

# COASTAL CORRIDOR RAIL TRANSIT PROJECT NORTH SEGMENT

## INITIAL ALTERNATIVES EVALUATION REPORT Summary Report

Los Angeles County Transportation Commission



Prepared by  
Bechtel Civil Team



August 1988

HE  
4491  
.G73  
C665  
I87

41479006

**COASTAL CORRIDOR  
RAIL TRANSIT PROJECT**  
NORTH SEGMENT

INITIAL ALTERNATIVES EVALUATION  
REPORT  
Summary Report

Prepared for  
Los Angeles County Transportation Commission



Prepared by  
Bechtel Civil Team



August 1988

## TABLE OF CONTENTS

### 1.0 INTRODUCTION AND SUMMARY

- 1.1 Background
- 1.2 Purpose
- 1.3 Methodology
- 1.4 General Description of Alignments
- 1.5 Summary of Findings

## 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 Report

## 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 (B) Best access to development (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.

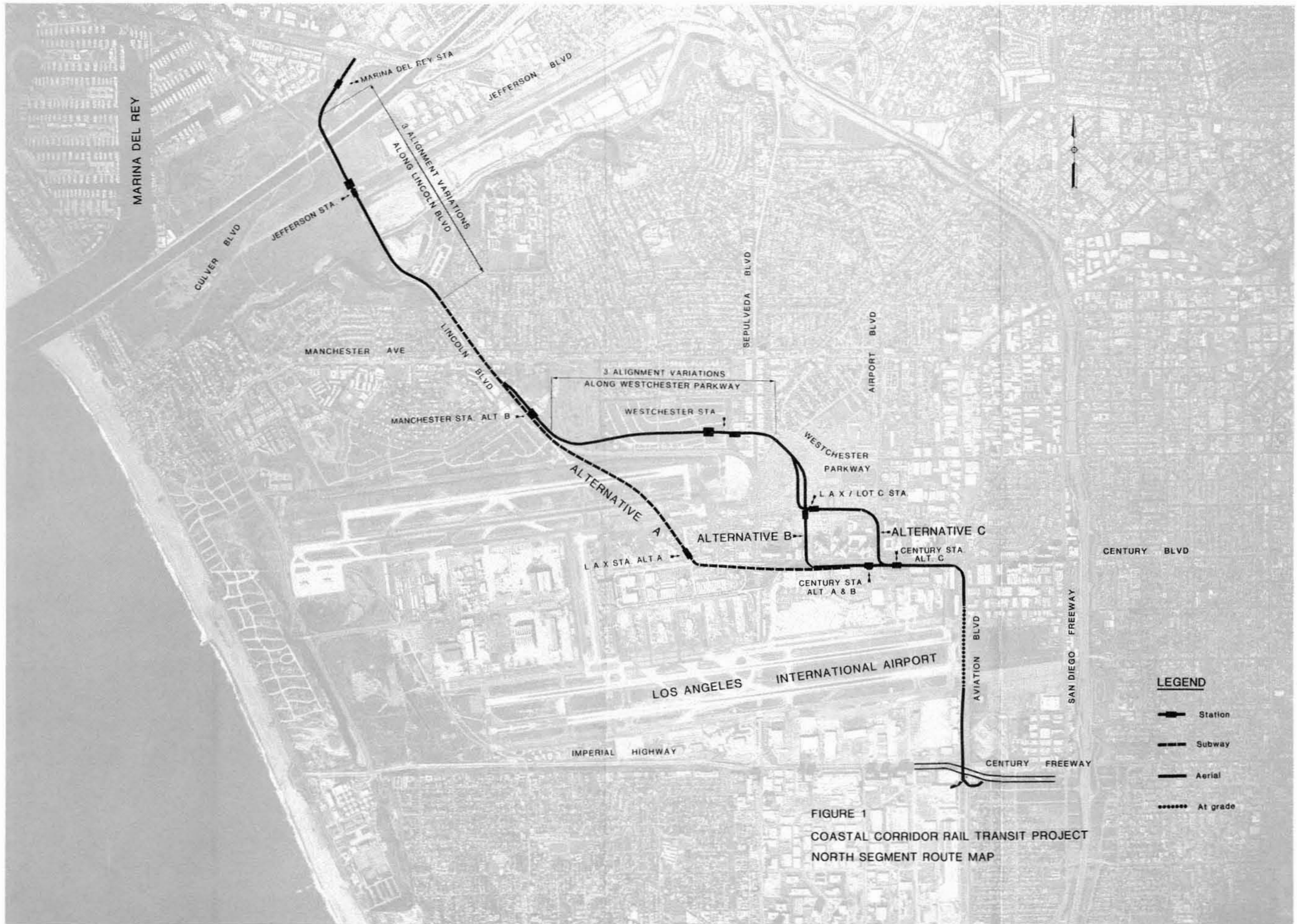
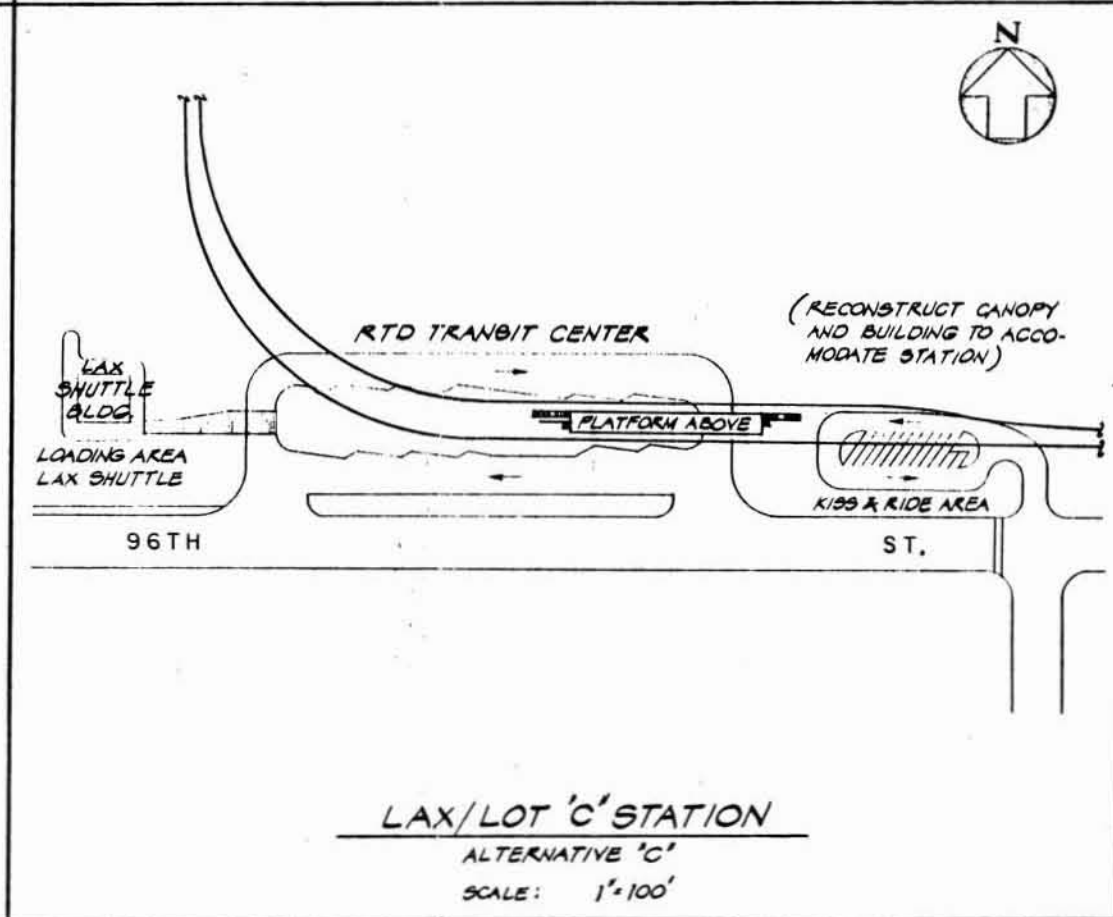
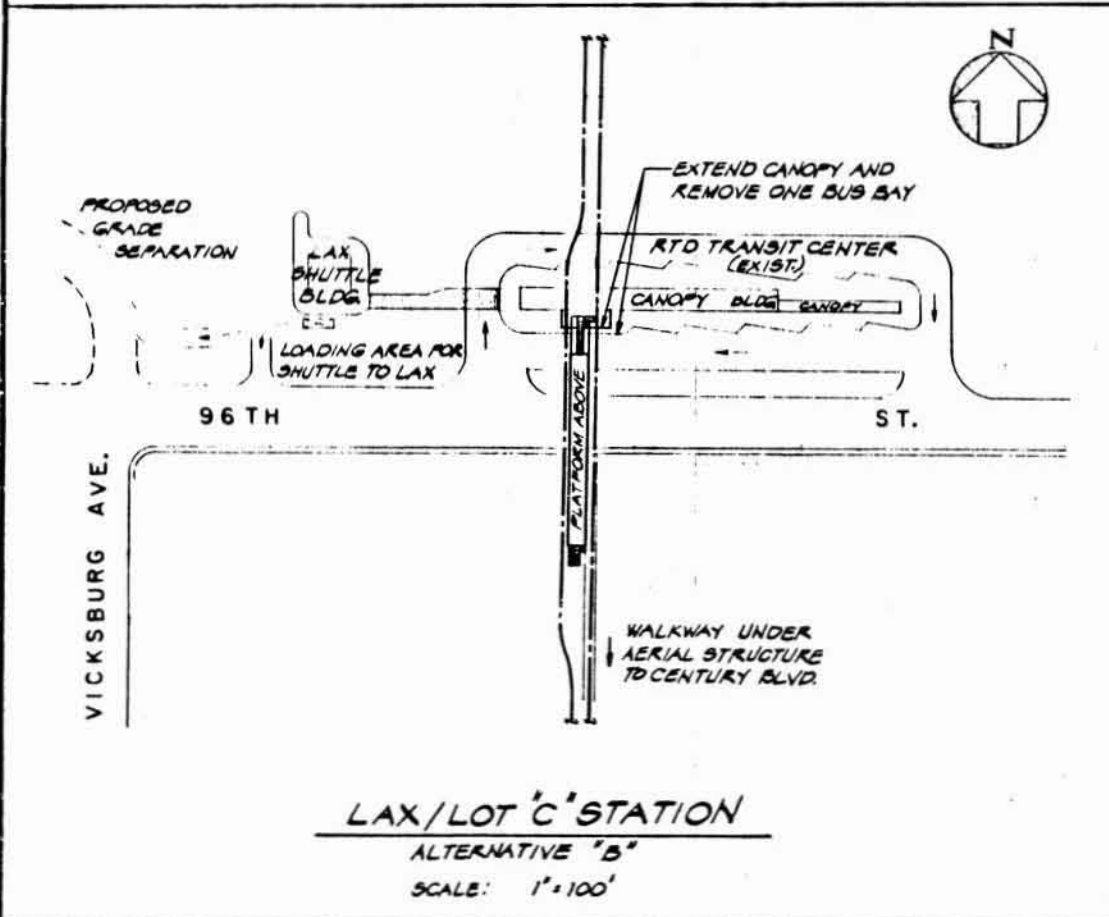
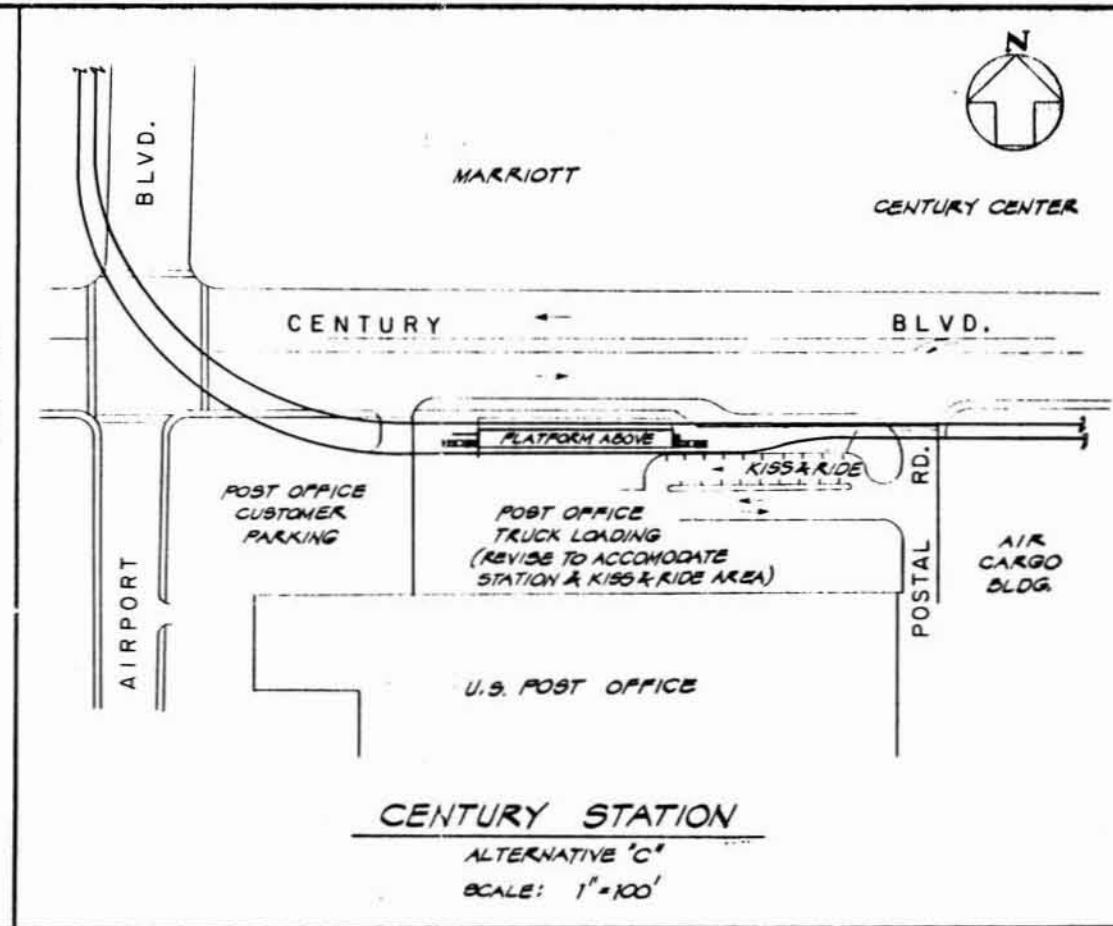
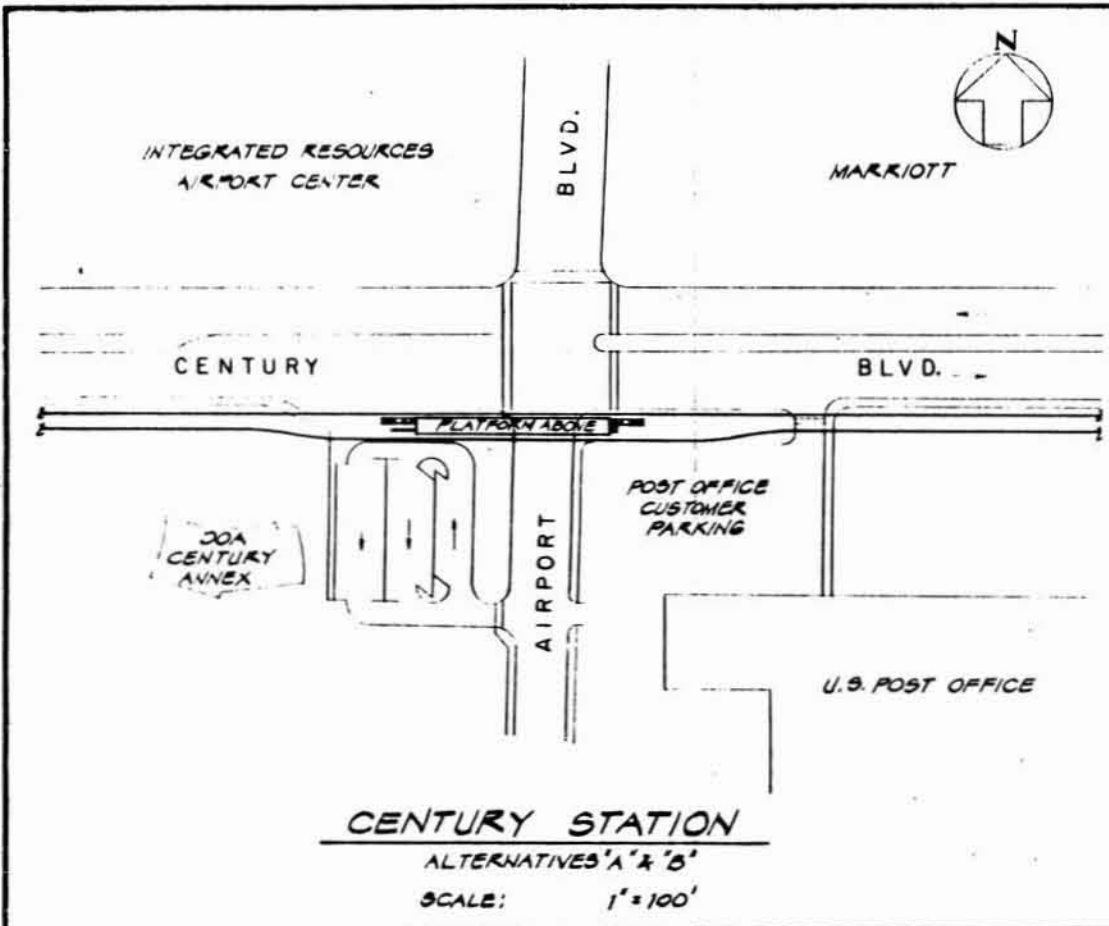


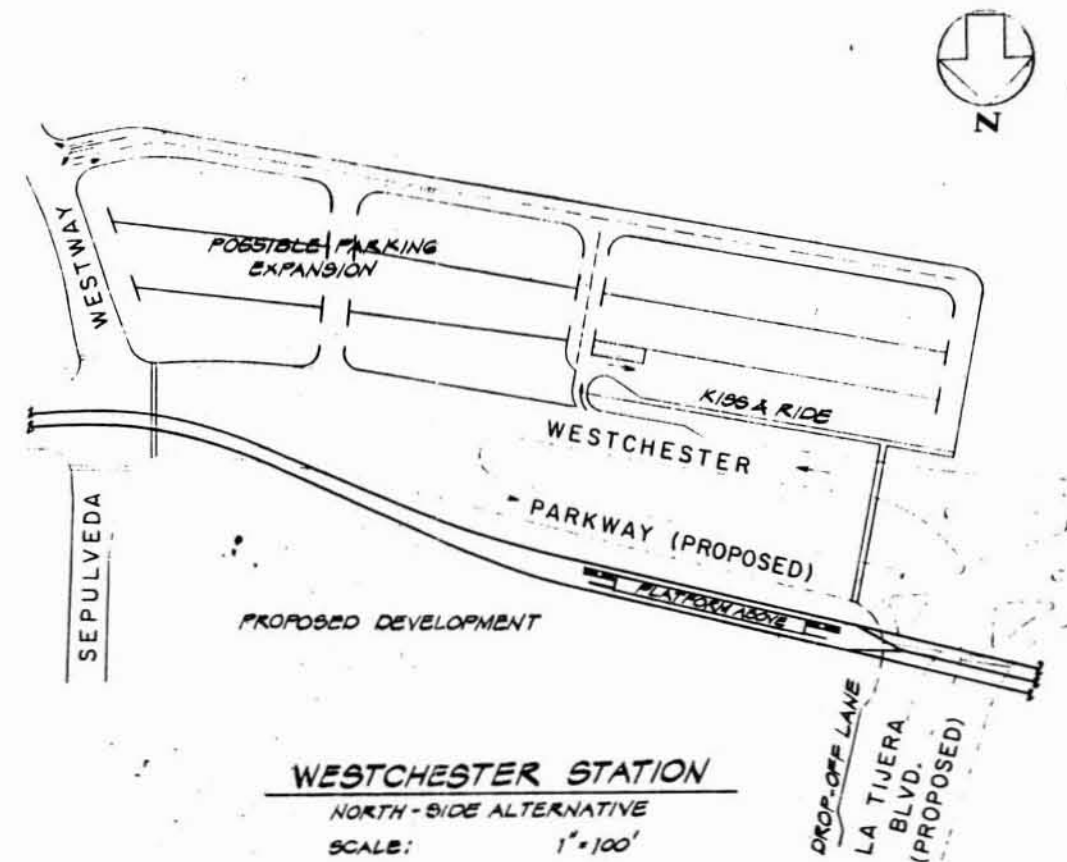
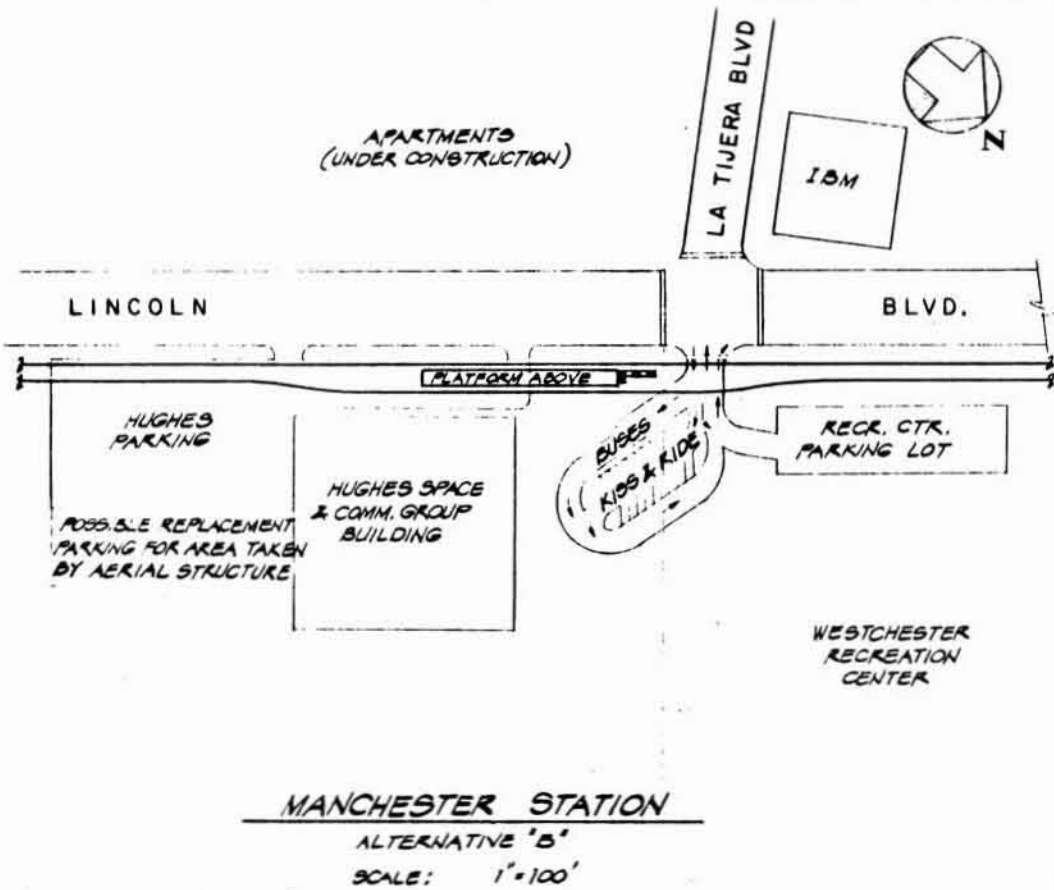
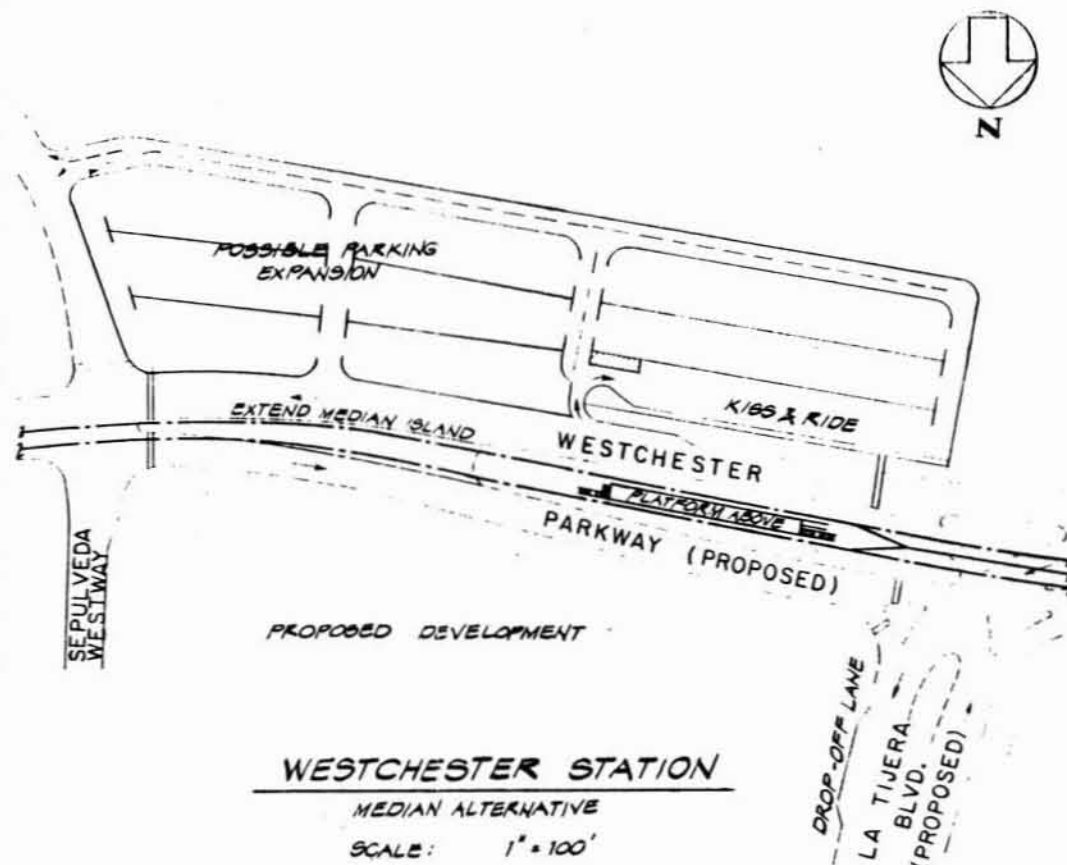
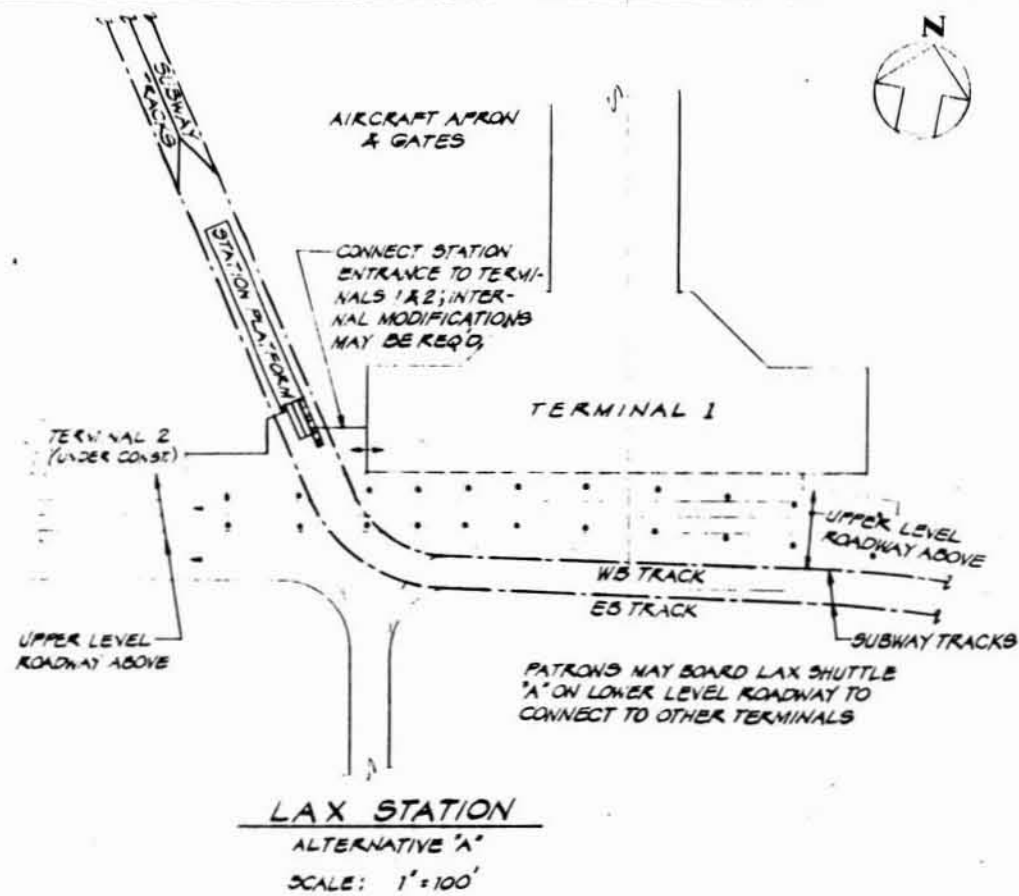
FIGURE 1  
 COASTAL CORRIDOR RAIL TRANSIT PROJECT  
 NORTH SEGMENT ROUTE MAP



DRAWN: PNM DESIGNED: BE APPROVED: BOB	LOS ANGELES COUNTY TRANSPORTATION COMMISSION COASTAL CORRIDOR RAIL TRANSIT PROJECT  <b>BECHTEL CIVIL, INC.</b>	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. <b>FIGURE 3A</b> SCALE AS SHOWN DATE SHEET NUMBER
--	---	--	--

**STATION SKETCHES**





DRAWN: PNM  
DESIGNED: DE  
APPROVED: BOB

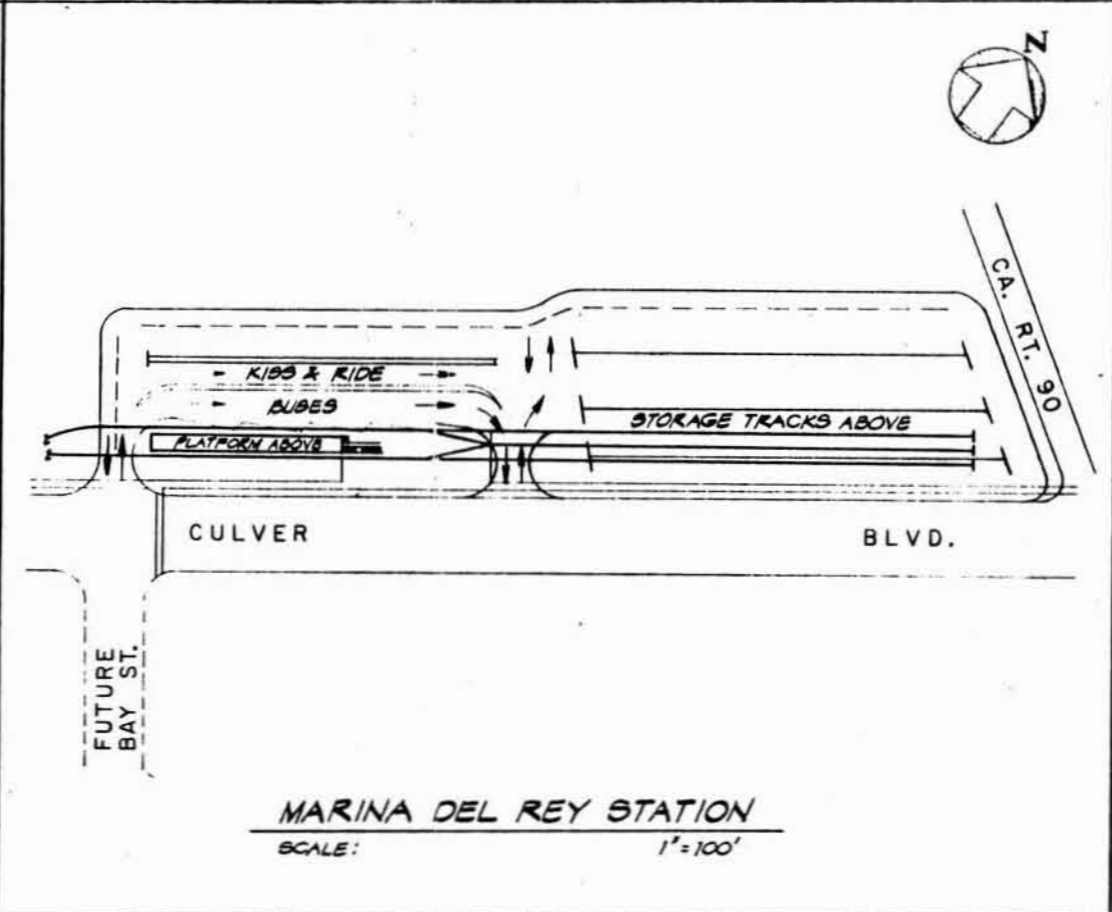
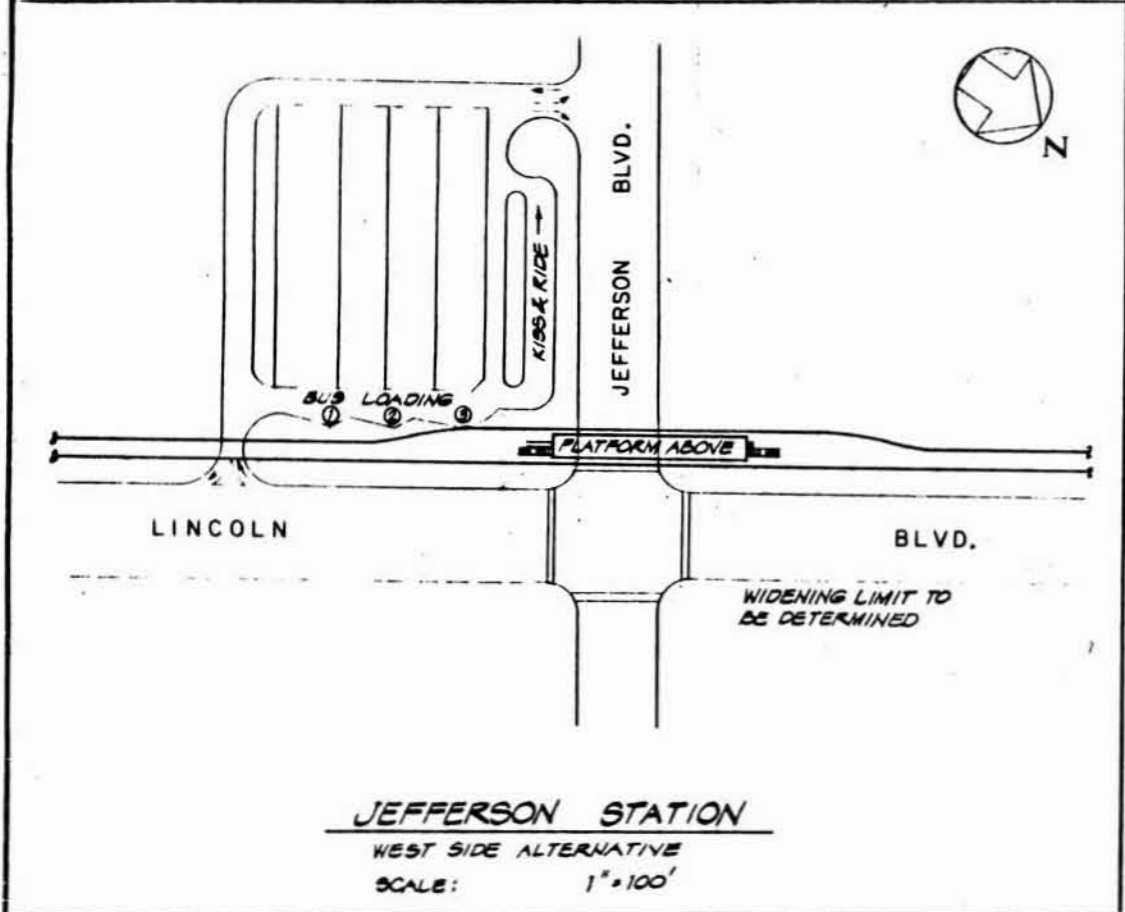
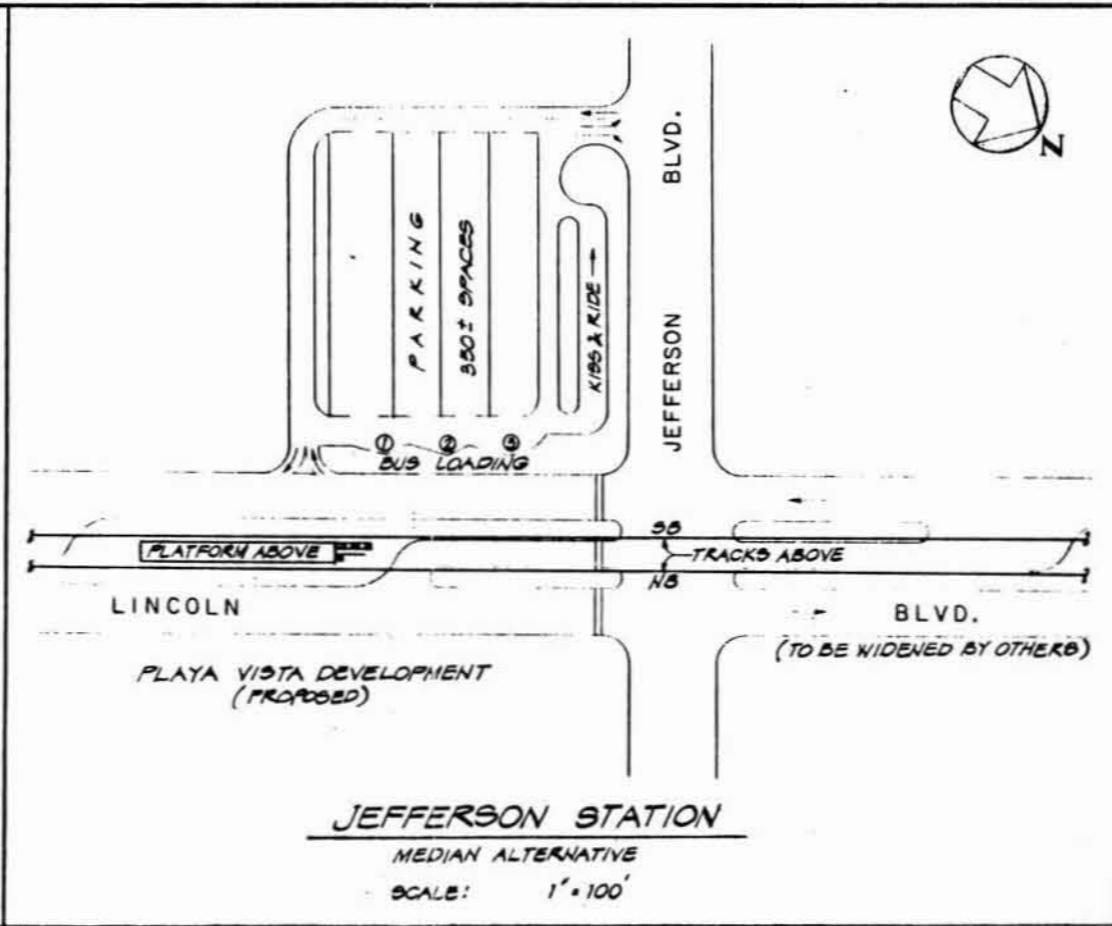
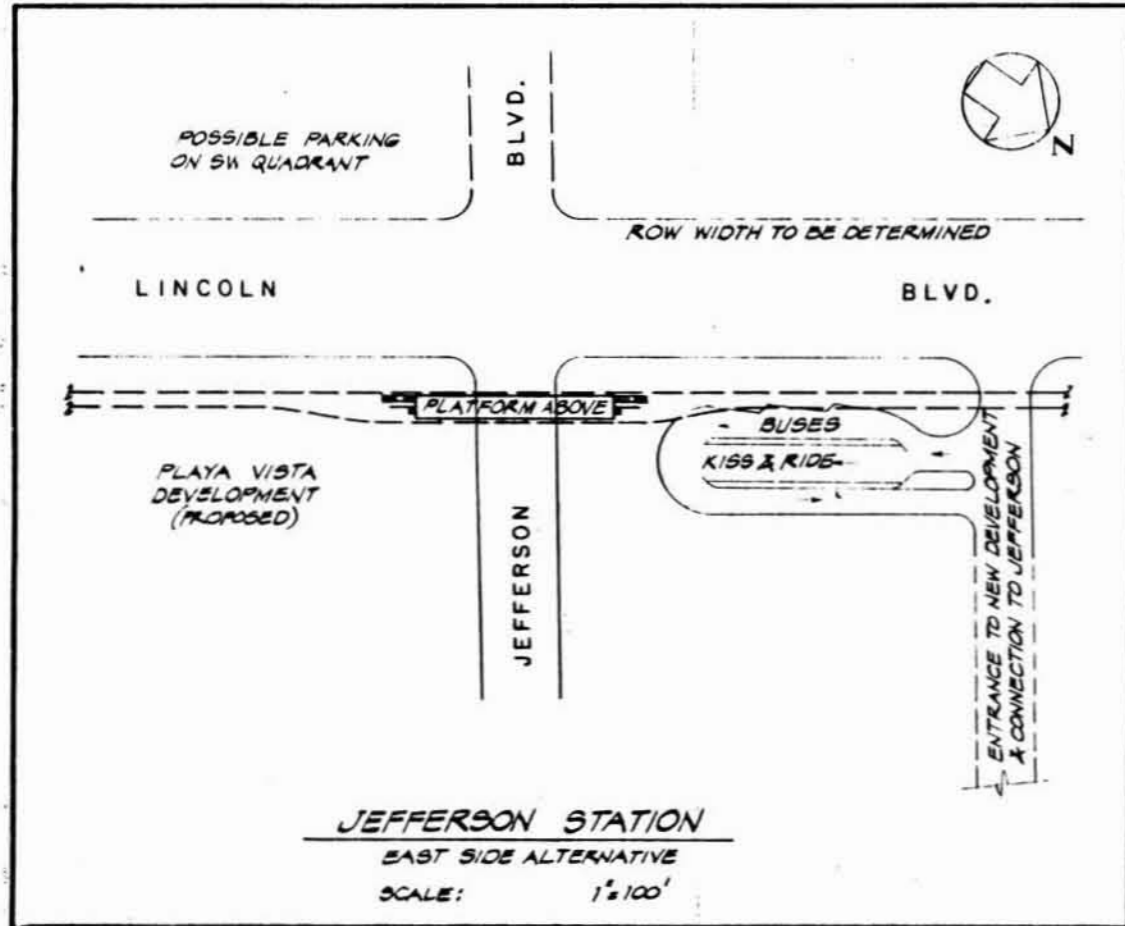
**LOS ANGELES COUNTY TRANSPORTATION COMMISSION**  
COASTAL CORRIDOR RAIL TRANSIT PROJECT

**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

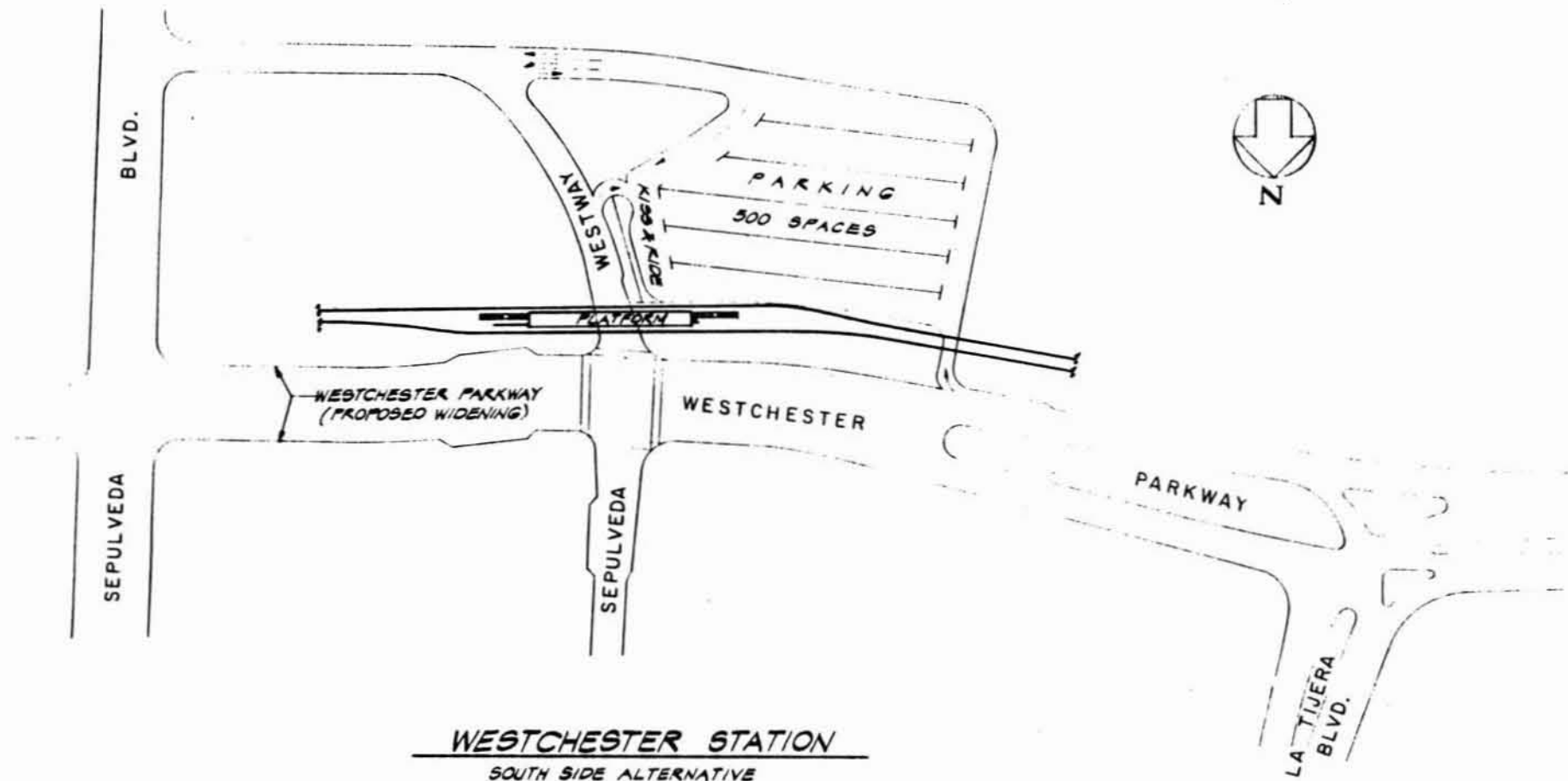
**STATION SKETCHES**



DRAWN: FNM DESIGNED: APPROVED: BOB	LOS ANGELES COUNTY TRANSPORTATION COMMISSION COASTAL CORRIDOR RAIL TRANSIT PROJECT  <b>BECHTEL CIVIL, INC.</b>	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. <b>FIGURE 3C</b>	
SCALE AS SHOWN	DATE
SHEET NUMBER	

**STATION SKETCHES**



**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  
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 3D	
SCALE	DATE
AS SHOWN	
SHEET NUMBER	