

**MICROFILMED
COPY IN RMC**

L.A.C.T.C.
Received

1988 SEP -7 PH 2 25

COASTAL CORRIDOR RAIL TRANSIT PROJECT

NORTH SEGMENT

INITIAL ALTERNATIVES EVALUATION REPORT

Prepared for
Los Angeles County Transportation Commission
403 W. Eighth St., Suite 500, Los Angeles, CA. 90014



Prepared by
Bechtel Civil Inc.



in association with
Acoustical Analysis Associates
DKS Associates
Manuel Padron Associates
Michael Brandman Associates, Inc.
PGH Wong Engineering Inc.
Ralph Stone and Company, Inc.

August 1988

**HE
4491
.G73
C665
I47**

34175936

COASTAL CORRIDOR RAIL TRANSIT PROJECT NORTH SEGMENT

INITIAL ALTERNATIVES EVALUATION REPORT

Prepared for
Los Angeles County Transportation Commission
403 W. Eighth St., Suite 500, Los Angeles, CA. 90014



Prepared by
Bechtel Civil Inc.



in association with
Acoustical Analysis Associates
DKS Associates
Manuel Padron Associates
Michael Brandman Associates, Inc.
PGH Wong Engineering Inc.
Ralph Stone and Company, Inc.

August 1988

TABLE OF CONTENTS

	PAGE NO.
1.0 INTRODUCTION AND SUMMARY	1
1.1 Background	1
1.2 Purpose	1
1.3 Methodology	1
1.4 General Description of Alignments	3
1.5 Summary of Findings	5
2.0 COMMON SEGMENT OF ALIGNMENT BETWEEN IMPERIAL HIGHWAY AND CENTURY STATION	10
2.1 Alignment Description and Geometry	10
2.2 Construction Techniques and Costs	10
2.3 Utilities/Right-of-Way/Restrains	11
2.4 Environmental and Traffic Impacts	11
3.0 EVALUATION OF ALTERNATIVE ALIGNMENTS A, B AND C AND ALIGNMENT VARIATIONS ALONG LINCOLN BOULEVARD	12
3.1 ALTERNATIVE A	12
3.1.1 Alignment Description and Geometry	12
3.1.2 Construction Techniques and Costs	13
3.1.3 Utilities/Right-of-Way/Restrains	13
3.1.4 Station Access and Circulation	15
3.1.5 Environmental Impacts	18
3.1.6 Traffic Impacts	19
3.2 ALTERNATIVE B	19
3.2.1 Alignment Description and Geometry	19
3.2.2 Construction Techniques and Costs	20
3.2.3 Utilities/Right-of-Way/Restrains	21

	PAGE NO.
3.2.4 Station Access and Circulation	23
3.2.5 Environmental Impacts	27
3.2.6 Traffic Impacts	27
3.3 ALTERNATIVE C	28
3.3.1 Alignment Description and Geometry	28
3.3.2 Construction Techniques and Costs	29
3.3.3 Utilities/Right-of-Way/Restrictions	29
3.3.4 Station Access and Circulation	30
3.3.5 Environmental Impacts	31
3.3.6 Traffic Impacts	32
3.4 VARIATIONS ALONG LINCOLN BOULEVARD	32
3.4.1 Alignment Description and Constructibility	32
3.4.2 Station Access and Circulation	35
3.4.3 Environmental and Traffic Impacts	38

APPENDIX A - RAIL SERVICE TO U.S. AIRPORTS: AN
EVALUATION OF SERVICE TO LAX STATION

LIST OF FIGURES

<u>Figure</u>	<u>Title</u>
1	Route Map
2	Hazardous Materials Sites
3A, 3B, 3C, 3D	Station Sketches

LIST OF TABLES

<u>Table</u>	<u>Title</u>
1	Alternatives Evaluation Matrix

1.0 INTRODUCTION

1.1 Background

In November 1980, the voters of Los Angeles County passed Proposition A, an LACTC sponsored measure which raised the sales tax in the county by a half-cent to improve public transportation. Subsequently, corridors were evaluated on the Proposition A map in order to identify high priority rail lines for development. The North Segment of the Coastal Corridor was selected to be of high priority, and in 1984 a route refinement study of this corridor was undertaken by LACTC. The report summarizing the results was published in December 1984 by LACTC entitled Coast Route Refinement Study, Century Freeway to Marina Area. The rail alignment that resulted from this study was incorporated into the Coastal Transportation Corridor specific plan for purposes of reserving the physical requirements for the route.

In February, 1988, LACTC issued a Request for Proposals with the principal objective of providing the professional assistance necessary to prepare an Environmental Impact Report (EIR) for the North Segment. The Bechtel Civil team was selected for this project and on April 22, 1988, the work proceeded on studying alignment alternatives and variations as a route refinement step necessary in determining the alignments to be carried into the EIR.

1.2 Purpose

The purpose of this Initial Alternatives Evaluation Report (IAER) is to report on the findings of the route refinement task for the North Segment and to make a recommendation on the more feasible alignment taking into consideration the engineering and environmental factors assessed. The findings of this report, considered along with the comments and recommendations of agencies and parties that may review it, should establish the preferred alignment and alternatives or variations, if any, to be carried into the EIR.

1.3 Methodology

The alignment alternatives and variations as defined in the request for proposals and those later introduced into the study were developed and refined to sufficient detail to allow an evaluation of engineering, cost, and environmental factors essential for preparing the IAER.

In preparing the IAER, and in performing the engineering necessary to evaluate the alternatives, the following activities were conducted:

- . Technical coordination with the Federal Aviation Administration, City of Los Angeles Department of Transportation, City of Los Angeles Department of Airports, State of California Department of Transportation, AT&SF RR, LACTC engineering staff, and other parties as necessary.
- . Review of development plans for roadways and facilities in the area and coordination with consultants designing these projects.
- . Review of North Outfall Replacement Sewer (NORS) project.
- . Research and analysis of existing geotechnical and hazardous waste data.
- . Research of existing utility and structure foundation locations.
- . Analysis of ridership experienced at some major airports accessed by rail transit.
- . Review of FAA clearance restrictions.

The Long Beach-Los Angeles Rail Transit Project Design and Performance Criteria was followed in performing the work. The decision by LACTC in June 1988 to fully automate the Norwalk-El Segundo Rail Transit Project dictated that the Coastal Corridor be studied as a grade-separated guideway, and this major change in criteria was taken into account.

Conceptual level construction costs in 1988 dollars were developed utilizing unit costs from similar types of construction on other projects. The costs were not developed from a detailed calculation of quantities and should be considered in this context. A contingency factor was included to cover the unforeseen, which may be significant, especially in underground construction or in contaminated areas. Construction costs include all civil/structural, track, electrification, and systemwide components, but do not include the cost of real estate, maintenance facilities, and vehicles. Engineering, construction management, administration, and contingency are included.

Cost figures are not developed accurately enough to be furnished in a concise manner, so a range of costs are provided for purposes of furthering the evaluation of alternatives.

1.4 General Description of Alignments

(Please refer to Figure 1, Route Map, Figure 2, Hazardous Materials Sites, and to Figures 3A, B, C and D, Station Sketches.)

The Coastal Corridor will operate as an extension of the Century Freeway Rail Transit Project. The North Segment of the Coastal Corridor extends northwesterly from the Norwalk-El Segundo Rail Transit line some 5.75 miles to a temporary end along Culver Boulevard near Lincoln Boulevard. The North Segment has three alternatives, as shown in Figure 1, Route Map. Alternative A provides rail service directly to the Los Angeles International Airport (LAX) terminal area. Alternative B provides service to the airport Lot C parking lot, as does Alternative C (which is basically a variation of Alternative B), and to the Westchester community.

More specifically, the North Segment begins on aerial structure at the wye connection to the Norwalk-El Segundo Project near Imperial Highway and Aviation Boulevard and continues northward on aerial structure in the AT&SF Railroad right-of-way until 111th Street is cleared. Due to Federal Aviation Administration height restrictions, the guideway drops to an at-grade profile in the AT&SF right-of-way between 111th Street and the access road opposite 104th Street, which is crossed on aerial structure. For a portion of this at-grade segment, the AT&SF siding is removed in order for the right-of-way to accommodate the guideway.

Aerial guideway continues northward in the AT&SF right-of-way, and then turns westward along the south side of Century Boulevard, where Alternatives A, B and C originate. The alignment from the beginning to this area is common for all alternatives, and is discussed in Section 4.

For Alternatives A and B, a center platform aerial station (Century Station) straddles Airport Boulevard with entrances on the east and west side of the street. Alternative A portals west of the station and continues into the airport terminal area in subway with a station (LAX Station) near Terminal 1 and continues underneath LAX runways 24L and 24R into Lincoln Boulevard in subway, while Alternative B remains aerial beyond the

Century Station and bears north near the west property line of Dollar Rent-A-Car continuing northerly across Lot C, with an aerial center platform station (LAX/Lot C, near the existing transit center. For Alternative C, a center platform aerial station (Century Station) will be located east of Airport Boulevard on the south side of Century Boulevard with the aerial guideway turning northward and following the west side of Airport Boulevard until 96th Street is reached. It then proceeds westerly on the north side of 96th Street and enters Lot C with an aerial center platform station (LAX/Lot C Station) located near the existing transit center.

Alternatives B and C become common on aerial guideway in Lot C north of the existing transit center, and from that point Alternative B continues aerial and bears westerly in Sepulveda Boulevard and continues aerial either center, southside, or northside along the proposed Westchester Parkway extension until Lincoln

Boulevard is reached. An aerial center platform station (Westchester Station) is situated just west of Sepulveda Westway for both the center and northside of parkway alignment variations, and straddle of Sepulveda Westway for the southside alignment. In all cases, the station calls for a park-ride lot to be located south of the parkway in this area. An aerial center platform station (Manchester Station) is located as the alignment enters the Lincoln Boulevard right-of-way on the easterly side. A station is not shown for Alternative A at this location, but the geometry does not preclude a subway station. Alternative B then goes into portal and proceeds in subway under Lincoln Boulevard becoming common in profile with the Alternative A subway north of Manchester Boulevard, very near to the portals in the bluff area. It should be noted that while Alternative B is mostly aerial, there is a stretch of cut and cover subway construction in Lincoln Boulevard.

The common alignment then continues northwesterly in subway along Lincoln Boulevard with portals near Hughes Terrace, in the bluff area, where three variations of aerial guideway; the west side, center, and east side of Lincoln Boulevard are developed as options, or variations.

Continuing along Lincoln Boulevard, these three aerial guideway options are aligned to acknowledge proposed improvements to Lincoln Boulevard. An aerial center platform station (Jefferson Station) is sited for the three alignments at the Jefferson Boulevard

intersection. The center alignment places the station just southerly of Jefferson Boulevard, while the station on the east and west sides straddle Jefferson Boulevard.

The three aerial alignments continue northwesterly along Lincoln Boulevard, becoming one as the guideway crosses Culver Boulevard and swings northeasterly to a temporary terminal aerial station (Marina del Rey Station) which is proposed to have a park-ride lot. Tail tracks for midday storage are proposed at-grade beyond the station and parallel to Culver Boulevard.

1.5 Summary of Findings

The engineering and environmental factors assessed in this report are summarized in Table 1, ALTERNATIVES EVALUATION MATRIX.

The engineering assessment involved construction techniques, alignment geometry (which has an impact on operation speeds and maintenance costs, as well as construction costs), utility conflicts, right-of-way impacts, geotechnical and seismic conditions, and costs of construction.

The stations were sited for service to the community and analyzed for modes of access and the relationship to the surrounding community.

Environmental analysis identified impacts on adjacent land uses that may require further consideration. Contaminated sites were researched and initially identified. Please refer to Figure 2, Hazardous Materials Sites. The engineering assessment discusses the conflicts with these sites.

Because the alignments are completely grade separated, traffic impacts, except during construction, are limited to conflicts with column spacings (which can be minimized along Westchester Parkway and Lincoln Boulevard, where new roadway designs are emerging) and station access driveways and surrounding intersections, due to increased traffic volumes around station sites.

The purpose of this report is to evaluate alternative alignments and variations sufficient to select the most feasible path. Please refer to Figure 1, Route Map and Table 1, ALTERNATIVES EVALUATION MATRIX.

TABLE 1
ALTERNATIVES EVALUATION MATRIX

Alternatives	ENGINEERING ASSESSMENT				Station Site Issues	Environmental Issues	Traffic Impacts	Preliminary Assessment
	Type (Miles)	Geometry	Utility Conflicts	*Costs 1988\$				
Common segment (from Imperial Highway to Century Station)	Aerial 1.0 At-grade 0.4	Fair, one tight radius, 2 steep grades	Major drainage conflicts	40M-55M	No Stations	Low-moderate potential for hazardous sites	Minor, Impacts During Construction	No major difficulties
Alternative A (from Century Station to bluff area)	Aerial 0.1 Tunnel 2.6	Fair, one tight radius, 2 steep grades	Major conflicts	220M-270M	LAX Terminal - good service (better than Alternative B) Westchester - no service	Moderate - high potential for hazardous sites. Displacement of four gates during LAX Station construction. Minor noise/vibration concern.	Minor, impacts during construction	Shorter than Alternative B, more expensive construction, contaminated site conflicts, no service to Westchester
Alternative B (from Century Station to bluff area via Lot C)	Aerial 2.4 cut & cover subway 0.6	Fair, one tight radius curve, one steep grade	Moderate, conflict with radar site	130M-160M	LAX Terminal - fair service (not as good as Alt. A) Westchester - good service	Low-moderate potential for contaminated sites. Possible displacement at dollar lot. Business disruption during construction in Westchester. Moderate noise/vibration concern. Minor park displacement.	Minor, impacts during construction, some parking losses, station access. Park access changed.	Moderate to expensive construction, fair airport service, good community service.
Alternative C (from Century Station to Lot C via Airport and 96th)	Aerial 1.0	Poor, three tight radius curves	Low - moderate conflicts	45M - 55M	LAX Terminal-fair service (not as good as Alt A)	Low-moderate potential for contaminated sites. Postal service displacement. Minor noise/vibration concern. Minor park displacement.	Minor, impacts during construction, some parking losses	Moderate to expensive construction, poor geometry, service similar to Alt B, postal service displacement.

*Construction costs; not total project costs

Table 1
Page Two

Alternatives	ENGINEERING ASSESSMENT				Station Site Issues	Environmental Issues	Traffic Impacts	Preliminary Assessment
	Type (Miles)	Geometry	Utility Conflicts	*Costs 1988\$				
Variations along Westchester Boulevard (A) Center (B) North (C) South	Aerial (A)(B)(C) 1.0± Total Length incl. in Alt B	Fair, (B) tight radius	Moderate, conflict with radar site	Incl. in Alt B	(A) Fair access to development (B) Best access to P-R and Sepulveda business (C) Best access to P-R and Sepulveda business	(A) Minor pedestrian safety concern (B) Encroachment on airport property, private development and golf course (C) Displacement of two commercial buildings	(A) Construction and turn pocket conflicts (B)(C) Minor (A)(B)(C) Minor for station access (C) Surface parking	(A) More difficult construction (B) Tight curve (C) Business displace. (B)(C) Best station access
Variations along Lincoln Boulevard (A) Center (B) West (C) East	Aerial (A)(B)(C) 1.4	Fair (A)(B)(C) one steep grade, one tight radius	Low - moderate conflicts	75M - 90M	(A) Least convenient (B) Best for auto (C) Most convenient for most patrons	(A)(B)(C) No major impacts, one landfill, minor visual impacts (B)(C) More visual and noise/vibration impacts to proposed developments	(A) Construction and turn pocket conflicts (B)(C) Minor	(A) Least visual impacts most traffic conflict and difficult construct. (B) Least convenient service (C) Most convenient service

*Construction costs; not total project costs

ALTERNATIVES A, B AND C

Alternative A, which serves the LAX Terminal in subway, is the much more expensive segment to build, even though it contains two stations as opposed to four stations and is shorter in length by about one quarter mile than Alternative B, which traverses Lot C and the Westchester Commercial District. Within a given funding limit, Alternative B allows considerably more line to be built.

Alternative A may present major utility conflicts and construction complexities at the portal and at the LAX station location, and could encounter significant contaminated sites and minor subsidence of the LAX runways it crosses under. Restraints of a comparable nature are much less severe for Alternative B.

Geometry restrictions for Alternative A are slightly less than Alternative B, as the horizontal alignment is more sweeping. Each has one tight radius curve and a steep grade at the portals.

Displacement for Alternative A is significant for air passenger service at Terminal 1 and 2, as construction of the station will temporarily close two gates at each terminal. Otherwise, Alternative B has potentially more environmental and traffic impacts, as it is mostly aerial. The subway portion of Alternative B is cut-and-cover construction that would cause construction impacts. However, it should be noted that due to the land uses in the area, environmental impacts should not be substantial for Alternative B. Because of a grade separated guideway, traffic conflicts would be minimal, except during construction, where some disruption would be expected, especially in Lincoln Boulevard.

Alternative A serves two airport terminals more directly than does B, and an assessment of direct rail service at other terminals in the United States indicates the Lot C service may be less effective. (Please refer to Appendix A, Rail Service to U.S. Airports: An Evaluation of Service to LAX Station.) Alternative B, however, serves the Westchester community in two locations. Alternative A does not serve Westchester, even though it could for the major expense of a subway station along Lincoln Boulevard.

Alternative C, which is really a variation to Alternative B disrupts loading dock operations at the Worldway Postal Center, and has poor horizontal geometry by virtue of three tight radius curves that create

construction difficulties, slows operations, and increases maintenance costs. Alternative C would probably cost more than a comparable segment of Alternative B. The aerial crossing of the Airport/Century intersection would be expensive. The two common stations, Century Boulevard and LAX/Lot C Stations, are served better by Alternative B.

Westchester Parkway Variations

Along the proposed Westchester Parkway, the guideway variations differ less distinctively than the major alignment alternatives. The center alignment is more difficult to build and requires more complex construction due to variable span lengths and creates more traffic impacts (although these can be minimized), but has better horizontal geometry and provides better station access from the park and ride lot.

The north alignment may cause more potential environmental impacts to the proposed development and the golf course, has one tight radius curve just west of the Westchester Station, is more readily constructible by virtue of being out of the roadway and in an exclusive right-of-way, and provides the best station access from the proposed development to the north side of the parkway. The construction costs for the two variations would be similar, with the center guideway slightly higher due to inconsistent column spacing. The costing done for purposes of this report is not in sufficient detail to discern the difference.

A third option for Westchester Parkway is to have the guideway on the south side of the proposed street. Initial discussion with the Federal Aviation Administration indicated that this option was probably infeasible because of the runway clearance criteria established by the FAA. Nevertheless, after meeting with the City of Los Angeles Departments of Airport, Planning and Transportation, the LACTC staff will study this option in greater detail to determine if it is viable. At this time, it appears that the south side alignment would better serve the businesses along Sepulveda, but would require the displacement of two buildings.

Lincoln Boulevard Variations

There are three variations along Lincoln Boulevard between Hughes Terrace (the portal area) and the terminal Marina del Rey Station near the Culver/Lincoln interchange. The variations include an aerial guideway

on the east, west and center of Lincoln Boulevard. The variations along Lincoln Boulevard are similar in that they all portal in an area that will require some additional right-of-way along Lincoln Boulevard, are all aerial guideway of conventional construction, and, once beyond the portal, are within the right-of-way of the proposed improved Lincoln Boulevard. All three variations converge at the Marina Station. The horizontal geometry for all three alignments is comparable, but the east alignment is less desirable because of the curve that swings it to the east side of Lincoln Boulevard.

Steep grades near the portal, and relatively tight curves (500 foot radius) into the Marina Station are common for the three alignments.

The more difficult, and maybe slightly more expensive, construction could be expected in the center of the street, due to the difficulty of gaining an even and symmetrical spacing of columns, especially in turn pockets and the Jefferson Station area, and because of traffic conflicts during construction. Construction costs should be about the same for all three alignments. The slightly longer west side alignment has a short section of at-grade construction near the portal that may offset the costs created by being longer.

The side of Lincoln Boulevard variations can be more efficiently constructed in the exclusive transit right-of-way. These variations, however, may be more environmentally sensitive to proposed developments on either side of Lincoln Boulevard.

The east side alignment may be more substantially in conflict with a landfill near the portal, but this landfill apparently extends to the west side of Lincoln Boulevard. It is classified as completed with no ground water contamination.

The center alignment may be in the least conflict with the existing and planned land uses in the area. The horizontal geometry is slightly better than the east side and about the same as the west. Station access is not as desirable, partially because of the pedestrian conflict with traffic, but some safety concerns can be addressed in design. Although construction for the center alignment may be more difficult, the complications could be minimized by careful design coordination between the guideway and the improved Lincoln Boulevard. Being in the center of the established transportation corridor reduces

environmental impacts to proposed developments on either side. The east side alignment, however, provides the best access to the proposed development.

The Jefferson Station is best for auto access for the west side alignment due to the park-ride lot that would be located on that side. The east side station site is considered more convenient for the largest number of patrons. The center median station is considered the least convenient, as all patrons would have to cross part of Lincoln Boulevard, and some patrons would have to cross Jefferson Boulevard, in both cases at street grade. As with all stations accessed from a busy street median, there may be some pedestrian safety concerns. These could be mitigated with pedestrian overcrossings.

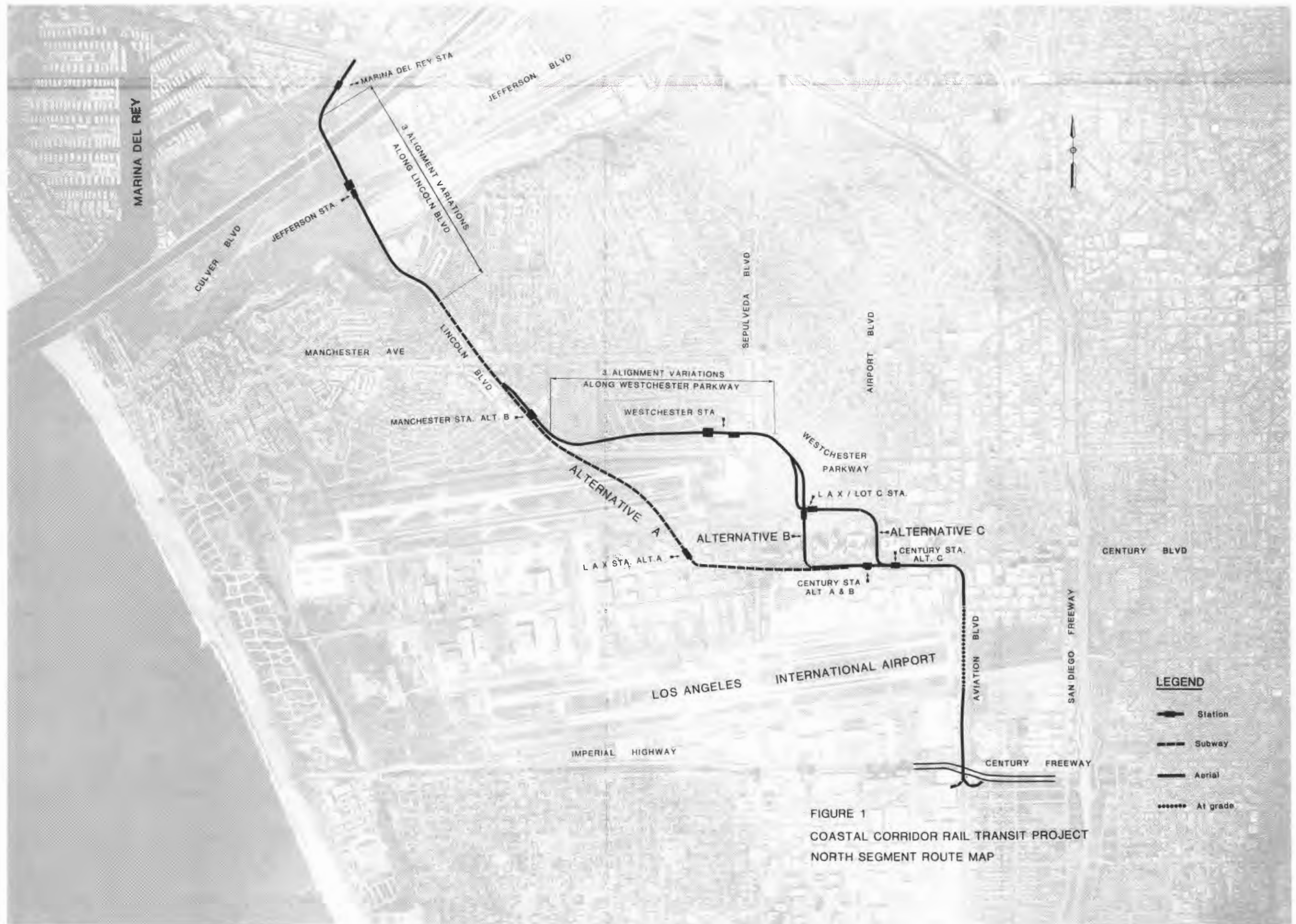














FIGURE 1
 COASTAL CORRIDOR RAIL TRANSIT PROJECT
 NORTH SEGMENT ROUTE MAP

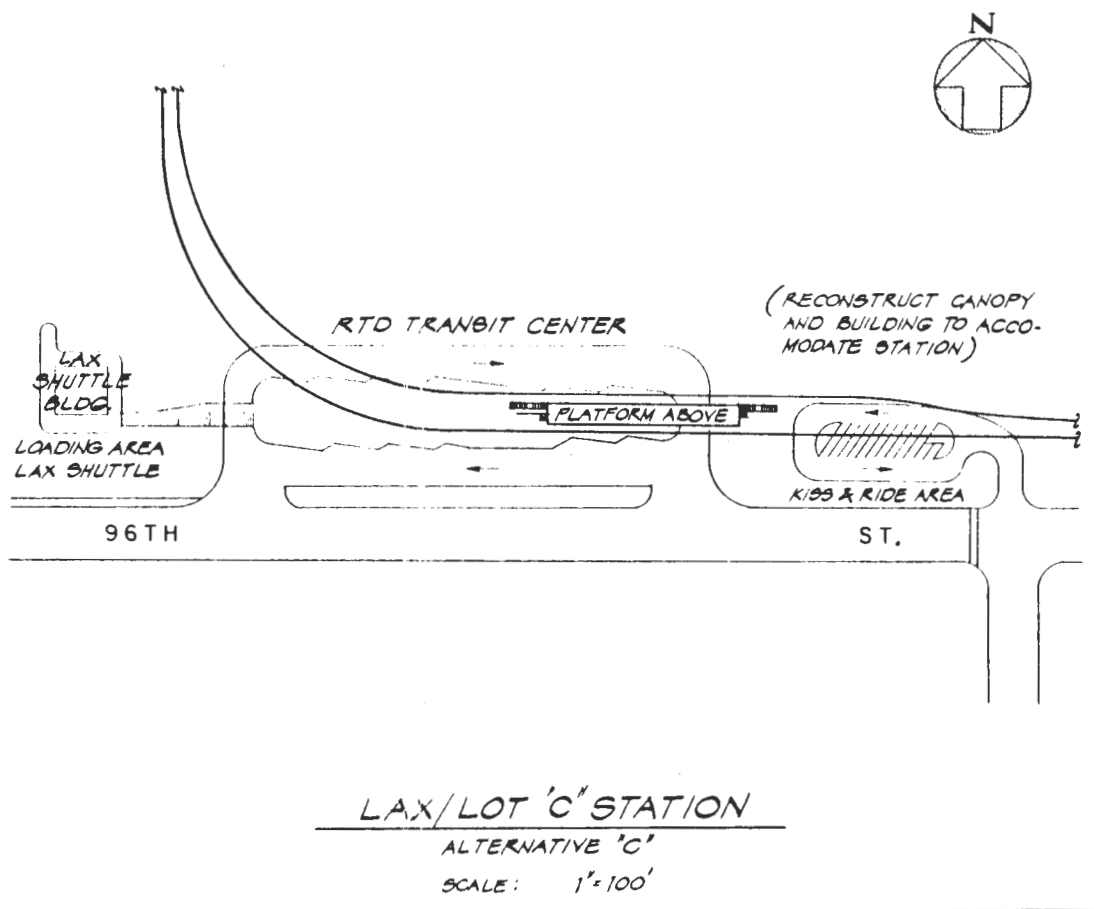
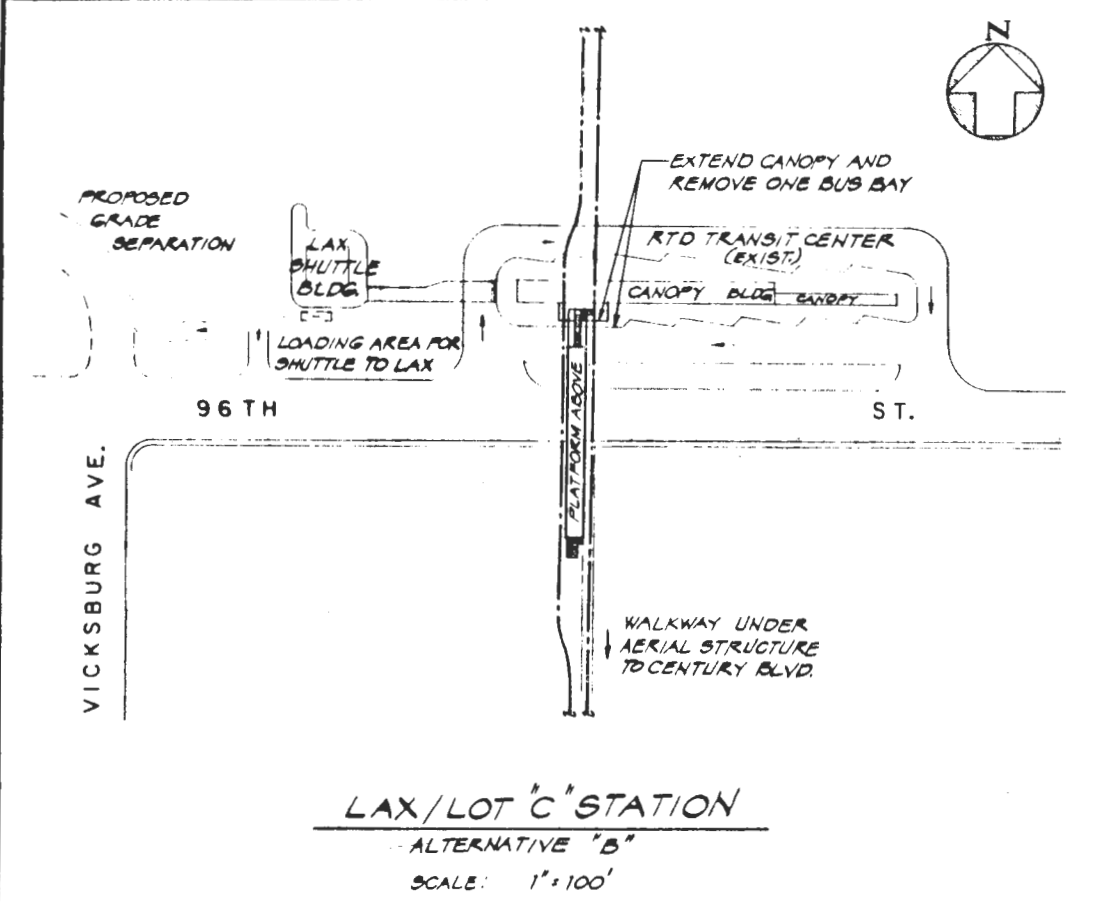
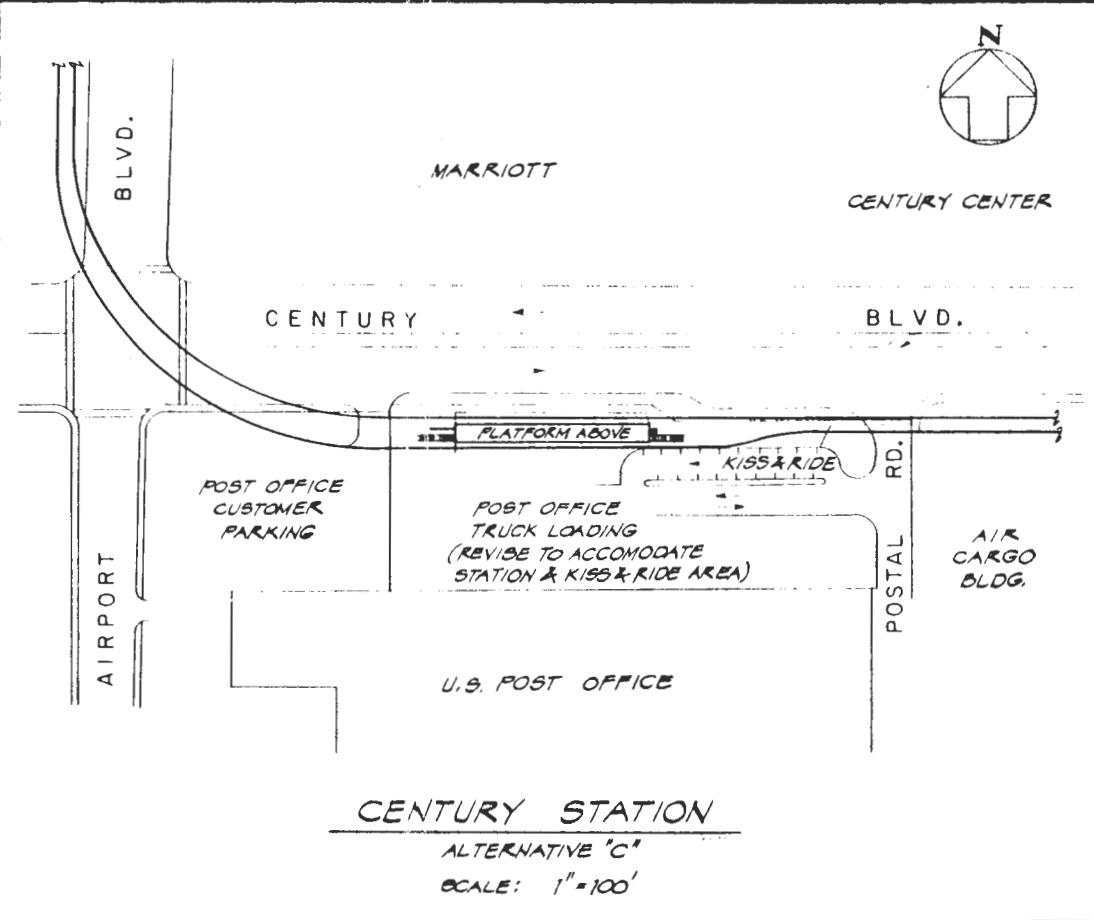
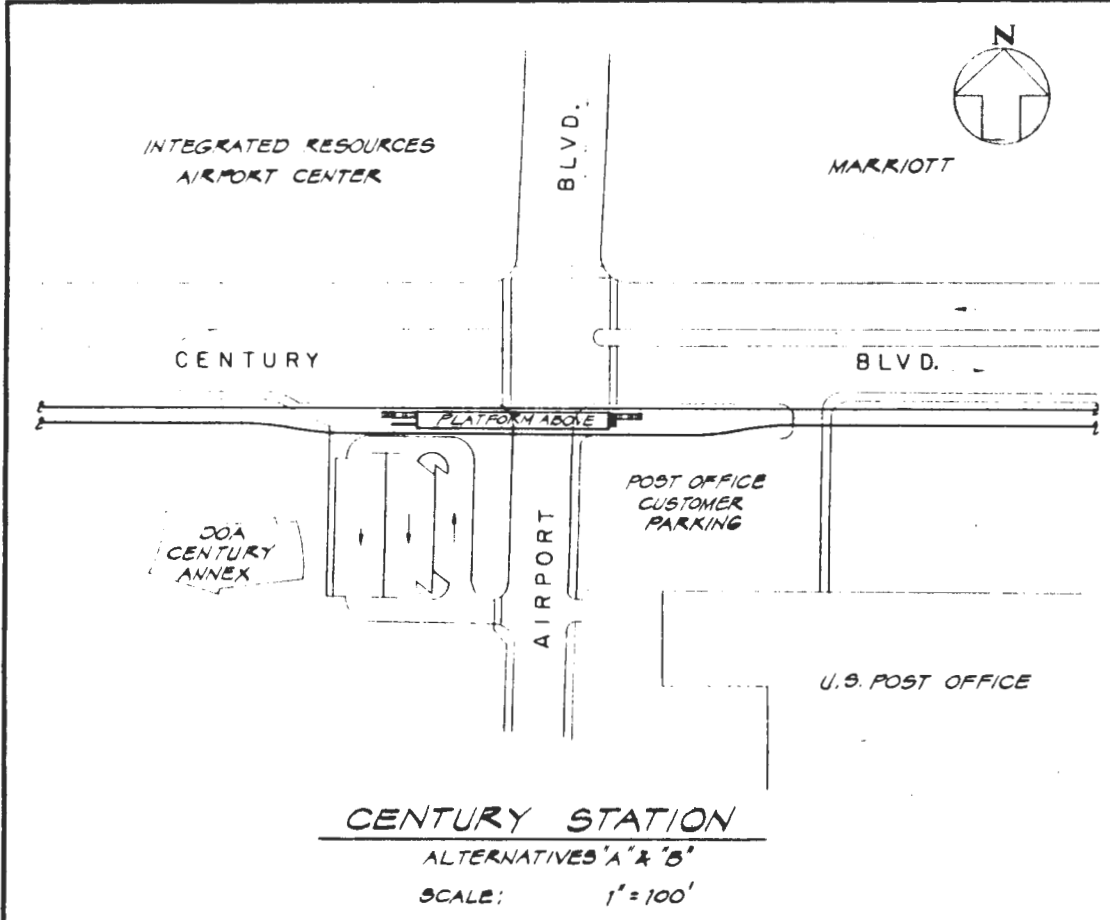



- Legend**
-  LANDFILLS CLASS UNKNOWN (SOURCE: CITY OF LOS ANGELES)
 -  CERCLIS SITES
 -  CLOSED LANDFILLS (SOURCE: DEIR, NORTH OUTFALL REPLACEMENT SEWER)
 -  U.S.T. LEAK (SOURCE: RWQCB)
 -  U.S.T. LEAK (SOURCE: DEIR, NORTH OUTFALL REPLACEMENT SEWER)
 -  CALIFORNIA HAZARDOUS WASTE SUBSTANCES AND SITES LIST
 -  CALIFORNIA BOND EXPENDITURE PLAN FOR THE HAZARDOUS SUBSTANCES CLEANUP BOND ACT SITE
 -  CONTAMINATED AREA, SOLVENTS & FUEL SPILLS (SOURCE: ENVIRONMENTAL DEPARTMENT, LAX)
 -  APPROXIMATE LIMITS OF CONTAMINATED AREAS (HYDROCARBONS, UNKNOWN)
 -  POSSIBLE GROUND WATER CONTAMINATION (SOURCE: RWQCB)
 -  RAIL ALIGNMENT
 -  ALIGNMENT OPTIONS AT LAX

Hazardous Materials Sites North Segment of the Coastal Corridor Rail Transit Project

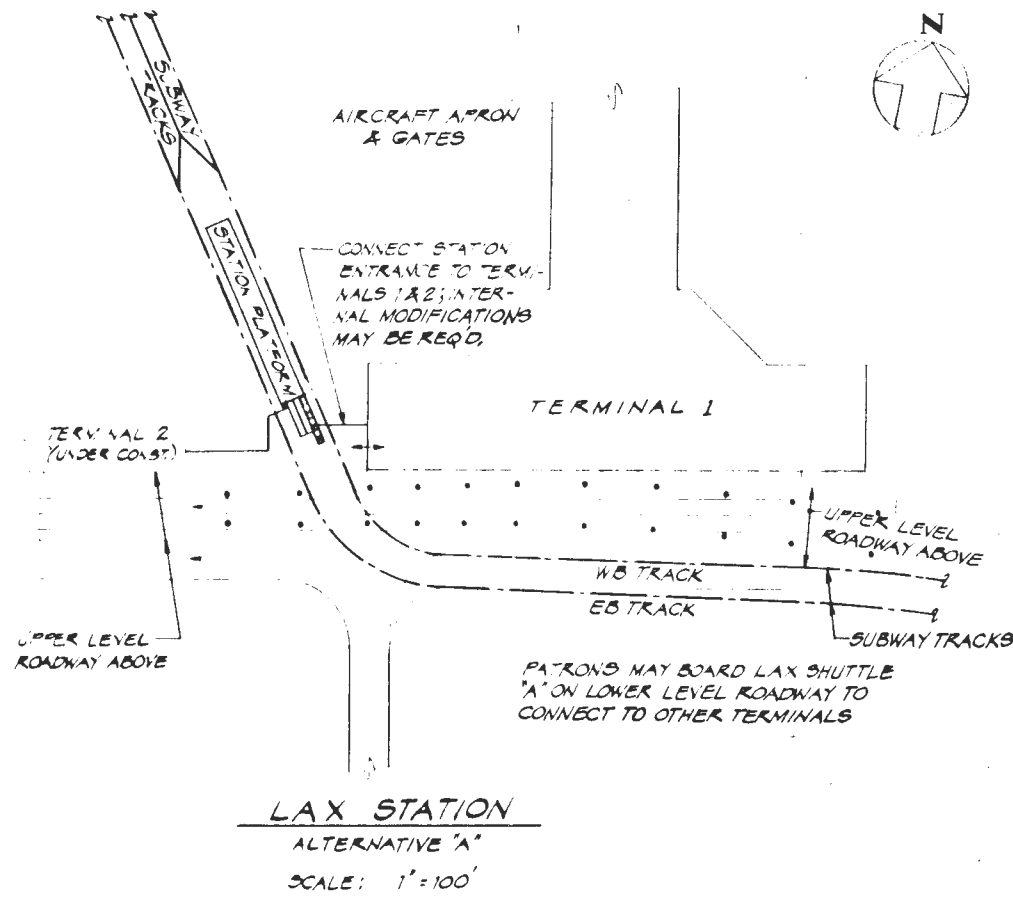


FIGURE 2

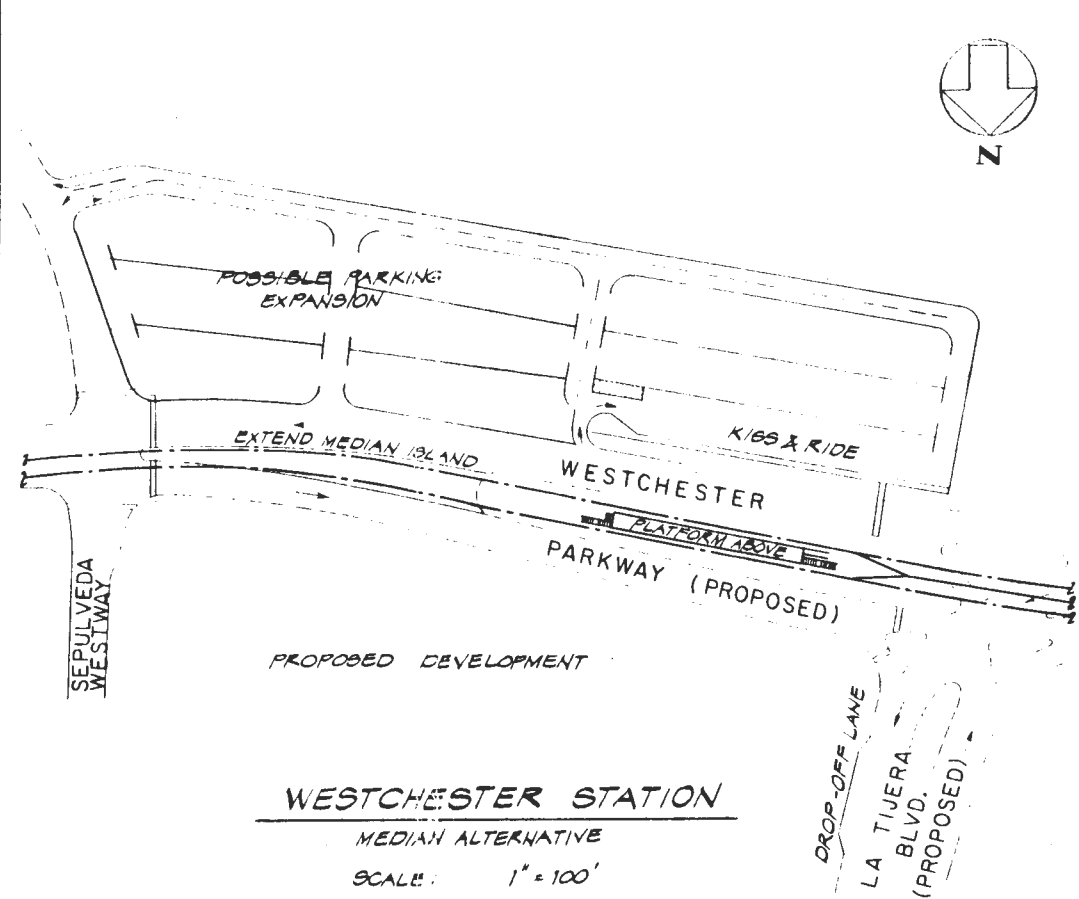


DRAWN: PNM DESIGNED: BE APPROVED: BOB	 LOS ANGELES COUNTY TRANSPORTATION COMMISSION COASTAL CORRIDOR RAIL TRANSIT PROJECT BECHTEL CIVIL, INC.	IN ASSOCIATION WITH: ACOUSTICAL ANALYSIS ASSOCIATES OXS ASSOCIATES MANUEL PADRON ASSOCIATES MICHAEL BRANDMAN ASSOCIATES, INC. PGM WONG ENGINEERING, INC. RALPH STONE AND COMPANY, INC.	CONTRACT NO. DRAWING NO. FIGURE 3A SCALE AS SHOWN DATE SHEET NUMBER
--	--	--	--

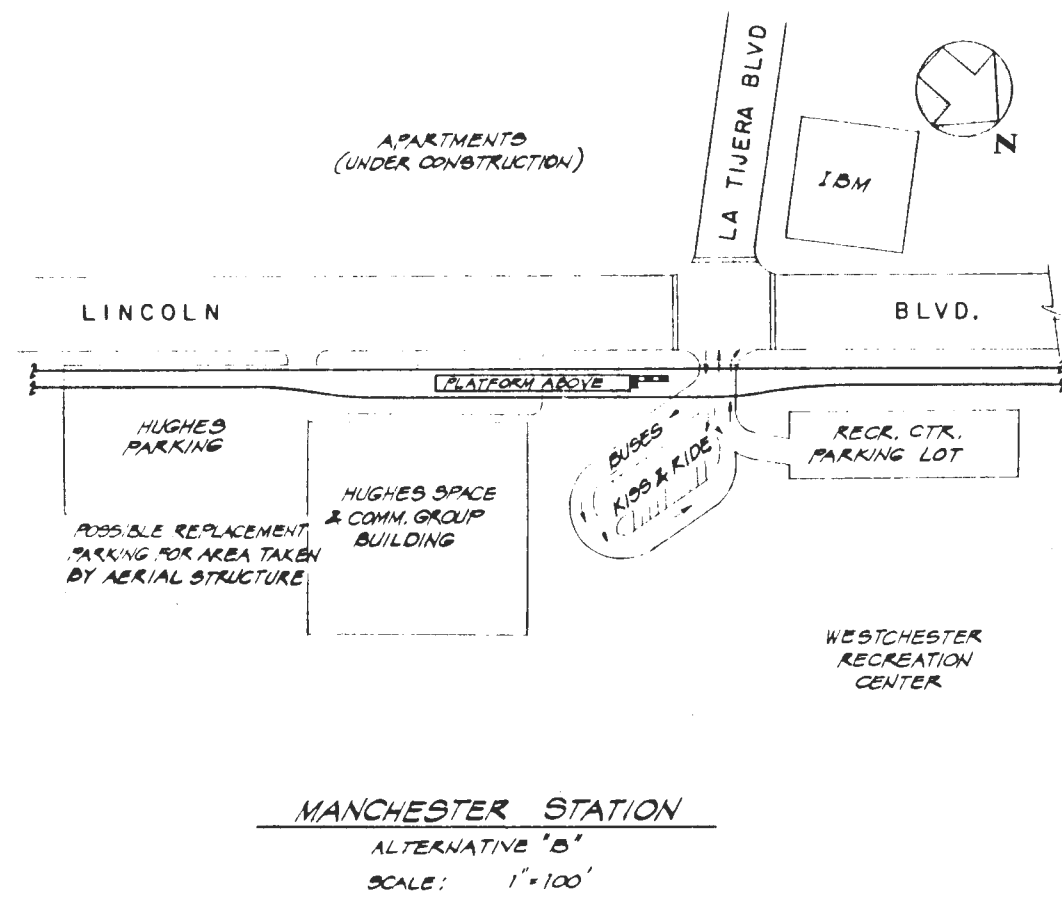
STATION SKETCHES



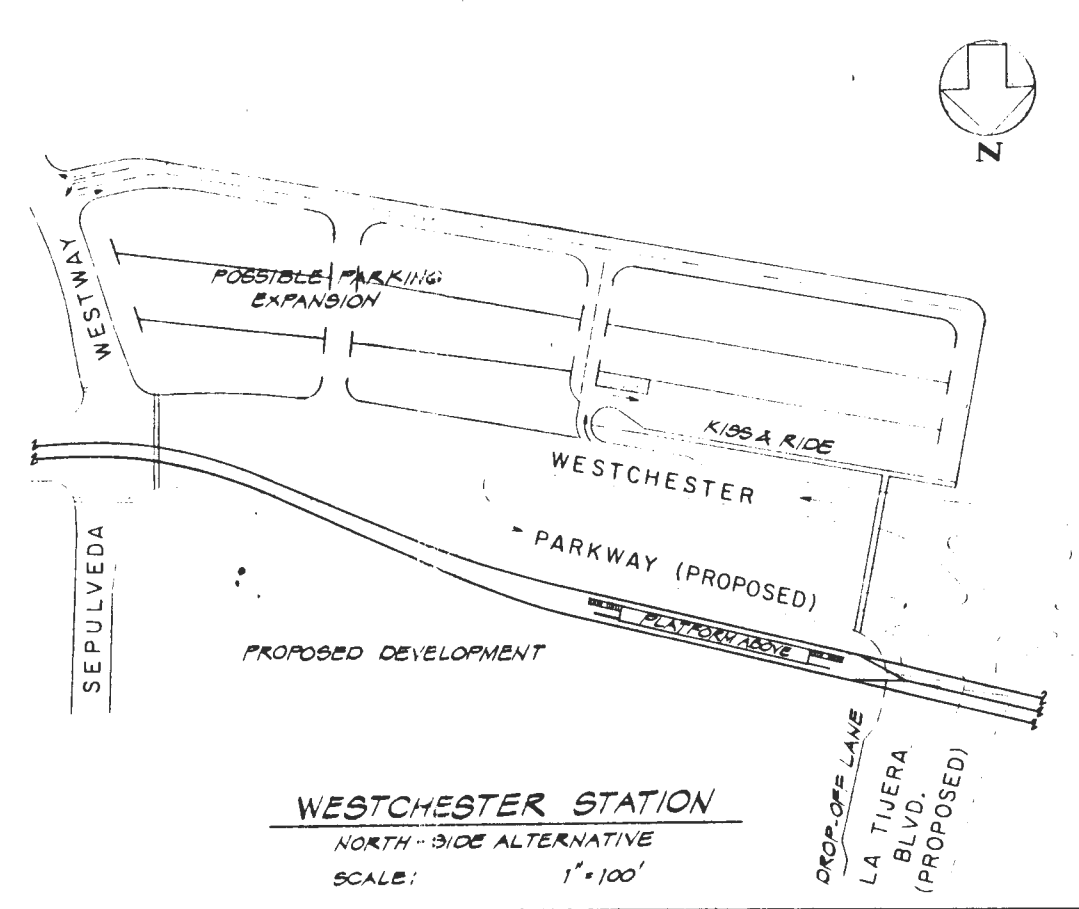
LAX STATION
ALTERNATIVE "A"
SCALE: 1" = 100'




WESTCHESTER STATION
MEDIAN ALTERNATIVE
SCALE: 1" = 100'



MANCHESTER STATION
ALTERNATIVE "B"
SCALE: 1" = 100'

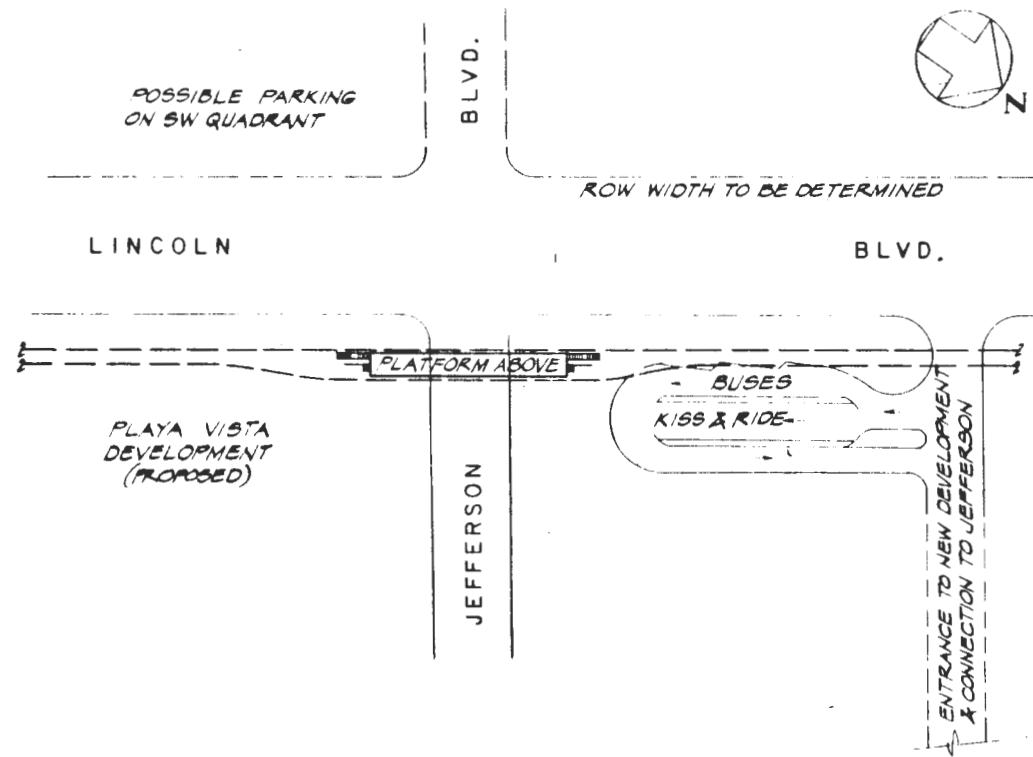


WESTCHESTER STATION
NORTH-SIDE ALTERNATIVE
SCALE: 1" = 100'

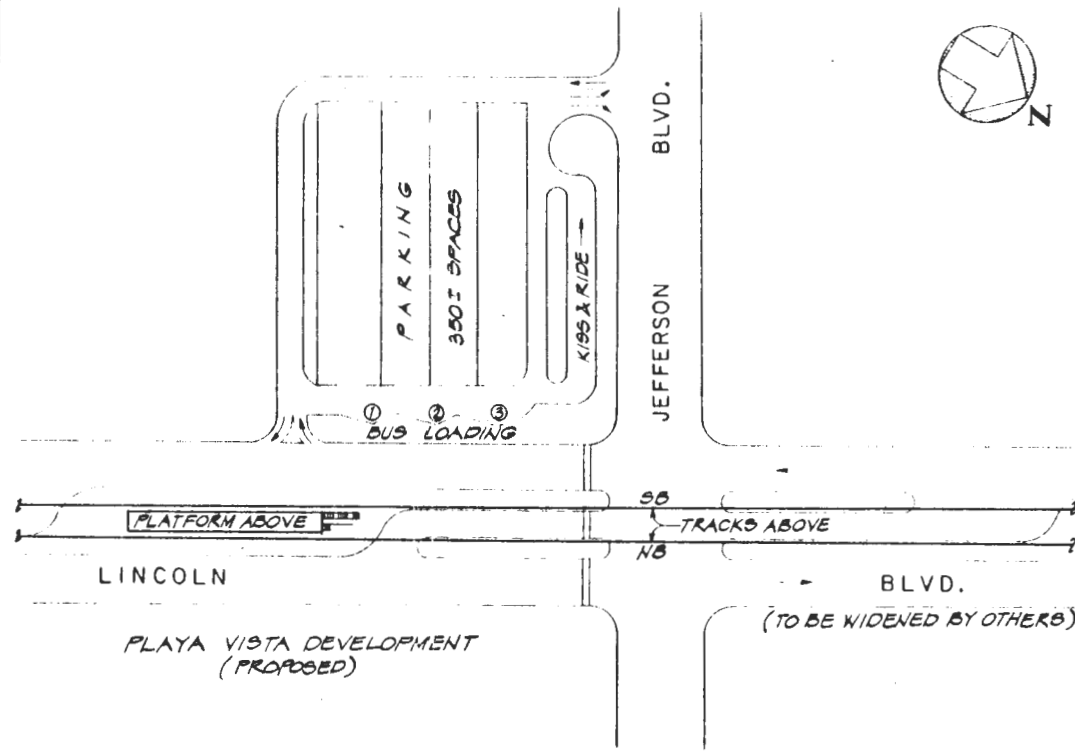
DRAWN: PNM DESIGNED: BE APPROVED: BOB	 LOS ANGELES COUNTY TRANSPORTATION COMMISSION COASTAL CORRIDOR RAIL TRANSIT PROJECT BECHTEL CIVIL, INC.	IN ASSOCIATION WITH: ACOUSTICAL ANALYSIS ASSOCIATES DKS ASSOCIATES MANUEL PADRON ASSOCIATES MICHAEL BRANDMAN ASSOCIATES, INC. PGM WONG ENGINEERING, INC. RALPH STONE AND COMPANY, INC.
--	--	--

CONTRACT NO. DRAWING NO. FIGURE 3D	
SCALE AS SHOWN	DATE
SHEET NUMBER	

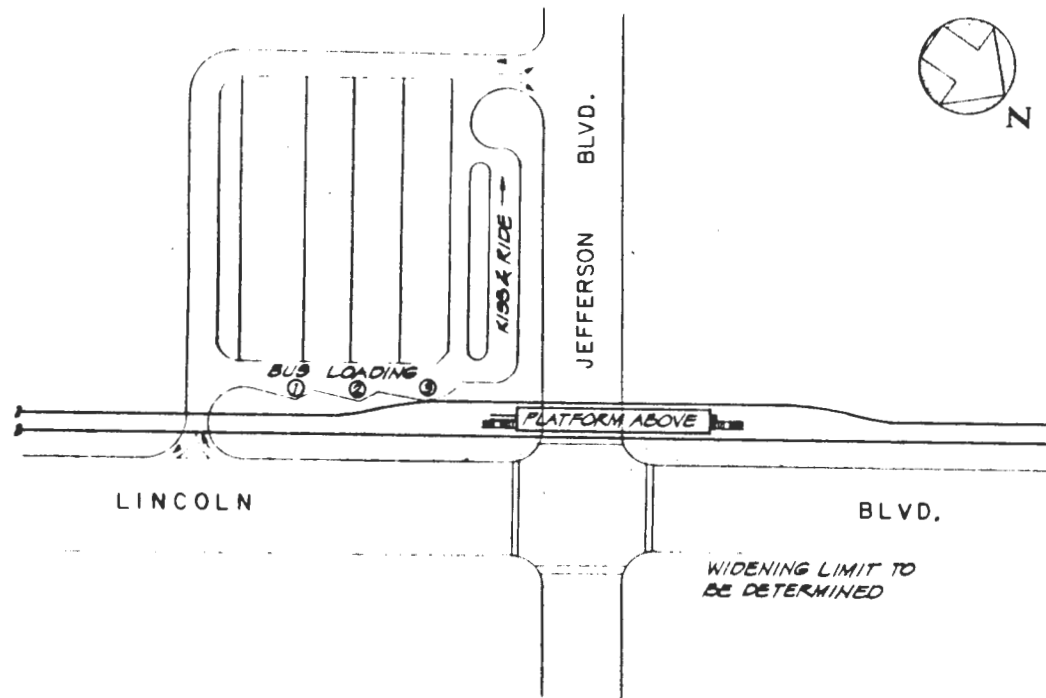
STATION SKETCHES



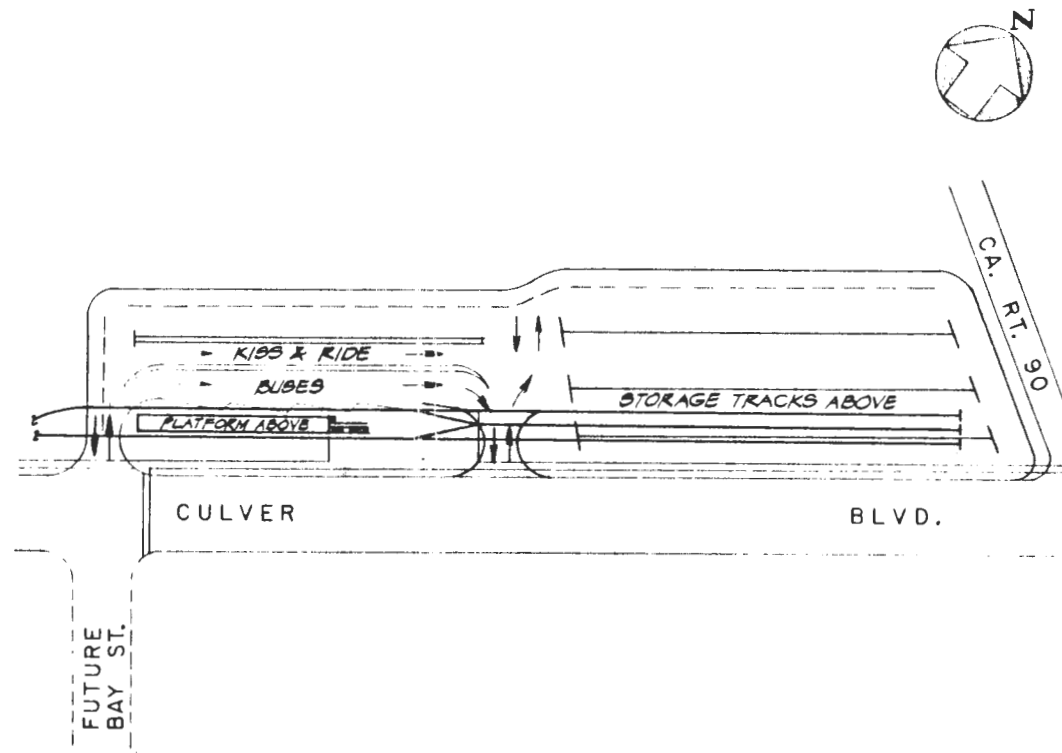
JEFFERSON STATION
EAST SIDE ALTERNATIVE
SCALE: 1" = 100'



JEFFERSON STATION
MEDIAN ALTERNATIVE
SCALE: 1" = 100'



JEFFERSON STATION
WEST SIDE ALTERNATIVE
SCALE: 1" = 100'



MARINA DEL REY STATION
SCALE: 1" = 100'

DRAWN:
PNM
DESIGNED:
APPROVED:
BOB



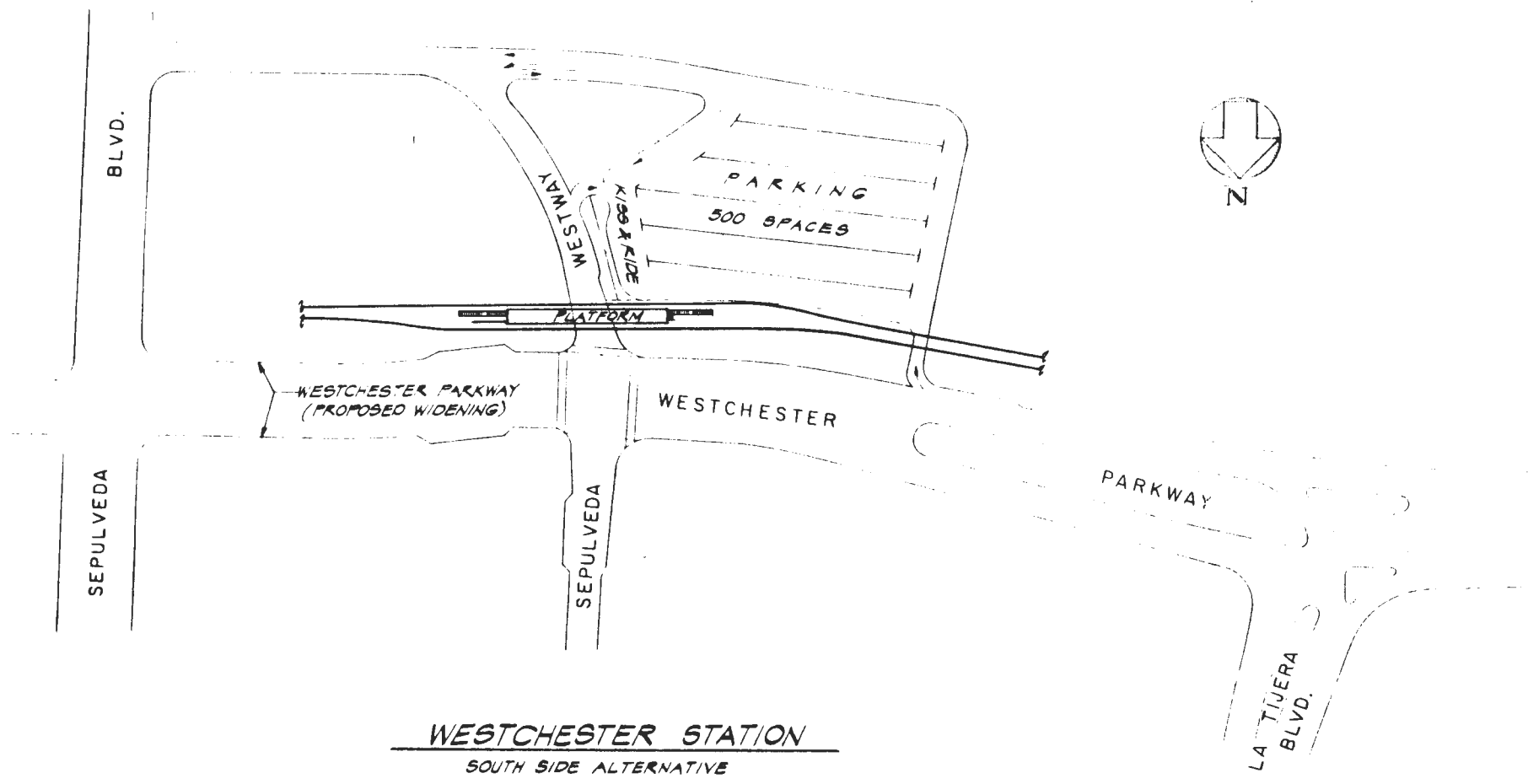
LOS ANGELES COUNTY TRANSPORTATION COMMISSION
COASTAL CORRIDOR RAIL TRANSIT PROJECT

BECHTEL CIVIL, INC.


IN ASSOCIATION WITH:
ACOUSTICAL ANALYSIS ASSOCIATES
DKS ASSOCIATES
MANUEL PADRON ASSOCIATES
MICHAEL BRANDMAN ASSOCIATES, INC.
PGH WONG ENGINEERING, INC.
RALPH STONE AND COMPANY, INC.

STATION SKETCHES

CONTRACT NO.
DRAWING NO.
FIGURE 3C
SCALE AS SHOWN
DATE
SHEET NUMBER



WESTCHESTER STATION
 SOUTH SIDE ALTERNATIVE
 SCALE: 1" = 100'

DRAWN: PNM DESIGNED: AJM APPROVED: BOB	 LOS ANGELES COUNTY TRANSPORTATION COMMISSION COASTAL CORRIDOR RAIL TRANSIT PROJECT BECHTEL CIVIL, INC.	IN ASSOCIATION WITH: ACOUSTICAL ANALYSIS ASSOCIATES OKS ASSOCIATES MANUEL PADRON ASSOCIATES MICHAEL BRANDMAN ASSOCIATES, INC. PGH WONG ENGINEERING, INC. RALPH STONE AND COMPANY, INC.	CONTRACT NO. DRAWING NO. FIGURE 3D SCALE AS SHOWN DATE SHEET NUMBER
---	--	--	--

STATION SKETCHES

2.0 COMMON SEGMENT OF ALIGNMENT BETWEEN IMPERIAL HIGHWAY AND CENTURY STATION

The alignment segment from the beginning of the project at Imperial Highway to the divergence of Alternatives A, B and C is common for all alignment paths and is discussed in this section. There are no stations in this common segment. The Century Station is discussed under Alternative A, B and C.

2.1 Alignment Description and Geometry

Beginning on aerial structure at the wye connection near Imperial Highway, the guideway proceeds northerly in the AT&SF Railroad right-of-way to the west of Aviation Boulevard and after clearing 111th Street, descends on a four percent grade to an at-grade section opposite runways 25L and 25R for purposes of meeting Federal Aviation Administration (FAA) height restrictions.

Ascending on a seven percent grade and clearing the access road opposite to 104th Street, which is relocated northward in order to clear the FAA height restrictions, the guideway continues aerial on a relatively flat grade and turns westward on a 300 foot radius curve along the south side of Century Boulevard, and then continues along Century Boulevard until the divergence of Alternatives A, B and C. The stations along Century Boulevard for the three alternatives are described in the sections of this report discussing these Alternatives.

2.2 Construction Techniques and Costs

As previously described, this section is aerial except for the at-grade section opposite LAX runways 25L and 25R required for FAA clearances.

Construction is conventional with aerial guideway columns supported by deep piling. The at-grade section requires a railroad spur relocation, but should present no special problems.

The estimated construction cost for this common alignment is in the range of \$45,000,000 for the segment linking to Alternative C, excluding the Century Station, and is in the range of \$45,000,000 to \$55,000,000 for the segment linking to Alternative A and B, again excluding the Century Station for those Alternatives.

2.3 Utilities/Right-of-Way/Restrictions

Utilities

The usual minor utility rearrangements are encountered. The major conflict is an underground storm drain box and a 78 inch storm drain along the AT&SF Railroad and Century Boulevard that will require temporary relocation in places. Columns may be sited to avoid conflict with most major underground utilities, by using caissons in lieu of spread footings.

Right-of-Way

Right-of-way will be required from the AT&SF and from street or airport property along Century Boulevard.

Restrictions/Conflicts

Two contaminated sites are identified along the south side of Century Boulevard (please refer to Figure 2). Both sites are also discussed under Sections 3.1.3 and 3.2.3 in this report.

The transit impact on these contaminated sites should be minimized by virtue of being on aerial structure with the major underground work being installation of piling or utility rearrangements. It is not presently known if the guideway construction would encroach on these sites, and if so, what the implications are, especially if a clean-up should be undertaken after transit is in operation.

Geotechnical and seismic conditions are discussed further under Section 3.2.3. Conditions can be adequately designed for by requiring deep pilings under the supporting columns.

2.4 Environmental and Traffic Impacts

ENVIRONMENTAL IMPACTS

Land uses are airport, industrial, commercial and vacant. Significant environmental impacts are not anticipated.

A Los Angeles County Fire Station is located on the corner of Century and Aviation Boulevards. The aerial structure is adjacent to it, but will not result in a significant impact.

Noise and vibration impacts are not expected to be a significant concern in this segment.

TRAFFIC IMPACTS

No traffic impacts are expected along this section of guideway, except during construction, as all columns are placed outside the traveled ways. Circulation around station sites is discussed under the respective alternative.

3.0 EVALUATION OF ALTERNATIVE ALIGNMENTS A, B AND C AND ALIGNMENT VARIATIONS ALONG LINCOLN BOULEVARD

3.1 ALTERNATIVE A

3.1.1 Alignment Description and Geometry

Alternative A separates in profile from Alternative B near the intersection of Airport Boulevard and Century Boulevard, just east of Century Station. Continuing on aerial structure and then descending on an approximately six percent grade in a westerly direction along the south side of Century Boulevard, Alternative A portals along the south side of Century Boulevard just east of Avion Drive, which is crossed under. Subway continues westward, with the tracks diverging in the area east of Sepulveda Boulevard for purposes of avoiding bridge foundations in the Century Boulevard/Sepulveda Boulevard interchange area. Tracks converge to a standard twin bore tunnel spacing underneath the lower level of World Way, and near East Way bears northerly in a 300 foot radius curve (or sharper curve if major underpinnings of bridge columns are to be avoided) into a subway station site (LAX Station) in the tarmac area between Terminals 1 and 2, just northerly of World Way.

Continuing northwesterly in subway, Alternative A passes underneath LAX runways 24L and 24R and rises to enter the Lincoln Boulevard right-of-way on a moderate grade in the vicinity of the proposed Westchester Parkway extension crossing. A station is not proposed in this area, but the geometry does not preclude siting a subway station. Proceeding in subway underneath Lincoln Boulevard, the vertical alignment rises slightly and becomes common with Alternative B north of Manchester Avenue and opposite to 84th Street. From this point northward, a common subway alignment leads into the portal area and this final segment is evaluated in Section 4.5.

3.1.2 Construction Techniques and Costs

Construction Techniques

Alternative A is twin bore tunnel construction except for the aerial Century Station and the portal area on the south side of Century Boulevard, where cut and cover is required, and LAX Station, which must be constructed from the surface.

Difficulties and expensive construction solutions may be encountered in relocating major storm drains in the portal area, in underpinning World Way bridge columns near Terminal 1, and in building LAX Station, which may require expensive construction techniques due to the confined area and the soil conditions. Adequate laydown area for construction of the station may be a problem due to limited space available and conflicts with airline operations.

Planning of the tunnelling operation will be critical for Alternative A, and further techniques may be revealed if construction scheduling is undertaken.

Construction Costs

Construction costs for Alternative A are estimated to range between \$220,000,000 and \$270,000,000.

3.1.3 Utilities/Right-of-Way/Restrains

Utilities

Major conflicts are anticipated along the south side of Century Boulevard in the aerial guideway and portal area where large storm drains are encountered and other buried utilities would be disrupted.

The tunnel sections are sufficiently deep to avoid major conflicts, but the LAX Station site may require the rearrangement of major utilities, especially those facilities used in fueling and servicing aircraft at the gates.

The North Outfall Replacement Sewer (NORS) is proposed to be constructed approximately 80 feet deep where the rail tunnel sections would cross

over then under the LAX runways. Clearances are adequate and no conflict is anticipated.

Right-of-Way

The aerial guideway on the southside of Century Boulevard and underground portion are situated in street or airport properties and will require acquisition or easements.

Restraints/Conflicts

A major concern is the likely encounter of toxic and hazardous materials contamination. Figure 2, Hazardous Materials Sites, identifies two areas along Alternative A known to be contaminated. The areas are identified on the south side of Century Boulevard in the portal area and in the tarmac area of the airport between the terminal buildings and the runways. Either area may require cleanup, or the treatment of ground water that may be removed for construction purposes. Where methane gas is possible, potentially explosive conditions may require special considerations during construction, and provisions would have to be made during design to guard against gas deposits in the completed facility.

Other possible contaminated sites in the airport property may be revealed during the two year period of the Airport Contamination Survey.

A cursory analysis of existing geotechnical data available in the airport area indicates that tunneling can be achieved successfully without substantial construction or subsidence problems. For the most part, alternating layers of dense to heavy dense sand, clayey sand and silty sand, and very stiff to silty to sandy clay and clayey silt are encountered. Dune sand may be encountered along Lincoln Boulevard near the crest. Groundwater is generally deep and below the tunnel construction, but some perched water zones could be encountered.

Based on geotechnical data known at present, with proper construction techniques, settlement in the runway areas could be held to less than one inch in a trough area of 70 to 100 feet.

Seismic hazards would be as a result of direct structural response to earthquake motions, which can be accommodated in the design process. The potential for liquefaction, or subsidence, appears low.

Because the research of existing geotechnical data in the airport area at this point in time has not been extensive, our findings are accordingly qualified. Further research will be required to more conclusively make our recommendations, and to be more exacting regarding construction costs.

3.1.4 Station Access and Circulation

Century Station

The Century Station would be located at the intersection of Century Boulevard and Airport Boulevard in both Alternatives A & B. The proposed station site plan is shown in Figure 3A. The station would be on the south side of Century Boulevard. The center-platform station would straddle Airport Boulevard, with vertical circulation at both ends of the platform. This arrangement would reduce walking distance for pedestrians using the station, and would avoid the need for pedestrians to cross Airport Boulevard to reach the station. A stairway and escalator would be located at the western entrance, while a stairway and elevator would serve the eastern entrance.

The primary mode of access to the station would be walking. There are a large number of major trip generators within walking distance along Century Boulevard, including several major hotels, office buildings, and a large Post Office facility adjacent to the station. A small kiss-ride drop-off facility would be located just south of the western station entrance, with access from Airport Boulevard just across from the driveway to the Post Office.

The provision of bus access for Alternative A is uncertain at this time. The SCRTD LAX Transit Center is located at 96th Street, just a few blocks from the proposed Century Station. Several of the twelve bus routes which operate to the LAX Transit Center will intercept the Century or Coast Lines at other stations. However, for

those routes which do not, passengers desiring to transfer to the rail line would have to make an additional transfer, using the LAX Shuttle C to go from the Transit Center to the LAX Station. An alternative which could be considered is to provide some bus access at the Century Station, or conceivably to relocate the entire Transit Center to a site adjacent to the Century Station. There appears to be ample space, currently used for surface parking, west of Airport Boulevard and south of the station, to provide for some bus loading. However, there would be considerable cost associated with such a plan, particularly for real estate acquisition.

LAX Station

The distinguishing feature of Alternative A is that the LAX Station is located within the central terminal area, rather than at Lot C as in Alternatives B & C. Several locations within the central terminal area were considered.

Theoretically, a station located at the geographic centroid of the terminal complex would provide the least overall walking distance to all eight terminals. However, there are serious problems with such a location. The location of the various terminal buildings, parking garages, the airport theme structure, and the supporting structures for the upper level roadway all combine to make it extremely difficult to locate a station in the center of the terminal area. Even if it were possible, access to the individual terminals would be difficult. A station just west of the theme structure would still be about 1500 feet from Terminals 3, 4, and Bradley, and would be 1600 feet from Terminal 7. If the station were designed to bring passengers from the subway platform directly to the surface, passengers would then have to cross several busy roadways to reach any of the terminals. The alternative would be to build subsurface pedestrian passageways from the station to each of the terminals. This would be very difficult and expensive, since the central area is almost totally occupied by parking structures and busy roadways. A centrally located station would also not have direct access to the LAX Shuttle system, which operates on the upper and lower level roadways.

As a result of these factors, a site in the center of the terminal area was rejected in favor of a site which serves some terminals directly, and uses the LAX Shuttle service for connections to the remaining terminals. Given the alignment of the Coast Line east and north of LAX, the best location for such a station is in the northeast portion of the terminal complex. The proposed site is between Terminals 1 & 2, with direct connections to both terminals. Terminal 1 is the busiest of all eight terminals, accounting for 20% of total LAX passengers. Terminal 1 is used by the commuter airlines, and it is likely that those passengers would be more inclined to use rail transit for airport access than other air passengers. Terminal 2 accounts for an additional 9% of LAX passengers, although that figure may increase with the completion of reconstruction. Several other terminals are within possible, though lengthy, walking distance. Terminal 6 would be 1050 feet away, while Terminals 3, 5, and 7 would be from 1500 to 1800 feet away. (1500 feet is generally considered to be an upper limit for walk access; it represents a walking time of six to eight minutes, depending on walking speed and number of delays for street crossings.) The Bradley Terminal and Terminal 4 would be 2250 and 2500 feet away. Passengers destined for those terminals would likely use the LAX Shuttle between the rail station and the terminal.

The proposed station layout is shown in Figure 3B. The subway line turns to the northwest between Terminals 1 & 2. The track spacing would be widened to allow space for all vertical circulation at the south end of the center platform. There would be two escalators, an elevator, and a stairway. The station entrance building would be located at the lower level of the airport terminals, between the two terminal buildings, and just north of the lower level roadway. This space has been used recently for temporary purposes during the reconstruction of Terminal 2. There are no immediate plans for other uses. The station entrance would not require all of the 200 feet between the terminal buildings, so some space would still be available for other uses.

A key element in analyzing Alternatives A & B is the effect on ridership of the different locations for LAX Station. This issue has been analyzed by studying the experience of other U.S. cities with rail transit service to airports. This analysis is discussed in detail in Appendix A. The overall conclusion is that direct service attracts significantly higher patronage among air passengers than service which depends on shuttle bus connections. Although the LAX Station in Alternative A would only have direct service to some terminals, and shuttle service to the more distant ones, ridership may be significantly higher than with Alternative B.

Westchester Area

The subway alignment through LAX in Alternative A misses the Westchester area, where the Westchester Station is proposed for Alternative B. In addition, the subway alignment along Lincoln Boulevard in the vicinity of Manchester Boulevard makes a station in that area extremely expensive. (Alternative B would have an aerial station at Lincoln and La Tijera.)

The absence of both of these stations in Alternative A would result in much poorer service to the Westchester and Manchester areas. All access modes would be affected. No park-ride spaces would be available in the Westchester area, while Alternative B would have 500 to 1000 spaces at Westchester Station. Bus access would be limited to the Jefferson Station, or to the LAX Transit Center with a connection via the LAX Shuttle.

3.1.5 Environmental Impacts

Existing land uses include airport, commercial, recreational, apartment and vacant.

Key environmental concerns along this portion are conflicts with contaminated sites and possible groundwater contamination on airport property.

Portal noise and vibration could impact the apartment buildings north of 83rd Street.

3.1.6 Traffic Impacts

The station along Century Boulevard and the portal are located outside the traffic lanes of Century Boulevard, and the balance of Alternative A is underground. Therefore, there are no anticipated traffic impacts except for Century Station access, where egress/ingress would need to be examined along with possible increased congestion at the Avion Street intersection. Traffic impacts may be anticipated during construction along Century Boulevard and along World Way, where columns will require underpinning near LAX Station.

3.2 ALTERNATIVE B

3.2.1 Alignment Description and Geometry

Alternative B separates from Alternative A in profile near the intersection of Airport Boulevard and Century Boulevard, just east of Century Station. Continuing on relatively level aerial guideway along the south side of Century Boulevard, the alignment swings north on a 300 foot radius curve after crossing Avion Street, with the columns placed on the west side of the property containing the Dollar Rent-A-Car facilities, and the guideway overhanging the Integrated Resources Property. It then traverses a surface parking lot to the south of 96th Street. A station (LAX/Lot C Station) is sited as a center platform aerial station straddling 96th Street at the existing SCRTD Transit Center.

Continuing north and then northwesterly through Lot C and two small commercial parking areas, the aerial guideway climbs on a gentle grade and swings westerly into the center of Westchester Boulevard near Sepulveda Boulevard.

Near Sepulveda Westway, three aerial alignment variations develop along the proposed Westchester Parkway Extension; median, northside, and southside of the street. The first two options have an aerial center platform station (Westchester Station) located westerly of Sepulveda Westway, but as easterly as horizontal geometry will allow. The southside option has the center platform station straddling Sepulveda

Westway. Parking is allotted south of the proposed parkway for both station sites. The center alignment would require redesign of the proposed parkway median, but could have better horizontal alignment geometry than either the south or north side option, which may require tighter curves.

The aerial guideway continues westerly either center, north side, or south side of the parkway, climbs and then descends on mild to moderate grades, and swings northwesterly alongside Lincoln Boulevard with an aerial center platform station (Manchester Station) situated on the easterly side of the street, partially sited in the Westchester Recreational Center property.

Immediately beyond the station and opposite the Recreational Center, the aerial guideway descends on an approximately five percent grade into cut and cover subway, and crosses under the Manchester Avenue and Lincoln Boulevard intersection as it becomes common with the Alternative A twin bore tunnel section opposite to 84th Street. From this point northward, a short stretch of common subway alignment is underneath Lincoln Boulevard as the portals in the bluff area are approached.

3.2.2 Construction Techniques and Costs

Construction Techniques

Alternative B is conventional aerial guideway construction until the subway portal is reached at Lincoln Boulevard. Concrete girders, which may be pre-cast, or cast-in-place, are supported by concrete piers with piled footings. Deep, cast-in-place concrete girders may be required where streets are crossed on skews and in the center of the proposed Westchester Parkway, where traffic turn lanes require spanning. Due to soil conditions, foundations are expected to be supported on deep pilings and may be drilled concrete friction piles or driven piles, depending on the specific site conditions. Special consideration will be required for traffic maintenance where streets are impacted.

Because of the impracticability of tunneling for a short stretch of line, and due to the feasibility of a shallow profile, cut and cover

construction is specified in Lincoln Boulevard. There will be traffic impacts during the construction period. Because conventional methods of support utilizing soldier piles and lagging are expected, no major construction problems are identified.

Construction Costs

Construction costs for Alternative B are expected to range between \$140,000,000 and \$170,000,000.

3.2.3 Utilities/Right-of-Way/Restrictions

Utilities

On the south side of Century Boulevard, the construction of pier foundations will require the temporary relocation of a major storm channel, making the construction more efficient during the dry season.

Aerial structure may conflict with overhead utility service lines, and pier footings will disrupt minor utilities in some areas. In most areas, columns may be spaced to avoid piling conflicts with major underground facilities, such as the proposed North Outfall Replacement Sewer or existing outfall sewers. The radar site located south of the proposed Westchester Parkway poses problems for the south side alignment. Further discussion with the airport and the FAA to relocate or reconfigure the tower may be necessary to accommodate any of the three alignment options. The FAA is concerned that the south side station at Sepulveda Westway may conflict with runway 24R clearance. The lighting towers for the approach landing system at LAX are avoided and cleared vertically with further FAA coordination required. Major electrical transmission lines are in conflict near Lincoln Boulevard, and costly rearrangement of these facilities is anticipated. A drainage channel planned along the north side of Westchester Parkway may conflict with guideway columns. Minor utilities will be encountered in Lincoln Boulevard, but at this point in the study no major conflicts have been identified.

Right-of-Way

Right-of-way acquisition will be required in fee except where guideway is in public right-of-way, where easements must be obtained. Private takes occur between Century Boulevard and 96th Street and again in the Westchester business district. The major street easements will be Westchester Parkway and Lincoln Boulevard. The private property take of the parking area in the southwest quadrant of the Westchester Boulevard and Sepulveda Eastway intersection may be injurious to the property as a whole. For the south side alignment variation along the proposed Westchester Parkway extension, part-takes, or possibly full takes, of the businesses located in the southwest and southeast quadrants of Sepulveda Boulevard and Westchester Parkway are required. A private take of land is also required at the Hughes Space and Communication Group Facility on Lincoln Boulevard.

Restraints/Conflicts

An area contaminated by hydrocarbon has been identified along the south side of Century Boulevard. Please refer to Figure 2, Hazardous Materials Sites. For Alternative B, the guideway construction in this area is aerial and problems may not be as significant as in underground construction.

The area surrounding the intersection of Sepulveda Boulevard and Westchester Parkway has been identified as a contaminated site and some problems may arise during construction, but major problems are not anticipated due to the nature of construction.

Other possible contaminated sites in the airport area may become apparent as more investigation is conducted.

Geotechnical conditions in the area are such that deep piling can adequately support the aerial guideway. The cut and cover subway portion along Lincoln Boulevard may be constructed by conventional means.

In the area of aerial guideway, seismic hazards would be the result of direct structural response to earthquake motions, which can be accommodated

in the design process. The potential for liquefaction may be considered low. Low to moderate liquefaction may be expected in the Lincoln Boulevard subway portion.

Further research of existing geotechnical data is needed for more definitive conclusions about foundation requirements and seismic implications and their implications on construction costs.

3.2.4 Station Access and Circulation

Century Station

The location of Century Station in Alternative B is identical to Alternative A; see the site plan and narrative in Figure 3A and Section 3.1.4.

LAX/Lot C Station

The LAX/Lot C Station would be located at 96th Street at the SCRTD LAX Transit Center. The center-platform, aerial station would straddle 96th Street. The northern entrance would serve the Transit Center, and provide a connection to the LAX Terminals via the LAX Shuttle C. The southern entrance would serve walk-in patrons from the area between 96th Street and Century Boulevard. The proposed station site plan is shown in Figure 3A.

The northern entrance would have an escalator, elevator, and stairway. All three elements would land in the passenger island of the SCRTD Transit Center. This would require some modifications to the existing layout, including deletion or modification of one bus loading stall, and extension of the canopy structure. Patrons destined to LAX would use the existing pedestrian crosswalk across the bus roadway to reach the loading area for LAX Shuttle C. The walking distance from the foot of the rail station stairway to the shuttle loading area is about 275 feet. The shuttle currently operates every ten minutes; service should be improved to handle the additional patrons transferring from the rail system.

Bus access to the LAX/Lot C Station would be excellent. Twelve bus routes currently operate to the LAX Transit Center. There are ten SCRTD routes (#42, 111, 112, 117, 220, 225, 226, 232,

439, and 560), and one Santa Monica route (#3) and one Culver City route (#3). Collectively these routes serve large tributary areas to the north, east, and south of LAX. While some of the routes would also connect with the rail system at other stations along the Century or Coast Lines, several would connect only at the LAX/Lot C Station.

No kiss-and-ride access would be provided at this station; drop-off facilities are located just a few blocks away at the Century Station.

A second station entrance would be located on the south side of 96th Street, and would be coordinated with future development on that site. A pedestrian walkway should be provided south of the station to provide convenient access to development along 98th Street and the western portion of Century Boulevard. The walkway could be constructed underneath the aerial structure.

Westchester Station

The Westchester Station would be located on the new Westchester Parkway between Sepulveda Westway and La Tijera Boulevard. The station would be at the southwestern edge of the Westchester business district, and would be at the eastern edge of the proposed new development along Westchester Parkway. The station would serve walk-in, drop-off, and park-and-ride patrons. No bus access would be provided, since all bus routes in the area converge on the LAX Transit Center, which would be the location of the LAX/Lot C Station.

Three horizontal alignment variations for the aerial station are being considered: north and south of Westchester Parkway and its median. The basic station functions would be similar in all alternatives. All of the development which would generate walk-in trips is north of Westchester. The proposed parking area is south of Westchester. Therefore the major differences among alternatives would be in which groups of patrons would have to cross Westchester Parkway to reach the station entrance.

The site plan for the station north of Westchester Parkway is shown in Figure 3B. The aerial center platform would have vertical circulation at both ends. The eastern entrance,

with a stairway and elevator, would be oriented to the Westchester business district. The western entrance, with a stairway and escalator, would serve new development on either side of La Tijera, and would serve patrons using the parking lot.

The parking lot would be located south of Westchester Parkway. An entrance would be located along Westchester Parkway, just east of the La Tijera intersection. It would be difficult to realign the proposed La Tijera intersection to accommodate a direct parking lot entrance. However, the intersection will have to be signalized to allow pedestrians to cross Westchester Parkway from the parking lot to the station entrance. An entrance and exit for the lot would be located on Sepulveda Westway, just south of Westchester Parkway. The area between Westchester Parkway and Lincoln Boulevard is ideally suited for parking, since air space restrictions preclude any new development. The area could easily accommodate 500 cars, and could be expanded if desired in either of two directions. It could be extended eastward to Sepulveda Westway to accommodate at least 1000 cars. The lot could also be extended westward toward Emerson Avenue.

The site plan for the station in the median of Westchester Parkway is shown in Figure 3B. The median island would have to be extended eastward to the Sepulveda Westway intersection to allow pedestrian access to and from the Westchester business district, and to the eastern portion of the parking area.

The site plan for the station south of Westchester Parkway is shown in Figure 3D. The parking lot is located in the same area as the other sites. However, the station would straddle Sepulveda Westway, with an eastern entrance serving the Westchester Business District on Sepulveda Boulevard, and a western entrance serving the LAX Northside Development. This station is closest to the businesses on Sepulveda Boulevard.

The north side site is more convenient for walk-in patrons than the median site, since patrons must cross half of busy Westchester Parkway to reach the median site. Park-ride patrons must

cross part or all of Westchester Parkway in both alternatives; the median site would reduce the walking distance very slightly. The south site has the best park-ride access. It is also closest to the Sepulveda Business District, but least accessible from the Northside Development. The median site requires widening the median of Westchester Parkway to accommodate the columns for the station and adjacent line segments. Placing the station on the north or south side would allow the median width to be reduced, thus preserving more land on either side for future development. (The conceptual plan for Westchester Parkway which was used as the base for these site plans assumed the widened median.)

Manchester Station

The aerial Manchester Station would be located at the intersection of Lincoln Boulevard and La Tijera Boulevard, approximately 1500 feet south of Manchester Avenue. Just north of the station the line descends to a subway to pass under Manchester Avenue. Therefore it is not possible to locate the station closer to Manchester Avenue. Please refer to Figure 3B.

The station would be on the east side of Lincoln Boulevard. The aerial center platform would be located near the northern end of a Hughes Corp. building. The vertical circulation would be at the northern end of the platform, and the entrance would be located at the corner of the Westchester Recreation Area. A vehicular entrance would be located directly across from La Tijera. This is currently used as a driveway to a small parking area for the Recreation Center. This use would still be accommodated. A loading area for two buses and approximately ten kiss-and-ride vehicles would be provided, utilizing land owned by the City of Los Angeles Parks Department.

Bus access could include RTD route 115, which generally operates along Manchester Avenue, with a diversion to serve Loyola Marymount University.

Walk-in access would be primarily from development along the west side of Lincoln Boulevard. There are existing commercial uses

north of La Tijera along Lincoln, with residential areas to the west. A new apartment complex is under construction just south of La Tijera. Walk-in patronage east of Lincoln would be low since most of the tributary area is occupied by the Recreation Center and golf course.

Kiss-ride access would serve the neighborhoods north and south of Manchester. No parking spaces would be provided, since no land is readily available. Also, parking would be provided at the Westchester Station to the southeast and at the Jefferson Station to the northwest, which would serve the general Westchester Community.

3.2.5 Environmental Impacts

Land uses between Century Station and the proposed Westchester Parkway development areas are five blocks of commercial and one block of industrial use, and vacant land, designated as "airport buffer." Environmental concerns include noise and vibration to existing and planned commercial establishments, business displacement and disruption during construction, and visual impacts of aerial structure.

Beyond the proposed development area, minor concerns are encroachments into the recreational areas; the Westchester Golf Course and the Westchester Recreational Center.

3.2.6 Traffic Impacts

Near the beginning of Alternative B, the spacing of columns as the guideway crosses Century Boulevard will be critical.

No traffic impacts are projected along Alternative B between Century Boulevard and Westchester Parkway. Potential impacts would be experienced, however, at the intersections of Westchester Parkway and Sepulveda Boulevard. Westchester Parkway is currently 66' wide curb-to-curb between Sepulveda Eastway and Sepulveda Westway. Aerial guideway columns in the median of Westchester Parkway would take approximately 12 feet of roadway width and would require relocation of left-turn lanes both east and west of Sepulveda Boulevard. There may also be parking impacts due to the loss of approximately

10 to 20 parking spaces on Westchester Parkway for the northside and median options. The south side option would widen the parkway between Sepulveda Eastway and Westway, conserving parking in this area. For the median option along the proposed Westchester Parkway, redesign would be required to accommodate column placement and some traffic conflicts may be anticipated in twin pockets. Traffic impact may also be significant during construction. No impacts are expected for Alternative B along Lincoln Boulevard between Westchester Parkway and the portal south of Manchester Boulevard as that segment is located out of the existing roadway.

Westchester Parkway is wider at both sides of Sepulveda Eastway and Westway. The centerline of the roadway is also off-set with the centerline at the bottleneck between Sepulveda Eastway and Westway. Should Westchester Parkway be widened in the future to match the ultimate width on both sides, one potential problem is that an alignment that follows the existing centerline would eventually be in the middle of the travel lane of the widened roadway with the north side and medium option. The south side option eliminates this problem.

Traffic impacts during cut-and-cover subway construction in Lincoln Boulevard can be anticipated.

As discussed under Section 3.1, Alternative A, some traffic impacts are expected around the Century Station. In addition, potential station related impacts would occur at the SCRTD Transit Center (LAX/Lot C Station), Westchester Parkway Sepulveda Boulevard intersection, Westchester Parkway/La Tijera Boulevard intersection (proposed near the Westchester Station), and at Westchester Parkway/Emerson Avenue intersection (proposed).

3.3 ALTERNATIVE C

3.3.1 Alignment Description and Geometry

Alternative C is primarily a variation of Alternative B, but begins at the common aerial guideway section east of the intersection of Century Boulevard and Airport Road. A center platform aerial station (Century Station) is

located south of the intersection on the south side of Century Boulevard. Swinging north to the west side of Airport Road on a 300 foot radius curve on level grade and continuing to 96th Street, the alignment swings westerly on a 300 foot radius curve to the northerly side of 96th Street. Jenny Street is crossed aerial and Lot C is entered for purposes of positioning a station (LAX/Lot C Station) in the SCRTD Transit Center area.

Alternative C turns northerly on a 300 foot radius curve and transverses Lot C as easterly as possible in order to avoid conflict with the LAX Approach Landing System. A common alignment with Alternative B is achieved in the northern area of Lot C.

3.3.2 Construction Techniques and Costs

Construction Techniques

The aerial guideway construction techniques would be similar to that of Alternative B. Conventional concrete guideway construction with deep piled foundations appears feasible. Cast-in-place deep girders may be required at major street crossings on skews, such as Century Boulevard and 96th Street.

Construction Costs

Construction costs should not be significantly different from the segment of common alignment and Alternative B that form the variation of this alignment, as the length of line, number of stations, and type of construction is quite similar. A detailed quantity break out would be required to establish the cost differential. The costs for Alternative C are expected to be in the range of 45-55 million dollars.

3.3.3 Utilities/Right-of-Way/Restrictions

Utilities

Conflict with a major storm drain is anticipated on the south side of Century Boulevard. Temporary rearrangement of the facilities would make dry season construction more attractive.

Minor overhead and subsurface utility conflicts are anticipated, but major conflicts are avoided. Large underground utilities may be avoided by spacing the aerial structure foundations accordingly.

In Lot C, conflict with the LAX Approach Landing System is avoided. Coordination will be pursued in more detail with the FAA.

Right-of-Way

With the exception of the segment on the west side of Airport Boulevard, Alternative C is situated within public streets or airport property. A narrow strip of property will require purchase along Airport Boulevard in front of the hotel and along rental car lots. Postal Service property is also necessary to accommodate the Century Station.

Restraints/Conflicts

A hazardous substance site suspected of containing solvents, fuels, heavy metals, and pesticides is identified in the Worldway Postal Center south of Century Boulevard and east of Airport Boulevard, in the area of the Century Boulevard Station site. A preliminary assessment of this site will be completed in 1991. While Alternative C is the only alignment that places a station in the area of possible cleanup, guideway for the base alignment common to Alternatives A and B is located in this area. It is assumed a station site may have more physical impacts on the site than aerial guideway. It is not known at this time if there exists any conflict between the station site and the hazardous substances, or if in conflict, the extent.

Geotechnical and seismic considerations are the same as Alternative B in this area. Problems are not anticipated that cannot be resolved through adequate foundation design with deep pilings. In this area, more geotechnical research is needed before more specific conclusions can be reached.

3.3.4 Station Access and Circulation

Century Station

Since Alternative C turns north from Century

Boulevard to Airport Boulevard, the station cannot be located as in Alternatives A & B. The proposed site is on the south side of Century Boulevard, just east of Airport Boulevard. This would be in front of the Post Office, and would provide convenient walk-in access for the dense development along Century Boulevard. The site plan is shown in Figure 3A.

A small kiss-and-ride facility is proposed for this station. However, the only space that could be used for such a facility is currently utilized by the Post Office for truck loading and maneuvering. It is unlikely that both uses could be accommodated in such a restricted space.

LAX/Lot C Station

The function of this station is similar to Alternative B. The site plan would be somewhat different (Figure 3A) due to the east-west vs. north-south orientation of the line. However, emphasis would be placed on convenient connections to the SCRTD LAX Transit Center. Since the horizontal alignment dictates that the station be located near the east end of the Transit Center, access to the loading area for the LAX Shuttle C would be less convenient than in Alternative B.

A kiss-ride facility would be provided just east of the Transit Center on the north side of 96th Street. Walk-in access to the station would be less convenient than in Alternative B, since patrons from proposed development on the south side of 96th Street would have to cross that busy street to reach the station.

3.3.5 Environmental Impacts

Impacts are similar to the equivalent segment of Alternative B. Commercial land uses are traversed along Airport Boulevard and 96th Street. The north side of 96th Street borders vacant land designated as an airport approach area.

Potential concerns are noise and vibration impacts to an existing two-story apartment building at the northeast corner of 96th Street. Business disruption is a potential effect of construction.

3.3.6 Traffic Impacts

Potential traffic impacts of Alternative C may occur at the intersection of Century Boulevard/Airport Boulevard where aerial structure column placement may result in loss of roadway capacity. No impacts are expected along Airport Boulevard or 96th Street, however, as the aerial structure will be located outside of the existing roadway. Loss of sidewalk capacity must be evaluated, however, if the aerial structure cannot be located entirely within existing private right-of-way on Airport Boulevard and 96th Street.

Station related impacts should be similar in nature to the equivalent stations along Alternative B, in that some midblock or intersection volumes may be increased due to station access. Some traffic impacts can be anticipated during construction.

3.4 Variations Along Lincoln Boulevard

3.4.1 Alignment Description and Constructibility

The alignment variations along Lincoln Boulevard develop in the slope, or bluff area, as the subway section portals and aerial guideway transverses the Ballona Wetlands.

Three aerial alignment variations; west side, east side, and center of Lincoln Boulevard, are studied between the bluff area and the interim terminal station site along Culver Boulevard (Marina del Rey Station).

The west and east side variations would not require modifications to Lincoln Boulevard for purposes of guideway construction. The center scheme requires a median be developed in Lincoln Boulevard to accommodate transit.

The Summa Corporation's proposed Playa Vista development in this area indicates improvements to Lincoln Boulevard for accommodating increased traffic volumes and for including rail transit in the median. The improved median would not be necessary for the west and east side variations, and because the median layout has not been developed in concert with transit planning, modification would be required to accommodate

aerial guideway columns and station access. Design opportunities exist for the median to efficiently accommodate transit and to minimize right-of-way requirements.

A transit station (Jefferson Station) straddles Jefferson Boulevard for the west and east side alignments, and is situated south of the intersection for the center scheme. A park-ride lot is provided in the southwest quadrant of the intersection.

All three variations are similar in horizontal geometry with all curves having a radius of 500 feet or greater. Relatively steep grades of approximately five percent are called for in the bluff area, and an approximately four percent grade descends from the Culver Boulevard interchange to the interim terminal station (Marina del Rey Station) which is aerial and provides park-ride.

Beyond the station, tail tracks for midday storage are provided on a section of embankment, which is preferable to aerial structure in terminating guideway due to thermal characteristics of rail and anchorage on concrete structure.

Construction techniques for the three variations are similar and conventional in nature. The portal construction coming from cut and cover subway to aerial would be standard U-Wall construction and would require support on pilings due to the geotechnical conditions. The portals are located partially in a landfill which is classified as closed, and is supposedly uncontaminated. Further investigation regarding possible cleanup should be pursued prior to constructing this area. Piling would be considered mandatory in this fill area.

Aerial guideway would be concrete girder and columns supported on deep pilings. The girders may require casting-in-place in some areas, especially on the median alignment. The economy of a pre-cast girder operation would need to be assessed based on the quantity of standard girders required.

Construction costs may be slightly less for the easterly alignment due to very straightforward construction and a slightly shorter length. The center alignment may be slightly more costly due to work in the roadway median, long span girders, and more complex station support. The westerly alignment is longer, but contains some retained at-grade construction near the portal. The westerly alignment also has a long span crossing of Lincoln and Culver. The cost for the center and westerly alignments should be approximately the same. This segment may cost in the range of 75 to 90 million dollars.

Utility conflicts in this segment can be held to a minimum. The major outfall sewers in the bluff area are avoided.

Additional street right-of-way will be required in the portal area for all three variations. For the median alignment, Lincoln Boulevard requires widening in the portal area. Right-of-way for Lincoln Boulevard through the wetlands is proposed to be widened by the Summa Corporation to accommodate the improved roadway. Transit on the east or west side should not require land from the Playa Vista development beyond the roadway requirements. The right-of-way requirement may be minimized if transit is not in the median.

There would be a public land need for the Marina Station and the attendant park-ride lot and tail tracks.

Geotechnical and seismic conditions can be accommodated in structural design of the guideway. Due to poor soil conditions near the surface, pilings would need to be founded in the deeper dense gravelly sand, maybe 70 or 80 feet deep or deeper. The deep gravelly sand has a low potential for liquefaction in the area in general, with a high potential for liquefaction in some shallow isolated levels of granular soil encountered in the upper, clay soils.

Another potential restraint in this area was identified as the operation of the Hughes Corporation helicopter pad in the bluff area. Caltrans Aeronautical Division, who has jurisdiction, was contacted and clearance over the top of the transit vehicle for the worst case is more than adequate for helipad operations.

3.4.2 Station Access and Circulation

Jefferson Station (Playa Vista)

The Jefferson Station would be located at the intersection of Jefferson Boulevard and Lincoln Boulevard. In Alternative A the station would have to serve a larger tributary area due to the absence of any station between Jefferson and LAX.

There are three alternatives (please refer to Figure 3C) for the horizontal alignment of the station: east of Lincoln Boulevard, in the median of Lincoln, and west of Lincoln. In all three cases, the station would be an aerial station with a center platform. In the east and west side alternatives, the station would straddle Jefferson Boulevard, with station entrances at either end of the center platform, i.e. on the north and south sides of Jefferson. In the median alternative the entire station would be south of Jefferson, with a single entrance at the north end of the platform.

The station would serve all four primary modes of access. The proposed Playa Vista development involves high density commercial and residential development, primarily on the southeast quadrant of the Lincoln/Jefferson intersection. The southern entrance to the east side alternative would provide direct walk access to this development. The design of the station entrance should be coordinated with the Playa Vista development. In the other alternatives walk-in patrons would have to cross half or all of Lincoln Boulevard to reach the station entrance. New development is also proposed for the northeast quadrant. It would be served directly by the northern entrance of the east side alternative. Street crossing(s) would be required with the other alternatives.

Bus access would be important. There are several existing SCRTD bus routes in the area serving Playa del Rey and areas further south, as well as the Jefferson corridor to the east. In addition, the Local Coastal Plan prepared for the Marina del Rey/Ballona area calls for new shuttle service to be provided in the area to serve both existing and proposed development. For the east-side alignment, a bus loading area is proposed in

the northeast quadrant of the Jefferson/Lincoln intersection, with access to and from both streets. In the median and west-side alternatives, the bus loading area should be located along with the proposed parking area in the southwest quadrant.

Future land uses just west of Lincoln Boulevard are still uncertain. Much of the wetlands area will be preserved in a natural state, and some residential development may be allowed. A small parking lot for the station is proposed for the southwest quadrant of the intersection. This parking lot could also be used for public parking for visitors to the wetlands area on weekends, when transit demand will be low. Primary access to and from the lot will be from Jefferson, since most parking demand will come from the area to the west. A right-turn-only entrance and exit is provided on Lincoln Boulevard. Kiss-and-ride spaces will also be provided in the parking area for the west-side and median alternatives; kiss-ride spaces would also be included with the bus loading area in the east-side alternative. Patrons using the lot would have direct access to the southern entrance to the west-side station alternative; they would have to cross half or all of Lincoln Boulevard to reach the entrances to the median or east-side alternatives.

Since the primary modes of access are expected to be walking and bus, the east-side alternative would provide the most convenient access to the largest number of patrons. The west-side station would be most convenient for auto access patrons. The median station is considered to be the least convenient, since all patrons would have to cross part of busy Lincoln Boulevard, and many patrons would also have to cross Jefferson.

An additional consideration for bus access is the proximity of the Marina del Rey Station. Since it will be the terminal station for the north Coast Line, it will depend heavily on bus access. Since the Marina and Jefferson Stations are only about one-half mile apart, it may be more desirable to consolidate all bus access at one of the two stations, probably Marina. Building one versus two bus loading areas would save valuable real estate, and would reduce construction costs. It would also facilitate bus-to-bus transferring by bringing all routes together at a single location.

Marina del Rey Station

The terminal station for the north end of the Coast Line would be located on the north side of Culver Boulevard, about a quarter-mile east of Lincoln Boulevard, and just south of Marina del Rey. The proposed site plan is shown in Figure 3C. The aerial, center-platform station would have vertical circulation at the western end of the platform.

The plan creates an entrance/exit for all station traffic on Culver Boulevard, aligned with a proposed new development roadway (Bay Street). The station is easily accessible from both Lincoln Boulevard and Route 90 (Marina Freeway) via Culver Boulevard.

Since this will be an end-of-line station for an indeterminate time, feeder bus access will be important. The following bus routes currently operate in the vicinity and could feed the station:

Santa Monica #3 (Santa Monica to LAX via Lincoln Boulevard)
SCRTD #108 (Marina del Rey, Slauson)
SCRTD #220 (Beverly Hills to LAX via Culver City, Marina)
SCRTD #437 (express, Marina to downtown L.A.)
SCRTD #438 (express, Manhattan Beach to L.A. via Culver)

Several other routes (SCRTD, Santa Monica, and Culver City) operate within a mile or two and could possibly be modified to feed the rail system. SCRTD #110 (Jefferson), might feed the Marina Station if bus loading were not provided at Jefferson Station. In addition, new shuttles required by the Local Coastal Plan should feed the Marina Station. Five bus stalls are proposed to accommodate the bus demand.

The site plan also includes a kiss-and-ride facility, and approximately 350 parking spaces. The provision of parking at this terminal station is recommended. However, the land requirements for parking will have to be coordinated with development plans for the area between Culver Boulevard and the existing Marina development. There are excellent possibilities for joint development in this area.

3.4.3 Environmental and Traffic Impacts

Environmental Impacts

The three alignment variations are within the proposed right-of-way for the improved Lincoln Boulevard. As the portal areas are near to existing development, there could be a potential for some noise and vibration impacts, but the concern is low.

The landfill situated near Hughes Terrace in the portal area is listed as closed, but the consequences of construction in this area may require further research.

The visual impact of aerial transit structure may be considered a concern in this area. There may be some noise impacts to proposed adjacent developments, but the extent of concern would be related to the type of development and proximity to the guideway.

Environmental impacts are not anticipated to be significant for the wetlands.

Traffic Impacts

No traffic impacts are expected for the side running options because they will be located entirely outside of the roadway. The center running alignment, however, may result in traffic impacts at the portal location and along Lincoln Boulevard. Loss of roadway width due to portal and column locations will require more detailed traffic analysis. Construction related traffic impacts may be anticipated for the center alignment.

Potential future traffic impacts must be analyzed for the common center running alignment at the proposed new intersections and Lincoln Boulevard/Jefferson Boulevard. Future level of service projections will identify impacts and help develop potential mitigation measures at those locations. If proposed improvements to Lincoln Boulevard are designed in concert with center guideway design, potential traffic conflicts should be minimum.

No traffic impacts are expected north of Jefferson Boulevard as the proposed alignment crosses over the Lincoln Boulevard/Culver Boulevard interchange and runs along the north side of Culver Boulevard.

Except for the possibility of slightly increased traffic volumes at nearby intersections, traffic problems at station sites should be minimum.

APPENDIX A

RAIL SERVICE TO U.S. AIRPORTS: AN EVALUATION OF THE LAX STATION

The major difference between Alternatives A and B is the location of the station serving Los Angeles International Airport (LAX). Alternative A has a subway station located within the central terminal area, with the station entrance located between Terminals 1 and 2. In Alternative B the Airport Station is located on 96th Street at Lot C and the SCRTD Transit Center; passengers could transfer from the rail line to the LAX Shuttle C to reach any of the eight airport terminals.

Rail Service to Other U.S. Airports

In order to compare the ridership that could be expected to use the rail system to reach LAX with either alternative, LACTC and MPA gathered information on the use of rail transit systems for access to other major U.S. airports. The information is summarized in Table A-1. Several categories of information are included:

- Rail service information, including headways, and travel times and fares from downtown to the airport.
- Rail ridership to the airport, with a trip purpose breakdown where available (air passengers, airport employees, and other).
- Airport data, including annual passengers, daily originating/terminating passengers, and airport employees.
- Transit mode share data for air passengers and airport employees; in some cases this data was derived from surveys of the particular group, while in others it was computed indirectly from the data cited above. The mode share for air passengers is based on the number of originating and terminating passengers; i.e. connecting air passengers are excluded. The mode share for employees reflect the fact that about 70% of total airport employees are scheduled to work on a given day.

The cities are divided into two groups. The first group includes cities with transit stations located within the airport. Atlanta, Chicago (O'Hare), Cleveland, and Philadelphia have stations inside the terminal building. At Washington National the station is about a five-minute walk from the terminal; a shuttle bus is also available. The second group of cities includes stations outside the airport, with connecting shuttle bus service: Boston, New York (Kennedy), Oakland, and Atlanta (prior to June 1988).

Among cities in the first group, the transit mode share for air passengers ranges from 4% in Philadelphia to 15% in Cleveland. The low figure for Philadelphia probably reflects the high fare and relatively infrequent service; also the service is still relatively new. The high figure in Cleveland is from a very comprehensive survey done in 1969; current usage appears to be somewhat lower, probably in the same 8-10% range observed in Chicago and Atlanta. Atlanta's Airport Station has only been open since June 1988, so the mode share may increase. Good data is not available for Washington; a recent survey is still being processed. Based on total station utilization, the mode share is probably also around 10%.

The mode share for air passengers is significantly lower for systems relying on shuttle connections. Three of the four cities are in the 1 to 2% range; Kennedy's low share is probably attributable to the high fare and long travel time. Only Boston has a share (8%) similar to the cities in the first group; Boston has generally high transit ridership, and has a low fare. The Airport Station is a short ride from downtown, and there is extreme traffic congestion in the airport area.

The mode share for airport employees is also higher for cities with stations at the airport than for those with shuttle connections. However, the difference is not as great as for air passengers.

In general, the cities with direct rail service to the airport carry more air passengers than employees, and the mode shares for both groups is in the same general range, about 8 to 10 %. By contrast, systems with shuttle bus connections carry more airport employees than air passengers.

Atlanta's experience is especially relevant to the situation in Los Angeles, since it has had both a shuttle bus connection and direct service to the terminal. Prior to June 1988, the shuttle bus from a nearby rail station to the airport was carrying 1800 daily passengers. With the opening of the Airport Station, patronage jumped to 8000 daily passengers. Ridership among air passengers increased dramatically, from less than 1% of air passengers to about 8%. Ridership among employees increased by a lesser proportion, from about 4% to 10%.

For purposes of comparison to the other cities, LAX currently handles 45 million annual passengers, with just under 100,000 daily originating or terminating passengers. Airport employment is approximately 35,000.

Proposed Service to LAX - Alternative A

In Alternative A, LAX would be served by a rail station located adjacent to Terminals 1 & 2. According to current operating plans, the station would be served by trains running every 12 minutes from Norwalk to LAX, and trains running every 12 minutes

on the Coast Line. A passenger from downtown Los Angeles would have to take the Long Beach Line and then transfer to the Century Line. In this respect, the service is less convenient than in the other cities with airport rail stations, all of which have single-train service from downtown. Total travel time from downtown to the LAX Station would be about 45 to 50 minutes, including transfer time. This is also at the high end of the range of other cities.

At LAX, the rail station would have direct connections to both Terminals 1 & 2. Terminal 1 is the busiest of all eight terminals, accounting for 20% of total LAX passengers. Terminal 1 is used by the commuter airlines, and it is likely that those passengers would be more inclined to use rail transit for airport access than other air passengers. Terminal 2 accounts for an additional 9% of LAX passengers, although that figure may increase with the completion of reconstruction. Several other terminals are within possible, though lengthy, walking distance. Terminal 6 would be 1050 feet away, while Terminals 3, 5, and 7 would be from 1500 to 1800 feet away. (1500 feet is generally considered to be an upper limit for walk access; it represents a walking time of six to eight minutes, depending on walking speed and number of delays for street crossings.) The Bradley Terminal and Terminal 4 would be 2250 and 2500 feet away. Passengers destined for those terminals would likely use the LAX Shuttle between the rail station and the terminal.

Overall, the situation at LAX would be similar to that at Washington National, in that some passengers could walk to their terminal, while others would use the shuttle. Walking distances to the farthest terminals at LAX would be greater than the longest walking distance at National.

In summary, there are several factors which distinguish Alternative A from the other cities with direct airport rail service: relatively long travel time from downtown; an additional transfer; and the long walk or need to use a shuttle for many passengers. Therefore it is unlikely that a station at LAX would attract as high a mode share of air passengers as the 8 to 10% range that generally prevails.

For airport employees the comparative situation would be slightly better, due to the good regional coverage provided by the various rail lines and the bus network. However, service would not be very good for employees who do not work in the central terminal area. The provision of connecting shuttle service to peripheral employment locations would be difficult; shuttles would either have to come into the congested terminal area or operate to Century Station. Overall, the mode share for employees would probably be in the lower end of the 5 to 10 % range observed in other cities.

Proposed Service to LAX - Alternative B

In Alternative B LAX would be served by a station at Lot C and the SCRTD LAX Transit Center. The station would be connected to the various terminals by LAX Shuttle C. The shuttle currently operates every ten minutes, but should be upgraded to improve the rail to airport connection.

The rail operating pattern would be identical to that described above for Alternative A. The need to make an additional transfer to the shuttle would mean that a passenger from downtown would have to use three vehicles, with a total travel time of about one hour.

In comparison to the other cities which have shuttle service connections to airports, Alternative B would probably be in the middle range in terms of transit mode share. LAX has more congestion and higher parking fees than Atlanta or Oakland, which attract only 1 to 2% of air passengers with shuttle connections. The service to LAX would be much cheaper than to New York's Kennedy, where transit usage is also low. However, it is very unlikely that Alternative B could approach the 8% mode share achieved in Boston, which has more convenient service and lower fares.

The mode share for employees would probably be higher than for air passengers, and may be about as high as for Alternative A. While Alternative A provides better service to the central terminal area, Alternative B, with provisions for bus and van connections, could better serve employees in peripheral areas.

Employees will tend to be less concerned than air passengers with having to transfer to a shuttle bus to complete their trips. There appears to be reluctance on the part of air passengers to depend on a shuttle bus connection. This is probably due to the perceived unreliability of shuttle service, and to the fact that occasional users are unfamiliar with the system. In addition, air passengers are generally choice riders, and many are carrying luggage.

Summary

Alternative A would provide faster and more convenient service to LAX air passengers than Alternative B. Even though Alternative A would not provide direct rail service to most of the terminals, it would be perceived as being more convenient and as providing more reliable service than Alternative B. As a result, the transit mode share of trips by air passengers to LAX could be as much as twice as high with Alternative A as it would with Alternative B. This was demonstrated in Atlanta when transit use by air passengers increased tenfold when the Airport rail station replaced the former rail/bus shuttle connection.

However, even with Alternative A the transit mode share to LAX would be smaller than that of other rail/airport links such as Washington, Atlanta, Chicago, for the following reasons:

- o Alternative A -- unlike Atlanta's rail/airport connection -- would still be remote in terms of walking distance from most LAX terminals, except terminals 1 and 2. Only 29% of LAX passengers would be within a short walking distance to the terminals after arriving at LAX by rail. Other potential rail users would have to transfer to the bus shuttle or walk long distances, which would discourage passengers carrying luggage.
- o The great majority of air passengers using rail to get to LAX would have to make at least one transfer within the rail system before arriving at the LAX Station. Unlike Atlanta, Washington and Chicago, the rail system in Los Angeles would not provide a direct connection between LAX and a major trip generator in the region, such as downtown Los Angeles.
- o The origins of air passengers served by LAX are probably much more dispersed in the Los Angeles Region than in other regions with airport rail access.

For airport employees there would be a much smaller difference between alternatives A & B. Alternative A would serve employees in the central terminal area better, while Alternative B would be preferable for employees in peripheral areas. Since the majority of employees are in the central area of the airport, Alternative A would be slightly better on balance, but the difference would be small.

Alternative A is estimated to cost between \$80 and \$100 million more than Alternative B. Therefore, when the above service considerations are coupled with the relative cost of both alternatives, direct service to the LAX terminals may not offer sufficiently higher ridership potential to justify its greater cost.

TABLE A-1 COMPARISON OF RIDERSHIP FOR RAIL TRANSIT SYSTEMS SERVING MAJOR AIRPORTS

06-Jul-88

LOCATION	RAIL	TRAVEL	FARE	DAILY	TRIP PURPOSE			ANNUAL	DAILY	RAIL MODE		MODE
	HEADWAY	TIME	CBD TO		PASS.	EMPL.	OTHER	AIR PASS.	ORIG/TERM	SHARE	AIRPORT	SHARE
	PEAK/MID	CBD/APT	AIRPORT	RIDERS			(millions)	PASS.		AIR PASS.	EMPLOYEES	EMPL.
=====												
RAIL STATION AT AIRPORT												

Chicago: CTA/O'Hare	5/15	45	\$1.00	14,700	50%	40%	10%	54.8	75,000	10%C	40,000	6% S
Cleveland: RTA/Hopkins	11/18	28	\$1.00	3,000	58%	7%	35%	5.0	12,000	15% 14%C	3,100	11%C
Philadelphia: SEPTA	30/30	23	\$4.00	1,900	77%	9%	14%	15.2	33,000	4%C	6,000	4%C
Washington: WMATA/Nat.	3/6	10-20	\$0.85	9,200	NA	NA	NA	15.7	39,000	8-10%?	9,400	?
Atlanta: MARTA/Hartsf.	12/12	15	\$0.85	8,000	45%	31%	24%	45.4	44,000	8%C	35,000	10%C
SHUTTLE BUS TO AIRPORT												

Atlanta: MARTA/Hartsf.	18/18	25	\$0.75	1,800	19%	61%	20%	45.4	44,000	1%C	35,000	4%C
Boston: MTA/Logan	10/10	25-30	\$0.60	7,200	NA	NA	NA	23.3	58,000	8% 8% 8% 8%	15,000	8% 8% 8% 8%
New York: CTA/Kennedy	20/20	60-70	\$6.50	3,500	30%	60%	10%	27.1	52,000	2%C	30,000	10%C
Oakland: BART/Oakland	10-15	35-40	\$1.90	400	NA	NA	NA	3.8	9,000	1-2%?		NA

NOTES:

Cleveland data are from 1968-9

Philadelphia train stops at 4 terminals

Washington: station is 5-min. walk or shuttle bus ride from terminal

Atlanta: shuttle service operated prior to 6/18/88 when rail station opened

New York: \$3 discount available to regular riders

Mode Share data are from surveys (S) or are calculated (C) from secondary data

? indicates value estimated by analogy; no direct data available