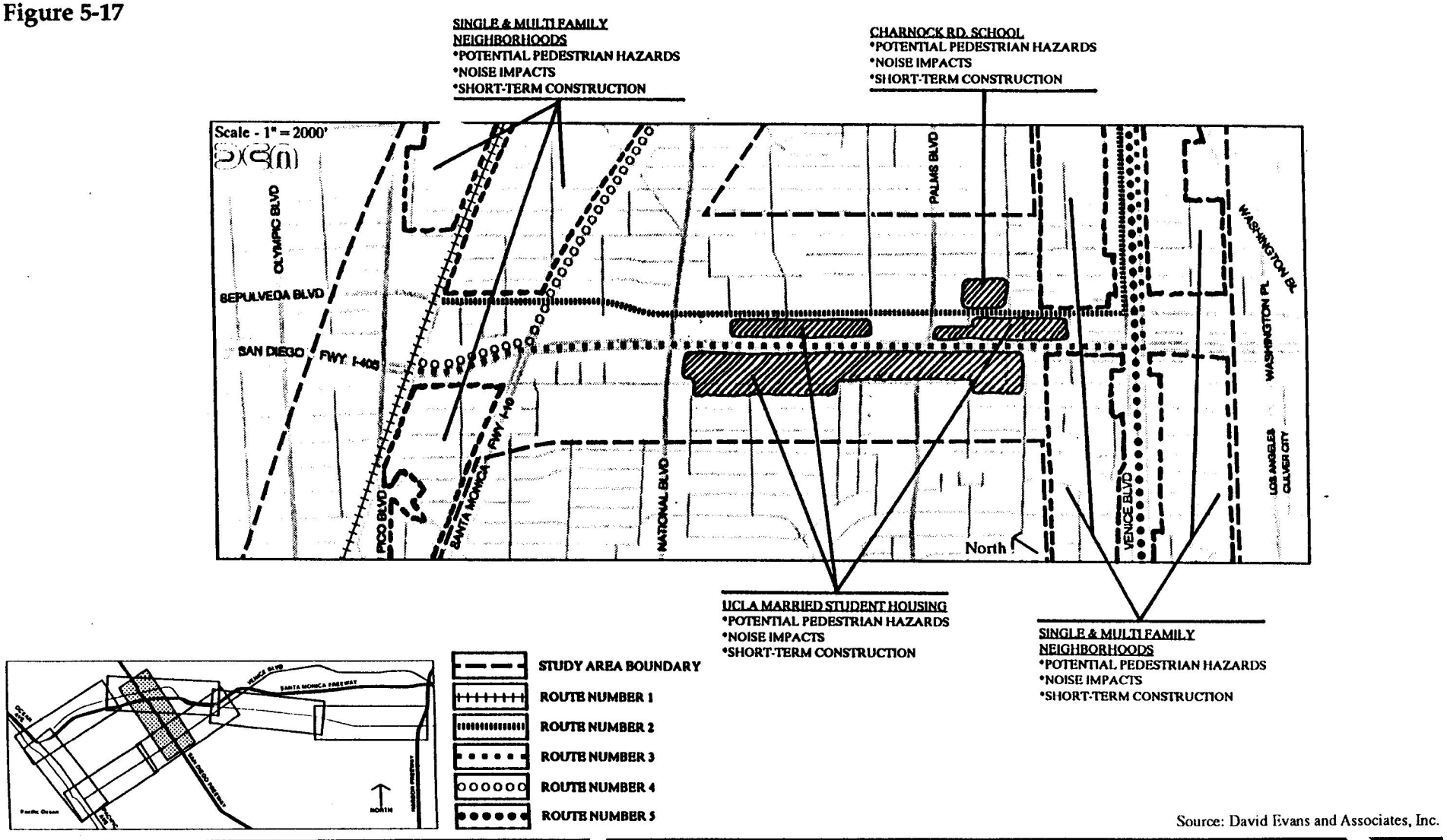
EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Potential Impacts: Segment H

Figure 5-17



Source: David Evans and Associates, Inc.

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

5.8 CONCLUSIONS OF DETAILED SCREENING OF FEASIBLE ALTERNATIVES

After the preliminary screening, 8 alternatives were deferred. At the conclusion of the detailed technical analysis, it was found that the transitway option was not feasible for many operational and policy reasons. Accordingly, the two remaining transitway modal alternatives, along Routes 1 and 4, were recommended for deferral from further study at the DEIR level for the reasons listed below:

ROUTE 1: *Transitway*

- Operationally infeasible due to numerous potential intersection delays and conflicts, potential traffic delays to users, and lack of available width in some places along the alignment.
- Slower travel time due to mixed usage and delays behind stopped vehicles.
- Traffic prioritization would be required for efficient use, requiring policy and/or technical action by the affected cities along the route.
- Access point implementation along the route would be difficult.
- Potential impacts to residential areas, such as noise, along the alignment.
- The City of Santa Monica expressed a preference for ending the facility at the eastern edge of their City limits, due to potential traffic impacts, and the likelihood of better service collection and distribution from that area.

ROUTE 4: *Transitway*

- Very costly to design and construct along the I-10 segment.
- Requires major structure above I-10, similar to Harbor Transitway.
- Design of transition areas at both ends is costly and complex.
- Ends east of downtown Santa Monica CBD, due to City of Santa Monica preference for access point at eastern edge of city limits.
- Operationally infeasible due to numerous potential intersection and traffic delays, potential travel time delays, and complex access point issues, and potential impacts to residential areas.

A structured ranking process was used to evaluate the feasible alternatives and provide a process to recommend alternatives for inclusion in the subsequent DEIR Study. The process used a plus/minus system to rate each category, while the number of pluses or minuses indicates the strength of the rating. The results of the ranking are shown in Figure 5-18, the summary of Comparisons. The final results of the analysis are displayed in Figure 5-19, which includes the Project Teams recommendations for the subsequent EIR.

Based on the evaluations conducted above and considering the identified major differences and critical constraints among the alternatives, the following alternatives were recommended for deferral from further study in a DEIR.

- **Route 1:** Transitway, Bikeway (as an exclusive long term use)
- **Route 2:** LRT, Transitway
- **Route 3:** LRT, Trolley Bus, Transitway
- **Route 4:** Transitway, Trolley Bus
- **Route 5:** LRT, Transitway

This provides for five distinct alternatives which may be recommended for inclusion in a subsequent EIR Study, plus one supplemental or adjunct alternative in the form of the bikepath along Route 1, as follows:

- **Route 1:** LRT, Trolley Bus, Bikeway (as an interim/adjunct use)
- **Route 2:** Trolley Bus (in mixed-flow conditions on Sepulveda)
- **Route 4:** LRT
- **Route 5:** Trolley Bus (with potential future conversion to LRT)

Summary of Comparisons

Figure 5-18

	Transportation Improvement		Ridership Access		Environmental	Compatibility w/Supplemental Uses	Engineering Feasibility		Cost Considerations		Recommend for EIR
	Travel Time	System Links	Pop	Empl	Sensitive Uses		Alignmnt. Cmplx.	Intersections Crossed	Capital	O & M	
1. Exposition ROW											
LRT	++	++	0	+	0	+	+	0	-	+	Y
Transitway	++	--	0	+	-	-	0	--	0	0	N
Trolley Bus	+	0	0	+	0	+	+	-	0	0	Y
Bicycle	*	*	*	*	*	*	*	*	*	*	Y
2. Venice/Sepulveda											
Trolley Bus (in mixed traffic)	-	0	+	+	0	--	0	--	+	-	Y
4. I-10											
LRT	++	++	0	+	0	-	--	0	-	+	Y
Transitway	++	--	0	+	-	-	--	-	+	0	N
5. Venice to Main/Pacific											
Trolley Bus	--	+	+	+	--	--	0	--	+	-	Y

Source: BRW, Inc., 26 February 1992

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

++ significantly better than other alternatives
+ somewhat better than other alternatives
0 somewhat worse than other alternatives
- significantly worse than other alternatives
-- bycicle path as adjunct use to other modes
*

BRW

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Final Recommendations

Figure 5-19

Route Options
Los Angeles/Santa Monica

Mode Options	Route 1 Exposition: Vermont to 17th	Route 2 Exposition via Venice, Sepulveda	Route 3 Exposition via Venice, I-405	Route 4 Exposition via I-10, I-405	Route 5 Venice to the Coast North/South
LRT	• Recommend for EIR	Defer because: • Very Complex/Costly • Travel Time Increase • Impacts: Severe Traffic Disruption	Defer because: • More Complex/Costly • Travel Time Increase • Impacts: Severe Traffic Disruption • Property Access Impacts	• Recommend for EIR	Defer because: • Serves Different Travel Shed, Less Reduction in Congestion • Severe Impacts on Main/Pacific along Coast: Traffic, Property Acquisitions, etc.
Trolley-Bus	• Recommend for EIR	• Recommend for EIR	Defer because: • Very Complex/Costly • Travel Time Increase • Impacts: Severe Traffic Disruption and Lack of Right-of-Way	Defer because: • Very Complex/Costly • Not Proven on Freeway	• Recommend for EIR
Transitway	Defer because: • Very Complex/Costly • Operational Issues • Impacts: Unacceptable Traffic Disruption	Defer because: • Very Complex/Costly • Travel Time Increase • Impacts: Severe Traffic Impacts, Right-of-Way Needs	Defer because: • Very Complex/Costly • Travel Time Increase • Impacts: Unacceptable Traffic Disruption	Defer because: • Very Complex/Costly • Operational Issues • Impacts: Traffic Access Problems, Right-of-Way Needs	Defer because: • HOV Control/ Capacity West of Robertson not Possible, Less Through Capacity • Severe Traffic Impacts and Right-of-Way Needs
Bikeway	• Recommend for EIR as adjunct facility	• Not Applicable			

Source: BRW, Inc., 4 March 1992

6.0 Additional Considerations For Further Study

This section covers results of additional technical studies to describe regional, local, and environmental issues along the Exposition Corridor. The topics presented in this section include:

- Supplemental Uses of Property
- Surplus Property Analysis
- Regional Transit Linkages
- Staging Options

6.1 SUMMARY OF SUPPLEMENTAL USES

This analysis was conducted to identify potential non-transportation uses that could be accommodated within the Exposition right-of-way.

After determining the right-of-way needs for interim or long-term transportation purposes, the Project Team assessed the feasibility of accommodating the following supplemental uses on or near the alignment. These uses may include but not be limited to:

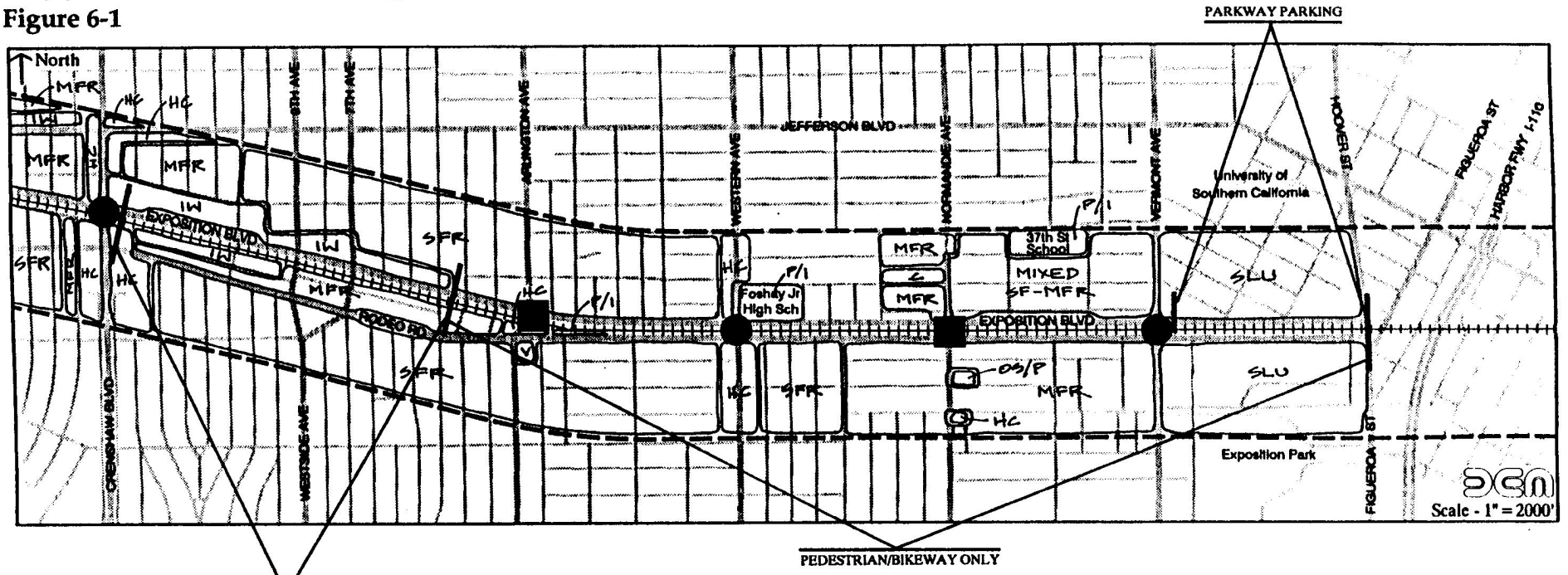
- Community gardens; land reserved for the public for preparing gardens.
- Landscaped greenways or parkways.
- Potential parking areas that may serve existing or future development along the corridor.
- Active recreational land uses involving bikeways, jogging trails, and other linear park uses will be examined.

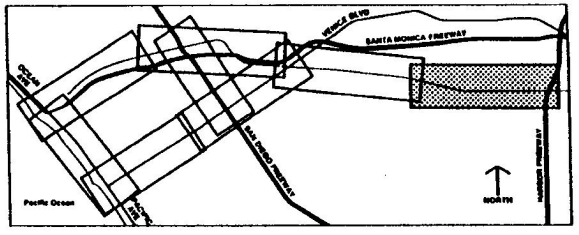
The Project Team examined existing and planned land uses along the Exposition right-of-way. The study focused on uses that are not actual transit facilities. As a result, the addition of travel lanes for the existing Exposition Boulevard was not considered as a supplemental use.

The assessment focused only on the alignment along Exposition Boulevard. Figures 6-1 through 6-4 summarize the potential supplemental uses that could be located within the alignment and indicates the generalized locations where these uses could be placed.

Supplemental Uses: Segment A

Figure 6-1





SFR SINGLE FAMILY RESIDENTIAL

MS/MR MIXED SINGLE & MULTI FAMILY

MFR MULTI-FAMILY RESIDENTIAL

HC HIGHWAY COMMERCIAL

IW INDUSTRIAL WAREHOUSING

P/I PUBLIC/INSTITUTIONAL

OS/P OPEN SPACE/PARKS

SLU SPECIALTY LAND USE

V VACANT

STUDY AREA BOUNDARY

ROUTE NUMBER 1

POTENTIAL STATIONS/STOPS

TROLLEY BUS STOPS ONLY

Source: David Evans and Associates, Inc.

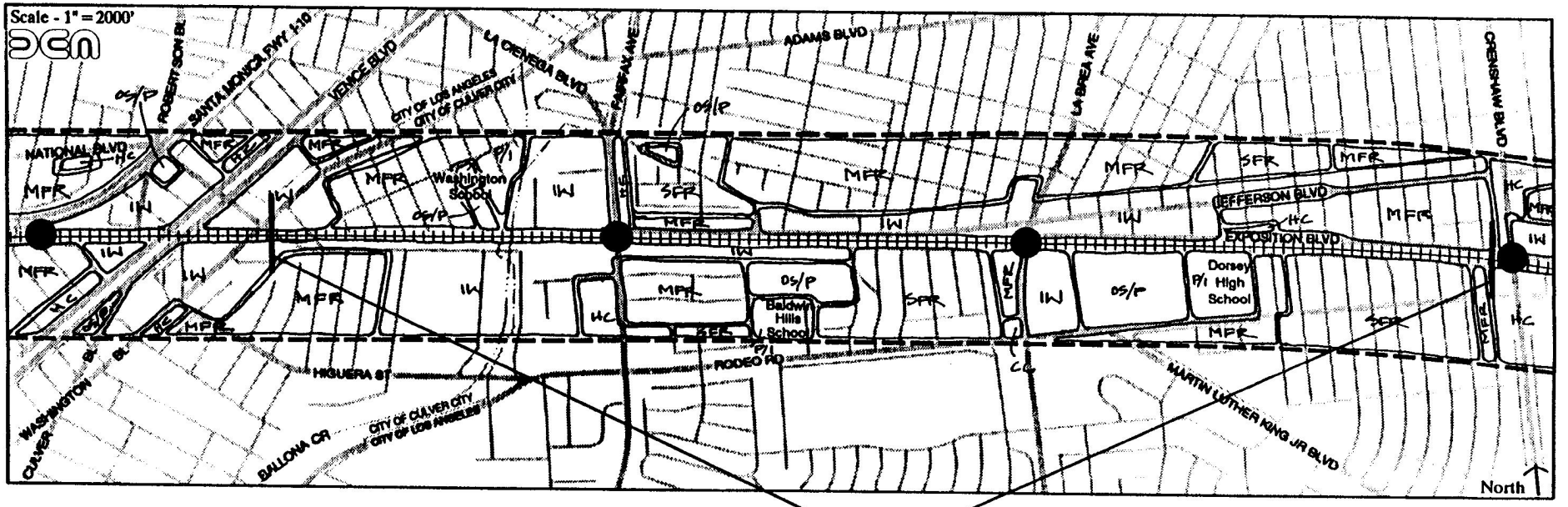
EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Supplemental Uses: Segment B

Figure 6-2



Source: David Evans and Associates, Inc.

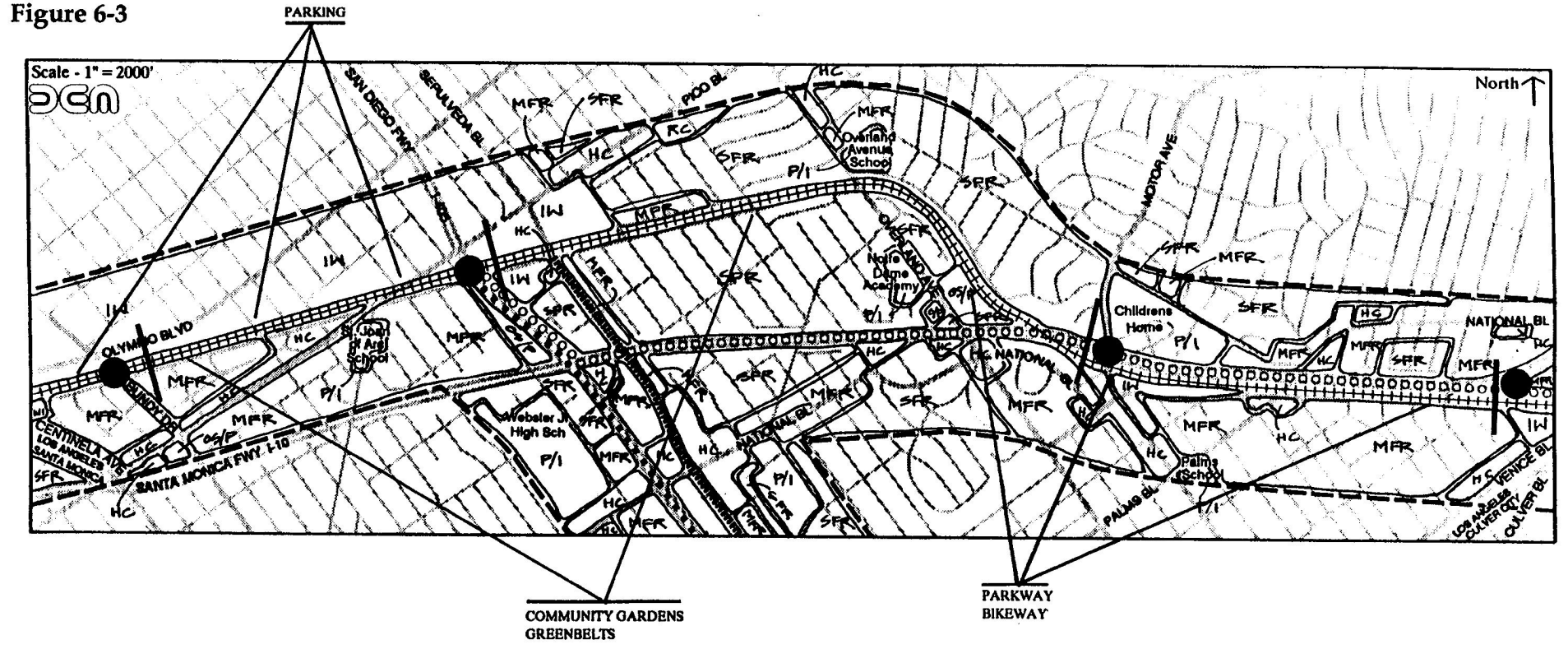
EXPOSITION

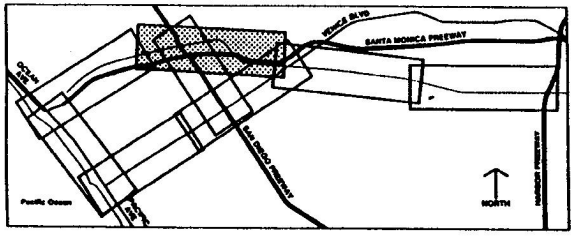
RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Supplemental Uses: Segment C

Figure 6-3





STUDY AREA BOUNDARY
ROUTE NUMBER 1
ROUTE NUMBER 2
ROUTE NUMBER 3
ROUTE NUMBER 4

SFR SINGLE FAMILY RESIDENTIAL
MFR MULTI-FAMILY RESIDENTIAL
HC HIGHWAY COMMERCIAL
RC REGIONAL COMMERCIAL
IW INDUSTRIAL WAREHOUSING
P/I PUBLIC/INSTITUTIONAL
OS/P OPEN SPACE/PARKS

POTENTIAL STATIONS/STOPS

Source: David Evans and Associates, Inc.

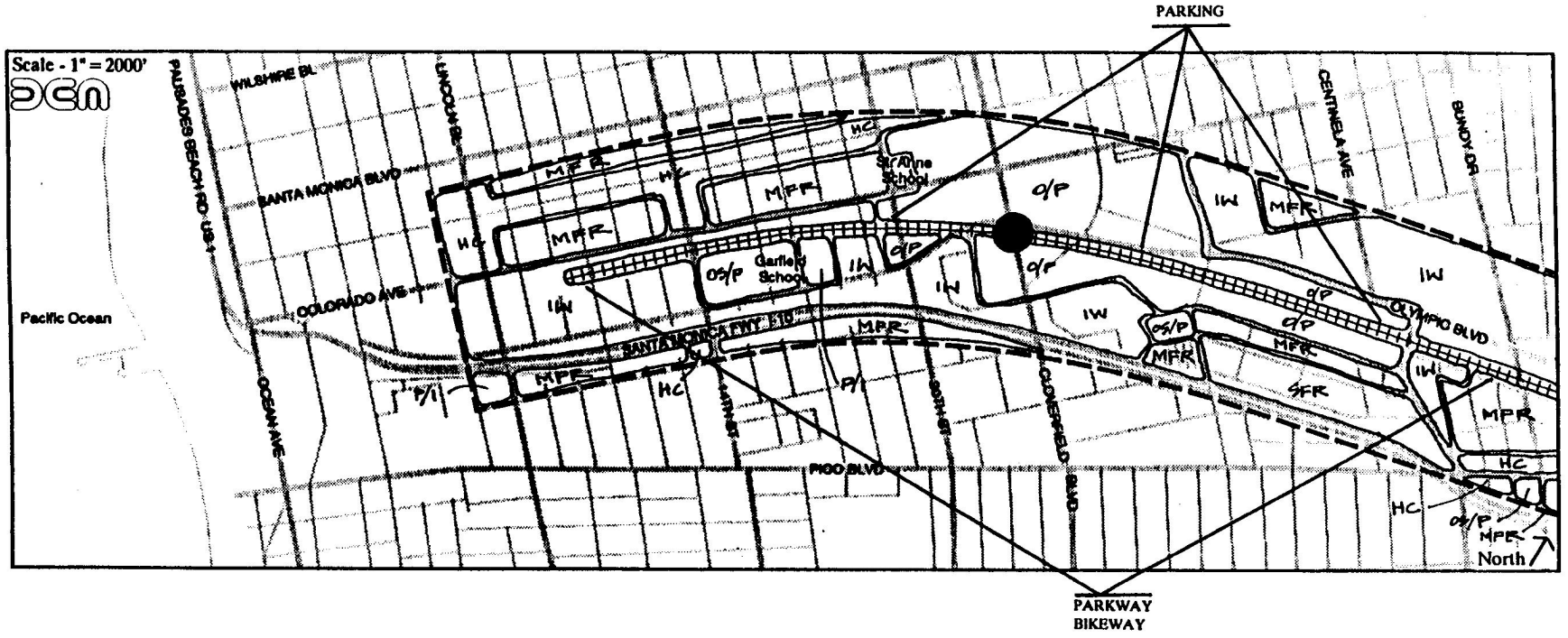
EXPOSITION

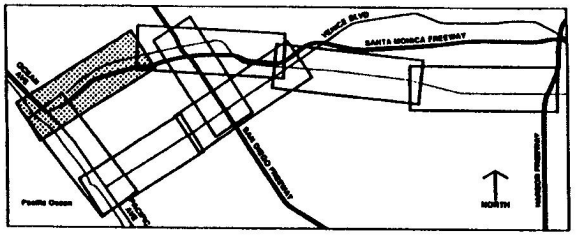
RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

Supplemental Uses: Segment D

Figure 6-4





STUDY AREA BOUNDARY

ROUTE NUMBER 1

SFR	SINGLE FAMILY RESIDENTIAL
MFR	MULTI-FAMILY RESIDENTIAL
HC	HIGHWAY COMMERCIAL
O/P	OFFICE/PROFESSIONAL
IW	INDUSTRIAL WAREHOUSING
P/I	PUBLIC/INSTITUTIONAL
OS/P	OPEN SPACE/PARKS

POTENTIAL STATIONS/STOPS

TROLLEY BUS STOPS ONLY

Source: David Evans and Associates, Inc.

EXPOSITION

RIGHT OF WAY PRELIMINARY PLANNING STUDY

Katz, Okitsu & Associates
David Evans & Associates
Rose & Kindel

6.2 CORRIDOR SURPLUS PROPERTY

This section provides information on the nature and locations of potential surplus property within the LACTC–acquired Exposition right–of–way, and also discusses the feasibility of leasing, sale, or other alternate land uses for any parcels identified as surplus property.

Surplus property, for the purpose of this discussion, was defined as any LACTC–owned property (conveyed in the November 1990 SP purchase) which would not be suitable for any transit–related purpose which may include the following:

- Implementation of a guideway (rail or road), including trackbed/paved areas, stations/boarding areas, required clearances, catenary support (poles and substations), fencing to prevent intrusion, and necessary maintenance access, along with desired landscaping along the guideway.
- Peripheral community–related uses, such as an adjacent bicycle path, adjacent landscaping such as gardens or parks, or a linear greenway.
- Support installations such as storage tracks or a small yard for LRT trains; turning areas or parking pads for buses and trolley buses; parking spaces for users at key stations and terminals, and even employee parking at designated terminal points.

6.2.1 Assumptions

In defining surplus property, the first step was to determine the legitimate property needs of a transportation facility to provide efficient service. In general, a need exists for sufficient space to install facilities in an unconstrained, practical, and accessible manner, while providing amenities such as landscaping and maintenance vehicle access. The assumptions used in this assessment consist of the following:

- The Exposition property was examined over the entire thirteen mile Study area from Vermont Avenue to the literal end of property at 17th Street in Santa Monica. Although the acquired property east of Vermont to the Blue Line at Long Beach Boulevard is not specifically in the Study area, comments are provided on the potential utility of this segment.
- The desired minimum linear property width for any transit modal alternative is 50 feet, except in limited station areas, which includes the guideway, support installations, clearances, and perimeter fencing and landscaping. Although this is wider than necessary in alignment segments without stations, the use of this assumption allows for continuous boundaries and practical facility design.
- For route options other than Route 1, the potential for surplus property increases since the Exposition alignment west of Venice/Robertson may become surplus in whole or in part unless multiple improvement options were implemented, perhaps as part of a staging strategy. In this event, surplus property could be disposed of in a piecemeal manner, which would break up the property, but inhibit coordinated development.

- Portions of the Exposition property are currently occupied by commercial uses under leases conveyed by Southern Pacific. Valuation maps on file at LACTC also show several small, odd-shaped pieces of property, which do not directly affect potential modal services. These parcels were examined only if they were potentially useful to the Exposition transit service, and it was assumed that any short-term lease from SP could be revoked prior to transit service development or initiation.

6.2.2 Surplus Property Identification

The analysis of surplus property was conducted by segment, as follows:

- *Segment 1* – Blue Line to Vermont Avenue
- *Segment 2* – Vermont Avenue to Venice Boulevard
- *Segment 3* – Venice Boulevard to I-405
- *Segment 4* – I-405 to Cloverfield Boulevard
- *Segment 5* – Cloverfield Boulevard to 17th Street

Table 6.1 summarizes the surplus property analysis by segment.

TABLE 6.1

EXPOSITION CORRIDOR SURPLUS PROPERTY

Segment #	Study Route	Surplus Property	Comments
1	All	None west of Figueroa St	Potential link to Main/ Spring east of Figueroa
2	All	2.5 acres in Industrial area	Possible parking/storage on former sidings to south
3	1	12 acres	Excessive width of ROW
3	2,5	32 acres	Project uses Venice Blvd.
3	4	20 acres	Project built along I-10
4	1,2,4	12 acres	Potential lease changes
4	5	25 acres	Project uses Venice Blvd.
5	1,2,4	4.6 acres	Property ends at 17th
5	5	6 acres	Project uses Venice Blvd.

6.2.3 Feasibility Of Surplus Property Sales or Leasing

This section describes the potential opportunities for alternate uses of any potential property rendered surplus by future determination of routing for an Exposition Corridor transportation project. It should be noted that property which is sold for alternate use is

often difficult to reacquire in the future, and the decision to sell or lease must consider the likelihood of potential future transportation use. While property *sales* in the western portions of Los Angeles or Santa Monica can yield substantial one-time revenues, the utility of the property to transportation projects may be lost forever. *Leasing*, on the other hand, can yield a moderate, steady revenue stream with transit use remaining feasible upon providing proper notice to leaseholders of the intention to develop the property.

Parcels of property which are not leased or sold could be turned into attractive peripheral uses such as landscaping, parklands, or greenways containing bike paths. However, it is difficult to revert a parkway use to transportation use once the community becomes used to the park-like use. This conversion may be done by LACTC, the local municipality, or even adjacent private sector or property interests. Often, projects which create civic benefits or facilities are sponsored and implemented by partnerships of public or public/private interests, which provide funding and/or specific elements to help make the attractive use possible.

Below is a discussion of surplus property opportunities by segment.

SEGMENT 1 (Blue Line to Vermont Avenue)

In Segment 1, the 2-mile portion between the Blue Line to Figueroa at USC may be considered surplus. This property lies in an industrial area recently designated an Enterprise Zone, by the City of Los Angeles, to encourage redevelopment. The entire segment could be sold or leased to adjacent or new users for facility expansion, new facility implementation, or improved access to adjacent uses. Sale of the property would raise revenue for LACTC and potentially preclude future transit use. The Enterprise Zone portion of this segment is not part of the Exposition Study but may be considered for a connecting linkage to the eastern side of downtown Los Angeles for some modal alternatives. The City of Los Angeles is investigating a new major sewer line (20') in this area which might use this corridor. In addition, this connection could be used to take Blue Line trains off Washington Boulevard to a new Figueroa connection, thus increasing Blue Line operating speeds or opening an auxiliary route.

SEGMENT 2 (Vermont to Venice/Robertson)

In Segment 2, the only identified surplus property is a 2.5-acre parcel of former freight sidings in an industrial area just south of the right of way and west of Ballona Creek. These linear strips lie alongside existing industries and could be sold or leased for facility expansion or industrial access and parking. Unless the former sidings were determined to be useful as auxiliary or storage tracks, the sale of the property could raise revenue, yet not impair future transit projects.

SEGMENT 3 (Venice/Robertson to I-405)

Depending on the ultimate routing choice of an Exposition Corridor project, part or all of Segment 3 could be deemed surplus. The portion from Venice to I-10 lies along a freeway shelf and has little potential alternate use beyond a trail or landscaping, since any

developed use would require construction on a slope directly adjacent to a busy freeway. The portion from I-10 to I-405, if not used for a project, lies within a residential area and has sufficient width to be converted to uses which would be compatible with a community plan, such as parklands or even additional housing or civic uses. If a project is implemented in this stretch, then the generous width of the alignment provides sufficient room for conversion of property along the outside of the alignment to a linear adjunct use such as a park or greenbelt.

SEGMENT 4 (I-405 to Cloverfield)

Depending on the ultimate routing choice of an Exposition Corridor project, all or none of this segment could be considered surplus. If the entire 25-acre segment becomes surplus, then the primary opportunity for sales would be the continuation and conversion to sales of numerous short-term leases which have already encroached significantly onto much of the segment. Since the segment lies in an industrial area, conversion to parklands or greenbelts might not be compatible with the industrial nature of the area, and would not raise revenue equal to the potential sales to current lessees.

SEGMENT 5 (Cloverfield to 17th St)

The portion of Segment 5 west of Olympic could be considered surplus if not used for a transportation project, and lies within an industrial area several blocks in length. Short term leases have allowed adjacent industries to encroach into this area, and similar to Segment 4, conversion of the leases into sales could raise revenue while not impairing any future transit use. The 1.5-acre eastern portion of the segment, from Cloverfield to the Olympic grade crossing, would be considered surplus property if the project routing does not include this segment. The property could be sold or leased for adjacent industrial expansion.

6.3 REGIONAL LINKAGES WITH THE EXPOSITION CORRIDOR

This section describes the potential regional linkages which may become available to any transit services which may be offered in the Exposition Corridor. Although the Exposition Corridor Study area extends from Vermont Avenue to eastern Santa Monica, this assessment assumes that the Corridor's services provide connections between the LACBD to the Santa Monica CBD.

6.3.1 Purpose of Linkages

One objective of LACTC, in planning and implementing a regional network of multi-modal improvements, is to provide a complementary system of routes and quality services available to the travelling public at reasonable cost and attractive frequency. Several issues to be considered when reviewing the regional network in relation to one project like Exposition Corridor are:

- Are other projects complementary to the specified project? In most cases, projects complement each other, especially given the high degree of congestion and need for mobility improvements in Los Angeles. Even though high-capacity parallel

projects such as the Orange Line West could be competitive, the degree of travel demand suggests that most projects of any mode would be complementary in nature. More analysis of ridership needs to be completed in an EIR to determine the relationship of the two projects.

- What benefits may accrue from related or complementary projects? Obvious benefits to users include reduction in transferring, increased numbers of potential trip pairs, and greater use of the system as service quality improves. Less obvious benefits include infrastructure economies, modal technology cross–utilization, and concentration of activity near key linkage points, such as Transit Centers with multiple lines and feeder services, as well as sites with mixed use or joint development potential. It assumed that projects are planned in a cooperative and complementary manner to maximize linkage benefits, otherwise facilities and services may be physically close but difficult to connect, utilize or provide cost–effective joint implementation and operation.
- What issues may lie in the path of implementing complementary linkages? For instance, the Long Beach and Pasadena Blue Line segments cannot enjoy through service, or even a joint maintenance facility, until a downtown tunnel or bypass track is constructed. The use of different rail technologies, such as heavy rail, light rail, or even monorail, causes each technology to be unique and non–inter–changeable for both service and maintenance. For intermodal linkages, the lack of direct access between HOV lanes and Transit Centers, or a lack of desirable parking near transit stops, may discourage transit use and motivate users to continue using automobiles. Specialized technologies, such as trolley buses, require a widespread network of specific facilities to be considered a truly regional linkage. For instance, if a trolley bus service were implemented on the Exposition Corridor, the service could be extended as a regional through route linked with trolley bus service serving other parts of the Los Angeles Basin, to provide maximum cost–efficiency.

6.3.2 Exposition Corridor Regional Linkages

This section describes the various potential regional project linkages which may affect the Exposition Corridor. The other projects were viewed as eastern (connecting in or near downtown Los Angeles and extending out from downtown), or western (connecting at some point west of downtown). The assessment focused on funded or proposed projects from the LACTC's 30–Year Integrated Transportation Plan which could offer improved service and more regional access, moving from east to west.

Eastern Linkages

Most transportation improvement projects in greater Los Angeles involve some degree of service or access to downtown Los Angeles. It was assumed that Exposition Corridor transit services will extend to the CBD, either using the funded Blue Line LRT extension to USC or dedicated lanes on Flower/Figueroa or Main/Spring from Exposition Boulevard to downtown.

The following future connections will or may be available in downtown:

- ***Metro Red Line*** – The existing Blue Line terminus at 7th and Flower, known as MetroCenter Station, will serve the first segment of the Red Line subway after mid–1993. As additional segments are opened, the Red Line will extend west along the Wilshire Corridor and northwest to Hollywood and ultimately the eastern San Fernando Valley. The Metro Red Line will have beneficial impacts on Exposition Corridor services, by offering a downtown circulator and feeder function with more extensive potential as extensions are opened.

- ***Blue Line Northern Extension*** – LACTC is implementing the Pasadena Blue Line LRT extension which begins at Union Station and moves northeast into the San Gabriel Valley via Pasadena. Additional potential extensions include a northwesterly line to Glendale or Burbank and an east–west line linking Burbank and Pasadena. A key issue to be resolved in the future will be linking the southern Blue Line services (to Long Beach and USC) and the northerly lines.

  According to LACTC's 30–Year Plan a Blue Line downtown subway link is a programmed project implemented after the Year 2000. Completion of this connection would offer a substantial benefit to the Exposition Corridor by increasing trip opportunities while improving operational and service efficiency.

- ***Commuter Rail*** – LACTC and the Southern California Regional Rail Authority will ultimately implement a 400–mile regional commuter rail network in many portions of Southern California. The process will begin in late 1992 as peak–hour services to Moorpark, Santa Clarita, and the San Bernardino area come on line, with additional services and lines to be added as quickly as possible. All commuter rail services will utilize Union Station as the terminus (as will the northerly Blue Line extension), which will be served by the Red Line, DASH, and several downtown bus routes, while Exposition Corridor services such as trolley bus might be routed to Union Station to provide this link.

- ***Amtrak Inter–City Rail and Bus Services*** – Amtrak uses Union Station as a hub and operates on many routes to the south, east, and north. Linkages to Amtrak would be identical to Commuter Rail, and Amtrak also expects to add services in the years leading to 2000. The benefit to Exposition Corridor services would be identical to those identified in the Commuter Rail section.

Western Linkages

- ***Orange Line*** – The longer–range east–west heavy rail transit system extensions are similar to the Red Line and will be known as the Orange Line. Service and could extend from Norwalk on the east to UCLA/Westwood on the west. The Orange Line will be implemented in stages depending on funding. It does parallel the Exposition Corridor to the north at a distance of several miles. It is currently estimated that the western segments of the Orange Line would be funded to the Pico/San Vicente Station by the year 2000, with westerly extensions implemented

after the year 2010. The Orange Line could compete with the Exposition Corridor in a moderate sense, with potential slight overlap of ridership. Additional ridership evaluation needs to be undertaken in the Orange Line EIS and this Exposition EIR.

- ***Harbor Transitway*** - CALTRANS is currently constructing an overhead structure above the San Pedro-Los Angeles I-110 freeway. The Harbor Freeway Transitway will end at the south edge of downtown, with the City of Los Angeles proposing exclusive lanes on Flower and/or Figueroa to funnel traffic between the Transitway and CBD in a preferential manner. The Transitway facility could complement Exposition Corridor services by adding a potential South Bay distribution link from the 23rd Street connection.

- ***Crenshaw Corridor*** - LACTC, in the Draft 30-Year Integrated Transportation Plan, has identified several potential corridors which may be candidates for funding. One such alignment study area is called the Crenshaw Corridor which would extend from the Pico and San Vicente Orange Line station, north of the Exposition Corridor to the Metro Green Line on the south, which lies along the I-105 Century Freeway between Norwalk and LAX/El Segundo. This new Corridor would provide a mid-City north-south line which would intersect Exposition and complement service in this dense part of Los Angeles, with increased ridership a likely benefit.

- ***SCRTD Trolley Bus*** - SCRTD, in cooperation with LACTC, is currently in the second phase of an electric trolley bus study encompassing approximately 10 routes around the RTD's service area. SCRTD has also considered using the eastern portion of the Exposition alignment from downtown and USC to Venice/Robertson, to provide higher speed service on an exclusive right-of-way. It is likely that any preferred trolley bus alternative from the Exposition Study will be integrated with the future development of trolley bus in SCRTD's study, with resultant complementary benefits if Exposition Corridor service includes trolley bus also.

- ***I-10/I-405 HOV Lanes*** - The LACTC 30-Year Plan identifies Caltrans-proposed HOV lanes on both the east-west I-10 freeway (between I-405 on the west and downtown on the east) and the north-south I-405 freeway (from north of I-10 to CA 90, the Marina Freeway). In addition, implementation of access paths at points near the Exposition line (such as where I-405 crosses the Exposition alignment) could serve to provide significant traffic feed to a Transit Center serving the Exposition Corridor. In the long run, once the I-10 HOV lanes are implemented, the east-west travelshed served by I-10 will enjoy greater capacity due to both Exposition Corridor improvements and HOV lanes, although the parallel facilities could be viewed as competing. The I-405 HOV lanes should provide a moderate complementary benefit in the form of feeder access from other parts of the westside.

- ***LAX–Palmdale Service*** – LACTC is currently requesting proposals to develop a high–speed rail service between LAX and Palmdale Airport with potential intermediate stops including areas near Venice Boulevard, I–10, and others. The line is currently planned to be constructed on an elevated structure in the median of I–405. The project may be privately funded and must proceed through extensive permitting processes before implementation. This project could provide a link to an Exposition project depending upon LAX–Palmdale station locations.

6.3.3 Summary

A large number of projects offer potential opportunities for strengthening the Exposition Corridor and the regional network as a whole. While it was not the intent of the assessment to rank or prioritize the potential connections or linkages, the potential advantages of several future projects are worthy of mention:

- ***Blue Line Extensions*** – If LRT is implemented through the Exposition Corridor, the potential for through service to and through downtown Los Angeles to other regional points would provide both greater attraction to users as well as increased economies of scale. Likewise, if the trolley bus modal option is implemented, through service along a network of electrified routes would offer a similar attraction.

- ***Crenshaw Corridor*** – At present, there is no high–capacity Mid–City north–south transit service, although bus service is offered at frequent headways along Normandie, Western, Vermont, Crenshaw, La Brea, and other parallel arterials. Implementation of a north–south guideway service between the Green Line and the Orange Line West could stimulate ridership in this heavily travelled area.

6.4 STAGING OPTIONS

This section describes potential staged implementation of transit service in the Corridor, an issue which must also be further analyzed in any subsequent study. An important factor in the implementation of a transit improvement in the Exposition Corridor is the staging of the improvement. Staging is important since the transit improvement may be constructed in usable segments depending on such requirements as availability of funds and acquisition of approvals and right–of–way. Staging considerations will help to make sure each increment of construction is usable and can assist in maximizing the number of riders for each segment.

The purpose of this section is to define potential staging concepts and terminal points for the Corridor.

6.4.1 Planning Considerations

A number of planning considerations were identified to assist in outlining staging concepts. These considerations consist of:

- Initiate construction from the east end of the Corridor and build west. The Trolley Bus option would penetrate the LACBD while the LRT option would connect to the USC/Exposition Line at Vermont.
- Incremental segments should end at reasonable stopping points. These points should be close to major sources of origins/destinations and have good connections to crossing bus routes (i.e., Vermont, Crenshaw, La Cienega, Venice, etc.).
- Incremental segments should result in significant ridership increases. This implies the segments should provide for good connections of trip pairs.
- Related to the interest in significant ridership increases is the desire to provide attractive connections for westbound trips as well as eastbound.
- Terminal points should be at locations where transfers among modes can be made easily. This requires space for auto drop-off, park-and-ride and coordinated bus transfer.
- Each incremental segment will require a different number of vehicles to support the service. A consideration will be the point at which additional vehicle maintenance facilities must be provided which is a substantial cost implication.

6.4.2 Potential Staging Concepts

Given the planning considerations outlined above, the following staging concepts were suggested for further analysis:

Trolley Bus

Stage 1: LACBD to Crenshaw
- Good access to activity center and adjacent residential areas.
- Strong crossing bus routes serve as feeders to Metro Red Line.
- Constrained right-of-way requires acquisition for major facility.

Stage 2: Crenshaw to Venice/Robertson
- Good access to I-10 ramps to/from the west.
- Close to the West LA Transit Center which could be relocated.
- Sufficient right-of-way available or could be acquired for sizable facility.
- Feeder routes from Culver City, Santa Monica and SCRTD with good access.
- Good location for westbound destinations.

Stage 3: Venice/Robertson to I-405 (Routes 1 and 2)
- Sizable area for major transit center available.

- Connections possible to I-405 HOV lanes and LAX/Palmdale line.
  - Good location for westbound destinations.

Stage 3: Venice/Robertson to Venice Beach (Route 5)

- Constrained residential/commercial area requires on-street facility.
- Good connection to bus routes along beach.
- Good location for westbound trips.

Stage 4: Santa Monica CBD (All Routes)

- Good destination for westbound trips.
- Major facility possible with joint development.
- Good connections to Santa Monica and SCRTD bus routes.

Light Rail Transit

Stage 1: Vermont to Crenshaw

- Good access to activity center and adjacent residential areas.
- Strong crossing bus routes serve as feeders to Metro Red Line
- Constrained right-of-way requires acquisition for major facility.

Stage 2: Crenshaw to Venice/Robertson

- Good access to I-10 ramps to/from the west.
- Close to the West LA Transit Center which could be relocated.
- Sufficient right-of-way available or could be acquired for sizable facility.
- Feeder routes from Culver City, Santa Monica and SCRTD with good access.
- Good location for westbound destinations.

Stage 3: Venice/Robertson to I-405 or Bundy Avenue (Routes 1 and 4)

- Two Stage 3 terminal options exist at I-405 or at Bundy Avenue.
- Terminal option at I-405 could include large transit center/park-and-ride with connections to I-405 HOV lanes and LAX/Palmdale line.
- Terminal option at Bundy Avenue on property owned by City of Santa Monica with major transit center/park-and-ride possible.
- Either option good for westbound destinations. Bundy site closer to major employment center.
- Sizable area for major transit center available at both sites.

Stage 4: Santa Monica CBD (Routes 1 and 4)

- Good destination for westbound trips.
- Major facility possible with joint development.
- Good connections to Santa Monica and SCRTD bus routes.

7.0 Public Suggestions

This section briefly analyzes and responds to the public suggestions received during public meetings and in writing concerning ideas for additional route and modal alternatives within the Exposition Right-of-Way Preliminary Planning Study. As a result of the public outreach process, suggestions were received from the community, interested public agencies, and local elected officials proposing the consideration of additional routes, modes, and issues which are not part of the formal study alternatives.

7.1 RESPONSES TO PUBLIC SUGGESTIONS FOR ADDITIONAL ROUTE OR MODE OPTIONS

SUGGESTION 1: ***Use National Boulevard for East-West routing instead of Venice on Routes 2, 3, and 5.*** (Defer from further study.)

There are several tight turns on National that would slow travel time, increase noise, and create safety problems. In addition, National is relatively narrow. A fixed guideway would impact residential areas and would require property acquisition.

SUGGESTION 2: ***Use Lincoln instead of Main/Pacific on Route 5.*** (Defer from further study.)

Lincoln is already a very congested street; the placement of an additional transportation facility within Lincoln's confined right-of-way would result in severe traffic disruption on Lincoln and its cross-streets. In order for Lincoln to accommodate a fixed guideway, residential and commercial property would have to be acquired for an at-grade or aerial guideway.

SUGGESTION 3: ***Use Grand Boulevard to connect Venice Boulevard and Main/ Pacific instead of Venice Way (Route 5).*** (Study in EIR.)

This suggestion could be examined as part of a more detailed study of this route for the trolley bus mode within the Environmental Impact Report (EIR).

SUGGESTION 4: ***Convert Main Street to an LRT mall and route cars on Ocean Avenue and/or Nelson Way (Route 5).*** (Study in EIR.)

This level could be examined in detail in an EIR, but there would be considerable impact to property access on all the streets suggested.

SUGGESTION 5: ***Use Santa Monica Boulevard instead of Exposition Right-of-Way.*** (Defer from further study.)

Santa Monica Boulevard is not considered to be within this project study area and is primarily north of the Orange Line transit alignment proposed for Wilshire Boulevard to Westwood. The Commission is initiating a separate study of the Santa Monica corridor in the Summer of 1992.

SUGGESTION 6: ***Use Culver Boulevard instead of Venice Boulevard.*** (Defer from further study.)

South of downtown Culver City, Culver Boulevard is outside the project study area. The use of Culver Boulevard between Sawtelle and the Exposition Right-of-Way has no advantage over other routes and serves fewer activity centers.

SUGGESTION 7: ***Use Washington Boulevard instead of Culver Boulevard.*** (Defer from further study.)

Many of the same issues that apply to Culver Boulevard also apply to using Washington Boulevard. In addition, Washington Boulevard is narrow in a number of places and cannot accommodate a fixed guideway or mixed flow transit improvement without severe traffic disruption and possible displacements.

SUGGESTION 8: ***Use separate alignments along I-10 for each direction of travel.*** (Study in EIR.)

CALTRANS will be involved in this design process for any mode. The EIR will examine all possible alignments. It would be more costly to have separate stations and guideway segments on different sides of the freeway than locating them all on one side. Using two sides could preclude development of good feeder bus service and park-and-ride lots, since a rider would get on at one station in the morning and off at another in the evening. It would also result in traffic impacts spreading into several different areas. Any facility developed along the freeway will look at all possibilities for a good "fit" that is least disruptive to the area.

SUGGESTION 9: ***Between Overland and Sepulveda, turn north to Pico and then west in subway to serve the Westside Pavilion.*** (Defer from further study.)

The guidelines for this study emphasize the use of moderate cost construction techniques, which in general preclude subway construction, except for short grade separations. However, this concept does have some other drawbacks. To get from the Exposition right-of-way to Pico and back would add about an extra mile in length and would require property acquisition. Presuming that a station was located to serve Westside Pavilion, subway station construction methods could be very intrusive to the area between Pico and the Exposition right-of-way. Pico itself is a fairly narrow street and a subway box could be very difficult to fit within its confined limits.

SUGGESTION 10: ***Consider a Japanese-style bullet train in the Corridor.*** (Defer from further study.)

A 100-200 mph train would not be very effective with stops spaced about one mile apart. This type of train works best in inter-city service, as in Japan, where stations are over 25 miles apart.

SUGGESTION 11: ***Consider monorail technology for this corridor.*** (Defer from further study.)

Commission guidelines for this study emphasize the use of moderate cost construction techniques using the existing at-grade right-of-way to its greatest potential. A fully grade-separated monorail system in this right-of-way would be more costly than an at-grade system and would have greater visual impact.

SUGGESTION 12: ***Consider an electrified roadbed.*** (Defer from further study.)

This advanced technology concept is not yet in use commercially. In addition, it would require other similar corridors to take advantage of the special vehicles and support systems. Although a test bed is planned on Playa Vista property, there are no plans for this type of system to be tested in public right-of-way at this time. Thus, this concept was not recommended to be considered further.

SUGGESTION 13: ***Consider a subway alignment.*** (Defer from further study.)

Commission guidelines for this study emphasize the use of moderate cost construction techniques using the existing at-grade right-of-way to its greatest potential. This construction is very expensive and was not considered appropriate for this corridor. During the EIR, special problem areas may warrant subway construction if other options are not found to adequately address environmental problems.

SUGGESTION 14: ***Consider a guided busway.*** (Defer from further study.)

This technology is still experimental and in very limited use. A regional network would be needed, or special equipment will be limited to use just in this corridor. Dual mode rail/bus equipment has similar problems, and would require similar traffic treatment to a conventional light rail line. Therefore, these technologies were not included for consideration.

SUGGESTION 15: ***Consider security as a screening criteria.*** (Study in EIR.)

Security is a feature of any facility or new service introduced in the corridor. Different modes lend themselves to different security treatments and these will be covered in detail in the EIR.

SUGGESTION 16: ***Consider express bus service between Santa Monica and Robertson/Los Angeles and Robertson.*** (Study in EIR.)

This service is provided now by SCRTD routes 434, 436, and 439, as well as Santa Monica Municipal Bus Route 10 during peak and off-peak periods. The SCRTD has a transit center at Washington and Fairfax, adjacent to Robertson. The alternatives being considered in the study will examine different bus service interface alternatives.

SUGGESTION 17: ***Consider using the corridor as a bikeway.*** (Study in EIR.)

All of the options being examined are incorporating bikeway facilities wherever possible. Because of the nature of the right-of-way, placement of bikeway paths can be easily arranged in conjunction with another transportation mode throughout much of the corridor. However, in a few small narrow areas this may be difficult. The size of the primary transportation facility will also impact bikeway design. Some routes, where the alignment is in a heavily traveled street (like Venice Boulevard), will potentially require removal of existing facilities.

The bikeway as a sole permanent use of this corridor is not being recommended given the level of traffic congestion in the entire area. A bikeway as an interim use is recommended to be examined in the EIR. The Culver City/West Los Angeles/Santa Monica area already has a great number of recreational bikeways and the Class 1 bikeway in Ballona Creek already serves this area, while other parts of the County have no bike facilities above Class 3. (Signs posted on streets.)

SUGGESTION 18: ***Elevate the transit line on Venice Boulevard and connect to downtown Santa Monica through the Venice/Ocean Park area.*** (Study in EIR.)

Commission guidelines for this study emphasize the use of moderate cost construction techniques using the existing at-grade right-of-way to its greatest potential. This construction is very expensive and was not considered appropriate for this corridor. In addition, neither at-grade nor elevated connections through the Venice/Ocean Park area using Pacific, Main or Lincoln appear feasible without considerable property acquisition and residential displacement.

SUGGESTION 19: ***Place the Vermont Avenue Light Rail Station planned for the USC area close to Vermont Avenue where it will benefit bus riders who transfer to the rail system and residents of the neighborhood.*** (Study in EIR.)

The initial site plan for Vermont Station and this alignment was issued in a March 1992 LACTC Draft Environment Impact Report (DEIR). The station location will depend on the selected design of the rail line along Flower Street and Exposition Boulevard and on the mode and staging selected for the alignment west of Vermont.

8.0 Acknowledgements

The Exposition Right-of-Way Preliminary Planning Study was initiated in September, 1991, and concluded in May, 1992. A large group of dedicated staff from LACTC, the Project Team consultant firms, the Project Review Team, and agencies participating in the Project Review Team guided and provided valuable input to the Study and the recommendations. Hundreds of citizens also participated through meeting attendance and submittal of comments and questions. The list below includes the primary agency and company participants in the Study, with specific individuals in positions of leadership denoted as well.

LACTC : Steve Lantz, Director, Westside Area Team
Carol Inge, Project Manager, Westside Team
Fred Silverman, Project Manager, Westside Team
Miriam Simmons, Governmental Affairs Manager, Westside Team

BRW, Inc. : Rick Pilgrim, PE, Project Manager
Walt Stringer, Senior Transportation Planner
Dennis Landaal, Senior Transportation Engineer
Brady Raisch, Melissa Patrizi, Julie Ayres, Shirley Franklin

Katz, Okitsu, & Associates: Walter Okitsu, Principal
Gail Head

David Evans & Associates: Marc Blodgett, Sr. Project Manager
Wendy Walsh

Rose and Kindel: Michael Gagan, Principal
Sharri Davis

List of Appendices

A Conceptual Descriptions of Exposition Corridor Study Routes

B Conceptual Descriptions of Exposition Corridor Study Modes

C Detailed Environmental Analysis

D Plan/Profile

E Public Outreach Report

Appendix A

This Appendix section contains the conceptual descriptions of the Exposition Corridor study routes, referenced in Section 3.2 of the Final Report.

A.1 Route Option #1, Exposition Right-of-Way from Vermont/Exposition Boulevard to the alignment's end at 17th Street/Fisher Lumber in Santa Monica.

This alignment follows the existing, unused former Southern Pacific rail line from Vermont Avenue (the eastern end of the Study area) to the current end of the trackbed at 17th Street grade crossing in Santa Monica, just east of Fisher Lumber. The alignment can be subdivided into three segments for descriptive purposes, as follows:

East Segment: Vermont to Venice and Robertson Boulevards: This alignment segment contains six miles of primarily tangent track through commercial and industrial areas. The alignment begins at Vermont Avenue in a landscaped median of Exposition Boulevard, an east-west arterial. The alignment continues west in the median for about one mile, where it switches to the south side of the street after an "X" shaped intersection of Exposition Boulevard and Rodeo Road. The alignment continues west along the south side of Exposition for several miles, encountering numerous street and pedestrian grade crossings, many of which are signalized at nearby intersections.

Starting at La Brea the alignment passes by a residential area with buildings and foliage separating the alignment from adjacent uses for a short segment. At Hauser the alignment resumes side of street running on the south side, through open areas where the full width of the alignment is intact and crossed only by driveways and streets.

Just west of La Cienega, the alignment returns to the median of National Boulevard, after a complex interchange where Jefferson swings south just east of the Ballona Creek channel and bridge. The alignment crosses Ballona Creek on a single track metal bridge and parallels a median parking area for local industry, then transitions to the north side of National Boulevard until Washington, where the alignment enters an open area which formerly contained a small depot and yard in the vicinity of Venice, Robertson, and Washington Boulevards. This open area was near the end of freight service territory when Southern Pacific first abandoned the western end of the line beyond Bagley, and could provide a useful site for a transit center, terminal, or interim opening segment of the facility.

The east segment contains extensive interface and interaction with land uses and traffic facilities, including automobiles, transit, pedestrian, and bicycles (at the Ballona Creek crossing). A vital requirement in any future alignment development will be safe operation and minimal impact of any transit corridor service with grade crossings, pedestrian walkways, and adjacent land uses which are primarily

commercial/industrial with some residential and schools in several areas along the alignment in this segment.

The primary constraint in this segment is the Ballona Creek bridge which may require rehabilitation and/or widening in order to accommodate transit service or facilities such as the Transitway or LRT on double track.

Middle Segment: Venice and Robertson Boulevards to I-405 and Sepulveda in West Los Angeles: This segment is approximately three miles long and only Route 1 follows the railway alignment through this primarily residential area. From the area of the Robertson Boulevard crossing, the alignment proceeds west on a diagonal crossing of busy Venice Boulevard, which is a likely candidate for grade separation. The next mile is straight through an open strip below the south shoulder of I-10, in an area currently unused except for one business near Venice Boulevard.

The alignment gradually climbs along an embankment slightly above Exposition Boulevard, and crosses National and Motor Boulevards on single-track bridges above the streets. Just west of Motor Boulevard, in an area constrained by retaining walls supporting I-10 and residential apartment buildings (to the south), the alignment narrows and swerves under I-10 in an S curve configuration within a concrete-lined tunnel. West of the tunnel, the alignment lies in an earthen cut between two residential areas known as Cheviot Hills and Rancho Park. One pedestrian footbridge links the residential areas behind a school, and there are no grade crossings in the immediate area due to the railway alignment, topography, and I-10.

Approaching Overland Avenue, the cut ends and the alignment curves from a northerly path to a more westerly tangent, proceeding through an extremely wide right-of-way section with portions of Exposition Boulevard paralleling on both sides. The segment ends just west of the Sepulveda Boulevard grade crossing where I-405 crosses both the alignment and several surface streets in an industrial and commercial area.

The middle segment contains several modern and useable railway facilities, such as retaining walls and steel bridges for grade separation. Depending on clearance and facility requirements, some rehabilitation or widening of facilities such as the I-10 tunnel, Rancho Park/Cheviot Hills footbridge, and Motor/National bridges may be necessary. This segment also passes through several attractive residential areas, with the potential for both community impacts as well as improved transit service to these neighborhoods.

Western Segment: I-405 to 17th Street in Santa Monica: The western segment is approximately three miles long, and four of the route options utilize this segment of the study area. From the I-405 overpass, the alignment continues west on a tangent which first crosses Sawtelle and then Pico Boulevard on a diagonal crossing in a commercial area. The alignment then proceeds through an industrial corridor which is constrained fixed structures authorized under short-term

leases lying directly alongside the right-of-way. While some of the property constraints may be removable, the alignment is generally constrained by numerous properties and uses to a narrow corridor to 26th Street, approximately two miles distant. West of Cloverfield, the alignment runs along the south side of Olympic Boulevard, then crosses Olympic and proceeds through an industrial area to the end of track.

The western segment provides access to numerous commercial and industrial uses, with residential areas nearby as well. The condition of the property between Pico and Cloverfield may require economizing of any facilities due to width constraints and adjacent, well-entrenched uses by industries and warehouses under short-term leases. While previous long-range planning studies have suggested alternate routings in this segment, such as the median of Olympic Boulevard, this Study will concentrate on the existing Exposition rail alignment, with a separate technical analysis covering conceptual options to establish downtown Santa Monica linkages.

There is no existing right-of-way west of the Fisher Lumber property, although the rail alignment extended farther west during the years of Pacific Electric service.

A.2 Route Option #2: Exposition alignment to Venice - Sepulveda Boulevards, west on Venice Boulevard to Sepulveda Boulevard, north on Sepulveda to Exposition alignment, west on Exposition to 17th Street.

Route Option #2 will be described between Venice/Robertson and Exposition/ Sepulveda only since the other segments are described in Route Option #1.

Middle Segment: This segment is approximately 3.7 miles long and utilizes arterial street right-of-way for the entire length. Venice Boulevard is a six- to eight-lane facility, with a landscaped median and parking. The median once contained the Venice Short Line of the Pacific Electric, which was a well-used, double-track electric railway prior to PE's demise in the 1950s. Venice Boulevard generally is fronted by commercial and residential land uses, including activity centers such as the Culver Center retail mall and Brotman Medical Center, just north of the Culver City boundary and MGM Studios.

Sepulveda Boulevard contains primarily residential uses, with a commercial area at the top of a grade where Palms Boulevard intersects Sepulveda, as well as the flat intersection with National to the north.

The Exposition alignment would diverge from the existing alignment at Venice Boulevard, potentially using a grade separation to reach the median or sides of Venice Boulevard. The alignment would continue about 1.9 miles straight west to the intersection of Sepulveda, where it would turn north and run alongside or within Sepulveda. The alignment would include gradient estimated at up to 5 percent on both sides of the Palms intersection. After running about 1.8 miles north on primarily tangent Sepulveda Boulevard, the alignment would turn west at the Exposition alignment grade crossing and rejoin Route Option #1.

This segment could contain numerous traffic and construction impacts due to the established traffic facilities and land uses along Venice Boulevard, and to a lesser extent along Sepulveda. The three transition areas, especially the corner of Venice and Sepulveda, could involve property acquisition and/or access issues unless grade separation was employed. Both arterials currently contain both transit connections and service at key intersections, indicating that a ridership base already exists along these streets.

A.3 Route Option #3: Exposition alignment to Venice – I–405, Venice Boulevard west to I–405, I–405 north to the Exposition alignment, Exposition alignment west to 17th Street.

Route Option #3 will be described between Venice/Robertson and I–405/ Exposition, since the other segments are part of Option #1.

Middle Segment: This segment is approximately 3.6 miles long, and the first 1.9 miles west of Venice/Robertson uses the same alignment along Venice as Route Option #2.

At the intersection of Venice and Sepulveda, the alignment would begin to turn northwest and ascend to the level of the I–405 freeway which crosses Venice Boulevard on a bridge. The alignment would continue north along I–405 for about 1.6 miles, running along either side or on an overhead structure due to constrained right–of–way and residential areas alongside the freeway. The alignment would cross under Palms and over National Boulevards similar to the I–405, and then weave through the I–10/I–405 junction and descend to ground level to rejoin the Exposition alignment between Sawtelle and Sepulveda. This alignment segment would avoid impacts along most of Sepulveda, except for the transition area near Venice Boulevard which contains commercial and residential uses.

The transition area on the north end would be complicated by the nearby I–10/I–405 complex, as well as the I–405 overpasses over Sawtelle and Exposition itself in an industrial and commercial area. The I–405 freeway passes through a residential area between Venice and Exposition, with relatively constrained shoulders and right–of–way on both sides of the freeway which also includes two overpasses of local streets.

A.4 Route Option #4: Exposition alignment to Venice Boulevard., transition to I–10 shoulder to the I–10/I–405 junction, transition to Exposition alignment to 17th Street.

This option will be described between Venice/Robertson and the I–10/I–405 junction, since the other segments are described in Route Option #1.

Middle Segment: This segment is approximately 2.5 miles long and would primarily use the shoulder of I–10 with transition approaches from the Exposition alignment. From Venice Boulevard, the alignment would follow the existing right–of–way at least to the area of the I–10 tunnel (known as Palms Overhead)

containing the rail line. The alignment would then join the north shoulder of I–10, which could involve curvature and gradient to reach an appropriate level for the alignment along the freeway, as well as turning west to follow I–10. While along I–10, the alignment would interface with the Overland Avenue overpass and entry/exit ramps, as well as the I–405 junction ramps.

Near Sepulveda, the alignment would transition to ground level and rejoin the existing alignment near the I–405 overpasses. This routing would take advantage of existing facilities such as the railway tunnel under I–10. This segment would lie primarily within the freeway envelope and remain closely parallel to the Exposition alignment. The transitions to and from I–10, as well as integration with overpasses and ramps along the freeway, could pose construction cost and design impacts.

A.5 Route Option #5: Exposition alignment to Venice Boulevard, Venice Boulevard west to Venice Way, Venice Way to Main Street, Main Street north to I–10/Colorado Avenue in Santa Monica.

This alignment will be described west of Venice/Robertson, and the proposed terminus in Santa Monica is different from previous options, since the alignment option follows a different path to Santa Monica and does not utilize the Exposition right–of–way west of Venice Boulevard.

Middle Segment: The Venice Boulevard segment to I–405 has been described in Options 2 and 3 as far as I–405 where the alignment would continue west along Venice Boulevard.

Western Segment: From the I–405 overpass, this alignment extends about 3.2 miles west along Venice Boulevard prior to turning north along the Coast. Venice Boulevard contains primarily residential and commercial land uses along this segment, passing through the attractive residential areas of Mar Vista and Venice itself. The alignment crosses key arterials such as Centinela and Lincoln Boulevards. Washington Boulevard intersects the alignment in an area which once contained the terminus and yards of the Venice Short Line, and until recently, the median was used for beach parking. The former railway median is currently under construction, with landscaping and a new library (west of Abbott Kinney Blvd. intended for implementation in the near future.

The alignment would turn northwest on Venice Way following existing bus routes in the area, and negotiate the Venice traffic circle. The alignment would then turn north on Main Street for the 2.5 mile segment to the Civic Center complex on the south end of Santa Monica's downtown. Main Street consists of four lanes and is fronted by dense residential and commercial development consistent with popular beach areas. The alignment would proceed through the upscale Ocean Park shopping area, and then pass through the Civic Center area on a wider right–of–way with one gradient of short duration. The alignment would end either by a stub end terminal south of I–10 or could follow a looping path to Colorado Avenue in order to penetrate the downtown retail area.

A potential routing option in the north–south Main Street segment is a "couplet" arrangement, using Main and Pacific as one–way routes approximately one block apart. Under this scenario, northbound service would utilize Main Street, with southbound service on Pacific, and a turning segment on Colorado Avenue to link the two alignments. This arrangement could minimize traffic impacts to both north–south segments. Pacific Avenue is also known as Nielsen Way and Ocean Avenue in portions of this north–south coastal area.

This alignment option would have the potential for numerous residential and traffic impact areas along Venice Boulevard and Main Street, as well as the transitional areas in Venice. The alignment would serve areas with a substantial existing transit ridership base. Any transit service or facility improvement in the coastal areas of Venice and Santa Monica may be subject to Coastal Commission approval and could encounter local restrictions on development and view corridor preservation. On a more practical level, weekend and summer beach traffic could make street operations difficult and unreliable due to parking and congestion, although improved transit service could help to alleviate these common conditions.

In addition, the City of Santa Monica has approved a plan to narrow the width of Main Street to two lanes, plus parking, in the near future, from the current 3–4 lanes.

Appendix B

This Appendix section contains the conceptual descriptions of the Exposition Corridor Study modes, referenced in Section 3.3 of the Final Report.

B.1 BICYCLE PATH

A bicycle path is a facility intended primarily for one type of user, the non-motorized bicyclist. While pedestrians often use some bicycle paths, this discussion will center on bicycle paths which are paved and separated from other traffic lanes.

Many cities in California feature extensive bicycle facilities which are used by commuters, students, and recreational riders. Some agencies and jurisdictions publish regional and local bicycle trail maps to inform the cycling community of route options and available facilities. Bicycle paths generally are configured in two ways:

> A completely separated, protected, and paved linear path which follows a linear corridor such as a river channel, abandoned rail or road bed, or other public property line, with periodic access interface with other paths or ordinary roads. The Ballona Creek bike path is an example of this application.
>
> A striped or signed lane on an arterial, offering some traffic operations control and safety enhancement to bicycle users. This type of route requires no separate property or construction but sometimes leads to traffic confrontations or unsafe conditions for bicycle users. Venice Boulevard, as an example, contains bicycle route signs at curbside and some special lane designation and/or striping along the route.

Bicycle paths may contain one or two lanes and could have auxiliary facilities, such as pullouts or shelters, if funding permits. Most paths are not lighted at night, relying on the user to follow those vehicle codes which apply to non-motorized bicycles. Operations on a bike path are typically regulated solely by the users, consistent with the "free-spirited" nature of this personalized form of individual transportation.

The width of a typical bike path can range from a few feet to perhaps 15 feet, with overhead clearance of no more than 10 feet necessary. The Exposition right-of-way could readily contain a bike path in virtually all segments, with the key issues being safety and security of users in areas such as the I-10 tunnel or the Rancho Park cut where the path is not readily visible from adjacent areas. Crossings of arterial streets would also require attention to safety, since bicycles currently enjoy no priority at grade crossings legally and are in fact required to comply with motor vehicle movement laws on streets.

B.2 TRANSITWAY

A Transitway is defined, for the purposes of this study, as a barrier-separated paved facility of one or more lanes, capable of carrying any vehicle which carries passengers

and normally operates on streets. Trucks would be excluded, but bicycles could be permitted. The determination of legal and appropriate usage would be left to the facility developers, but for this study the assumption is made that transit vehicles (powered by diesel or electricity), multi-occupant automobiles, and small buses or vans with ridesharers or commercial clienteles (Airport shuttles) would be permitted to use the Transitway.

One example of this type of facility lies in Ardmore, Pennsylvania. At one time, a Red Arrow Lines trolley line ran between Upper Darby and Ardmore, Pennsylvania, in the western suburbs of Philadelphia. Soon after Red Arrow became part of SEPTA in 1968, the Ardmore Trolley was abandoned and the right-of-way paved over to form an exclusive busway, using the route and former stations of the Trolley. Diesel buses began service on similar headways to the electric streetcars, with the catenary and other rail facilities removed from the alignment. The buses enjoy priority signalization at some of the former grade crossings, both within residential and commercial areas and in median and exclusive alignment areas. The alignment has never been legally opened to other users, perhaps because the route is not one with extensive travel demand. In 1991, the busway continues to serve about eight buses per peak hour.

Physically, a Transitway should be from 40-50 feet wide in order to provide a minimum of one lane in each direction at all times, one pull-off lane in each direction for passing, breakdowns, or station stops for transit vehicles, and sufficient buffer room for a barrier separation, landscaping or soundwalls, and any support facilities, such as catenary structure for electric trolley-buses. A key issue for the Transitway is road access; that is, how many access points should be allowed, and what type of merging or lane design will be effective?

If a Transitway were implemented with no other access points for vehicles beyond the two endpoints, then average speed would be high and traffic operations potentially very smooth. This arrangement would still permit transit vehicles to make occasional community access stops, but vehicle users from mid-line points would not enjoy any benefit from the facility. A Transitway with several intermediate access points, either via ramps or carefully controlled intersections with special transition lanes, could benefit more transit and other users by providing evenly spaced access points at convenient areas such as key arterial intersections. If the Transitway were implemented along an existing arterial such as Venice Boulevard, then median running would be likely, and access could occur at any cross street which remained open to cross traffic. Along a freeway, access would be very limited, with end point access most likely due to construction impacts at interchanges, as well as potential traffic and safety impacts to freeway users.

The service characteristics of a Transitway could be attractive and help motivate transit and rideshare usage. Travel time could be improved as compared to running times on existing arterials, and with relatively few stops or access points, station activity would be concentrated at areas where transfers and connections would be made.

A key issue of transitway operations is control of at-grade crossings, since lack of preferential treatment could negate the potential benefit from the facility. In this study, it is assumed that any at-grade crossing between a Transitway and arterial street would be signalized and phased to provide for priority for the maximum allowable time for Transitway users. Traffic signal phasing would also allow for safe ingress/egress through turn lanes to and from the Transitway, and it is possible that this arrangement could create a penalty to ordinary users of the arterial street.

A potential major problem with operations will be the random arrival of vehicles at cross street signals. In order to provide priority through these locations, transitway vehicles will need to arrive in platoons. Organization of large numbers of vehicles into platoons and continued operation of these platoons at constant speeds to utilize the priority signal timing has not been attempted to any significant degree in the United States.

Grade separation of the Transitway could eliminate many such potential impacts, but bridges or tunnels tend to escalate construction costs, and community impacts may be foreseen if the grade separation lies in an area considered attractive, or one which contains view corridors. Each potential site must be reviewed for cost and impact.

B.3 TROLLEY BUS TECHNOLOGY

Trolley Buses are electric vehicles which are considered identical to ordinary buses, except for the electrical propulsion system, which requires roof-mounted poles and overhead catenary systems of some complexity. Trolley Buses are currently operated in San Francisco, Dayton, Philadelphia, and Vancouver, BC and other North American cities. Seattle has gone one step further than traditional systems by employing a European dual-mode vehicle, which operates electrically in a downtown tunnel, and via diesel propulsion on surface streets. The vehicle can also utilize Seattle's existing Trolley Bus route network, although it is not typically so employed. Trolley Buses offer quiet and fuel efficient mass transportation, with the drawbacks being electrical system complexity, safety, and visual impacts, as well as a certain lack of smoothness at lower speed ranges due to the direct use of electricity for propulsion.

Physically, Trolley Buses require the same space as buses, which allows use of normal traffic lanes. However, in order to provide electric operation, overhead catenary must be installed, which may considerably widen the overall right-of-way requirement depending on the design and integration of the catenary support system with existing utility structures.

For instance, Trolley Buses on arterials require one lane in each direction and curb space to stop, similar to a bus. This amount of space could be provided in less than thirty feet, assuming one lane in each direction. Shared lanes with street traffic are also possible, but result in no priority for the transit vehicle. Trolley Buses also have the ability to utilize nearby lanes to pass obstacles, due to the unique rotating nature of the overhead poles. On a freeway, a new European catenary design has enabled Trolley Bus operations at freeway speeds, with the suspension system staggering the contact wire back and forth

between hangars to promote continuous pickup shoe contact. Because of difficulties associated with electrification on existing freeways, this application will not be studied.

The total right-of-way width required for Trolley Bus, when catenary support systems are included, is between forty and fifty feet, which would apply to operation on a Transitway or arterial. Operations on a Trolley Bus alignment would be consistent with bus practices, with curbside stops on streets and right-hand side stops on a Transitway. Since Trolley Buses are somewhat more efficient than buses, travel time could improve and fuel efficiency would also improve slightly, as well as compliance with UMTA's requirement to utilize energy sources other than diesel propulsion.

B.4 LIGHT RAIL TRANSIT

LRT service involves the construction of a modern fixed guideway railway with electrically powered vehicles. Since the late 1970's, Light Rail Transit has been implemented in several California cities, including Los Angeles (Metro Blue Line), San Diego (San Diego Trolley), Sacramento (RT Metro), and Santa Clara County, as well as other cities around the country and in Canada. The Pacific Electric system, which once contained an extensive network of electric passenger rail lines all across the LA Basin, is an example of the predecessor to LRT. The development of LRT brought streetcar and interurban technology and practices to modern day standards.

Physically, LRT requires right-of-way approximately 30 feet wide, including catenary poles, wayside signal and support housings, and protective fencing. Overhead clearance can be as little as 14 feet under bridges, but desirable clearance is approximately 20 feet with no obstructions. Vehicles are typically 80-90 feet long (about twice the length of a standard bus or trolley-coach) and carry approximately 70 seated and up to 200 standing passengers. LRT can operate in exclusive right-of-way (including grade separations) or along streets, either median or side of street, although speed restrictions may apply when in or near mixed traffic due to regulations imposed by the California Public Utilities Commission. LRT is typically quiet and can achieve speeds up 50-60 miles per hour depending on systems constraints and vehicle design.

Along the Exposition Right-of-Way, LRT would be physically consistent with the line's previous use as a freight and passenger line, although modern standards would provide for frequent service not characteristic of local freight service, the last rail use of the line. Overhead catenary support, signal and grade crossing control systems, and protective fencing would be installed to provide a rail line environment similar to the Blue Line, capable of providing safe, high-speed service at frequent intervals. Stations could be located in the center or outside of the alignment, or both, depending on station site constraints. Stations would include ramps for accessibility for the handicapped, if high-level platforms and loading were employed, consistent with the ADA provisions.

Implementing LRT along the other alignment options could pose difficulties and potential impact areas. Operations along Venice Boulevard and/or Main Street in the median or curb lanes may crate traffic impacts and require traffic signal phasing or preemption for LRT.

Grade separations may be required at key arterial intersections, and the LRT line would be required to fit under fixed constraints such as the I–405 bridge on Venice Boulevard. Along freeways, LRT could be implemented along one shoulder, but the constraints posed by additional bridges and transitional grades to and from the freeway elevation could impose additional design and cost constraints. In addition, providing rail service from a freeway envelope generally requires stations with significant amounts of structure, and access may be difficult since parking or bus transfer points may be a short distance away, requiring users to walk to and from the freeway LRT station using ramps or elevators.

Appendix C

This Appendix section contains the detailed Environmental Analysis information conducted in a format similar to CEQA, the California Environmental Quality Act.

C.1 EARTH AND SEISMIC

The closest major active fault to the site is the Newport–Inglewood Fault Zone, located approximately 4.0 miles south of the site. The Newport–Inglewood Fault Zone is a broad zone of discontinuous faults extending southeastward from Beverly Hills to Newport Bay. A near–shore segment of the Newport–Inglewood Fault Zone was the source of the 1933 Long Beach earthquake. This zone represents a major hazard to the densely populated Los Angeles basin. Two other faults exhibiting activity during the Late Quaternary include the Charnock Fault and Overland Avenue Fault.

The geologic hazards at the Study Corridor are essentially limited to those caused by earthquakes and the resulting ground motion.

- **Ground Shaking.** Ground shaking from a major earthquake in the region would occur not only immediately adjacent to the earthquake epicenter, but for many miles in all directions. According to generalized Study conducted for the Los Angeles basin, the project area is largely underlain by Holocene alluvial sediment. The Holocene sediments are expected to experience the most severe levels of ground shaking in the event of a major earthquake.
- **Liquefaction.** Liquefaction potential has been found to be the greatest where the ground water level is shallow and loose fine sands occur within a depth of about 50 feet or less. The liquefaction susceptibility Study of the Los Angeles Region indicates the risk of liquefaction in the project area is generally low. A greater potential for liquefaction exists in portions of the Study Corridor located near Ballona Creek and the Venice and Santa Monica beach areas. Finally, an area west of Jefferson Boulevard is described as having a high liquefaction potential.
- **Subsidence.** Seismic settlement often occurs when loose to medium dense granular soils densify during ground shaking. Due to variations in distribution, density, and confining conditions of the soils, such settlement is generally non–uniform and can cause serious structural damage. Differential settlement may result from ground failures such as liquefaction, flow slides, and surface ruptures.
- **Surface Rupture.** Surface rupture occurs when there is physical movement along a fault trace. This movement can involve lateral movement along a fault trace or thrust motion where one side of the fault is thrust over the other side. Surface rupture can be extremely damaging to structures or improvements traversing the fault trace. Portions of the alignments presently under consideration cross the Newport–Inglewood fault zone just east of the Santa Monica freeway. A number of related faults are found in the vicinity of the Baldwin Hills including the

Inglewood and Potrero faults. Finally, the Charnock and Overland faults are found in the project area.

- **Slope Failure.** No known landslides are present in the Study Corridor or in the immediate vicinity. Drainage concerns are limited to a small sector of Rancho Park where the alignment is below grade and surrounded by steep slopes. The essentially flat lying topography at the project area precludes both stability problems and the potential for lurching (earth movement at right angles to a cliff or steep slope during ground shaking).

C.2 AIR QUALITY

A primary objective of this transit Study is to evaluate potential operational systems that would effectively move large numbers of residents through this corridor. Freeways and major roadways in the Study Area are among the most heavily travelled in the southland. An efficient transit system through the corridor would ease existing traffic congestion overall, thus reducing vehicle emissions. There would be a potential for some localized air quality impacts though these impacts would be largely offset by the reduction of vehicle emissions throughout the corridor.

The SCAQMD and the Southern California Association of Governments (SCAG) have identified a number of Air Quality Management Plan Control Strategies that would be effective in reducing vehicle emissions. In addition to more stringent vehicle emissions standards and requiring the use of cleaner fuels, a number of other transportation and land use control strategies are identified. These include rail electrification, congestion reduction through increased use of high occupancy vehicle lanes, and regional transportation facilities. The alternatives being considered in this Study would, in varying degrees, work towards implementing SCAG's and SCAQMD's plans.

Some potential air quality impacts would result with the construction and operation of those alternatives being considered in this Study. These impacts would be related to the following activities:

- **Short-term Construction Emissions.** The construction of any transit system would involve the use of heavy equipment which would generate diesel emissions. The level of emissions would depend on the duration of construction activities and the amount and types of equipment used. Short term impacts would cease when the construction was complete.
- **Local Vehicle Emissions.** Those alternatives involving some vehicle usage would result in a diversion of traffic within the corridor. For example, increased traffic in and around stations could lead to increased emission concentrations in the vicinity of stations. Given the existing background traffic (and the resulting emissions levels), the increases are not anticipated to be significant.

- **Long-term Stationary Emissions.** The LRT and trolley bus alternatives would involve significant amounts of electrical usage to power their respective equipment. This off-site electrical power generation would result in emissions at the source of power generation. The major impact would be at those power generating plants within the South Coast Air Basin using oil or gas to generate the power. Approximately 20% of the power produced by the Los Angeles Department of Water and Power (LADWP) is produced by oil and gas fired plants. An addition 60% of LADWP's power is provided by nuclear and coal powered plants located outside the Basin and the remainder (20%) is generated by hydroelectric plants.

C.3 WATER AND HYDROLOGY

The Los Angeles Department of Water and Power (LADWP) supplies water for the communities of Los Angeles. LADWP is entitled to draw from three main water sources for its supply: the San Fernando Groundwater Basin, the Los Angeles aqueducts and the Metropolitan Water District. Other water supply agencies in the Study Area includes the City of Santa Monica and the West Basin Metropolitan Water District. The MWD is a wholesale distributor of water from the Colorado River and the State Water Project. It is not expected that the LACTC transit project would significantly impact existing water supplies.

Los Angeles County is subject to a wide range of flood hazards, including those caused by earthquakes, intense storms and failure of man-made structures. Two damaging regional tsunamis caused by the 1812 Santa Barbara and the 1927 Point Arguello earthquakes indicate faults off the coast of Southern California are capable of producing large local tsunamis. The tsunami concern is heightened because the short historical record does not adequately characterize long term tsunami risk.

Portions of the Study area are located within the Federal Emergency Management Agency (FEMA) designated flood plain though the risk for flood is not any greater than that for most areas of the central Los Angeles Basin.

Within the established Study Corridor, Ballona Creek (East segment) and the Sepulveda Flood Channel (Central segment) are major sources of drainage for the Study Corridor as well as local area. Soil Conservation Service maps indicate that local soils are moderately to well drained, with ground water elevations in most portions located 60 inches below ground level. Site visits to the Study Corridor supported this research; additionally, the entire corridor is urbanized and contains drainage infrastructure.

Portions of the existing Exposition railroad right-of-way are below grade and some flooding is possible in the absence of any mitigation. In addition, localized ponding or flooding may occur in areas where grade separations have been recommended in the absence of appropriate mitigation.

Support facilities (station locations, parking areas, maintenance facilities) would be subject to National Pollutant Discharge Elimination System (NPDES) requirements. Appropriate drain and filtering equipment and possibly retention basins would be required. The degree and extent of the required improvements will not be known until subsequent phases of design and engineering are complete.

The transit alternatives considered in this Study would result in varying degrees of water consumption related to the following activities:

- **Short-term Consumption.** The SCAQMD's Regulation IV requires that exposed earth be periodically watered to reduce particulate dust emissions. This consumption would occur during grading and excavation phases of construction.
- **Landscaping.** All of the development scenarios will involve some form of landscaping which will involve water consumption.
- **Operational Consumption.** Water consumption related to system operation and maintenance would place an additional demand on water supplies.

C.4 PLANT AND ANIMAL LIFE

The Study Corridor surrounding each of the routes, with the exception of interspersed vacant parcels, is completely urbanized. Animal life in the area is limited to common bird, reptile and mammal species commonly found in an urban setting. The Exposition right-of-way is subject to heavy traffic thus limiting the variety of rodent and or domestic animal species that may inhabit or frequent the area within the Study right-of-ways.

No significant adverse impact on existing animal life is expected with project implementation. The existing vegetation in the area largely consists of introduced plant species. In addition to the existing landscaping, trees and shrubs will be planted as needed throughout the chosen transportation corridor as accents to residences, commercial and industrial properties.

Portions of the Exposition Boulevard right-of-way have been landscaped. Trees and shrubs may need to be removed where they are too close to the chosen transportation corridor. The project, however, will not result in the removal of any significant varieties of plants or trees. A segment of the Exposition Boulevard right-of-way between Vermont Avenue and Normandie Avenue has been planted with palm trees which would require removal with most of the development scenarios. The majority of the transit corridor will be landscaped as will the station and parking areas. The impacts of the project on plant and animal life should be considered beneficial and not adverse.

C.5 NOISE

The project area is in an urbanized setting and is subject to substantial levels of noise throughout the day. Much of the project area is subject to considerable levels of traffic noise (in excess of 70 CNEL). The noise model did not consider any obstructions to the noise path, such as shielding due to buildings or changes in topography, and are

therefore considered a worst-case representation. As a result, the actual noise levels at these locations are generally less than the estimated noise levels.

While the existing ambient noise environment in much of the project area presently exceeds those levels recommended by the aforementioned guidelines, there are large numbers of noise sensitive uses that will need to be considered in future design and engineering. Single family and residential neighborhoods line much of the corridors being considered in this Study. These uses will be most sensitive to noise impacts during the evening, night-time, and morning hours. On the other hand, there are a number of schools and specialized activities that will be especially sensitive to additional noise impacts during the daytime.

There is a potential for adverse noise impacts with all of the project alternatives being considered. These impacts would be related to the following activities:

- **Short-term Construction Noise.** The construction of any transit system would involve the use of heavy equipment which would generate significant levels of noise. The noise impacts would depend on the duration of construction activities and the amount and types of equipment used. Short term noise impacts would cease when the construction was complete.
- **Traffic Noise.** Those alternatives involving some vehicle usage would result in a diversion of traffic within the corridor. For example, the transitway alternative may lead to increased traffic noise over the existing levels. Increased traffic in and around stations for the LRT option may lead to increased traffic noise in the vicinity of stations.
- **Long-term Stationary Noise.** Certain types of equipment and facilities required for operations may result in localized stationary noise impacts. These facilities could include gate equipment, traffic signal devices, transformers, etc.
- **Long-term Mobile Noise.** Depending on the type of mass transit equipment used, there will be a potential for mobile noise impacts. For example, the HOV transitway will result in increased levels of traffic noise while the LRT alternative's noise impacts would be related to frequency of operation, rail noise, and signal devices on the individual trains.

Unlike many of the environmental issues considered in this Study, noise impacts can be effectively mitigated using relatively simple measures. Sound walls can reduce noise levels as much as 10 dB. Additional insulation in housing construction (now required under Title 24) is another effective way of reducing noise. Other measures, including directional noise shields, mufflers, and other devices can reduce noise impacts.

Development of the project will result in short-term noise impacts (construction-related) and the long-term exposure of persons to ambient noise levels exceeding 65 decibels (dBA). During project construction, heavy machinery will be capable of generating periodic peak noise levels ranging from 70 to 95 dBA at a distance of 50 feet from the

source. Once construction ends, the potential noise impacts will vary depending on the type of facility selected, topography, and distance to noise sensitive uses.

C.6 LIGHT AND GLARE

The Study Corridor is fully urbanized and subject to light and glare normally found in an urban setting. In addition, most of the alignments are located within or near major roadways and subject to lighting from vehicles, street lights, signage, and structural lighting. Residences that are typically sensitive to excessive levels of light and glare are located throughout the corridor and many are located adjacent to commercial areas and major roadways.

Light and glare impacts are not a significant concern in areas adjacent to the alignment developed as manufacturing or commercial. Warehouse and manufacturing activities located west of La Brea Avenue (Segment B), west of Sepulveda (Segment C), and west of Bundy Drive in Santa Monica (Segment D) would not be adversely impacted by additional lighting. In addition, the alignments following Venice Boulevard traverse a commercial area where substantial amounts of lighting are present.

The areas where light and glare impacts are of a major concern include the single family neighborhoods located in the vicinity of the Study alignments. The greatest concentrations of single family homes are located along the eastern portion of Exposition Boulevard and west of Venice Boulevard.

There is a potential for light and glare impacts at the local level, depending on the type of transit facility ultimately selected. Lighting will be necessary to ensure users of the facility will have adequate lighting to see and be seen. In addition, lighting will be required in parking areas and at stations with the LRT alternative. For most areas, this additional lighting will not be excessive given the existing lighting in the area.

C.7 LAND USE

The project area is urbanized with a considerable variety in the types and character of development. For purposes of characterizing land use within the Study Corridor, the corridor was divided into eight segments, (referred to as Segments A through H). Each segment is bounded by major thoroughfares and includes some overlapping of the adjacent segment. The land use characteristics for each segment is discussed below:

- **Segment A:** Land uses in this segment are characterized by institutional and specialized land uses (The University of Southern California and Exposition Park) at the eastern-most portion of the segment, and a mix of single- and multiple-family neighborhoods in the western portion of the segment. Commercial uses are located along several of the major thoroughfares. Industrial uses front Exposition Boulevard at the western portion of the Segment.
- **Segment B:** Land uses in Segment B contain a mix of multi-family and industrial uses. The eastern portion of the segment includes smaller single-family

neighborhoods interspersed among multi-family, public/institutional and open space uses. The western portion of the segment is characterized by large industrial areas located near multi-family developments. Highway commercial, public/institutional, and some open space are found along Venice and Exposition Boulevards.

- **Segment C:** Multiple-family developments are the dominant land use in the eastern portion of Segment C. The community of Rancho Park, located west of Motor Avenue and continuing to Sepulveda Boulevard, is characterized by single-family homes. West of Sepulveda Boulevard, industrial and warehousing activities front the north side of Exposition Boulevard, while the south side contains single- and multi-family uses and highway commercial developments. Public/institutional uses are interspersed throughout this portion of the segment.
- **Segment D:** Industrial/warehousing and office/professional uses comprise the majority of the segment with single-family neighborhoods and a combination of multi-family and community commercial uses located at the eastern and western portions of the segment, respectively. Throughout Segment D, the alignment is narrow and travels between industrial and commercial uses, except where crossing arterials and thoroughfares.
- **Segment E:** This segment shows Alternate routes 2 and 5 as well as portions of the Exposition alignment. Industrial uses at the Venice Boulevard/Robertson Boulevard intersection are surrounded by multi-family uses. The alignments using Venice Boulevard are surrounded by multi-family developments east of Sepulveda Boulevard, and single-family neighborhoods west of Sawtelle Boulevard. Segment E also includes the San Diego Freeway. Multi-family uses are located adjacent to the freeway.
- **Segment F:** This segment contains Route 5, the Venice Boulevard/Pacific and Main Avenue route options. Land uses in this segment are characterized by multi-family uses fronting Venice Boulevard, and the multiple-family development, in turn, is surrounded by single-family neighborhoods west of Lincoln Boulevard and north and south of the Venice Boulevard/Pacific Avenue intersection. Public institutional facilities are also interspersed throughout the segment. In a typical portion of this segment, commercial uses are found along major thoroughfares, while multiple-family units, including UCLA married student housing located along Sawtelle and Sepulveda Boulevards. Single-family neighborhoods are located to the east and west of these thoroughfares.
- **Segment G:** This segment includes route number 5. The City of Los Angeles boundary line separates the Venice community from the City of Santa Monica, dividing the segment into nearly equal halves. The Venice portion contains a large number of multi-family neighborhoods separated by single-family neighborhoods, clusters of highway commercial developments and public/institutional uses, all south of Washington/Abbott Kinney Boulevard. In the City of Santa Monica, multi-family uses are located west of Neilson Way, highway commercial is present east

of Neilson Way and the Santa Monica Civic Center is located at the most northern portion of the segment.

- **Segment H:** Segment H includes all of the routes currently being considered and presents the greatest diversity of development. Multi and single-family uses dominate the eastern and western areas of the Venice Boulevard segment, respectively. Multi-family uses are located adjacent to the San Diego Freeway with single-family neighborhoods located in the interior areas. Single-family uses predominate east of Sepulveda Boulevard with industrial/warehousing uses comprising a majority of the land southwest of this major arterial.

C.7.1 Planned Land Uses

Under the State of California planning, zoning and development laws, the general plan governs the character, location, and extent of future development. The Land Use Element, one of seven mandatory elements, includes a map or diagram indicating location and extent of future land uses. The Land Use Elements for Los Angeles, Santa Monica, and Culver City were consulted to identify planned land uses along the corridor.

- **Segment A:** The City of Los Angeles General Plan (South Central Community Plan) governs land uses within this Study segment. The general plan designations correspond to existing development found within the Study area. Major specialty land uses including Exposition Park and the University of Southern California are reflected in the Community Plan designations.
- **Segment B:** The City of Los Angeles General Plan (West Adams-Baldwin Hills-Leimert District and South Central Community Plans) and the City of Culver City govern land uses within this Study segment. There is a considerable mix in the plan designations that apply to this segment which is largely a reflection of the distribution of existing development.
- **Segment C:** The City of Los Angeles General Plan (West L.A. and Palms-Mar Vista-Del Rey Community Plan) governs land uses with this Study segment. Although there is considerable variation in land uses across the entire segment, particular portions show discernible patterns.
- **Segment D:** The City of Los Angeles General Plan (West Los Angeles Community Plan) governs land east of Centinela Avenue and the City of Santa Monica governs land west of the arterial. The eastern portion of the segment is a mix of office/professional and industrial/warehousing uses, with small areas of single- and multi-family neighborhoods located at the most eastern portion of the segment. West of 20th Street, industrial/warehousing uses surround the right-of-way, and multi-family neighborhoods and highway commercial uses are planned towards the outskirts of the established Study Corridor. Planned land uses closely parallel existing development in this segment.
- **Segment E:** The City of Los Angeles General Plan (West Adams Baldwin Hills-Leimert District Community Plan) and the City of Culver City governs land uses within this Study segment. There is a considerable mix in the plan designations

that apply to this segment. Higher density residential development and commercial development fronts Venice Boulevard. West of the San Diego Freeway, the interior neighborhoods are designated for higher density residential development while lower density (single-family) designations are located west of the San Diego Freeway.

- **Segment F:** The City of Los Angeles General Plan (Venice Community Plan) governs land uses within this Study segment. The Study area follows route alignment number five which travels along Venice Boulevard to Main and Pacific Avenue where the alignment turns in a northwesterly direction. The general plan designations generally correspond to the character and location of existing development in the area. Planned land uses immediately adjacent to the corridor include a mix of multiple-family residential development and highway commercial uses.
- **Segment G:** The Santa Monica General Plan and the City of Los Angeles General Plan (Venice Community Plan) were consulted to identify the planned land uses along the route alternative number five. The general plan land use designations along the route (Venice Boulevard to Ocean Avenue and then northwest) correspond very closely with the types and mix of existing land uses. Multiple-family residential designations front the alignment along Venice Boulevard and along both sides of Pacific Avenue and Neilson Way between Venice Boulevard and City of Santa Monica Boundary. Continuing in a northwesterly direction, the areas to the east of Pacific Avenue are designated as highway commercial and multiple-family residential designations are located along the western side of Pacific Avenue and Neilson Way.
- **Segment H:** In general, the land use designations contained in the City of Los Angeles General Plan (Palms-Mar Vista-Del Rey Community Plan) for this area correspond to the existing types and distribution of development. Higher density residential uses are permitted along alternative route 2 (Sepulevda Boulevard), alternative route 3 (Venice Boulevard to the San Diego Freeway), and alternative route 5 (Venice Boulevard). Along the Exposition right-of-way, lower density residential development is planned north of Sepulveda Boulevard, and industrial/warehousing uses are planned south of this thoroughfare.

The potential land use impacts essentially fall into four categories:

- **Displacement.** In certain instances, existing improvements have been constructed within the right-of-way which will be used for the transit facilities. In other cases, facility operations (grade separations, stations, parking areas, signals, power stations, etc,.) will require removal of existing improvements. In cases where private property is required, the LACTC will provide fair and just compensation only to those properties outside of the right-of-way, pursuant to State and Federal laws. The actual displacement impacts will not be known until subsequent phases of engineering and design.

- **Access.** Some commercial and industrial activities are accessible by roads that presently cross the Exposition right-of-way, particularly west of Fairfax Avenue. This access might be constrained or eliminated with transit operations. In other cases, access to properties would be affected during construction phases.
- **Growth-Inducing Impacts.** Depending on the type of facility that is ultimately constructed, there could be a potential for *growth-inducing* impacts. Growth-inducing impacts occur when a project serves as a catalyst for additional growth and development. For example, if land use controls permit higher density development, an LRT line may provide stimulus to higher density residential development along portions of the corridor or the establishment of certain types of commercial establishments in the vicinity of the stations.

C.8 NATURAL RESOURCES

Natural resources as they relate to the project may be grouped in two categories: 1) air and water resources; and 2) resources which will be used in project construction (e.g. aggregate for concrete, metals for steel, etc.). The project area, for the most part, is fully urbanized. There are no natural resource extraction activities in or near the project area. Substantial amounts of petroleum products have been drawn from the Potrero, Inglewood, and Athens oil fields which are located in the vicinity of the project area.

The CEQA Law and Guidelines indicates a project will have a significant adverse impact on the environment if it encourages activities which result in the use of large amounts of fuel, water, or energy. One of the benefits of the transit proposals under consideration is the more efficient use of fossil fuels by providing an alternative to personal automobile use.

The proposed transit facilities envisioned at the present time will not impact ongoing resource extraction activities in the vicinity of the project area. Like any other construction project, future development of the transit alternatives being considered will involve the irretrievable commitment of construction material resources and energy resources.

C.9 RISK OF UPSET/HUMAN HEALTH

According to the CEQA Law and Guidelines, risk of upset refers to those activities that will result in a risk of explosion or release of hazardous materials. There are a large number of industrial, commercial, and warehousing activities located in the project area. Some of these uses are involved in the handling, storage, or production of materials classified as being hazardous to public health.

As part of this assessment, a survey was undertaken to identify sites in the project area that had been identified by the Environmental Protection Agency (EPA). The EPA maintains the *Comprehensive Environmental Response, Compensation, and Liability Information System* or *CERCLIS* list. EPA's CERCLIS identifies those sites deemed by the EPA to be potentially hazardous. Once on a CERCLIS list, a site is assessed by the

EPA or other appropriate regulatory agencies to determine what further action, if any, is required for remediation.

Other sites may also be present in the project area that are not found on the CERCLIS list. The Regional Water Quality Control Board (RWQCB) maintains a listing of leaking underground storage tanks. The State Office of Planning and Research maintains a Hazardous Waste Substance and Sites List. The analysis found 13 CERCLIS sites in the vicinity of the Study alignments.

A project will result in significant adverse effects if it will create a potential public health hazard or involve the use, production, or disposal of materials which pose a hazard to people or animals or plant populations in the affected area. The impacts from the proposed transit projects envisioned at this time do not fall into this category.

The proposed transit projects under consideration will involve the use of certain hazardous materials. For example, solvents, paints, and cleaning fluids will be used to maintain buses or rail cars. In addition, the ballast under the existing tracks are likely contain byproducts related to past rail operations. Finally, the alignment has been unused for a number of years and it is likely that some illegal dumping has occurred in the past. As a result, some mitigation is likely prior to construction of any of the transit alternatives.

During the next phase of environmental review, a Phase I Risk Assessment should be undertaken for the entire alignment being considered. The Phase I assessment will involve a more detailed record check, site visits, and a visual survey of the alignment to identify areas where further testing (Phase II) may be required.

C.10 POPULATION AND HOUSING

Population and housing statistics were derived from the 1990 U.S. Census. Population and housing figures for each segment were estimated using Census Tract level statistics. Employment, housing, and population projections were obtained for each census tract from SCAG projections.

The proposed transit alternatives will not *directly* result in any substantial change in population or housing within the project area. Any potential population and housing impacts will involve the following:

- **Displacement.** In certain instances, some displacement of existing structures may occur to make room for right-of-way needs or other facilities. Significant amounts of residential displacement is not anticipated because the alignment alternatives will be largely confined to existing right-of-ways. Although some displacement may occur, the degree and extent of impact will have to be evaluated after the proposed project's design has been refined. Any displacement would require relocation and compensation to be provided to those affected persons.
- **Growth-Inducing Impacts.** Depending on the type of facility that is ultimately constructed, there could be a potential for *growth-inducing* impacts. Growth-

inducing impacts would result if the transit project were to be a catalyst to additional growth and development. For example, some areas along the transit corridor zoned for higher density residential development may be developed, in part due to the proximity of a reliable transit system nearby.

- **Employment Generation.** The proposed construction and operation of the transit facilities being considered will generate varying degrees of employment. Construction-related employment will be considerable for all of the alternatives.

C.11 TRAFFIC/CIRCULATION

Roadways and freeways within the Study area are among the most heavily travelled in the Southland. The housing, population, and employment projections discussed in the previous section indicate that increased traffic generation will occur due to local growth. In addition, regional transportation systems (the I-405 and I-10 Freeways) will be handling increased traffic volumes resulting in even greater delays in commute times. Generally, regional traffic volumes are expected to increase 1.5% on an annual basis by the year 2000. At the present, this congestions (both existing and future) will not be resolved by other mass transit proposals because they serve different travel sheds.

A main objective of the transit alternatives being considered is to improve traffic conditions in the area. By effectively reducing the number of private vehicles on local roads and freeway, addition capacity will be provided. There may be potential traffic impacts on the local level:

- **Short-term Construction Impacts.** The construction of the transit alternatives being considered here will result in varying degrees of impact, depending on the length and duration of construction. In some instances, access to individual properties will be affected during construction.
- **Operational Impacts - Roadway Crossings.** Locations where the transit facility will cross local roads will result in delays in cross traffic depending on the type of transit (trolley bus, LRT, HOV, or bikeway). In some locations, grade separations would be required to more reduce interference from transit vehicles.
- **Operational Impacts - Mixed Flow Impacts.** The transit alternatives using trolley bus or special HOV lanes that deviate from the Exposition right-of-way will travel in mixed traffic. This may result in traffic impacts on arterial roadways such as Venice Boulevard and Pacific Avenue. Preliminary studies indicate some street widening or elimination of on-street parking may be required to accommodate trolley bus or the segregated LRT right-of-way.
- **Operational Impacts - Redistributed Traffic.** Some traffic in the Study area will be redistributed following the transit facility's operation. For example, transit stations with parking areas will be localized generators of new traffic. The trips, however, will be removed from the regional transportation network. Other types of redistributed trips will include changes in bus line and feeder connections, kiss-n-ride drop offs, and park and ride commuters.

C.12 PUBLIC SERVICES

The communities of Los Angeles contract with the City of Los Angeles for fire and police protection services, park and recreational facilities, public schools, public facilities and roads and other governmental services such as libraries and post offices. California Department of Transportation (CalTrans) is responsible for maintaining the Santa Monica and San Diego freeways. Likewise, the cities of Santa Monica and Culver City offer similar services to its residents. Typically public services are located along major roadways to service concentrated portions of the population and achieve high visibility and public access.

Fire protection and police and law enforcement services will be provided by the City of Los Angeles, Santa Monica, and Culver City fire and police departments. The selected mode and transportation route will largely determine the extent of security needed. the LACTC will contract with the County to provide law enforcement services.

The proposed alignments will improve the accessibility of visitors and residents to parks recreational facilities. Rancho Cienega Sports Center, Baldwin Hills Playground, McManus Park, Media Park, Woodbine Park, Palms Parks, Stewart Street Park, Memorial Park in Santa Monica, Mar Vista Recreational Center, and Westminster Recreation Center are located adjacent or near the proposed routes.

The proposed project is located within the Los Angeles, Santa Monica and Culver City Unified School Districts. The proposed transit project may serve as a catalyst for the development of high density housing units adjacent to the selected alignment. Foshay Junior High School, Dorsey High School, Washington School, Ellis Avenue School, Notre Dame Academy Elementary and Girls' High School, St. Joan of Arc School, Garfield School, La Ballona School, First Lutheran School, St. Augustine School, Charnock Road School, Venice High School, Westminster Avenue School, and St. Clement School are located along the proposed study routes.

C.13 ENERGY

The California region is presently serviced by two energy companies: Southern California Edison (SCE) and the Southern California Gas Company (SCGC). SCE and SCGC provide electrical and natural gas service to the project area, with lines located along each of the proposed alternatives.

The project area is urbanized with utilities and infrastructure already in place. The proposed transit project may require the local extension of gas and electric lines on site to accommodate the new development. The LRT or trolley bus alternatives will require the installation of overhead and catenary wires. In addition, aboveground electrical lines may need to be relocated where they are too close to the proposed operations. As the SCE and SCGC provide service on demand, no adverse impacts are expected with any of the project alternatives.

C.14 UTILITIES

Southern California Edison (SCE) provides electricity to the planning area. The Southern California Gas Company (SCGC) provides natural gas service to the planning area.

Water service for the communities of Los Angeles and the City of Santa Monica is provided by the Los Angeles Department of Water and Power (LADWP). That portion of Culver City west of Washington Boulevard secures its water supply from the Southern California Water Company.

The Los Angeles County Sanitation District provides sewer service to the project area with local sewer lines maintained by the Los Angeles County Department of Public Works. The cities of Los Angeles, Santa Monica and Culver City are served by a storm drain system maintained by the Los Angeles County Department of Public Works. The proposed routes are banked to direct runoff to the sides of the road and into existing catch basins.

The Light Rail Transit (LRT) and the trolley bus alternatives derive their power from overhead electrical wires. Although these alternatives would require the extension of existing power and catenary lines to the corridor, SCE provides service on demand and does not anticipate any adverse impacts with project construction or operation. In addition, electrical lines placed too close to the proposed transit operations may need to be removed.

The project may require the local extension of gas lines on site. As the SCGC provides service on demand, the project will have no adverse impacts on natural gas service.

The selected transportation route may require the relocation of telephone lines in the project area. Depending on the needed lines, General Telephone will reinforce existing cables to serve the new facilities. In addition, telephone lines placed too close to the proposed transit operations may need to be removed. This situation is most evident along the Exposition right-of-way.

It is not anticipated that the LACTC transit project would significantly alter regional water supplies, however water would be required for landscaping. The types of activities and facilities associated with the proposed project typically do not generate large amounts of sewage. No sewer impacts are associated with project implementation.

C.15 AESTHETICS

The proposed transit system will pass through single-family residential neighborhoods, multi-family neighborhoods, community commercial neighborhoods consisting of low-rise buildings, and industrial and railway settings.

The proposed project will alter the aesthetics of the selected transportation route. Major alterations will occur with the light rail transit and trolley bus mode options which require catenary wires, station platforms, warning signals and safety gates with at-grade and above-grade crossings. Minor alterations are expected with the transitway and bike path options. All of the proposed projects will include landscaping, a beneficial aesthetic impact. Thus, the selected mode will determine the extent of aesthetic impacts to the corridor.

C.16 RECREATION

The cities of Los Angeles, Santa Monica and Culver City maintain and operate parks and recreational facilities for residents and visitors. City parks are dispersed along each of the alignments under consideration. The following parks are included adjacent or near the proposed routes: Rancho Cienaga Sports Center, Baldwin Hills Playground, McManus Park, Media Park, Woodbine Park, Palms Park, Stewart Street Park, Memorial Park in Santa Monica, Mar Vista Recreation Center, and Westminster Recreation Center.

Proposed station locations adjacent to City parks may require minor land acquisition. The proposed project will improve accessibility to local parks which should be considered beneficial. The proposed project is not expected to produce negative impacts on the use of recreational facilities in the vicinity of the selected alignment. The selected transportation route will provide efficient service for those without automobiles to frequent local parks.

C.17 CULTURAL RESOURCES

Historical landmarks within the City of Los Angeles are concentrated within the Los Angeles central business district. The proposed alignment passes several historical sites in Santa Monica and Culver City, as listed in national, state, county and city historical directories. Cultural resources in Santa Monica include: St. Anne's Home and Chapel, Heritage Square, First Methodist Episcopal Church, Santa Monica City Hall, the Merle Norman building, Horatio West Court Apartments, the Chronicle Restaurant, 2 bungalows located at the northwest corner of Main Street and Pier Avenue and the Santa Monica Bay District. In Culver City, St. Augustine's Church and the Pacific Electric Railroad Company Culver Substation, (also known as the Ivy Park Substation) are listed as state and local historical resources. Within the City of Los Angeles, the Venice Canal District and an unidentified historical industrial site located at in the 10200 block of National Boulevard listed as culturally significant.

The proposed project will provide improved accessibility to local cultural resources. Adverse impacts will be limited to modifications of the listed historical sites resulting from the development and operation of the selected transit corridor and generated air pollution associated with the transitway mode.

No archaeological resources are expected to be found onsite or within an approximate one mile radius. The proposed project will not impact any known or suspected culturally

or historically significant sites. In the event that artifacts or other cultural resources are unearthed, salvage operations pursuant to Appendix K Archeological Impacts in CEQA will result.