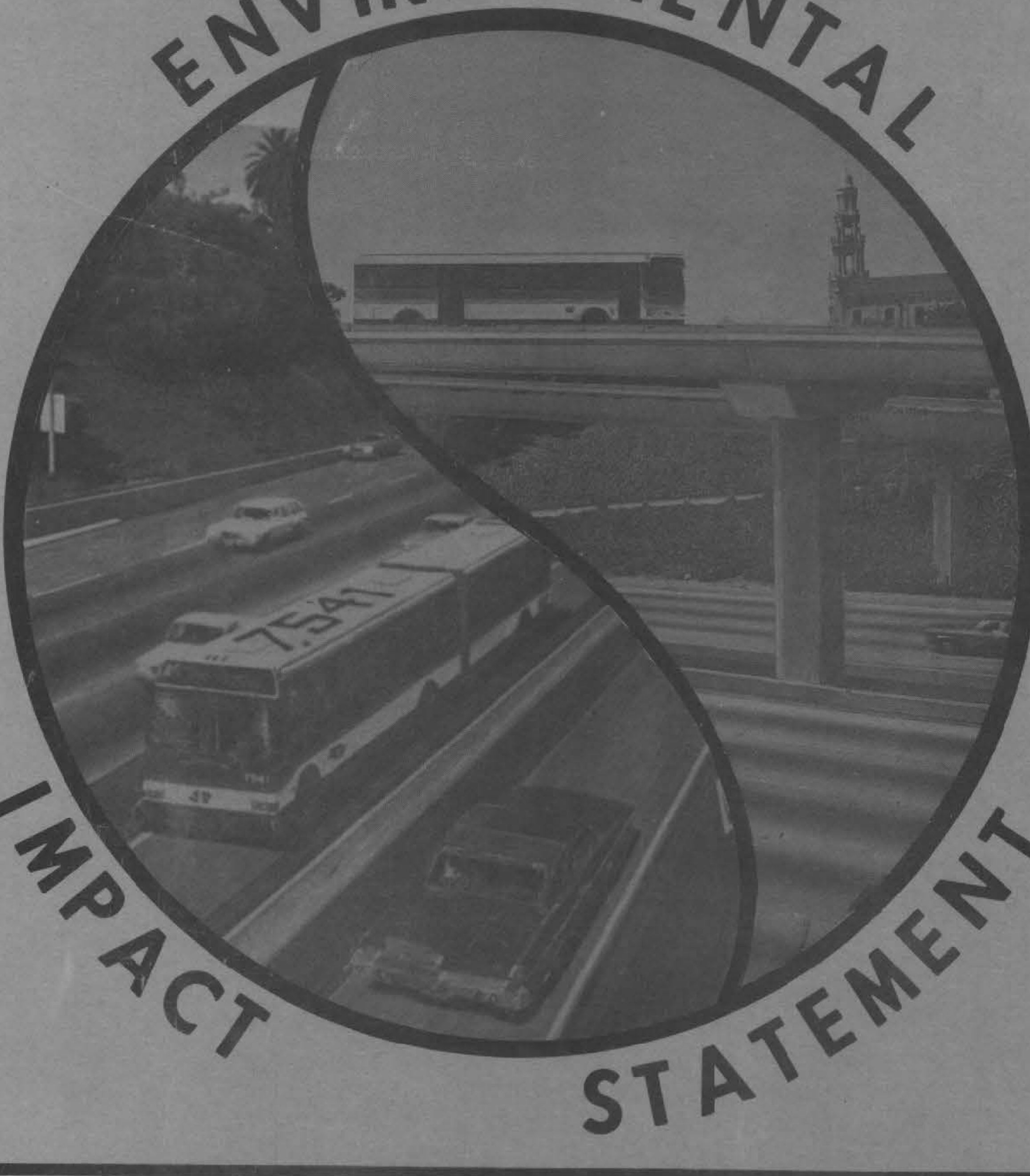
FEDERAL HIGHWAY
ADMINISTRATION

FINAL

CALTRANS
DISTRICT SEVEN

ENVIRONMENTAL IMPACT STATEMENT



APPENDICES

Interstate 110 Freeway Transit

HARBOR FREEWAY CORRIDOR

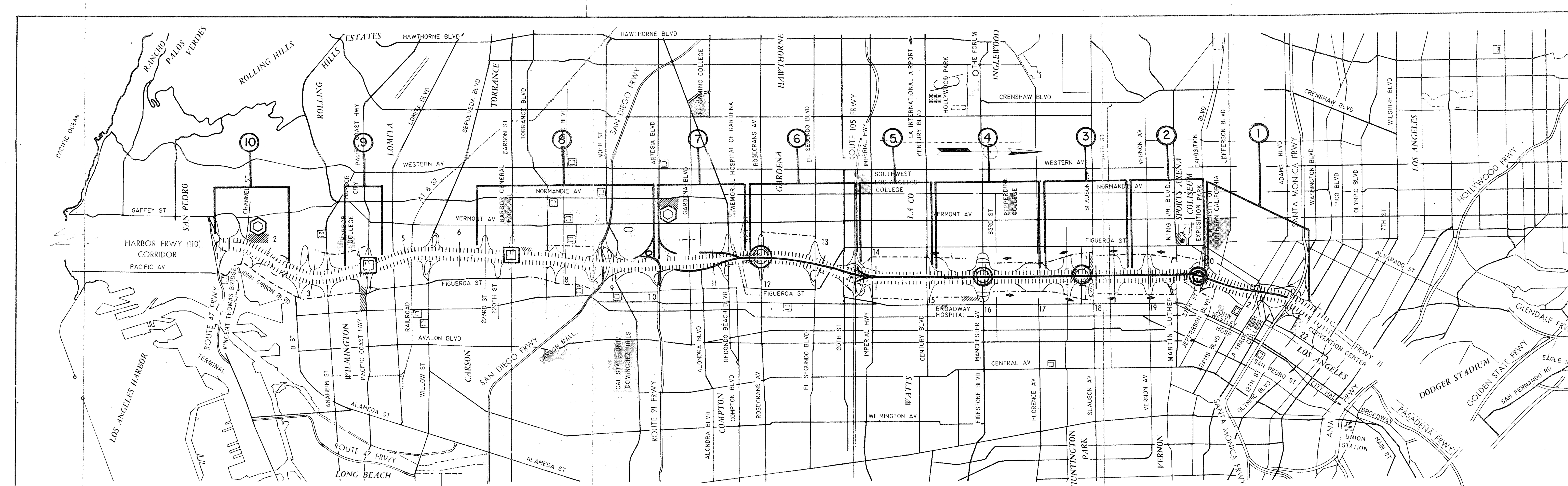
9542138

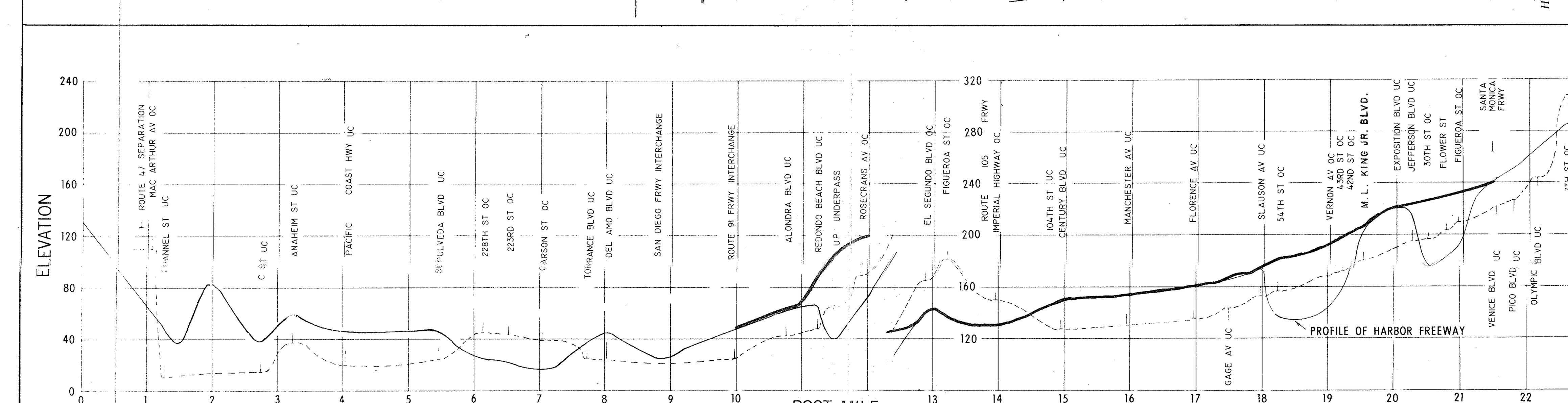
LIST OF APPENDICES

appendix a

RECOMMENDED ALTERNATIVE INDEX AND MAPPING

This appendix provides the preliminary mapping for the recommended alternative.





LEGEND

EXISTING HARBOR FRWY

EXISTING FRONTAGE ROAD

TRANSITWAY

PARK AND RIDE FACILITY

TRANSIT CENTER

ON LINE STATION

MIXED FLOW STATION

PROFILE OF HARBOR FREEWAY

PROFILE OF TRANSITWAY

BUILDINGS WITH OVER 500 EMPLOYEES

INDEX

HARBOR FREEWAY TRANSIT STUDY

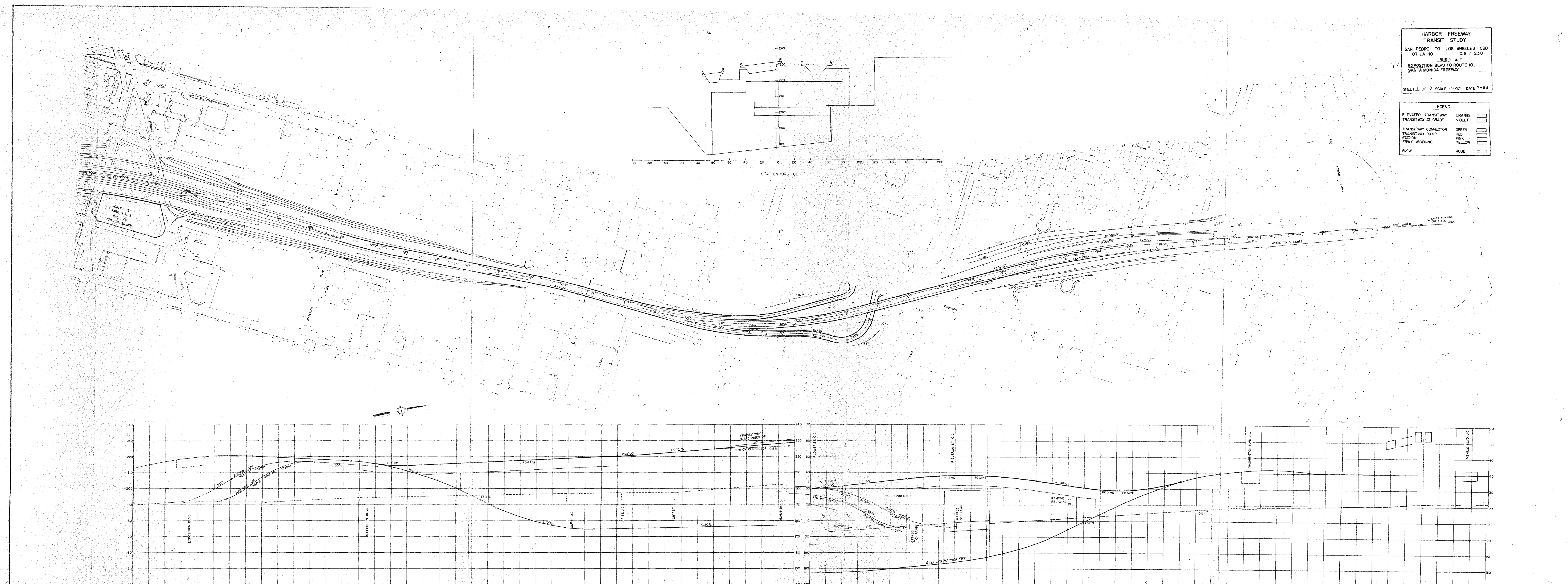
ROUTE 47 TO ROUTE 10 FREEWAY

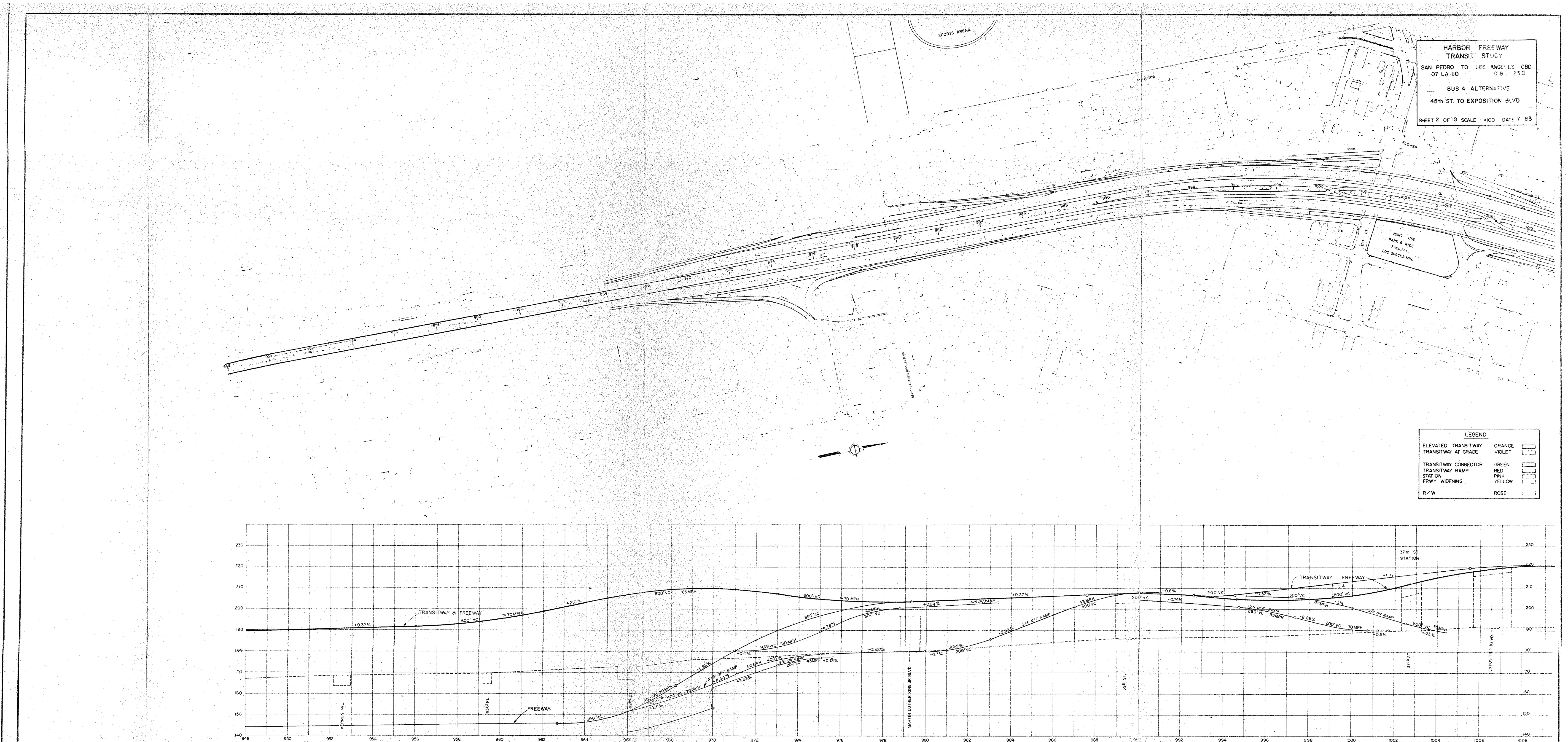
BUS - 4 ALTERNATE

AT GRADE AND ELEVATED BUS & HOV TRANSITWAY IN THE MEDIAN

0 0.5 1 1.5 MILES
EXCEPT IN FRWY CORRIDOR

REV


HARBOR FREEWAY
TRANSIT STUDY
SAN PEDRO TO LOS ANGELES CBD
07 LA 110 0.9 / 23.0
BUS 4 ALT
EXPOSITION BLVD TO ROUTE 10,
SANTA MONICA FREEWAY
SHEET 1 OF 10 SCALE 1"=100' DATE 7-83
LEGEND
ELEVATED TRANSITWAY ORANGE
TRANSITWAY AT GRADE VIOLET
TRANSITWAY CONNECTOR GREEN
TRANSITWAY RAMP RED
STATION PINK
FRWY WIDENING YELLOW
R/W ROSE
STATION 1046+00
EXPOSITION BLVD
JEFFERSON BLVD
FIGUEROA ST. O.C.
S/B CONNECTOR
EXISTING HARBOR FWY
WASHINGTON BLVD O.C.
VENICE BLVD O.C.


HARBOR FREEWAY
TRANSIT STUDY
SAN PEDRO TO LOS ANGELES CBD
07 LA 110 0.9 / 23.0
BUS 4 ALTERNATIVE
45th ST. TO EXPOSITION BLVD
SHEET 2 OF 10 SCALE 1"=100' DATE 7-83
FLOWER
SPORTS ARENA
LEGEND
ELEVATED TRANSITWAY ORANGE
TRANSITWAY AT GRADE VIOLET
TRANSITWAY CONNECTOR GREEN
TRANSITWAY RAMP RED
STATION PINK
FRWY WIDENING YELLOW
R/W ROSE
37th ST.
STATION
TRANSITWAY
FREEWAY
TRANSITWAY & FREEWAY
FREEWAY

HARBOR FREEWAY
TRANSIT STUDY

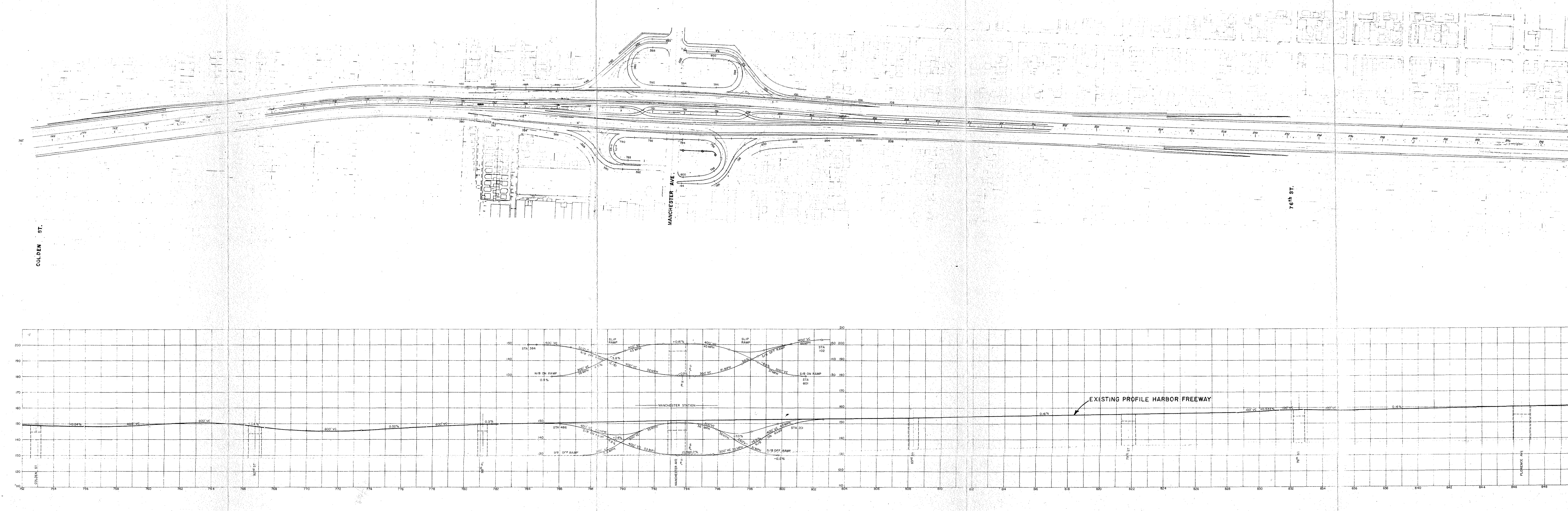
SAN PEDRO TO LOS ANGELES CBD
07 LA 110 0.9 / 23.0

BUS 4 ALT

FLORENCE AV TO 46th ST.

SHEET 3 OF 10 DATE 5/83


FLORENCE AVE
GAGE AVE.
BROADWAY
SLAUSON AVE.
FIGUEROA ST.
51st ST.
46th ST.
EXISTING
TRANSITWAY
N/B OFF RAMP
N/B ON RAMP
FLORENCE AVE U.C.
SLAUSON AVE U.C.
HARBOR FREEWAY
TRANSIT STUDY
SAN PEDRO TO LOS ANGELES CBD
07 LA 110 0.9 / 23.0
BUS 4 ALT
FLORENCE AV TO 46th ST.
SHEET 3 OF 10
DATE 5/83



HARBOR FREEWAY
TRANSIT STUDY

SAN PEDRO TO LOS ANGELES CBD
07 LA 110 0.9 / 21.5

BUS 4 ALTERNATIVE

98th ST. TO FLORENCE AVE.

SHEET 4 OF 10 SCALE 1"=100' DATE 7-83

HARBOR FREEWAY
TRANSIT STUDY

SAN PEDRO TO LOS ANGELES CBD
07 LA 110 09 / 23.0

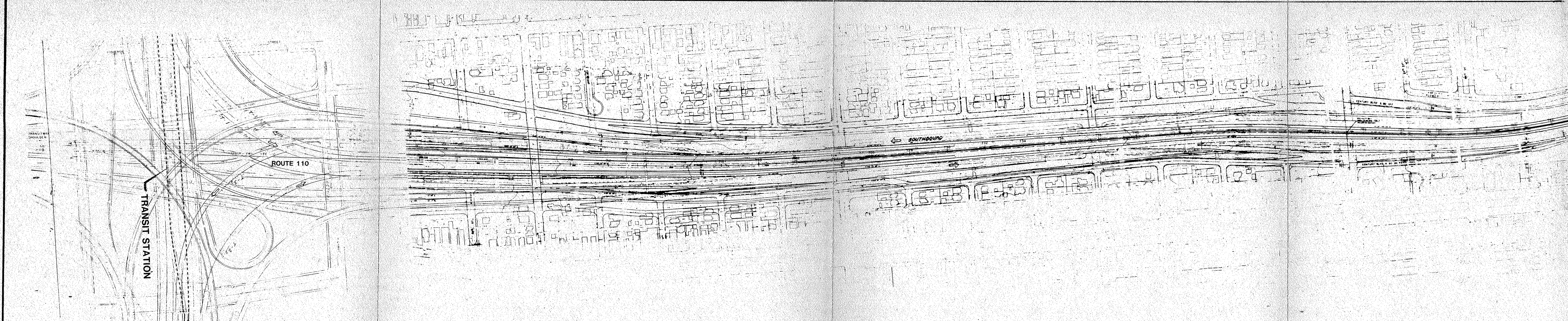
BUS 4 ALTERNATIVE

ROUTE 105 TO 97th ST.

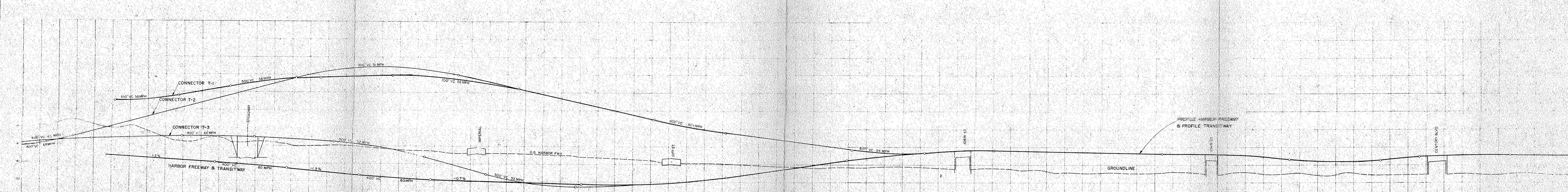
SHEET 5 OF 10 SCALE 1"=100' DATE 7-83

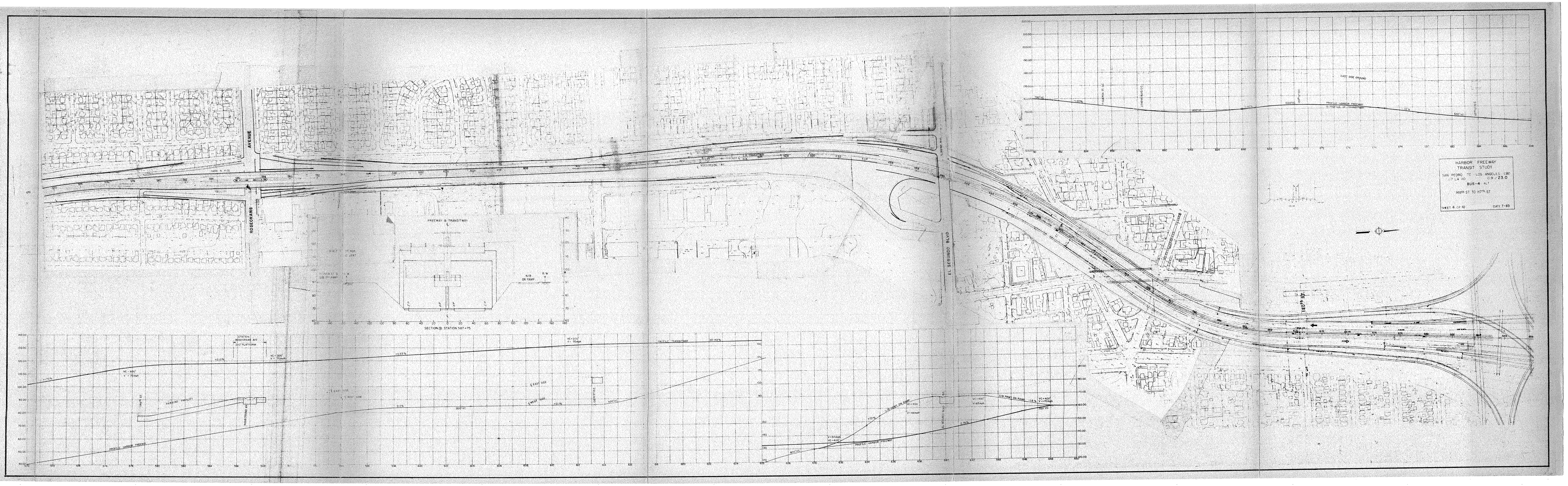
LEGEND

ELEVATED TRANSITWAY	ORANGE
TRANSITWAY AT GRADE	VIOLET
TRANSITWAY CONNECTOR	GREEN
TRANSITWAY RAMP	RED
STATION	PINK
FRWY WIDENING	YELLOW
R/W	ROSE

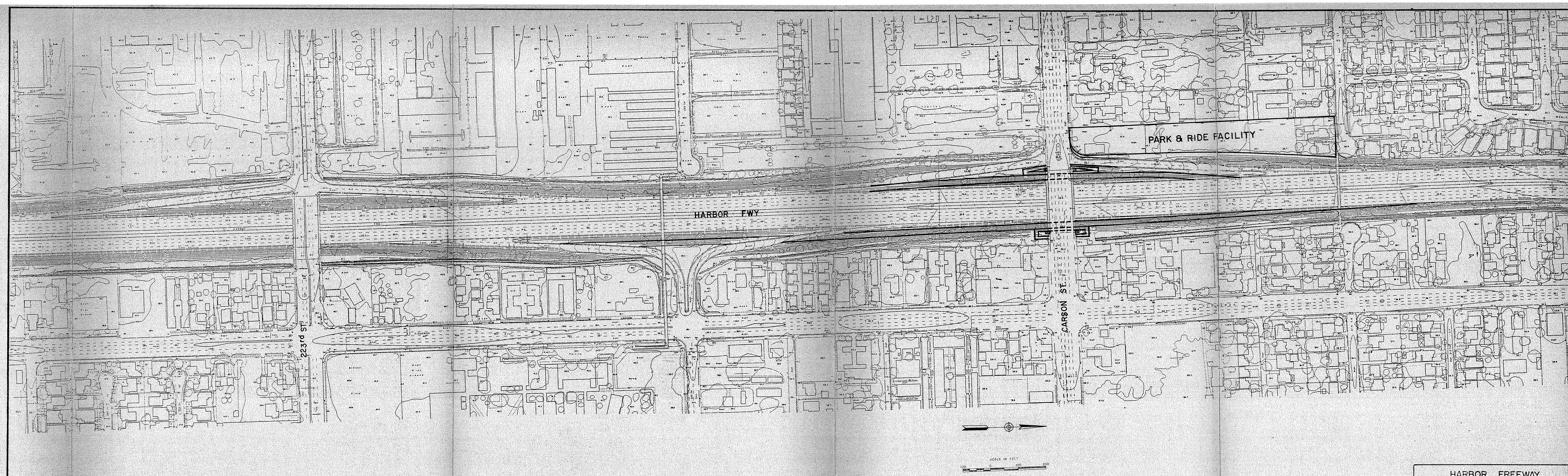


NOTE Ramp connectors will be required only if the H O V proposal is approved for the Century (105) Transitway.
These Connectors, as is the Harbor (I-110) Transitway, are convertible to rail




HARBOR FREEWAY
TRANSIT STUDY
SAN PEDRO TO LOS ANGELES CBD
07 LA 110 0.9 / 23.0
BUS-4 ALT
148th ST TO 117th ST
SHEET 6 OF 10
DATE 7-83
EL SEGUNDO BLVD
ROSECRANS
AVENUE


MATCH LINE TO
ARTESIA TRANSIT CENTER
REDONDO BEACH FWY
GARDENA BLVD
REDONDO BEACH BLVD
ROUTE 91 FREEWAY
ARTESIA BOULEVARD
ARTESIA TRANSIT CENTER
RESIDENTIAL AREA
GROUND LEVEL PARK & RIDE
3 LEVEL PARK & RIDE FACILITY (1000 VEHICLES)
STA 554+00
HARBOR FREEWAY
TRANSIT STUDY
SAN PEDRO TO LOS ANGELES CBD
07 LA 110 0.9 / 23.0
BUS 4 ALT
149th ST. TO ROUTE 91
SHEET 7 OF 10
DATE 7-83



HARBOR FREEWAY
TRANSIT STUDY

SAN PEDRO TO LOS ANGELES CBD
07 LA 110 09/23.0

BUS ALT
SAN PEDRO TO ROUTE 91

CARSON STATION

(MIXED FLOW)

SHEET 8 OF 10 SCALE: 1" = 200' DATE 7/83

HARBOR FREEWAY
TRANSIT STUDY

SAN PEDRO TO LOS ANGELES CO.
07 LA 110 0.9 / 23.0

BUS 4 ALT
D ST. TO ROUTE 91

PACIFIC COAST HIGHWAY STATION
(MIXED FLOW)

SHEET 9 OF 10 DATE 7/83


PARK & RIDE FACILITY
TRANSIT CENTER
ROUTE 47
HARBOR FWY.
TYPICAL SECTION
HARBOR FREEWAY
TRANSIT STUDY
SAN PEDRO TO LOS ANGELES CBD
07 LA 110 0.9 / 23.0
BUS 4 ALT
SAN PEDRO TO C ST.
CHANNEL ST. TRANSIT CENTER
SHEET 10 OF 10 DATE 7/83

appendix b

HARBOR FREEWAY CORRIDOR OPERATIONS

This appendix discusses the operational aspects of the Harbor Freeway Corridor.

APPENDIX B

Harbor Freeway (I-110) Corridor Operations

I. Operational Assumptions

- A. Description of 2005 Regional Line Haul Transit System
- B. Level of Service
- C. Fare System
- D. Fare Collection Method
- E. Transit Vehicle Capacities

II. Operational Plans

- A. Routing Plans
- B. Headways
- C. Vehicle Requirements

III. Operational Cost

- A. Items Included in Operational Costs
- B. Cost

IV. Revenue: Methodology and Assumptions

APPENDIX B

Harbor Freeway (I-110) Corridor Operations

A. Description of the 2005 Transportation System

A 2005 transportation network was developed by the LARTS Modeling Task Force. Inputs from each county in the LARTS region were compiled and an integrated transportation network was developed. In Los Angeles County, the highway network assumed the completion of the Simi Valley (State Route 118), the Long Beach Freeway (State Route 7) from Interstate 10 to Interstate 210, the Route 91/110 Freeway Interchange and the construction of the Century Freeway (I-105) in addition to the currently completed highway system. The transit network assumed SCRTD 1980 Sector Plan which calls for restructuring of many existing bus lines as well as additional lines and improved levels of service. Additional park and ride lines were added throughout the county. The line haul transit network consists of the Wilshire Metro Rail Line, the El Monte Busway and Bus/HOV transitway on Harbor, and the LACTC Interim Rail Transit System (see Figure 5). This network was used for the bus and rail alternatives.

B. Level of Service

The level of service assumed for all alternatives is volume-based, however headways would not exceed policy service intervals established as follows:

Period	Maximum Policy Headway (Minutes)
Early Morning (5:00-6:00 A.M.)	20
Peak Periods (6:00-9:00 A.M.) (3:00-6:00 P.M.)	15
Midday (9:00 A.M.-3:00 P.M.)	15
Evening and Night (6:00-12:00 P.M.)	30

C. Fare System

The assumed fare system reflects an average line haul express fare for patrons who walk on or access the line haul system in a mode other than a local feeder bus, and an average line haul fare for patrons using a local feeder bus and the line haul system. The assumed average fare is based on the fare system in existence in January 1980 and shown in 1984 dollars. Transfer fares from SCRTD, OCTD and the other municipal bus lines are accounted for in the fare system. See Section IV for a complete description of the fare system.

D. Fare Collection Method

A self-service, barrier-type collection system is assumed at all freeway stations. Passengers would pay fares as they enter the station in the northbound direction and as they exit the station in the southbound direction. Since the fare will be based upon mileage traveled, a ticket system would likely be utilized with ticket machines indicating the cost to each destination at each stop.

E. Transit Vehicle Capacities

Vehicle capacities were calculated as being the number of seats provided plus standees at 4 square feet of standing room per standee. The following are the vehicle capacities for typical vehicles:

Vehicle Type	No. of Seats	Design Capacity (spaces)
Advanced Design Bus-40 feet	47	66
Articulated Bus-60 feet	69	96
Light Rail Vehicle-73 feet	101	154
Intermediate Capacity Vehicle-55 feet	36	88
Heavy Rail Vehicle-75 feet	74	189

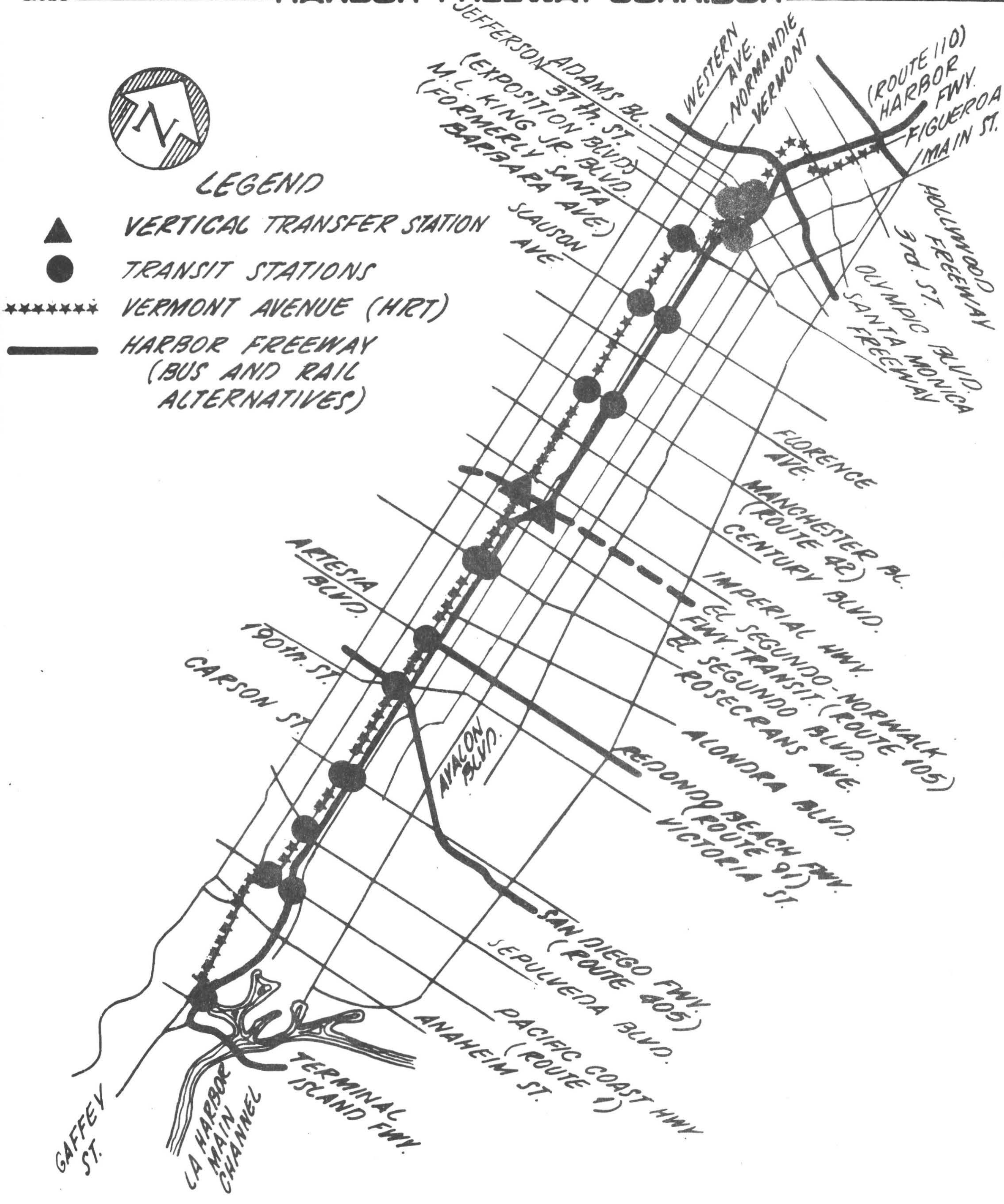
II. Operational Plans

A. Routing Plans

The assumed routing for the rail alternatives include (1) the LRT alignment, which would run from Ports O'Call in San Pedro to Seventh Street in Downtown Los Angeles, a vertical transfer would be provided to the Wilshire Rail Line (or alternatively local buses) to complete the route to Union Station; and (2) the ICTS alignment, which would run from Ports O' Call in San Pedro to Union Station in Downtown Los Angeles. The bus alignment would run from Ports O' Call in San Pedro to Union Station.

Interstate 110 Freeway Transit

HARBOR FREEWAY CORRIDOR

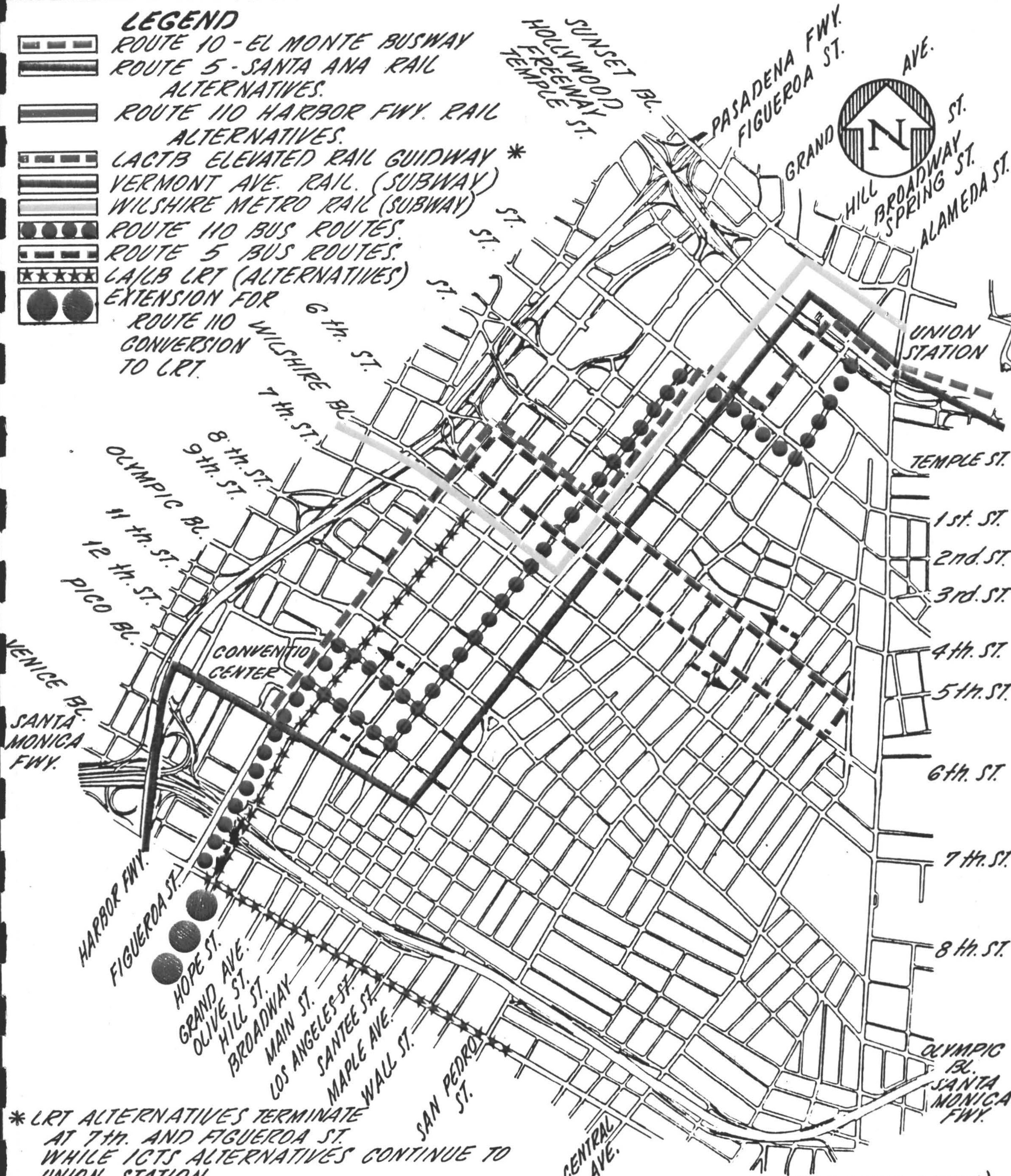


ALTERNATIVE ALIGNMENTS

FIGURE B-2

Interstate 110 Freeway Transit

HARBOR FREEWAY CORRIDOR



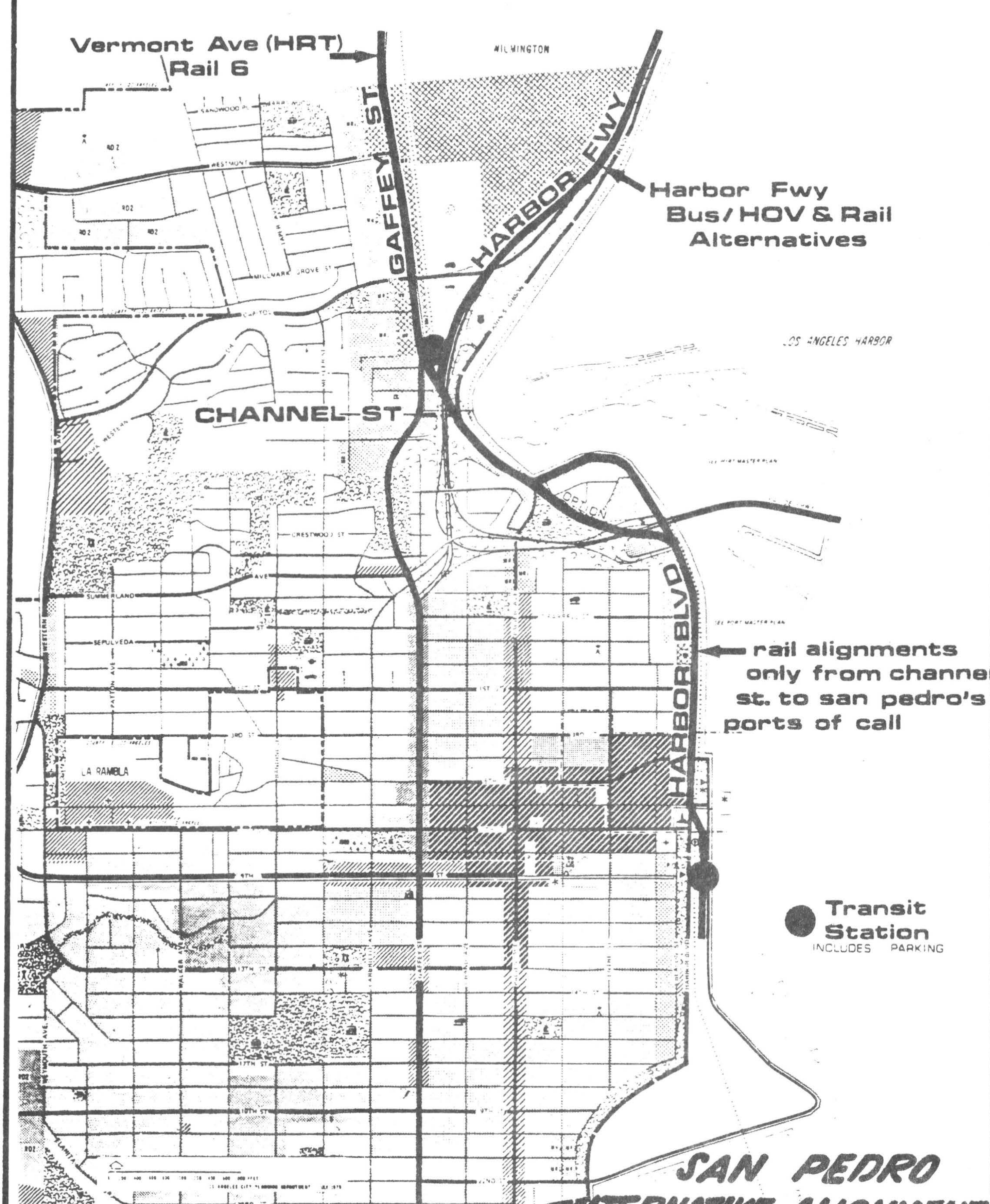
REGIONAL TRANSPORTATION DEVELOPMENT PLAN - LACTD RAIL ALTERNATIVES (UNDER STUDY)

DOWNTOWN STREET SYSTEM

REV. SEPT. 1984

FIGURE B-3

Interstate 110 Freeway Transit
HARBOR FREEWAY CORRIDOR



SAN PEDRO
ALTERNATIVE ALIGNMENT
FIGURE B-4

The LRT and ICTS rail alternatives would be operated with some trains continuing to Ports O'Call in San Pedro, while others would be turned back at Artesia Boulevard resulting in two different headways for each alternative. Based on the projected patronage volumes, the LRT alternative would have a peak hour headway of 5.5 minutes north of Artesia Boulevard, and a peak hour headway of 15 minutes south of Artesia Boulevard. The ICTS alternative would have a peak hour headway of 2 minutes north of Artesia Boulevard, and a peak hour headway of 12 minutes south of Artesia Boulevard. The Vermont rail alternative would have a peak hour headway of 8.5 minutes north of Artesia Boulevard. South of Artesia Boulevard the Vermont rail alternative would have a peak hour headway of 15 minutes.

C. Vehicles Requirements

The category of required vehicles has three components to it, 1) Vehicles required for the background system, 2) Vehicles required for the feeder system, and 3) Vehicles required for the line haul system. The number of vehicles required for the background system was assumed to grow from the No Project alternative's 551 advance design bus (ADB) fleet (not including spares) to 634 ADB buses (not including spares) for the TSM alternative. Feeder bus estimates were based on the assumption that the cross corridor bus lines would be near capacity. This may not be a valid assumption and may have resulted in an over estimation of required feeder service for all alternatives. The line haul vehicle requirements were based on peak patronage forecasts, vehicle capacities, policy headways, and length of routes. Table 1 summarizes all the vehicle requirements, including spares, for each alternative. Total vehicle requirements for each alternative are obtained by adding the total advanced design bus column, the total articulated bus column, and the total rail column.

III. Operational Cost

A. Items included in Operational Costs

1. Rail Alternatives

For the rail alternatives, the unit-cost approach to estimate costs of operation and maintenance was not used since local conditions could not be reflected because no rail service exists in Los Angeles. Information compiled from rail transit operators in other parts of the country was used in developing staffing requirements. This information was adjusted to make it appropriate for conditions in Los Angeles.

Estimates have been prepared using current prices in the Los Angeles area and current SCRTD wage levels as a base. All of the alternatives were treated uniformly. The estimates include manpower resouces required to support the alternatives, in addition to estimates of material and purchased services expense. Costs have been segregated by the following categories:

- Transportation
- Maintenance of equipment
- Maintenance of way
- Insurance and damages
- Electrical energy
- General and administrative

TABLE I

HARBOR FREEWAY (I-110) TRANSIT STUDY

2005 VEHICLE REQUIREMENTS

ALTERNATIVE	BUS										RAIL				
	ADVANCE DESIGN BUS					ARTICULATED BUS									
	Line Haul	Feeder	Back Ground	Spares*	Total	Line Haul	Feeder	Back Ground	Spares*	Total	ICTSV	LRV	HRV	SPARES	TOTAL RAIL
No Project	27	--	551	87	665	97	--	--	14	111	--	--	--	--	--
TSM	29	--	634	99	762	150	--	--	23	173	--	--	--	--	--
B 1, 4 , 7	--	101	621	108	830	174	--	--	26	200	--	--	--	--	--
B 8a, 8b	--	93	626	108	827	185	--	--	28	213	--	--	--	--	--
ICTS 1, 4, 7	--	102	607	106	815	--	--	--	--	--	104	--	--	12	116
LRT 1, 4, 7	--	129	611	111	851	--	--	--	--	--	--	53	--	11	64
HRT	--	133	598	110	841	--	--	--	--	--	--	--	50	10	60

ABBREVIATIONS: A.D.B. - Advance design bus
ARTIC - Articulated bus
ICTSV - Intermediate capacity transit system vehicle (rotary powered)
LRV - Light rail vehicle
HRV - Heavy rail vehicle

*Spares are 15% of Line Haul, and Background.

To calculate the revenue for the remaining alternatives the LARTS model was used. Since the only change in the transit networks of the model were those made for each line haul alternative, the resulting revenue differences produced by the model were directly related to each alternative. Using the TSM Alternative as a base, the revenue difference for each alternative were added to the TSM revenue as shown below:

Alternative	TSM Rev.		Model Diff.		Alt. Rev.
Bus-1,4,7	$57.0 mil.	+	$12.7 mil.	=	69.7
Bus-8a, 8b	57.0	+	8.4	=	65.4
ICTS-1,4,7	57.0	+	14.4	=	71.4
LRT-1,4,7	57.0	+	13.1	=	70.1
HRT-6	57.0	+	15.0	=	72.0

See Table 4 for complete corridor operating costs, revenue, subsidy and fare-box recovery for each alternative.

We will now look at only the line haul operating costs and revenue for another comparison of alternatives. The line haul alone and then the line haul and the feeder service combined. The ICTS alternative was additionally split to show the effects of the intra-CBD trips on this alternative. The results are shown on Table 5.

TABLE 5

HARBOR FREEWAY TRANSITWAY
2005 Annual
Linehaul Revenue and Operating Costs
(Millions of 1984 Dollars)

ALTERNATIVE	LINE HAUL ONLY			LINE HAUL & FEEDER		
	Rev.	Oper. Cost	Farebox Recovery (%)	Rev.	Oper. Cost	Farebox Recovery (%)
No Project (1)	4.8	13.4	36	-	-	-
TSM (1)	8.4	26.7	31	-	-	-
Bus-1, 4, 7	14.5	18.6	78	20.5	30.4	67
Bus-8A, 8B	11.9	18.5	64	16.9	29.8	57
ICTS-1, 4, 7						
w/o CBD Trips	17.9	31.5	57	26.2	43.5	60
w CBD Trips	27.1	31.5	86	39.6	43.5	91
LRT-1, 4, 7	16.5	20.8	79	24.1	35.0	69
HRT-6	20.2	25.1	80	29.4	39.8	74

Notes: (1) Self distributing bus service.

appendix c

COST ESTIMATES AND FUNDING SOURCE FOR FREEWAY TRANSIT

This appendix provides a detailed explanation of how the costs of the various transit alternatives of the I-110 Corridor Transitway were estimated, and what the possible sources of funding for those alternatives are.

COST ESTIMATES

The cost estimates used for this study have been developed by applying 1984 construction cost to site specific conditions. These unit cost developed by Caltrans' staff includes the following (Table 1 tabulates these factors): 1) Specific cost estimates for each type of structure (varies with transit mode, height, width, type of footings and pilings, and use of outriggers, etc.); 2) Costs associated with freeway modifications (widening, signing, lighting, striping, drainage, guard and barrier rails, retaining and sound walls, etc.); 3) Reconstruction of existing bridges; 4) Station details (height, width, length, access modes, amenities, etc.); 5) Traffic control (improvement to local streets for transit related operations, and detouring); 6) Construction of necessary ramps and connectors; 7) Vehicle maintenance and storage facilities; and for the rail alternatives, 8) Track, electrification, and communications. The vehicle costs were provided by a consultant and reflect an average cost per vehicle.

These cost estimates do not include costs for Right of Way, utility relocation, mobilization, contingency and engineering.

In order to calculate the cost-effectiveness of each alternative, the annualized cost had to be determined. To annualize the capital expenditures of the various alternatives, the following economic life expectancies were utilized.

Economic Life Expectancy for System Elements

Transit Ways	30 yrs.
Stations	30 yrs.
Parking Facilities	30 yrs.
Maintenance Facilities	30 yrs.
Highway Construction	30 yrs.
Vehicles:	
Bus (A.D.B. & Articulated)	12 yrs.
Rail Vehicles (ICTS, LRT, HRT)	30 yrs.

The bus operating cost estimates were provided by SCRTD and are based on actual bus operations in the Los Angeles area. These annual costs are detailed in Table 2. For the rail alternatives, the unit cost method was deemed inappropriate as there are no operating rail systems in the Los Angeles area. Therefore, the estimates were based on specified manpower requirements and other cost factors using the experience of operators of similar rail systems in other areas, modified to meet the Los Angeles conditions. Using this method, the following cost per rail vehicle mile were developed. These costs include the background and feeder bus systems. Bus alternative costs are included for comparison.

Mode	Cost/Vehicle Mile
Bi-directional bus	$2.54
Peak directional bus	$2.56
ICTS	$2.47
LRT	$2.66
HRT	$2.65

Table 1

UNIT CAPITAL COSTS
(MILLIONS OF 1984 DOLLARS)
PER MILE OR EACH

These do not include: Mobilization (10%), Engineering (10%) and Contingencies (20%)

Bus			Rail		
Guideway	**Cost**		**Guideway**	**Cost**	
Aerial	18-35	49' Wide*	Aerial - over fwy.	12-26	30' Wide
	12-26	30' Wide**	LRT/HRT - over st.	11-17	30'/32
Wide					
At-Grade	14-25	50' Wide*	At-Grade	12-22	30' Wide
	12-22	30' Wide**			
			Subway	37-45	
Stations			**Stations**		
Aerial	12-14*	ea	Aerial - over fwy.	2-6	ea
	5-10**	ea	over st.	1-4	ea
Vertical Transfer	5-10	ea	Vertical Transfer	5-10	ea
At-Grade	10-12*	ea	At-Grade	5-10	ea
Transit Ctrs.	5-6 **	ea	Subway	20-22	ea
Storage & Maintenance Facilities	20	ea	Transit Centers	0.5-1	ea
			Storage & Mtce. Facilities	47	ea
Conversion Bus to Rail			**Rail Infra-Structure**		
Guideway***	6-9		Trackage	1-1.5	
Stations	0.5-1	ea	Ballast	1-1.5	
			Electrification	1-2	
			Signals & Communication	0.5-2.5	
			Tunnel Ventilation	2-3	

* Bi-Directional
** Peak Directional
*** Includes trackage, electrification, signals and communication

Updated: October, 1984

Table 1 (Contd.)

UNIT CAPITAL COSTS
(1984 DOLLARS)
PER MILE OR EACH

Parking Facility Costs per Space (without R/W)(1984 $)	
Ground Level Parking	800
Structure parking over level land	6,600
Structure parking over freeway	12,200

Vehicle Costs	Cost (Thousands of 1984 $)
Advance design buses	160
Articulate buses	300
Intermediate capacity transit Vehicle (ICTS)	750
Light Rail Vehicle (LRT)	910
Heavy Rail Vehicle (HRT)	975

Table 2

UNIT BUS OPERATING COSTS

(1984 dollars)

Representative Express Bus Operators

	BUS-HOUR[a] FACTOR	BUS-MILE FACTORS[a] Fuel[b]	Other	Total	OVERHEAD FACTORS
Freeway Lines					
Articulated Buses	\$18.00	\$0.35[c]	\$0.94	1.29	Five percent surcharge on variable costs.
Improved ADB[d]	\$18.00	0.25[c]	0.67	0.92	
On-Street Lines					
Improved ADB[d]	18.00	0.30[c]	0.80	1.10	Five percent surcharge on variable costs.
Articulated Buses	18.00	0.42	1.03	1.45	

(a) These factors are applied to an estimate of total scheduled hours and miles, including pull-out and pull-in times and mileages.

(b) Does not include fuel tax. SCRTD system fuel cost per mile is increased by dominance of high-density local lines in Los Angeles. Other operators' fuel costs appear representative of freeway conditions and also of older, pre-ADB fuel-efficient buses.

(c) Assumed 2005 fuel costs, 50 percent above 1980 prices.

(d) Assumes that future generations of Advanced Design Buses (ADB's) will be comparable to older "new look" designs.

FUNDING SOURCES FOR FREEWAY TRANSIT

Potential funding for this Freeway Transit Project will come from funding programs that are generated at three levels; local, State and Federal. The following is a brief discussion of these funding sources and their potential applicability to each of the proposed alternatives.

I. Local Sources of Revenue

A. Proposition A

A. Proposition A: On November 4th, 1980, Los Angeles County voters approved Proposition A, which adds 1/2¢ to the existing 6¢ sales tax to fund transit improvements and lower bus fares. Proposition A resulted in litigation but, the California Supreme Court ruled that the tax was constitutional. Annual revenues in excess of $200 million per year are expected and will be distributed as follows:

For the first three years: (a) 25% to local jurisdictions for local transit; (b) a subsidy to Los Angeles County bus operators to hold the base fare at 50 cents (estimated to be 35-40%); and (c) the remaining revenue would fund a rail rapid transit system.

After three years, annual revenues will be distributed as follows:

1. 25% to local jurisdictions for local transit
2. 35% to construction and operation of a rail system
3. The remaining 40% would be allocated at the discretion of the Los Angeles County Transportation Commission (LACTC) for Public Transit purposes.

B. New Taxation

Because of the magnitude of the transit problem in the Los Angeles region, the escalating cost of transit projects, and the stagnant national economy, Proposition A may not generate sufficient funds to construct a transit system as rapidly as desireable. Local communities or the Los Angeles County Transportation Commission may then seek to implement additional taxes or institute other measures which would raise money for transit purposes. A variety of methods for transit funds exist. For example, special local transit districts could be created, or a CBD commuter automobile tax zone could be established. Any method chosen to raise funds would have to be acceptable to the public and to various special interest groups such as business owners who would bear the brunt of the additional taxation.

C. Tax Increment Financing (TIF)

Tax increment financing allows increases in property tax revenues to be used for funding Community Redevelopment Agency (CRA) programs to rehabilitate blighted areas.

These revenues may also be used to assist in the development or operation of a transit system based upon the concept that a transit system directly benefits adjacent businesses and stimulates growth and new development.

When an area is designated for a CRA project, the property assessment is frozen at the base year for ordinary tax purposes. Under Proposition 13 this assessment is limited to a 1% per year increase unless the ownership of the property changes or there are improvements made to the property since the base year. Thus, redevelopment increases the property values, which then generates more tax revenue for financing further redevelopment or transit systems.

D. Local Fares: With proposed cutbacks in Federal operating revenue sources, Transit Districts will be more dependent on fare box return to meet operating costs. Transit Districts across the country have been forced to raise fares to keep pace with inflation and rising operating costs. For several years the Southern California Rapid Transit District has been maintaining a 40% fare box return.

II. State Sources of Revenue

A. Proposition 5

This voter approved proposition amended Article XIX of the State Constitution to permit a portion of the funds in the State Highway Account to be used for planning and construction of a "fixed guideway" transit system. 25% of the L.A. County's allocated portion of the State fuel tax revenue must be set aside for this purpose. Caltrans is empowered to increase this percentage to maximize federal-aid matching funds for fixed guideways.

The State Legislative Counsel has ruled that busways are not "fixed guideways" and that Proposition 5 funds will not be available for busway planning and construction.

By statute, Proposition 5 funds may be used for maintenance of the mass transit structures and R/W, but not for maintenance and operation of mass transit power systems, passenger facilities, vehicles, equipment and services.

As a result of SB 215, discussed below, the gasoline tax of 7 cents a gallon was increased in 1983 to 9 cents a gallon. 50% of this money goes into the State Highway Account, thereby increasing the portion of funds to each county, and subsequently increasing the Proposition 5 funds. Los Angeles is authorized to hold its allocations in reserve for three fiscal years to aid its funding project.

B. Transportation Development Act (SB 325):

Approved in 1971, this Legislation placed a State Sales Tax on gasoline. TDA allocates 1/4 cent of each 6 cents of General Sales Tax to the Local Transportation Fund. The State Board of Equalization distributes these revenues in proportion to the amount of tax collected in each county. 89% of the funds are used for either capital or operating purposes, with the majority used for operating purposes. Of the remaining 11%, 2% is used for bicycle and pedestrian projects; 5% is used for community transit and paratransit service; and 4% is used for planning and administrative costs.

Based upon a 12% compounded growth factor, estimated revenues for Los Angeles County are $27.3, $30.6 $34.2, $38.4 and $43.0 million for the fiscal years 81/82 through 85/86 respectively.

C. SB 620 Funds

SB 620 modified the formula applied to sales tax on gasoline so as to increase the share of these revenues going to transit. The formula provides for what has become known as the "spillover" whereby the revenues for transit begin to accumulate when the total gasoline sales exceeds 5 1/4% of total taxable retail sales. A limit of $110 million per year (plus annual adjustments based upon consumer price index) was established for these "spillover" funds with the excess deposited into the State's general funds. These funds are then allocated to the State Transit Assistance Program (approximately 50%) and the balance to a list of specific programs and projects aimed, for the most part, at improving mass transit and assisting rail development. The total "spillover" funds for the 3 fiscal years is approximately $365 million.

D. SB 215

SB 215, the Foran Bill, generates revenue for highway building and maintenance. An additional 2 cents/gallon gas tax, an $11.00 increase in vehicle registration fees, a $6.75 increase in drivers license fees and a 50% increase in truck weight fees will combine to an estimated $2.7 billion over the next 5 years. The fee increases went into effect January 1, 1982, and the gas tax increase began January 1, 1983. In addition to this 2 cent gas tax the local cities and counties are empowered to add an additional tax. This additional county imposed tax would require approval from the county supervisors, city governments and 2/3 of the voters.

Under SB 215 the distribution of the added fuel tax will be 50% back to the local agencies for streets and highways and 50% will go into the State Highway Account. The bill also eliminates, over a period of five years, the limit on "spillover" funds that are allocated to transportation, and provides that the excess revenues that would otherwise go into the general fund to be distributed equally between the State Highway Account and the Transportation Planning and Development Account. This will have a corresponding effect of increasing funds available for transit and fixed guideways.

E. Tideland Oil Funds

This tax is an excise or "well head" tax imposed on oil produced in California and the rising oil prices assure continued growth of these funds. During the fiscal year of 1980 the Tideland Oil Funds of $25 million were combined with $30 million in SB 620 funds for a total of $55 million in fixed guideway funds. During fiscal year 81-82 this yearly allocation was diverted to the much depreciated state general fund. While the source continues to grow, its use for transit purposes depends on the condition of the state general fund and is, therefore, doubtful.

III. Federal

A. Federal-Aid Interstate (FAI): The Federal Highway Administration is responsible for the Federal-Aid Interstate Funds which are allocated by a Formula based on urbanized area population. The revenues come from the Highway Trust Fund and are derived from Highway-User Taxes. Federal-Aid Interstate Funds may be used to fund up to 92% of the cost of exclusive bus facilities, but all project funds must be committed by September 30, 1990.

B. Federal Urban Funds:

Established in 1970, approximately 8% of the total FHWA Funds are allocated to the Urban System to serve local urban transportation needs. With a local and state consensus the funds can be used for transit capital improvements and are administered by FHWA through regional agencies.

C. UMTA Section 3: This is a discretionary program which developed out of the 1964 Urban Mass Transportation Act. Under Section 3 the federal government could fund up to 80% of the rail or bus alternatives. With the passage of the oil "Windfall Profits" tax, a substantial revenue source has been added to Section 3 Grants.

However, as with FAI funds, Section 3 funding for "New Starts" will now be limited to low cost capital projects.

D. UMTA Section 5: The Section 5 program formula grants funding for construction, operation and maintenance of transit systems. Three of the four sections in the program distribute operating and maintenance funds (50%/50% matching) to large and small urbanized areas in proportion to their population and population density. The fourth section is used for capital expenditures (80%/20% matching) for bus related transit.

FUNDING SOURCES: CAPITAL COST

	RAIL TRANSITWAY	BUS/HOV TRANSITWAY
LOCAL		
	PROP A	
	TAX INCREMENT FINANCING	TAX INCREMENT FINANCING
STATE		
	ARTICLE XIX (PROP 5)	STATE HIGHWAY ACCOUNT
	TRANSPORTATION PLANNING & DEVELOPMENT (GUIDEWAY)	TRANSPORTATION DEVELOPMENT ACT. STATE TRANSPORTATION ASSISTANCE FUND
	TRANSPORTATION DEVELOPMENT ACT. STATE TRANSPORTATION ASSISTANCE FUND	
FEDERAL		
	UMTA Sec. 3	FAI (I-110)
	UMTA Sec. 5	FAU
		UMTA Sec. 3
		UMTA Sec. 5

FUNDING SOURCES: OPERATIONAL COST

	RAIL TRANSITWAY	BUS/HOV TRANSITWAY
LOCAL		
	FARE BOX	FARE BOX
	PROP. A	PROP. A
	TAX INCREMENT FINANCING	TAX INCREMENT FINANCING
STATE		
	TRANSPORTATION DEVELOPMENT ACT. STATE TRANSPORTATION ASSISTANCE FUND, UNIFIED TRANSPORTATION FUND	TRANSPORTATION DEVELOPMENT ACT. STATE TRANSPORTATION ASSISTANCE FUND
FEDERAL		
	UMTA Sec. 5	UMTA Sec. 5

appendix d

TRAVEL FORCASTING

This appendix explains the LARTS computer model and how it was used to generate information on patronage for the various alternatives of the I-110 Corridor Transitway.

TRAVEL FORECASTING

A. LARTS Model - Methodologies and Assumptions

The LARTS Transportation Model is a "demand model" developed on the basis of travel behavior observed under the system of restraints in existence during a base study period. The Model used in predicting travel variables were recently updated, based on data received from SCAG's 1976 Urban and Rural Travel Survey.

Basically, the model relates travel behavior in terms of demographic, economic and transportation system variables, related to the study area. These relationships are established by statistical techniques such as maximum-likelihood estimators, analysis of variance, multiple regression analysis, cross-classification, and others.

When discussing travel demand forecasting models in a relevant manner, it is first necessary to recognize that several descriptive levels exist, each progressively wider in scope, as follows:

1. The demand function itself, i.e., the actual equations used to calculate travel volumes, given socio-economic and transportation system variables;
2. The full set of models used to predict network flows, i.e., the demand and supply models, and

the network equilibrium procedures;

3. The full set of models used for predicting all the relevant transportation impacts including, in addition to flows, other effects such as construction and operating costs, displacement of households and jobs, changes in land-use, air pollution and energy consumption.

Essentially, items 1 and 2 above describe the structure of the LARTS Model, while item 3 relates how the output of the model is used as a basis for estimating the described impacts.

A comprehensive description of the LARTS transportation model as to structure, demand equations, variables and assumptions are fully documented in the following referenced reports.

(a) The LARTS Transportation Model
Technical Report Series TR/2 (Jan. 1974)

(b) SCAG Model Improvement Study, Volume I-Model Development and Application (Jan. 1983)

The relative role played by the LARTS Transportation Model is pictured in Exhibit 1, in terms of supporting the transportation planning process by providing an analytical tool required for generating transportation alternatives, data analysis, and evaluation methodology.

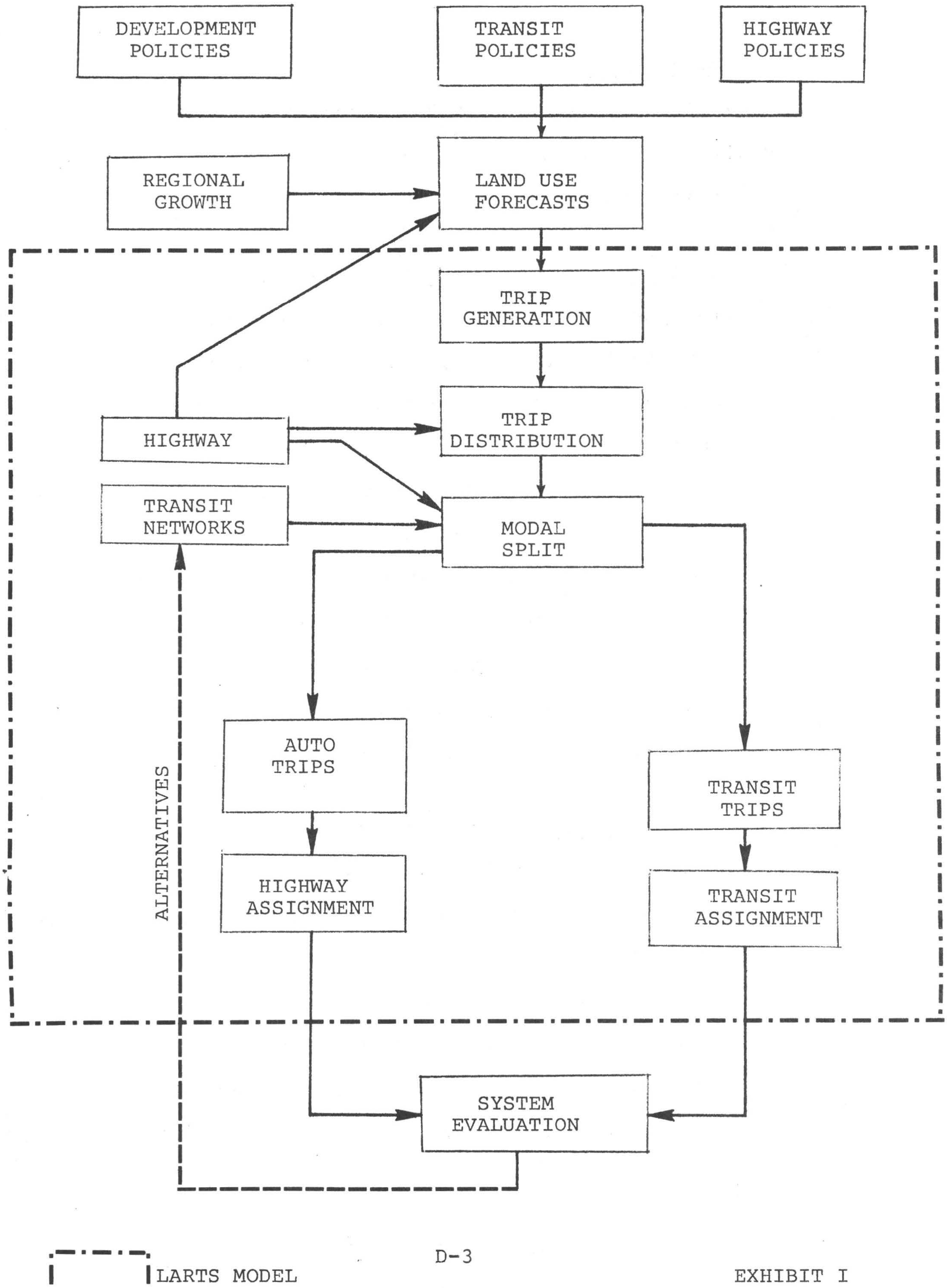

DEVELOPMENT POLICIES
TRANSIT POLICIES
HIGHWAY POLICIES
REGIONAL GROWTH
LAND USE FORECASTS
TRIP GENERATION
HIGHWAY
TRIP DISTRIBUTION
TRANSIT NETWORKS
MODAL SPLIT
AUTO TRIPS
TRANSIT TRIPS
ALTERNATIVES
HIGHWAY ASSIGNMENT
TRANSIT ASSIGNMENT
SYSTEM EVALUATION
LARTS MODEL

EXHIBIT I

B. Model Inputs

The LARTS model inputs can be expressed concisely in terms of the following variables, each of which is a collection of many data items:

1. Socio-economic activity - specification of the transportation system in terms of demographic and economic factors, and controllable options, such as land use controls. Specifically, socio-economic data items include:

   a. Vehicle ownership by housing units with 0, 1, 2 or more vehicles.

   b. Total population (based on SCAG-82 Forecasts).

   c. Single and multiple occupied housing units.

   d. Median household income.

   e. Employment by place of work (retail and total).

   f. Auto parking cost.

2. Level of Service - those attributes of the transportation system which influence an individual's decision as to where, when, and mode of trip; all costs factors in the model are in constant dollars (1980) and time in terms of minutes:

   a. Transit running (moving) time.

   b. Transit access (walk or auto) time.

   c. Transit wait time.

d. Auto running time

e. Auto access and terminal time

f. Gasoline price 120.0 ¢/gallon (1980)

g. Transit fare structure (1980)

SCRTD: Base fare 43¢ + 10¢ Transfer

OCTD: Base fare 40¢ + Free Transfer

Other: Base fare 31¢ + Free Transfer

Park-n-ride parking fee: 35¢ Premium or express: 7.12¢/mi: (43¢ minimum)

h. Inconvenience factor--a two minute transfer penalty to line-haul buses.

i. Psychological factor (2.5)--factor applied to out-of-vehicle time for both transit and auto.

3. <u>Transportation Systen</u> - for any technology, a transportation network must be specified, including the following elements:

a. <u>Highway Network</u>

1. Level-of-service speeds (work and non work).
2. Link distance.
3. Ramp-metering penalties.
4. Type of facility (freeway, city streets).
5. Capacity by facility type (V/C ratio).

b. <u>Transit Network</u>

1. Time and distance by link, mode.
2. Headways by transit line.

3. Transfer points.
4. Station locations.
5. Auto connectors.
6. Walk connectors.
7. Park-ride locations.

C. Capacity Restraint

Early guideway analyses utilized 1990 LARTS travel forecasts which were in actuality, traffic "desires" for a particular freeway corridor. However, in many instances, this desire may never get there, due to the facility's inherent geometric constraints, i.e., insufficient number of lanes.

When unconstrained traffic desires are modeled for a given freeway system without roadway capacity restraints, direct paths are generally "overloaded" and paths slightly out of direction will be underutilized.

To ameliorate this problem, use of capacity restraint techniques were utilized in order to more closely replicate the actual peak-hour traffic conditions expected by 1990.

Capacity restraint techniques are based on the finding that as traffic flow increases, the speed of travel decreases. A computer model developed by U. S. Department of Transportation entitled, "UROAD," was utilized in this analysis. UROAD is a capacity restraint process, programmed to bring the assigned volume, the capacity of a facility, and the related speed into equilibrium.

The initial travel time on each link is estimated and related volumes are calculated using a probabilistic multipath assignment process. Link times are then adjusted using the "FHWA" formula:

$$T = To + 0.15\ To\ (V/C)^4$$

Where T = estimated travel time at volume V

To = free flow travel time

V = assigned volume

C = capacity

This relationship between speed and volume exists on all types of highway facilities, both for interrupted and uninterrupted flow. On freeways, there is a constant decrease in speed with increase in traffic volume up to a point of critical density (density at maximum flow). Beyond this point, however, both volume and speed decrease with an increase in density (vehicles per mile). The situation is somewhat analogous to interrupted flow-type facilities, such as signalized intersections. Here, speed is influenced by speed limits, signal progression, and the conditions on adjacent sections.

Most important is the assignment of trips for some extended period of time, such as a day, or for some shorter period, such as a two hour period comprising the peak hours. In this analysis, the AM peak period between 6:30 and 8:30 was used, indicative of morning commuter travel. Also, the initial assignment process may load a facility far in excess of capacity based on some originally coded speed. Therefore, certain limits based on empirical data, are input on UROAD, e.g., maximum freeway capacity of 1700 vehicles per lane per hour, maximum speed of 55 miles per hour, except CBD and adjacent areas. A total of five area types were coded, ranging from CBD to rural areas and five separate facility types were coded, ranging from freeway to local roads.

A key output of the UROAD process is a computerized map plot of the 2000 freeway network on which is encoded travel speeds on a link-by-link basis. These speeds are average peak hour speeds, factored from the two hour trip assignment data.

The adopted free-flow criteria is defined to be speeds equal to or greater than 35 MPH in the peak hour. For any given alternative, this criteria was applied to the speed plots to determine the extent of congestion and/or guideway required.

appendix e

PATRONAGE

This appendix provides estimates for the various alternatives of the I-110 Corridor Transitway for the year 2005.

Harbor Freeway (I-110) Corridor

Patronage

When line haul transit services are improved within a corridor, a variety of impacts are introduced into the total transportation network of that corridor. Fast, reliable and safe line haul transit service has the potential for attracting new patronage from the private auto as well as having an impact on existing transit lines. Some parallel bus lines will lose patronage to the new facility while other cross-corridor lines which intersect the new facility at the stations will increase in patronage as they begin to act as the feeder system. It is necessary to consider the corridors entire transportation system in order to fully measure the impacts of each alternative. Each alternative has its own distinct characteristics which have an impact on its alignment, terminal treatment, station requirements, capital cost, operating cost, patronage and mode split.

No Project Alternative

This alternative is used as the base to assess the pros and cons of the other alternatives. It assumes no construction of additional transit facilities on the Harbor Freeway and no change in the level of transit service being provided in the corridor, with the exception of the introduction of the I-105 Transitway to the corridor. Line haul routes servicing the I-105 Transitway will use the Harbor Freeway to gain access to the LACBD. It is assumed by 2005, the bus fleet providing line haul service will be upgraded to high occupancy buses such as articulated or double deckers. This allows for additional transit capacity for the 2005 No Project alternative (line haul buses) even though the level of service (headways) remain as they are today. The 1984 corridor patronage is estimated at 115.5 million per year. The 2005 No Project alternative will increase the corridor patronage to 158.4 million per year. This growth is due in part to increased carrying capacity of the line haul buses, in part to the introduction of transit trips from the I-105 Transitway corridor being diverted to the Harbor Freeway but mostly to the overall growth in the use of the corridor's background bus system.

TSM Alternative

This alternative assumes a low to moderate capital improvement program for line haul transit facilities located on or near the Harbor Freeway. The level of line haul service was also improved to satisfy the increase demand due to the new facilities. There was a slight increase in I-105 Transitway trips due to the additional access and service level on the Harbor Freeway corridor. In addition to line haul improvements, the entire corridors background fleet was assumed to have a 15% build up by 2005. This is consistent with SCRTD's adopted "1980 sector plan" for transit improvements in Los Angeles County. The 2005 projected corridor patronage increased to 182.2 million per year reflecting this new service. This built-up background bus system is used as the background bus system for all of the following build alternatives.

Two-Way Bus/HOV (B-1, 4, 7) Alternatives

Even though these alternatives have different construction costs due to their vertical alignments, they are identical in terms of patronage and operational characteristics. The alternative is a two-way line haul bus system with on line stations and feeder service. An exclusive transitway is proposed in the median of the Harbor Freeway between Artesia Boulevard and Route 10. From Artesia Boulevard south to San Pedro the buses will operate in mixed-flow where the freeway is projected to be in free-flow. The transitway will be used by HOV's as well as by buses, and intermediate HOV access ramps to and from the transitway have been provided. This alternative will increase the 2005 projected corridor patronage to 189.5 million per year. In addition to the increased patronage the transitway will handle 2,910,000 annual HOV vehicle trips carrying 9.9 million persons. The line haul bus service will be continuous through the LACBD. Using the city streets the buses will act as their own feeder and distribution system within the LACBD.

Reversible Peak Direction Bus/HOV (B-8A, 8B) Alternative

These two alternatives differ only in cost due to their vertical alignments, but are identical in terms of patronage and operational characteristics. The concept of this alternative is to provide a reversible peak direction Bus/HOV operation. The reverse direction will use the freeway and operate in mixed-flow traffic. This alternative has a 2005 projected corridor patronage of 187.4 million per year. The HOV usage is projected to be 1,530,000 HOV annual vehicle trips carrying 5.2 million persons. Like the B-1, 4, 7 alternatives, the line haul bus service will be continuous through the LACBD and will act as its own feeder and distribution system.

ICTS-Rail (1, 4, 7) Alternative

Like the earlier alternatives these alternatives differ only in cost due to their vertical alignments, but are identical in terms of patronage and operational characteristics. The concept of this rail alternative is to provide continuous service from the Harbor Freeway Corridor through the LACBD (DPM) alignment) to Union Station on an elevated transitway. The alternative has a 2005 projected corridor patronage of 190.3 million per year.

LRT-Rail (1, 4, 7) Alternative

Similar to the above alternatives in terms of corridor service they differ in the LACBD treatment. It is assumed that the LRT alternatives will terminate service at Figueroa and 7th Street near the Regional Core Rail. Service throughout the LACBD will be provided by a bus feeder system and the Regional Core Rail. This alternative has a 2005 projected corridor patronage of 189.5 million per year.

Vermont HRT-Rail (R-6) Alternative

This is the only alternative that does not use the Harbor Freeway for its alignment. Located on Vermont Avenue this HRT alternative has three additional stations located within the corridor and is assumed to be in subway throughout the LACBD. This alternative has a 2005 projected corridor patronage of 190.7 million per year.

Alternative Comparisons

Exhibits 1-4 show 2005 daily link volumes. The peak link for all alternatives is located just prior to entering the LACBD. The alternatives range as follows:

No Project	15,980	
TSM	27,890	
Bus 1, 4, 7	58,200	(not including carpools)
Bus 8A, 8B	46,900	(not including carpools)
Rail 1, 4, 7 ICTS	78,790	
Rail 1, 4, 7 LRT	72,490	
Rail 6 (HRT)	63,130	

Exhibit 5 compares 2005 daily station volumes or all alternatives. The 37th Street station has the highest daily volumes for all of the build alternatives except Vermont HRT-Rail. This station is located in a transit dependent area and is surrounded by a high population density. High transit dependent density, and direct proximity to major regional activity generators (Exposition Park, Museum of Science and Industry, L.A. County Museum, L.A. Memorial Coliseum, L.A. Sports Arena and University of Southern California) combine to make the 37th Street station the busiest station in corridor.

Exhibit 6 compares total line haul daily patronage for each alternative. The exhibit breaks down the daily patronage to show where the boardings occur. Since all line haul service enters the LACBD, the treatment of each alternative (within the LACBD) has a major influence on its total patronage. The last column of Exhibit 6 compares the total corridor patronage. As can be seen between the build alternatives, the total corridor patronage changes very slowly compared to the line haul patronage. This is because the Harbor Freeway Corridor is a well developed local transit corridor. Slight improvements in the line haul service such as are being proposed between the build alternatives only results in attracting more riders from parallel bus lines while attracting few additional new riders.

Exhibit 7 compares the new transit and HOV riders that are formed using the No Project alternative as the base of comparison. There is a big gain in transit patronage between the base and TSM due to improvemennts made to the line haul service on the Harbor Freeway. Between TSM and the build alternatives there is also a fair gain in transit riders in the corridor due to the much improved line haul service. But between the build alternatives the differences are small. New HOV trips are formed in the bus/HOV alternatives (B-1, 4, 7, and B-8A, 8B) because of access to the transitway. The VMT reduction follows closely the total newly formed shared rides (Transit and HOV) for each alternative. The two-way Bus/HOV (B-1, 4, 7) alternative produces the biggest reduction in VMT, because of this combined new shared riders.

Exhibit 8 compares the daily use (both transit and HOV) of the proposed transitway excluding intra-CBD trips while Exhibit 9 compares peak hour trips only. Alternative B-1, 4, 7 has the most daily person trips followed closely by R-6 and R-1, 4, 7 ICTS. Exhibit 10 compares the two-way bus/HOV alternative (B-1, 4, 7), the reversible bus/HOV alternative (B-8A, 8B) and the ICTS rail alternative (R-2, 4, 7) in terms of total person trips occurring during the peak hour. Again the B-1, 4, 7) alternative handle the largest amount of trips during the peak hour. The equivalent number of freeway lanes needed to handle the same number of trips are shown on the exhibit. As can be seen, up to seven additional freeways lanes would be required to handle the same trips as the two lane transitway. Exhibits 11 and 12 show the distribution of the daily direct HOV connectors at the I-105/I-110 Interchange.

Summary

The TSM alternative shows the largest gain of total corridor transit ridership due to the build up of a large background fleet. It also produces some improvement in line haul ridership due to additional line haul facilities. It does not, however, improve the quality of the line haul service within the corridor. All of the "build" alternatives provide this efficient line haul service in a variety of ways. Considering transit patronage only, the rail alternatives produce the best results due to their superior speeds. In terms of HOV usage, the bus/HOV alternatives produce the best results. In terms of total shared rides (both transit and HOV) it becomes almost a toss-up with the two-way bus/HOV (B-1, 4, 7) alternative holding a slight edge.

All of the "build" alternatives produce substantial ridership, reduce VMT and provide the corridor with its much needed line haul service.

Finally, the assumptions and/or treatment of the downtown Los Angeles terminal needs to be understood. All alternatives assume a system operating within the Los Angeles Central Business District, i.e., ICTS and HRT providing continuous service through CBD to Union Station, LRT interconnecting with the Metro Rail. Such a forced transfer substantially reduces ridership.

This bus/HOV alternatives travel on city streets to Union Station, distributing passengers through the CBD.

2005 DAILY LINK VOLUMES

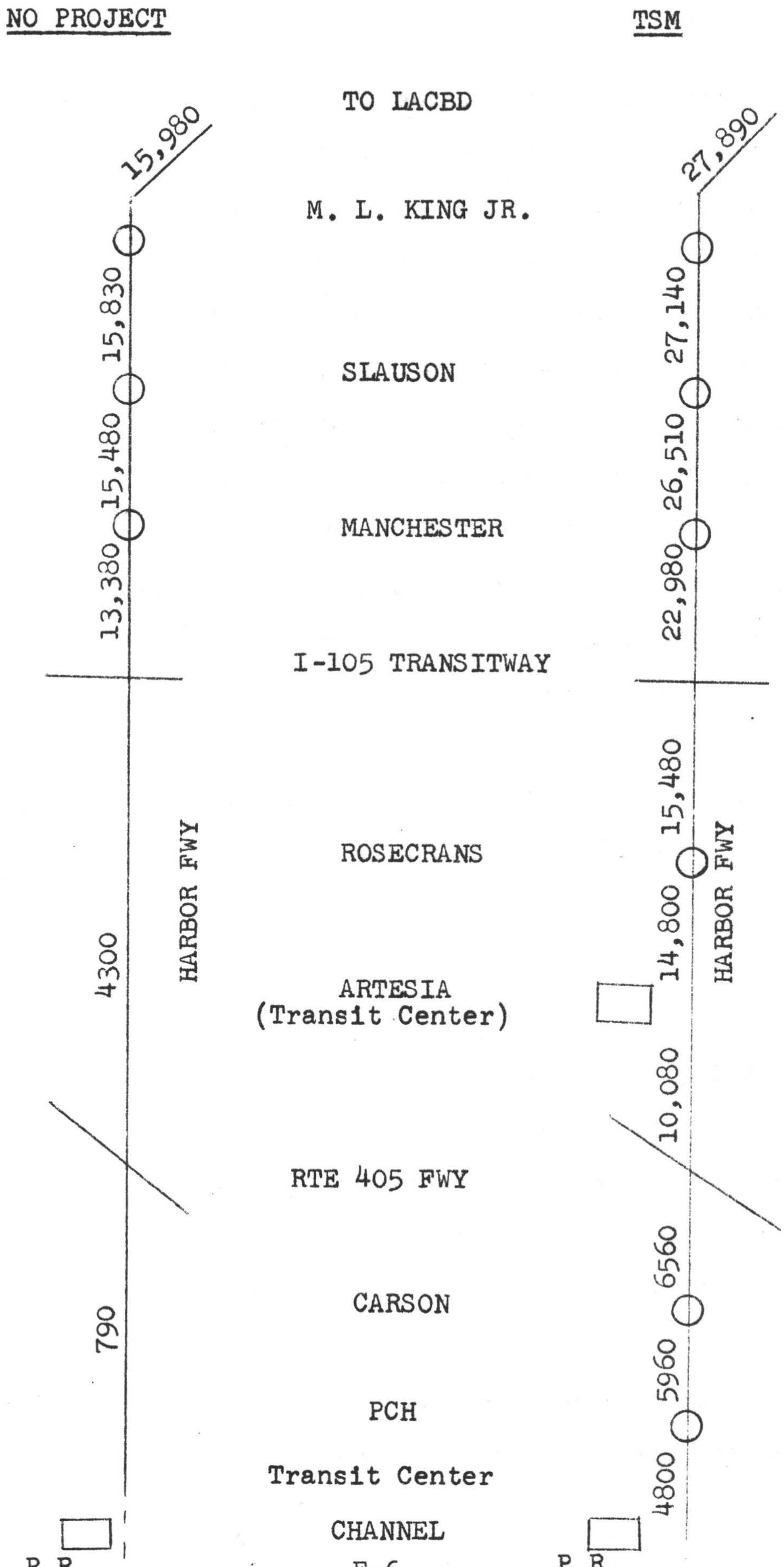
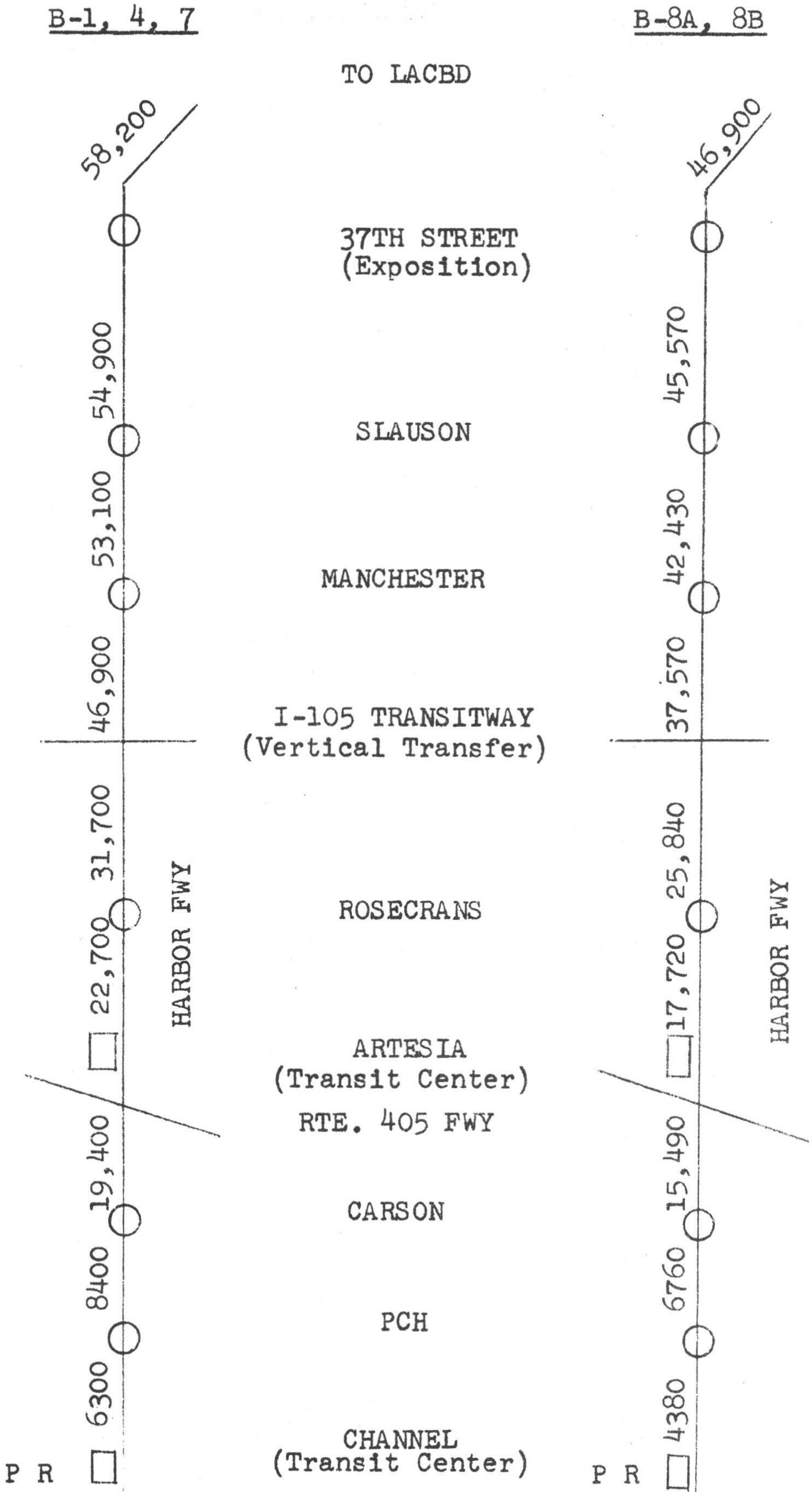


EXHIBIT 1

2005 DAILY LINK VOLUMES*



Updated: December, 1984

* Not including carpools

EXHIBIT 2

2005 DAILY LINK VOLUMES

Rail-1, 4, 7

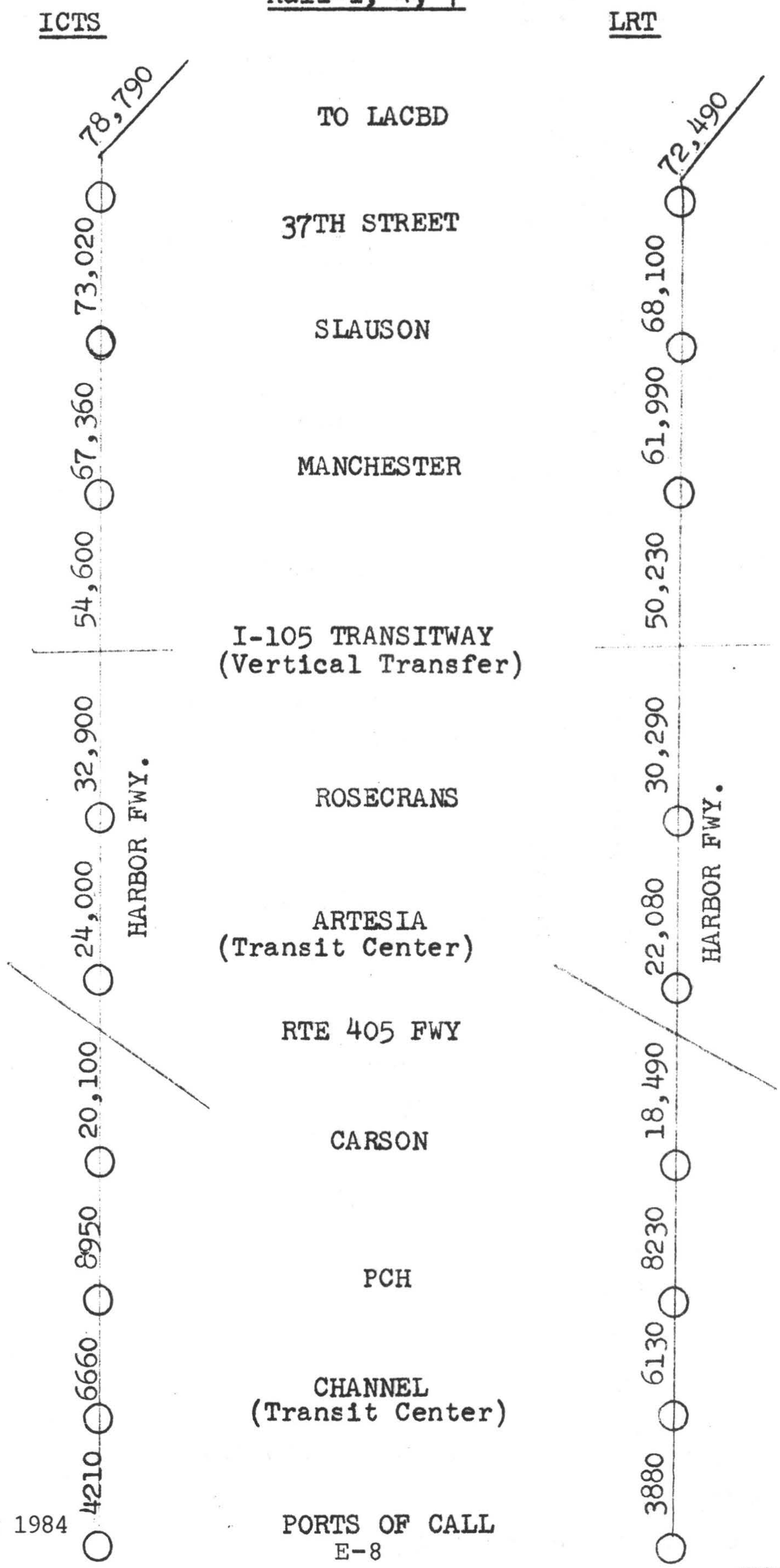


EXHIBIT 3

2005 DAILY LINK VOLUMES

Rail-6

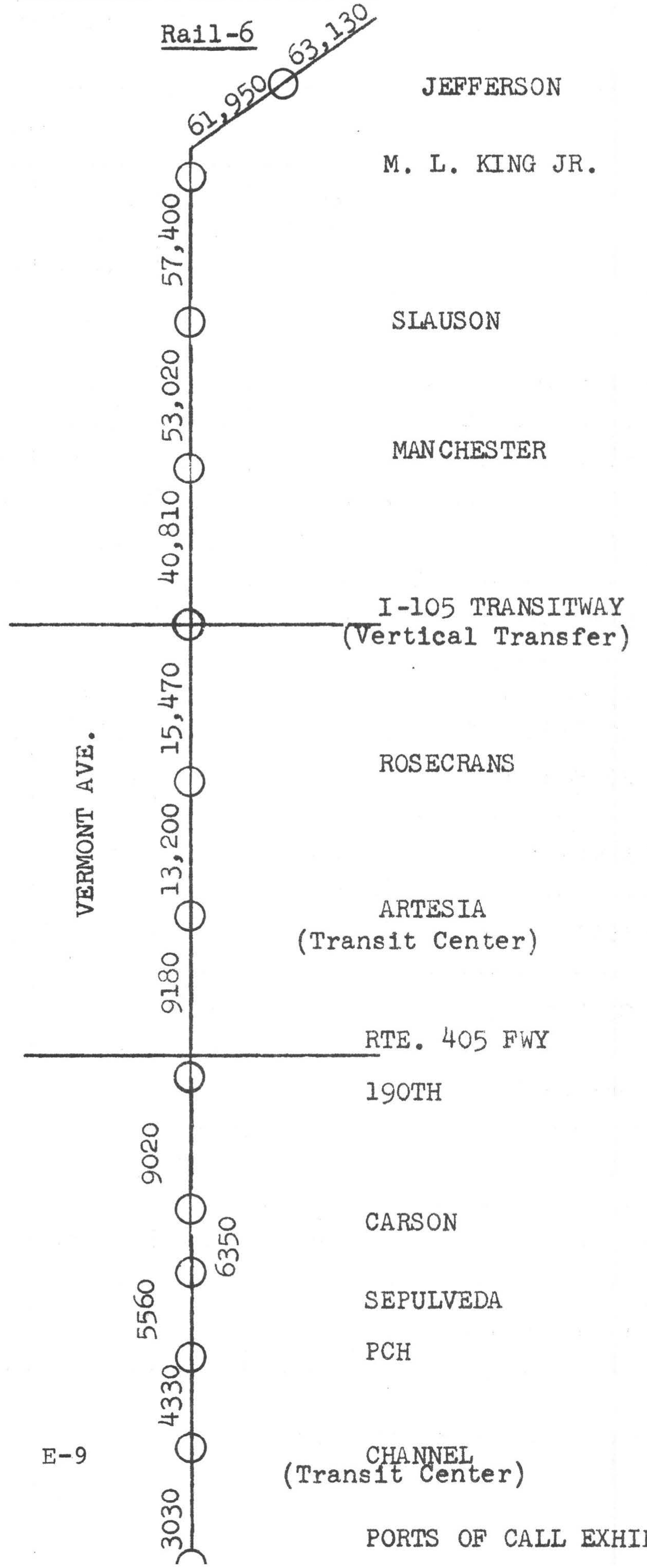


EXHIBIT 4

2005 DAILY STATION VOLUMES

	ALTERNATIVES						
	NO PROJECT	TSM	B, -1, 4, 7	B-8A, 8B	R-1, 4, 7		R-6
					ICTS	LRT	
JEFFERSON	-	-	-	-	-	-	4,960
37TH STREET	300	1000	11,650	9,930	14,540	13,440	8,050
SLAUSON	400	800	4,350	3,710	5,430	5,000	6,200
MANCHESTER	400	800	8,690	7,400	11,190	10,210	12,890
I-105/I-110 Vertical Transf.	-	-	27,750 (7,550)	22,200 (4,600)	33,700 (10,900)	31,100 (9,900)	34,800 (8,200)
ROSECRANS	-	700	10,570	9,010	12,290	11,290	13,910
ARTESIA	-	2600	7,700	7,010	7,370	7,040	7,280
190TH	-	-	-	-	-	-	410
CARSON	-	500	9,370	7,550	9,960	8,920	9.810
SEPULVEDA	-	-	-	-	-	-	1,600
PCH	-	500	3,090	2,640	2,320	2,140	2,410
CHANNEL	790	790	6,250	5,320	3,830	3,700	4,740
PORTS OF CALL	-	-	-	-	3,340	3,080	3,290

(Daily I-110 Transfers)

Updated: December, 1984

EXHIBIT 5

2005 DAILY TRANSIT PATRONAGE

ALTERNATIVE	BOARDINGS ONLY				
	LINE HAUL	I-105 TRANSFER	WITHIN CBD	TOTAL	(5) TOTAL CORRIDOR
No Project	4,750	3,400	7,990	16,190	514,400
TSM	10,780	3,750	13,940	28,470	591,600
B-1, 4, 7	30,840	13,880	22,090	66,810	615,240
B-8A & 8B	26,300	11,100	17,830	55,230	608,540
(1) R-1, 4, 7 ITCS	42,430	16,890	(2) 75,500	134,820	617,750
(3) R-1, 4, 7 LRT	32,960	15,530	29,160	77,650	615,110
(4) R-6	34,730	17,420	43,960	96,110	619,100

Notes:

(1) Assumes ICTS with continuous service through the CBD.
(2) Includes approximately 25,000 intra-CBD circulation trips & 18,850 Regional Core Rail Transfer Trips.
(3) Assumes LRT with termination of LRT service at the Regional Core Rail Line.
(4) Assumes HRT with continuous service through the CBD.
(5) Assumes at least one end of trip begins or ends within corridor.

Updated: December, 1984

EXHIBIT 6

TOTAL CORRIDOR

NEW TRANSIT TRIPS, HOV RIDERS AND VMT REDUCTION

(2005 DAILY PERSON TRIPS)

ALTERNATIVE	(1) TRANSIT	(2) HOV	TOTAL	VMT REDUCTION
No Project	Base	Base	Base	Base
TSM	77,200	0	77,200	643,300
B-1, 4, 7	100,800	19,400	120,200	988,100
B-8A, 8B	94,100	10,200	104,300	861,600
ICTS R-1, 4, 7	103,400	0	103,400	861,700
LRT R-1, 4, 7	100,700	0	100,700	839,200
R-6	104,700	0	104,700	872,500

(1) Total Corridor
(2) Transitway users only

Updated: December, 1984

EXHIBIT 7

2005 DAILY TRIPS-TRANSIT[1] & HOV[2]

USING HARBOR TRANSITWAY

ALTERNATIVE	TRANSIT	HOV	TOTAL
No Project[3]	16,200	0	16,200
TSM[3]	28,500	0	28,500
Bus-1, 4, 7	65,200	38,800	104,000
Bus 8A & 8B	53,900	20,400	74,300
ICTS R-1, 4, 7	81,000	0	81,000
LRT R-1, 4, 7	73,800	0	73,800
R-6 (HRT)	83,700	0	83,700

(1) All transit routes assigned to Harbor Freeway excluding intra-CBD trips.
(2) HOV's on transitway only.
(3) These alternatives have no transitway but are shown for comparison.

Updated: December, 1984

EXHIBIT 8

2005 PEAK HOUR PERSON TRIPS USING TRANSITWAY

(TRANSIT[1] & HOV[2])

ALTERNATIVE	TRANSIT	HOV	TOTAL
No Project[(3)]	2,590	0	2,590
TSM[(3)]	4,560	0	4,560
Bus-1, 4, 7	10,460	7,140	17,600
Bus 8A & 8B	8,630	3,910	12,540
ICTS R-1, 4, 7	13,000	0	13,000
LRT R-1, 4, 7	11,960	0	11,960
R-6 (HRT)	13,400	0	13,400

(1) All transit routes assigned to Harbor Freeway excluding intra-CBD trips.
(2) HOV's on transitway only.
(3) These alternatives have no transitway but are shown for comparison.

Updated: December, 1984

EXHIBIT 9

TRANSIT PEAK HOUR USAGE

(TOTAL PERSONS INCLUDING TRANSIT & CARPOOLS)

I-105 TRANSITWAY — MANCHESTER — SLAUSON — 37TH STREET

BUS 1, 4, 7

TRANSIT	7,500	8,500	8,780	9,300
CARPOOLERS	6,630	7,140	7,140	5,610
TOTAL	14,130	15,640	15,920	14,910
*EQUIVALENT NUMBER OF FREEWAY LANES	6.5	7.2	7.3	6.9

BUS 8A & 8B

TRANSIT	6,000	6,790	7,300	7,500
CARPOOLERS	2,890	3,910	3,910	2,890
TOTAL	8,890	10,700	11,210	10,390
EQUIVALENT NUMBER OF FREEWAY LANES	4.1	5.0	5.2	4.8

RAIL 1, 4, 7 (ICTS)

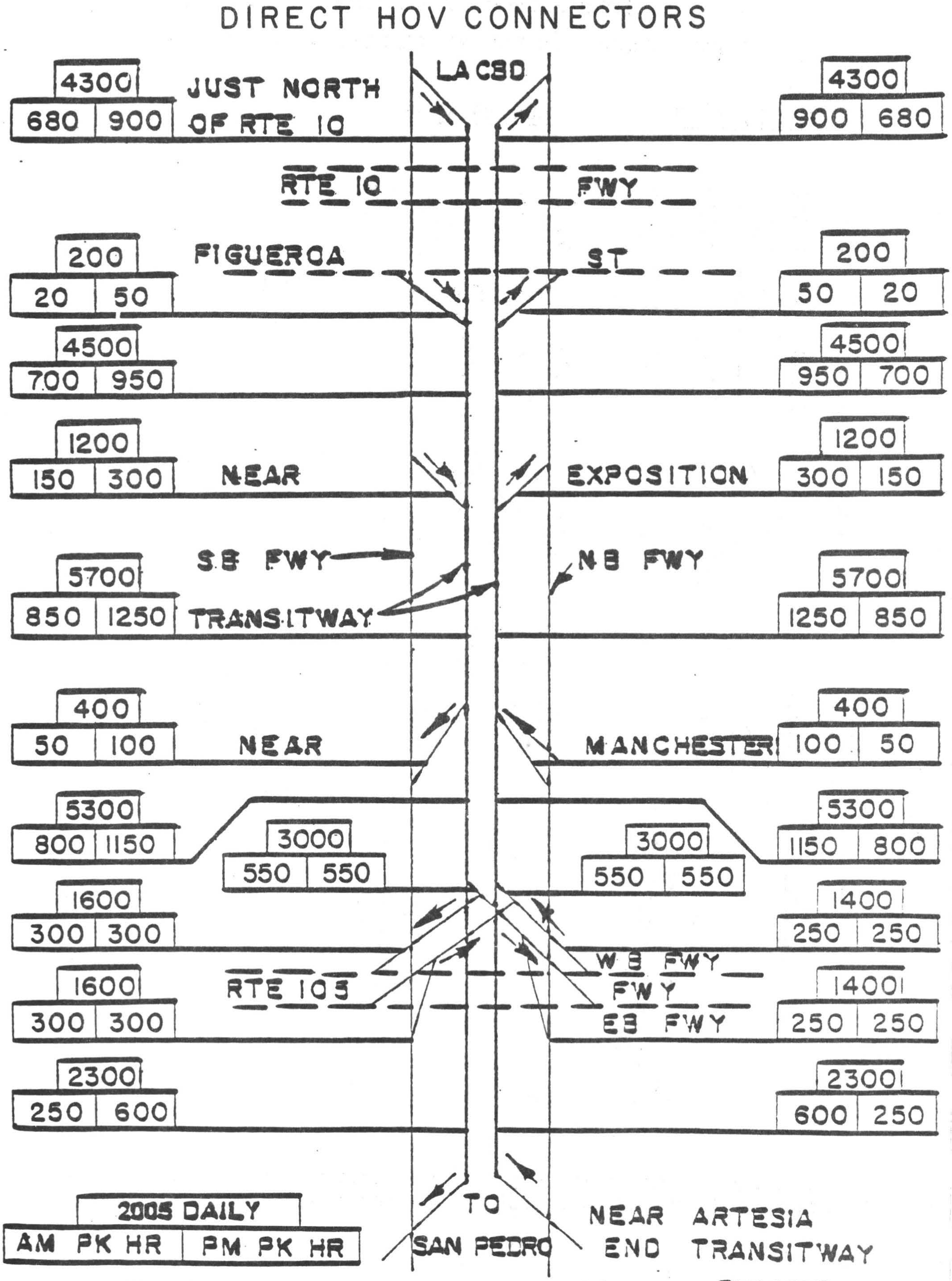
TOTAL	8,740	10,780	11,680	12,610
EQUIVALENT NUMBER OF FREEWAY LANES	4.0	5.0	5.4	5.8

*Normal carrying capacity of one freeway lane during the peak hour is 2160 persons (1800 vehicles x 1.2 persons per vehicle).

EXHIBIT 10

Updated: December, 1984

TWO WAY BUS / HOV ALT 1, 4, 7



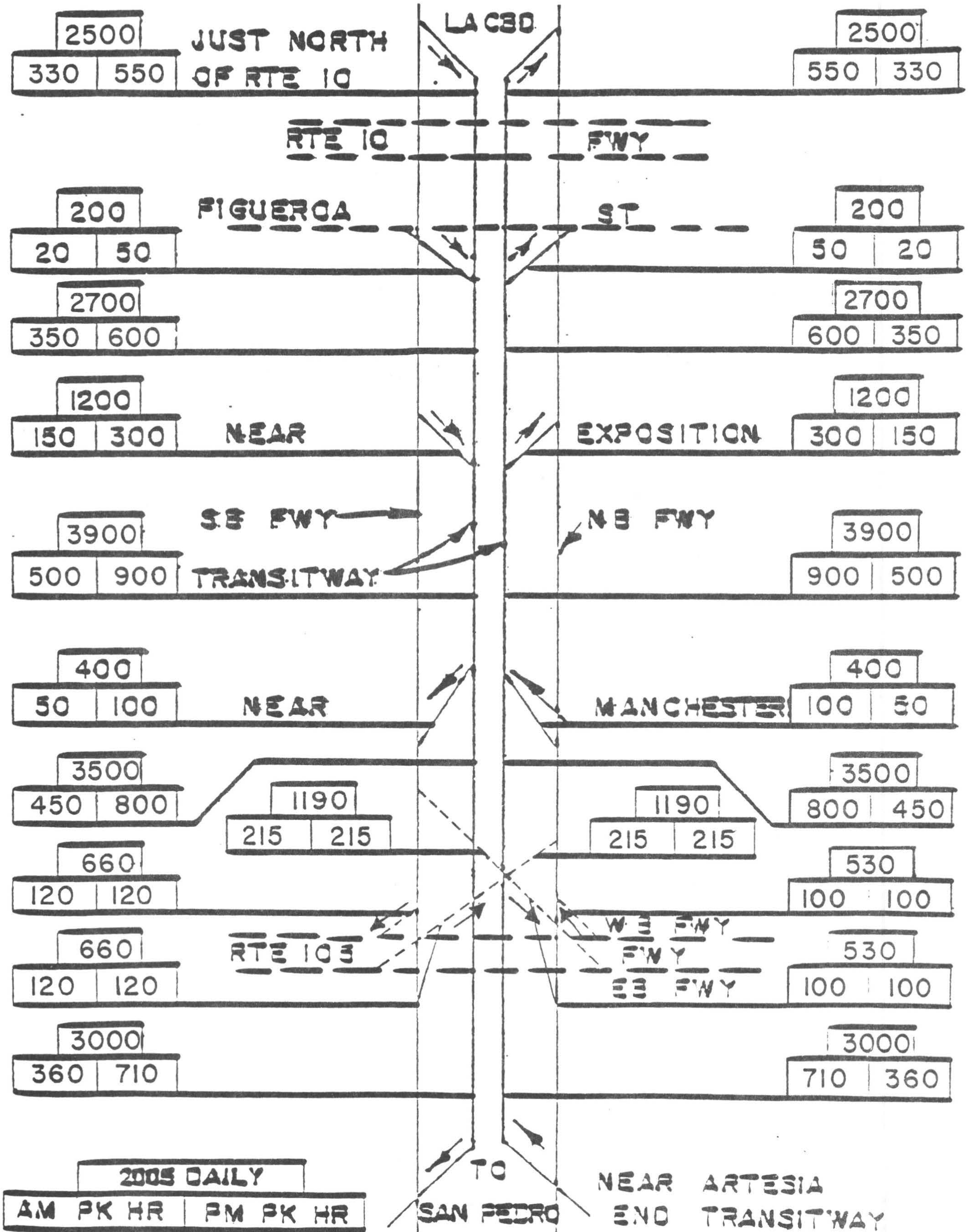
HOV VEHICLE VOLUMES

E-16

EXHIBIT 11

TWO WAY BUS / HOV ALT 1, 4, 7

NO DIRECT HOV CONNECTORS



HOV VEHICLE VOLUMES

EXHIBIT 12

appendix f

BIOLOGICAL ASSESSMENT

This appendix contains detailed information about the biological and wetlands impacts of the I-110 Corridor Transitway.

Introduction and Project Description

The California Department of Transportation is studying ways to improve public transit between Los Angeles' central business district and San Pedro in a corridor along the Harbor Freeway (I-110) and Vermont Avenue (Figure 1). The alternatives for the project are listed in Table 1. Transitway alignments and station sites are shown in (Figure 2).

Summary of Findings and Recommendations

Most of the area surrounding the project location is urbanized and has virtually no botanical or zoological value. The freeway margins are landscaped with introduced vegetation which provides habitat for common city dwelling birds, a few raptors, common city dwelling rodents, insects, and other invertebrates. Even though the zoological value of the freeway landscaping is limited by lack of water, it still provides important bird habitat in an urbanized area. Up to 13 acres of landscaping could be lost due to the project. Bixby Slough (Figures 2 and 3) is a palustrine persistent emergent wetland. The Willows (Figures 2 and 4) is a broad leaved deciduous wetland (Cowardin et al, 1979). Both of these wetlands are of regional importance. The endangered California Least Tern (Sterna antillarum (=albifrons) browni) heavily utilizes Harbor Lake which is part of Bixby Slough. The endangered, and presumed extinct, Los Angeles sunflower (Helianthus nuttallii ssp. parishii) could possibly be in one or both of the wetland areas. The transitway project would have no impact on the California Least Tern. However, there could be significant impacts on willows, and on the Los Angeles sunflower

Interstate 110 Freeway Transit
HARBOR FREEWAY CORRIDOR

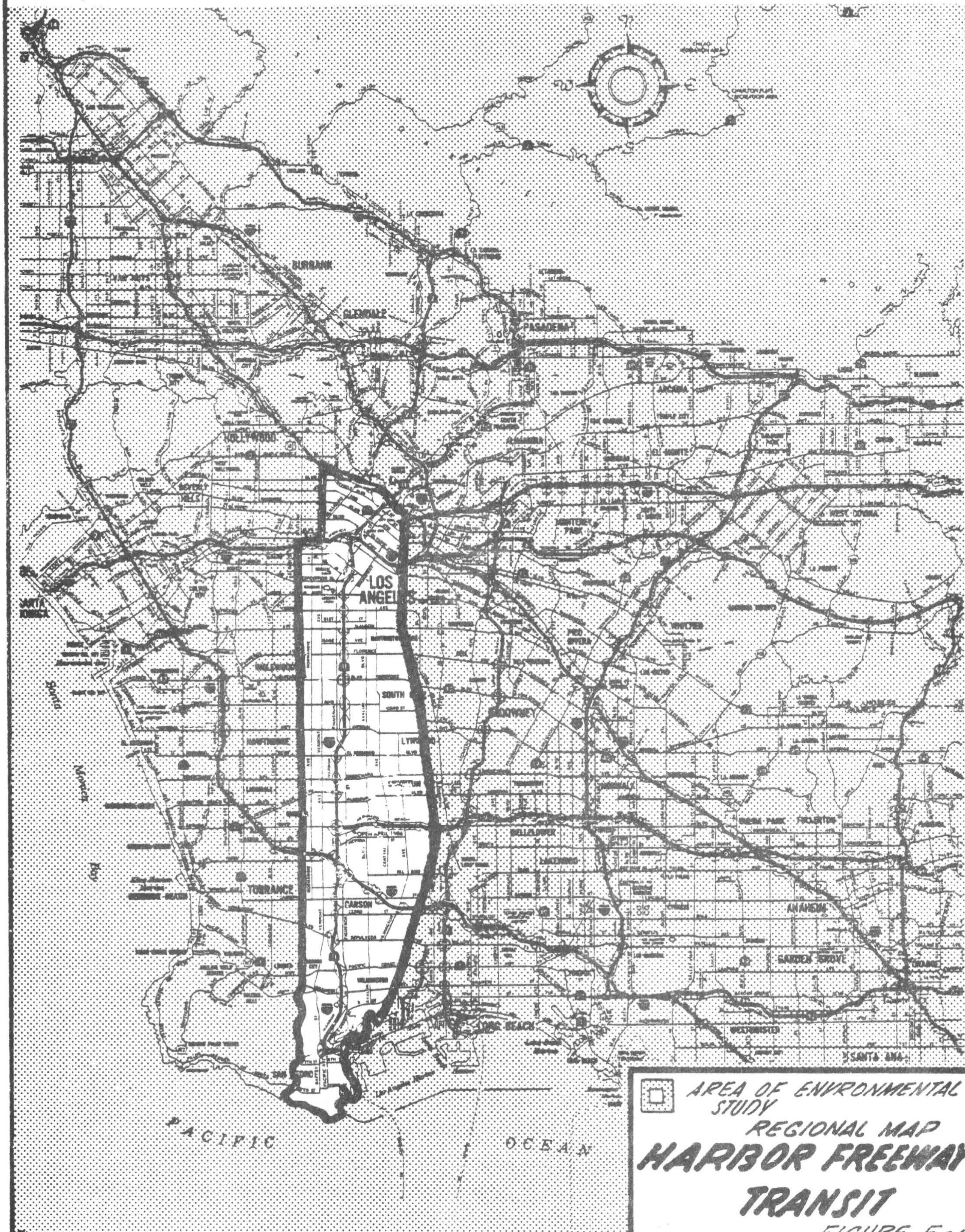


FIGURE F-1

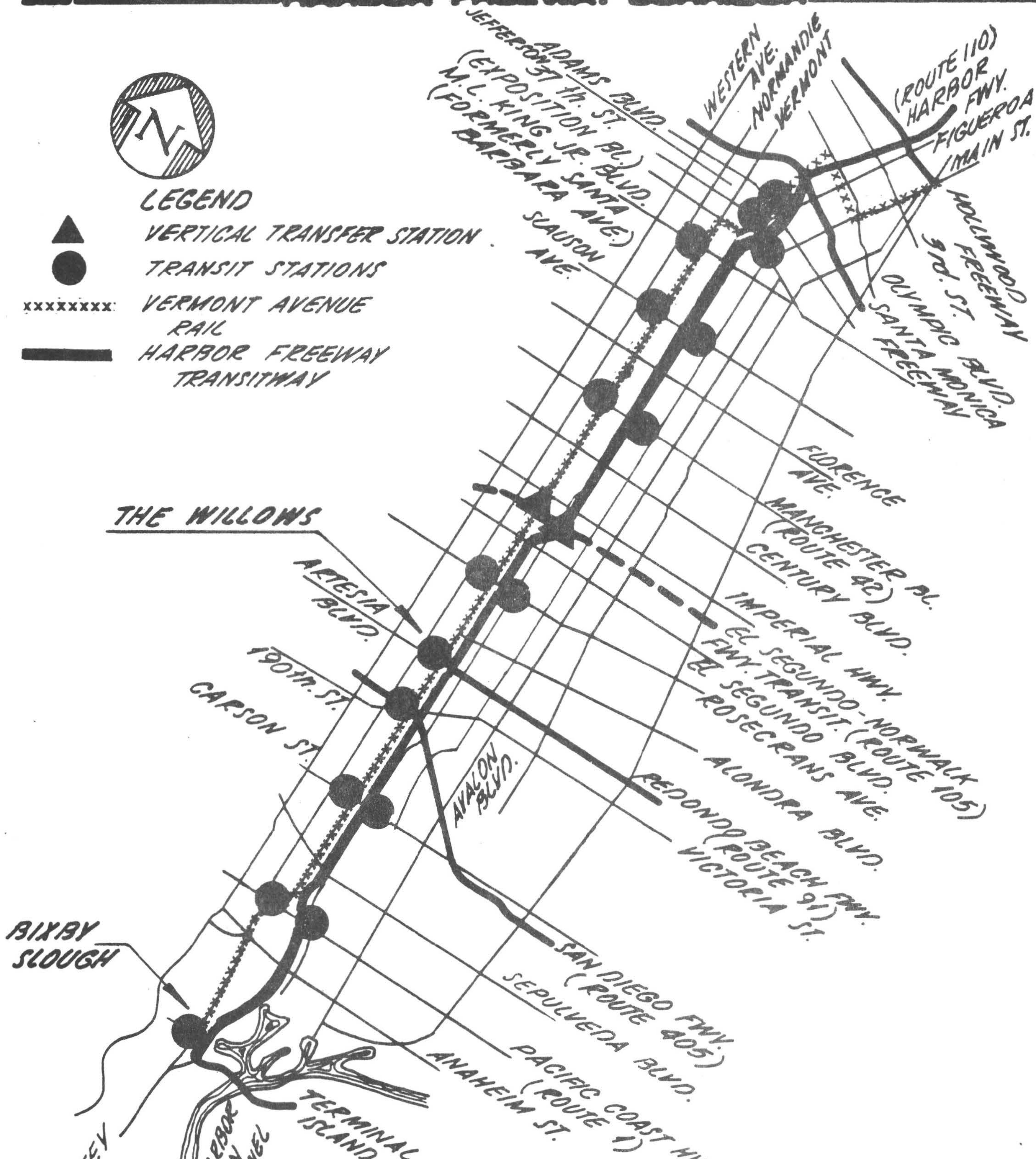
Table 1 I-110 Alternative Features

	Type	Profile	Limits	Stations*	Intermediate Transitway Access**
No Project	No proposed improvements	Not applicable - uses existing roadways	LACBD to San Pedro	No improvements	Not applicable
TSM	Minor highway system improvements, SCRTD's 1981 Transit Sector Plan	"	"	Minor upgrading to I-110 on line bus stops & 2 offline Stations (Artesia Blvd. & Channel St.)	"
Bus/HOV-1	Two way transitway elevated over fwy. median (49' wide)	Elevated 8.2 miles at grade 2.1 miles (I-105 Interchg.)	Between Santa Monica & Artesia Fwys. (Rtes 10 & 91). South of Rte. 91 is mixed fwy. traffic flow.	7-on line 3-off line (Union Station, Artesia Blvd. & Channel St.)	5 fwy connections & 1 local street ramp connection
Bus/HOV-4	Two way transitway elevated and at grade in fwy. median (49' & 50' widths)	Elevated 4.3 miles at grade 6.0 miles	"	"	7 fwy connections & 1 local street ramp connection
Bus/HOV -7	Two way transitway at fwy. grade (50' wide)-requires fwy. widening	At grade 10.3 miles	"	"	8 fwy connections
Bus/HOV-8A	One way directional transitway elevated over fwy median (32' wide)	Same as Bus/HOV-1	"	"	4 fwy connections & 2 local street ramp connection
Bus/HOV-8B	One way directional transitway elevated and at grade in fwy median (32' wide)	Same as Bus/HOV-4	"	"	3 fwy connections & 3 local street ramp connections
Rail-1 (LRT)	Same as Bus/HOV-1 except with a 27' width structure	Elevated 23.3 miles at grade 2.1 miles (I-105 Interchg.)	LA CBD (7th St.) to San Pedro's Ports O' Call Village	8 On-line 1-off line (Artesia Blvd.) 2-Terminals (7th St. & San Pedro's Ports O'Call)	Not applicable
Rail-4 (LRT)	Same as Bus/HOV-4 except with a 27' width structure	Elevated 14.0 miles at grade 11.4 miles	"	"	"
Rail-7 (LRT)	Same as Bus/HOV-7 except with a 27' width structure	Elevated 4.7 miles at grade 20.7 miles	"	"	"
Rail-1 (ICTS)	Same as Rail-1 (LRT)	Same as Rail-1 (LRT)	LA CBD (Union Station) to San Pedro's Port O'Call	16 on line (includes 8 DPM Sta.) 1 off line (Artesia) 2-Terminals (Union Sta & San Pedro Ports O'Call	"
Rail-4 (ICTS)	Same as Rail-4 (LRT)	Same as Rail-4 (LRT)	"	"	"
Rail-7(ICTS)	Same as Rail-7 (LRT)	Same as Rail-7 (LRT)	"	"	"
Rail-6 (HRT) Vermont Ave	Two way transitway elevated and in subway section. (30' & 70' resp. widths.	Elevated 18.0 miles subway 7.0 miles	LA CBD (Union Station) to San Pedro Port O'Call	17-on line 2-Terminals (Union Sta. & San Pedro's Port O'Call)	"

*Refer to Table III-6 & Appendix A
**Refer to Fig. III-4A & Appendix A

Interstate 110 Freeway Transit

HARBOR FREEWAY CORRIDOR



VERMONT AVENUE RAIL

FIGURE F-2

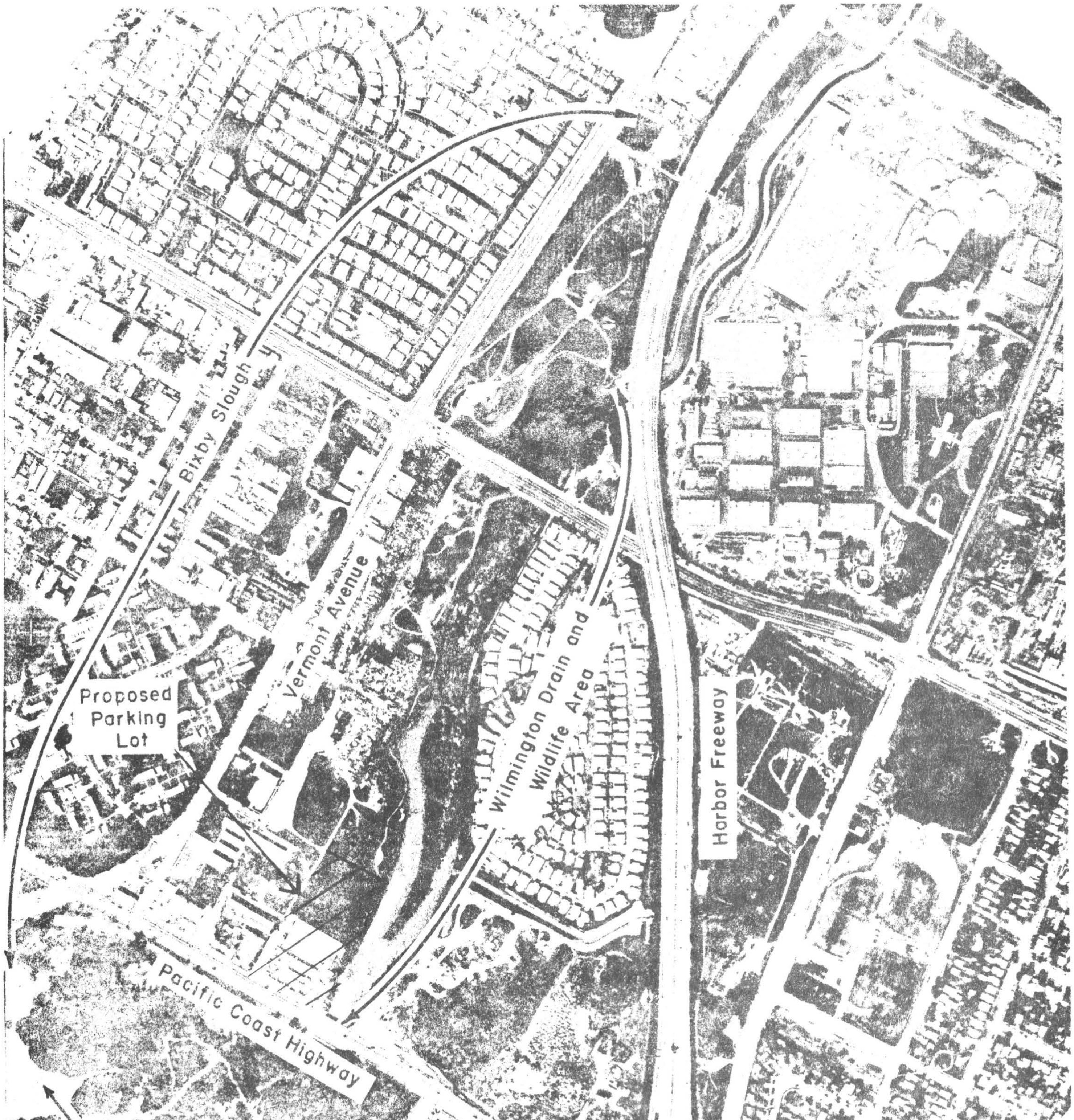


FIGURE 3. BIXBY SLOUGH AND VICINITY

if the sunflower is present in the impacted portion of The Willows. The Willows was surveyed for the Los Angeles sunflower during its blooming period in the Fall of 1982.

Study Methods

The Harbor Freeway, Vermont Avenue, and the proposed station site were surveyed to determine sites of biological significance. Thes vegetation of the Willows and Bixby Slough were qualitatively sur veyed in March, June, and November 1981. Incidental faunal observations were made during these surveys. Figures 2, 3 and 4 show - the locations of these wetlands. Herbarium Specimens at Rancho Santa Ana Botanical Gardens and the Los Angeles County Museum of Natural History were checked to confirm plant identifications. Doctors Robert Thorne and Robert Gustafson were consulted about the significance of the flora of Bixby Slough and The Willows. The California Department of Fish and Game, the U. S. Fish and Wildlife Service, and the U. S. Army Corp of Engineers were consulted about the significance of the biological resources of the study area and the possible effects of the proposed project on those biological resources.

The study methods used in this survey have the following limitations:

1. Because the possibility that the Los Angeles Sunflower may be present in the Study area was not discovered until November 1981, the presence or

absence of this plant - which blooms from August to October - could not be determined.

2. Because the surveys were qualitative in nature some of the project's impacts on the biota cannot be determined quantitatively.

Species of Concern

During the course of the Harbor Freeway Transitway Study a list of threatened and endangered species of plants and animals which could potentially be in the study area was compiled. The U. S. Fish and Wildlife Service provided input for this list. Additionally, a literature survey was conducted to insure that the threatened and endangered species list was complete. The U.S. Fish and Wildlife Service indicated that the following species, or their critical habitat, could occur in the study area.

Animals

Palos Verdes blue butterfly (Glaucopsyche lydamus palosverdesensis)

California least tern (Sterna antillarum (=albifrons) browni)

California brown pelican (Pelecanus occidentalis californicus)

salt marsh birds beak (Cordylanthus maritimus ssp. maritimus

Additionally the endangered Los Angeles sunflower (Helianthus nuttallii ssp. parishii) may be present in the study area.

Results

Environmental Setting and Wetland Impacts

The proposed project lies in the Los Angeles Metropolitan area,, which is the largest urban area in California. The extensive urbanization of the study area restricts the amount of significant animal and plant habitat that occurs within it. Within the urbanized area, nearly all of the native biota was removed as development occurred. The majority of the flora consists of introduced species used for landscaping and ornamentation. A few native plant species occur in vacant areas. A few squirrels, ground squirrels, rabbits, skunks and common city dwelling bird species exist in the study area. Stray dogs and cats are common.

The freeway margins are landscaped with introduced vegetation including large trees. The landscaping provides habitat for urban adapted birds a few raptors, rodents, insects, and other invertebrates. Even though the habitat value of the freeway landscaping is limited by the lack of water, it still provides important bird habitat in a heavily urbanized area.

In both bus/HOV and rail alternatives 1 and 4, small amounts of landscape vegetation will be removed due to freeway widening, redesign of on-off ramps, and constructionn of transit facilities. No significant biological immpacts would occur from landscape removal in these alternatives. In bus/HOV and rail alternatives 7, 13 acres of freeway landscaping would be permanently removed.

The landscaping currently provides nesting sites for passerine birds and roosting sites for raptors. Removal of this much landscaping would reduce the bird population along the Harbor Freeway. Because the study area is highly urbanized, this loss might be significant.

Two wetland areas, the Willows and Bixby Slough, exist in the study area. The locations of these wetlands are shown in Figure 2. The U. S. Army Corps of Engineers exercises jurisdiction over both of these areas as waters of the United States.

The Willows is located just north of the intersection of Vermont Avenue and Artesia Boulevard. It is a 10-acre remnant of a 5000 acre marsh which was known as Dominguez Slough. The slough flowed into San Pedro Bay through a series of small marshes and lakes. Near San Pedro Bay Dominguez Slough spread out into an extensive salt marsh. As the area was urbanized the marsh complex was drained and filled so that only the 10-acre Willows wetland remains.

The Willows is a broad leaved deciduous wetland (Cowardin, *et al* 1979) dominated by arroyo willow (*Salix lasiolepis*). The tree canopy is mature and contains a number of openings. Wetland indicator plants found in The Willows include tule (*Scripus californicus*), umbrella sedge (*Cyperus eragrostis*), cattail (*Typha latifolia* and arrowhead (*Sagittaria calycina*). Other plant species found in the area include several species of mustard

(Brassica spp.), cocklebur (*Xanthium Strumarium* var. *canadese*), speedwell (*Veronica anagallis - aquatica*) and numerous annual grasses. The Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*) is not present. Specimens of Sunflower were collected and compared with herbarium specimens in the Los Angeles County Museum of Natural History and Rancho Santa Ana Botanic Gardens herbarium. The specimens collected were found to be specimens of *Helianthus annuus* L. Ssp. *lenticularis* (Dougl.) Ckll. [H. l. Dougl. ex Lindl.] the common sunflower. The Los Angeles sunflower (*H. nuttallii* *T.* & G. Ssp. parishii (Gray) Heiser [*H*. *p*. Gray. *H*. *Oliveri* Gray] is not present in the Willows.

The Willows provides habitat for a number of bird species. The openings in the tree canopy are particularly important to the bird population. Large numbers of flying insects utilize the clearings for feeding and breeding, while insectivorous birds roost in the surrounding trees and forage on the insects. The bird diversity in the Willows is dependent on this interaction, and the bird diversity would be greatly reduced if it was disrupted. Several raptor species including the red shouldered hawk (*Buteo lineatus*), and the American kestrel (*Falco sparverius*), regularly hunt in the Willows. Migratory shore birds, water birds, and passerine birds use the area in the fall and the winter.

Other animals seen in The Willows during the surveys include the Pacific tree frog (*Hyla regilla*), side blotched lizard (*Uta stansburiana hesperis*), monarch butterfly (*Danus plexippus*), marine blue butterfly (*Leptotes marina*), seed shrimp (O.Podocopa), and pouch snail (*Physa virgata*). Additionally, cottontail rabbit (*Sylvilagus* sp.) sign was found.

The Willows wetland could be impacted by all alternatives, except the no project alternative. In every alternative except the no-project alternative, a 12-acre transit and parking facility would be constructed immediately south of the wetland. Construction of this facility could:

1. Cause siltation of the wetland due to construction site erosion.
2. Bring large numbers of transit patrons into The Willows vicinity and improve access to the wetland. This could lead to increased visitor traffic which would degrade the wetland. Also, wastes generated by transit patrons could accumulate in The Willows and degrade it.

In rail alternatives 1, 4, and 7 a pedestrian walkway could have the following impacts:

1. Change the vegetation of about 1000 sq. ft. of wetland by shading it.
2. Change the waterflow pattern in the wetland by modifying the outflow channel.
3. Degrade the wetland by the operation of construction machinery in the wetland.
4. Reduce the amount of wetland habitat by having bridge supports in the wetland.

Bixby Slough consists of Harbor Lake, and its adjacent marshes in Harbor Regional Park, and the Wilmington Drain and Wildlife Area (Figure 3). Originally the marsh covered about 300 to 500 acres. Bixby Slough flowed into San Pedro Bay about 3 or 4 miles west of Dominguez Slough. Near the bay Bixby Slough spread out into a saltmarsh which was part of the same saltmarsh complex as the saltmarsh at the mouth of Dominguez Slough.

Bixby Slough is composed of a palustrine persistent emergent wetland (Cowardin et al, 1979) and a lake. The visually dominant species is arroyo willow (Salix lasiolepis). In the upland area, there is an extensive understory of annual grasses, cocklebur (Xanthiumm strumarium var. canadense), mustard (Brassica spp.) and mule fat (Baccharis glutinosa). Other trees that occupy the upland areas include California sycamore (Platanus racemosa), eucalyptus and other exotic shrubs and trees. Water lily (Nuphar sp.), duck weed (Lemna gibba), and water weed, (Elodea sp.), are in some of the quieter portions of the stream. Tules (Scripus californicus) and cattails (Typha latifolia) occur on the marshy edges of the stream and the lake.

The stream supports much aquatic life including the pouch snail (Physa virgata), mosquito fish (Gambusia affinis), tadpoles (genus and species not determined), aquatic insects, and a large population of crayfish (species not determined). Shorebirds, long-legged wading birds, and other waterbirds have been reported from the area. The brown pelican periodically utilizes Harbor Lake. Harbor Lake is also heavily utilized by the California Least Tern as a post breeding season feeding area.

Bixby Slough is under public ownership. The area is used for flood control, recreational and wildlife purposes.

The construction of a parking lot, for rail alternative 6 in the graded vacant uplands adjacent to Bixby Slough could cause some siltation of the wetland. However, this impact would not be significant because the Los Angeles County Flood Control District manages the vegetation and the channel in this part of the slough for flood control purposes.

Species of Concern

A. Palos Verdes blue butterfly (Glaucopysche lydamus palosverdesensis). This species has a highly restricted range consisting of 3 zones (Federal Register/Vol. 45, No. 129). These 3 zones are located on the Palos Verdes Peninsula, at least seven miles from the southernmost point of the project. The larval food plant, Astragalus trichopous leucopsis, occurs on dry sites in coastal strand and coastal sage scrub not in wet areas. Hence, there is no possibility of the species being present in either the Willows or Bixby Slough.

B. California Least Tern (Sterna antillarum (=albifrons) browni) and California brown pelican (Pelecanus occidentalis californicus). Neither of these birds were seen in Willows. The brown pelican is almost exclusively a bird of marine habitats, e.g., open ocean, harbors, bays, and inshore waters. At various times, pelicans have been recorded at the Salton Sea and on the Colorado River, especially in the vicinity of Imperial Dam (Garrett, et al, 1981). These areas have large populations of forage fish. The Harbor Lake portion of Bixby Slough is periodically used by the brown pelican for foraging. The Willows has no open water and no fish have been observed there. Least terns and brown pelicans require similar foraging habitat. Harbor Lake is a major post-breeding foraging area for least terns and has been utilized extensively by terns from as far away as Mission Bay San Diego (Massey, personal communication).

C. Saltmarsh bird's beak (*Cordylanthus maritimus* ssp.) and salt grass (*Distichlis spicata*) in the mud-littoral zone (Heckard, 1977). The habitat in the Willows and in Bixby Slough is riparian woodland and freshwater marsh. No members of the figwort family (Schrophulariaceae) were found in either area. It does not appear likely that it would be found in the area as the habitat is not suitable for the species.

D. Los Angeles sunflower (*Helianthus nuttallii* var. *parishii*) The Federal Register, Vol. 45, No. 242 published a Notice of Review for plants for consideration as either threatened or endangered. The Los Angeles sunflower, a category one plant, is on the list. It has not been collected in the Los Angeles Basin since the late 1800's and has not been collected at all since 1933. However, there has been no systematic search made for the species in places that it might occur in Metropolitan Los Angeles. (Dr. Robert Thorne, personal communication).

The Rare Plant Status Report states that it occurs from near sea level to about 5000 feet. The U.S.G.S. quad sheets listed in the Los Angeles Basin are Hollywood, Pasadena, and Los Angeles (Niehaus). Potential sites, swampy or continously wet places, for the species that have not been historically distrubed are few--if not nonexistent. However, both Bixby Slough and the Willows are relatively undisturbed sites. In an examination of oblique aerial photographs taken of the Harbor Freeway when it was under construction in 1961, both sites can be clearly distinguished. Since that time there has been little or no permanent change in either site.

On November 20 and on November 24 both sites were visited in an attempt to find withered or living speciemens of H. n. var. parishii. The Los Angeles sunflower was not observed at that time. However, a final determination about the presence of the Los Angeles sunflower was made during the blooming season in the Fall of 1982. Specimens of sunflower were collected and compared with herbarium specimens in the Los Angeles County Museum of Natural History and Rancho Santa Ana Botanic Gardens herbarium. The specimens collected were found to be specimens of Helianthus annuus L. Ssp. lenticularis (Dougl.) Ckll. [H. l. Dougl. ex Lindl.] the common sunflower. The Los Angeles sunflower (H. nuttallii T. & G. Ssp. parishii (Gray) Heiser [H. p. Gray. H. Oliveri Gray] is not present in the Willows.

Conclusions

1. The proposed project would not impact any species of concern.
2. The proposed project could effect the Willows, but it would have no significant impact on Bixby Slough. All wetland impacts could be mitigated to an insignificant level.
3. The proposed project could cause the loss of up to 13 acres of freeway landscaping.

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LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES
AND CANDIDATE SPECIES THAT MAY OCCUR
IN THE AREA OF THE PROPOSED
HARBOR FREEWAY TRANSITWAY
INTERSTATE 101
1-1-81-SP-54

LISTED SPECIES

Palos Verdes blue butterfly, *Glaucopsyche lygdamus palosverdesensis*

California least tern, *Sterna albifrons browni*

California brown pelican, *Pelecanus occidentalis californicus*

Plants

Salt marsh bird's beak, *Cordylanthus maritimus* ssp. *maritimus*

PROPOSED SPECIES

None

CANDIDATE SPECIES

None

*Critical Habitat

State of California **Business and Transportation Agency**

Memorandum

To : K. D. Steele - 07
Chief, Environmental Branch

Attention H. Hunt
Endangered Species
Coordinator

Date : July 13, 1982

File No.: 07-LA-110 0.9/23.0
07224 - 444301

Subject :

From : **DEPARTMENT OF TRANSPORTATION**
Division of Transportation Planning
for ANN BARKLEY, Chief

Attached for your information is the Fish and Wildlife Service's letter concurring in your finding that the Harbor Transitway project will not impact endangered species.

Please complete the follow-up survey for the Los Angeles sunflower (Helianthus nuttallii). If you need any help with that survey, please contact Craig Martz at ATSS 473-5025, or the Fish and Wildlife Service at the Laguna Niguel office.

Attachment

SF:kp
cc:
RGiess
SFord
CMartz
AMoore
RSmith
DOTP File
Environ. File

F-110-1(243)0

JUL 7 1982

A | MAD | | | ALMA | 1 2 3 | PROG | 1 2 3 | OPER | 1 2 3 | PLANG | BRDG | L/A | ROW | DST A | B | C | OMCS | AIC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
AREA OFFICE
2800 Cottage Way, Room E-1803
Sacramento, California 95825

JUL 6 1982

Mr. Bruce E. Cannon
Federal Highway Administration
P.O. Box 1915
Sacramento, California 95809

Subject: Endangered Species Biological Assessment, Harbor Transitway EIS (HB-CA) 1-1-82-I-75

Dear Mr. Cannon:

We have reviewed your Biological Assessment prepared pursuant to Section 7(c) of the Endangered Spieces Act and transmitted to us on June 10, 1982. We concur in your conclusion that none of the project alternatives will affect endangered or threatened species.

Furthermore, we endorse your proposal to conduct additional field studies during the flowering season of the Los Angelos sunflower (Helianthus nuttallii.) CalTrans should mobilize to conduct those field surveys this summer if possible. We are available for further technical assistance on this matter if necessary.

Sincerely yours,

Area Manager

cc:
Ecological Services, Laguna Niguel, CA

State of California | Business, Transportation and Housing Agency

Harold Hunt

Memorandum

To : RONALD KOSINSKI
Senior Environmental Planner

Date: September 8, 1982

File : I-110 Transitway
07840 - 444301

From : HAROLD HUNT
DEPARTMENT OF TRANSPORTATION

Subject: I-110 and the Los Angeles Sunflower

On August 27 Chuck Morton and I surveyed the Willows wetland for the Los Angeles Sunflower Helianthus nuttallii ssp. parishii. No specimens of this species were found. The construction of the Artesia park and ride lot will have no impact on the Los Angeles sunflower.

The Willows harbors a large population of the beggar tick Bidens frondosa. Bidens frondosa is a common plant of moist areas. Material from this species was collected on November 20, 1981 and misidentified in the field as possibly being a Helianthus. The material was properly identified as being in the genus Bidens in my memo of December 31, 1981, which is attached.

Car trouble (we had a state car) prevented us from surveying Bixby Slough. I will survey Bixby Slough during September. Because the impacts of the I-110 transitway on Bixby Slough are minimal, there would be no impact on the Los Angeles Sunflower even if it occurs in Bixby Slough.

Additionally, shells of the fresh water snail Gyraulus parvus were discovered at the Willows. This snail is common in marshes around the Los Angeles area.

Harold F. Hunt

HAROLD HUNT
Endangered Species Coordinator
Environmental Planning &
Citizen Participation Branch

HH:fd

cc: Craig Martz, HQ-DOTP

Organisms Encountered During Reconnaissances
of the Willows and Bixby Slough

Common Name	Scientific Name	The Willows	Bixby Slough
green algae	Div. *Chlorophyta*	X	X
umbrella sedge	*Cyperus eragrostris*	X	X
cattail	*Typha latifolia*	X	X
arrowhead	*Sagittaria Calycina*	X	X
water lily	*Nuphar polysepalum*		X
water weed	*Elodea ssp.*		X
willow weed	*Polygonum lapathifolium*	X	
duckweed	*Lemna gibba*		X
arroyo willow	*Salix lasiolepis*	X	X
California sycamore	*Platanus racemosa*		X
eucalyptus	*Eucalyptus spp.*		X
cocklebur	*xanthium strumarium*	X	X
speedwell	*Veronica anagallis - aquatica*	X	
mustard	*Brassica spp.*	X	X
mule fat	*Baccharis glutinosa*	X	X
grasses	fam. Poaceae	X	X
ponds snail	*Physa virgata*	X	X
seed shrimp	Order Podocopa-genus, species undetermined	X	
blue butterfly	*Leptotes marina*	X	
monarch butterfly	*Danus plexippus*	X	
red admiral butterfly	*Vanessa atalanta rubia*	X	X

Common Name	Scientific Name	The Willows	Bixby Slough
savannah sparrow (Nevada form)	*Passerculus sandwiches navidensis*		X
plain titmouse	*Parus inornatuscina*	X	
wrentit	*Chamaea fasciata*	X	
Bewicks wren	*Thryomanes bewickii*	X	
ruby-crowned kinglet	*Regulus calendula*	X	
orange-crowned warbler	*Vermivora celata*	X	
Nashville warbler	*Vermivora ruficapilla*	X	
myrtle warbler	*Dendroica coronata*	X	
black-throated grey warbler	*Dendroica nigrescens*	X	
Wilsons warbler	*Wilsonia pusilla*	X	
western tanager	*Piranga ludoviciana*	X	
house finch	*Carpodacus mexicanus*	X	X
Annas hummingbird	*Calypte anna*	X	
Allens humming-bird	*Selasphorous sasin*	X	
red-shouldered hawk	*Buteo lineatus*	X	
red-tailed hawk	*Buteo jamaicensis*		X

Common Name	Scientific Name	The Willows	Bixby Slough
cabbage butterfly	*Pieris rapae*	X	X
mourning cloak butterfly	*Nymphalis antiopa*		X
ants	fam. *Formicidae*	X	X
orbweaver spider	fam. *Araneidae*	X	
crayfish	fam. *Astacidae*		X
Ca. side blotched lizard	*Uta stansburiana hesperis*	X	X
pacific tree frog	*Hyla regilla*	X	
myrtle warbler	*Dendroica coronata*	X	
Ca. least tern	*Sterna antillarum* (=*albifirons*) *browni*		X
Ca. gull	*Larus californicus*		X
green heron	*Butorides irescens*		X
loggerHead shrike	*Lanius ludovicianus*		X
mourning dove	*Zenaidura macroura*	X	X
common bushtit	*Psaltriparus minimus*	X	X
black phoebe	*Sayornis nigricans*	X	X
mocking bird	*Mimus polyglottos*	X	X
red-winged blackbird	*Agelaius phoeniceus*		X
brewers blackbird	*Euphagus cyanocephalus*		X
red-shafted flicker	*Colaptes cafer*		X
brown towhee	*Pipilo fuscus*		X
song sparrow	*Melospiza melodia*		X

The following species have been reported in the Willows by Sherrie Roberts and John Atwood.

Sherrie Roberts	
fennel	Foeniculum vulgare
rush	Juncus ssp.
wild oats	Avena fatua
salt bush	Atriplex ssp.
goose (or pig) foot	
cress	
daphnia	

John Atwood	
white-crowned sparrow	Fonorichia leucophrys
audubon's warbler	Pendroica aubudoni
orange-crowned warbler	Vermivora celata
lesser goldfinch	Spinus psaltria
brown-headed cowbird	Molothrus ater
house wren	Troglodytes aedon
hermit thrush	Hylocichla guttata
house sparrow	Passer domesticus
fox sparrow	Passerella iliaca
rock dove	Columba linia
Lincoln's sparrow	Melospiza lincolnii
common crow	Corous brachychynchos
ring-necked pheasant	Phasianus colchicus
ash-throated flycatcher	Myiarchus cinerascens
starling	Sturnus vulgaris

water pipit	Anthus spinoletta
cinnamon teal	Anas lyanoptera
American goldfinch	Spincus tristis
western meadowlark	Sturnella neglecta
American kestrel	Falco sparnerius
ring-billed gull	Larus delawarensis
pintail duck	Linas acuta
green-winged teal	Anas caroliensis
killdeer	Charadrius vaciferus
Virginia rail	Rallus limicola
Sora rail	Porzana carolina
spotted dove	Streptopelia chinerisis
American wigeon	Mareca americana
common snipe	Capella gallinago
American bittern	Botaurus lentigenosus
hooded oriole	Icterus cucullatus
black-chinned hummingbird	Archilochus alexandri
yellow throat	Geothlypis trichas
townsend's warbler	Dendroica townsendi
yellow warbler	Dendroica petechia
warbling vireo	Vireo gilvus

Interstate 110 Freeway Transit
HARBOR FREEWAY CORRIDOR

appendix g

PHYSICAL ENVIRONMENTAL REPORT

This appendix supplies detailed information about the current air quality, noise, and energy consumption in the Harbor Freeway Corridor and how the various alternatives of the Harbor Freeway Corridor Transitway will impact these items.

PHYSICAL ENVIRONMENTAL REPORT

AIR QUALITY, NOISE, ENERGY, WATER QUALITY AND SOLID WASTES

Route 110 Transportation Corridor
Between
Ports O' Call (Route 47)
And
Route 10
In
Los Angeles County

California Department Of Transportation
District 7
Environmental Investigations Section

PHYSICAL ENVIRONMENTAL REPORT

Air Quality, Noise,

Energy Consumption,

Water Quality and Solid Wastes

Harbor Freeway (Route 110)

Transportation Corridor

Between

Ports O' Call (Route 47)

and

Route 10

in

Los Angeles County

District 07

Environmental Investigation Section

Environmental Planning Branch

California Department of Transportation

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The California Department of Transportation is considering a wide range of alternatives for improving transportation services on the Harbor Freeway Corridor between San Pedro and the Los Angeles Central Business District.

These improvements range from "no project" and upgrading of bus service (TSM) to the major improvements of bus/high occupancy vehicle (Bus/HOV) and various rail alternates. The Bus/HOV and rail alternates would have separate transitway/guideway within the existing freeway centerline for most alternates.

This report assesses the impact the various transportation improvements would have on the physical environment (air quality, noise, energy consumption, water quality and solid waste).

The study area will be generally referred to in this report as the Harbor Freeway Corridor even though one of the rail alternates would be located on Vermont Avenue, a parallel major street westerly of the freeway.

The improvements in the corridor are intended to be operational by the year 1995.

LOCATION MAP

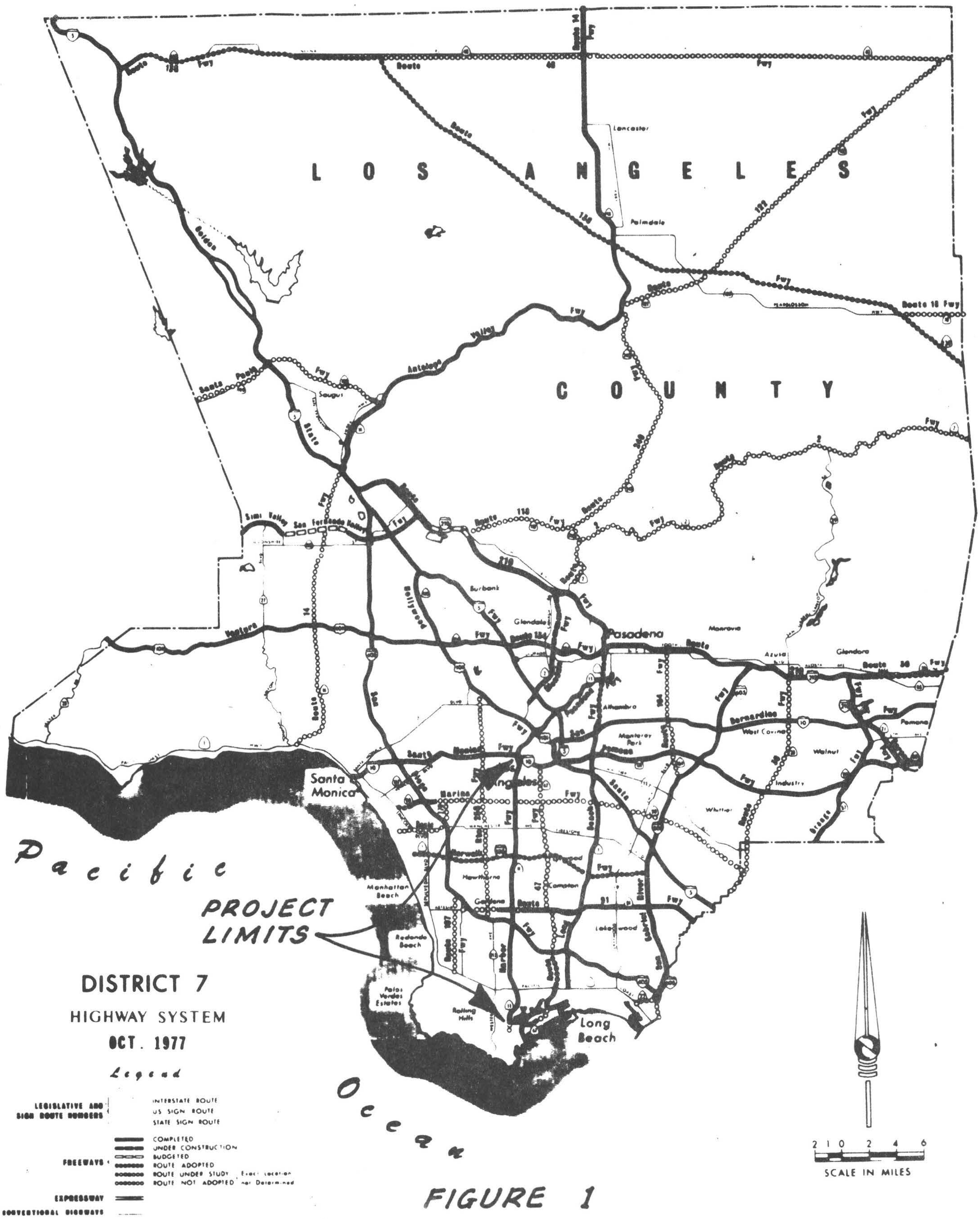


FIGURE 1

PROJECT DESCRIPTION

This report addresses 13 alternates along the Harbor Freeway and 1 alternate along Vermont Avenue. The limits of the study extend from Ports O' Call in San Pedro to Route 10 in the Central Business District of Los Angeles.

The 13 alternates along the Harbor Freeway are located in the centerline of the freeway either at-grade or elevated above the freeway or a combination of both.

The Vermont Avenue alternate is located in the median of that street on an elevated guideway between Ports O' Call and Gage Avenue. Northerly of Gage Avenue the alternate would be located in a subway section.

A description of the alternates follows:

- No Project
- TSM
- Bus/HOV 1 - All aerial transitway
- Bus/HOV 4 - Combined aerial and at-grade transitway
- Bus/HOV 7 - All at-grade transitway
- Bus/HOV 8A - Peak direction - combined aerial and at-grade
- Bus/HOV 8B - Peak direction - all aerial
- LRT 1 - All aerial transitway
- LRT 4 - Combined aerial and at-grade
- LRT 7 - All at-grade transitway

ICTS 1 - All aerial transitway

ICTS 4 - Combined aerial and at-grade

ICTS 7 - All at-grade transitway

HRT 6 - Vermont Avenue alignment

For comparison purposes the Harbor Freeway Corridor has been divided into 3 air quality zones.

Zone 1 - Ports O' Call to Compton Boulevard

Zone 2 - Compton Boulevard to Colden Avenue

Zone 3 - Colden Avenue to Route 10

The existing freeway facility south of Route 405 has adequate future capacity, therefore all Bus/HOV alternates will be in mixed flow. North of Route 405 because of inadequate capacity, the freeway will have a separate guideway and/or roadway for all Bus/HOV alternates. All rail alternates will have guideway through the total length of the project.

The TSM alternate will use the existing freeway through the length of project with most improvements such as Park and Ride lots located off the freeway.

ENVIRONMENTAL SETTING

The Harbor Freeway Corridor Study area is a north-south route extending from the Los Angeles Harbor area (Ports O' Call) on the south to the Convention Center in the Los Angeles Central Business District (CBD) on the north. Most of the alignment is within the City of Los Angeles with a short section located in the unincorporated area of Los Angeles County. Within the reaches of this facility and its proposed improvements are most types of urban development. Beginning at Ports O' Call, development consists of large heavy industrial and commercial tracts to the San Diego Freeway (Route 405). Northerly of this area, extending to the CBD development is primarily light commercial/industrial, single and multiple family residential.

Within the limits of this project, the terrain is fairly level with natural drainage generally parallel to the corridor in a southerly direction.

The Harbor Freeway profile provides grade separations with major streets either cut or fill sections having a grade differential of approximately 23 feet. Vermont Avenue is a major city street located parallel to and westerly of the Harbor Freeway.

TRAFFIC PROJECTIONS

The traffic data required for these studies were furnished by the Los Angeles Regional Transportation Study (LARTS) Branch and the Public Transportation Branch.

The "operational plan" for the various transit alternates was provided by the Southern California Rapid Transit District (SCRTD) and its consultants, including Wilbur Smith and Associates.

Further discussion of traffic inputs are covered under the individual studies.

SUMMARY OF RESULTS

I. AIR QUALITY

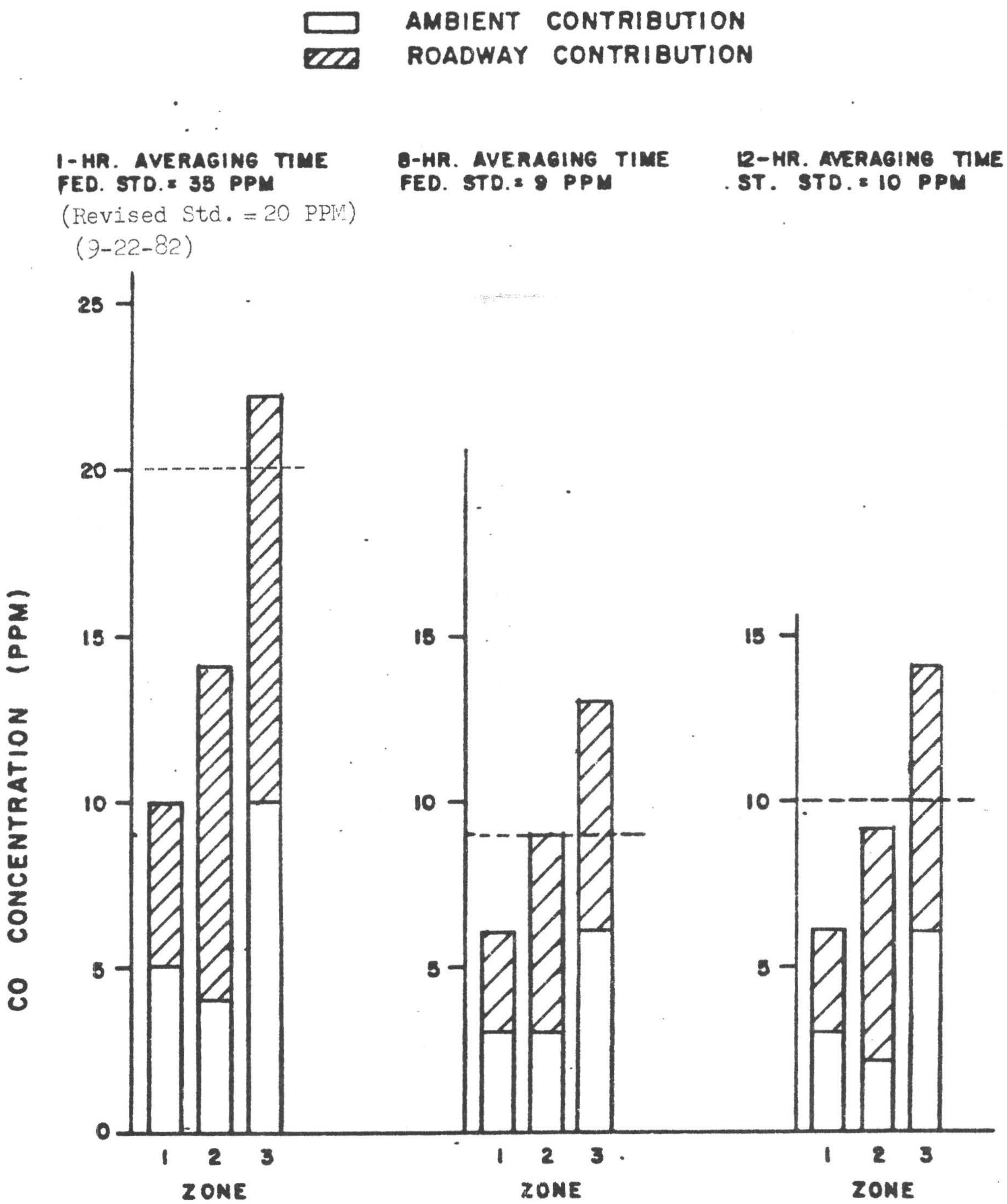
The results of this study lead to the conclusion that the construction of any of the proposed alternatives will cause no significant impact on air quality. The assessment of the CO impact on air quality was made for the microscale and mesoscale areas.

For purposes of assessing the air quality in the corridor, the project has been divided into three zones. Beginning at Ports O'Call, Zone 1 extends to Compton Boulevard, Zone 2 extends to Colden Avenue, and Zone 3 extends to the Route 10 Freeway. These zones are representative of changes in ambient air quality and traffic volumes throughout the corridor. The microscale analysis for 1995 was made for the no project, TSM, Bus/HOV, and rail alternatives. Forty-nine locations were selected to represent typical sensitive receptors adjacent to the freeway. The results of the analysis are shown in Figure 2. There were no significant differences between air quality impacts for various alternatives. All alternates will result in a 1-2 ppm reduction in CO for the 1-hour averaging time when compared to the no-project alternative. However, this slight reduction will not result in compliance with the eight and twelve hour standards in Zone 3. In this zone under "worst" case conditions, the National 8-hour and California 12-hour CO Standards would be exceeded at the closest receptors for all alternatives. The unlikely probability of "worst" case ever occurring is discussed elsewhere in the report.

The mesoscale analysis for the year 1995 was made for all alternatives. The analysis shows a decrease for the three primary

FIGURE 2

1995 MAXIMUM CO CONCENTRATION
AT NEAREST SENSITIVE RECEPTOR
FOR ALL ALTERNATIVES



ZONE 1 PORTS OF CALL TO COMPTON BLVD.
ZONE 2 COMPTON BLVD. TO COLDEN AVE.
ZONE 3 COLDEN AVE. TO ROUTE 10

pollutants, carbon monoxide (CO), reactive hydrocarbons (RHC), and nitrogen oxides (NO_x) for all build alternatives. (See Figure 3.) The bus and rail alternates achieve a reduction that is approximately double the TSM alternate.

An analysis was made for CO emissions at the park-and-ride lots. The results show the nearest receptors will receive an increase of about 5 ppm in the worst case and about 1 ppm in the most probable case during the evening peak hour from vehicles using the parking lot. This was based on an analysis of a park-and-ride lot with 1000 parking spaces and 600 cars exiting during the evening peak hour.

Lead, one of the more deleterious substances emitted by motor vehicle exhaust, was not quantified in the report. The primary source of airborne lead is the lead additive in gasoline. No significant change in lead concentrations is expected to occur as a result of these projects. Lead concentrations will be less of a problem in the future because of a program to gradually phase out lead additives in gasoline. Reductions in lead emissions can also be expected as older model vehicles are phased out in favor of newer models which utilize lead-free gasoline.

II. NOISE

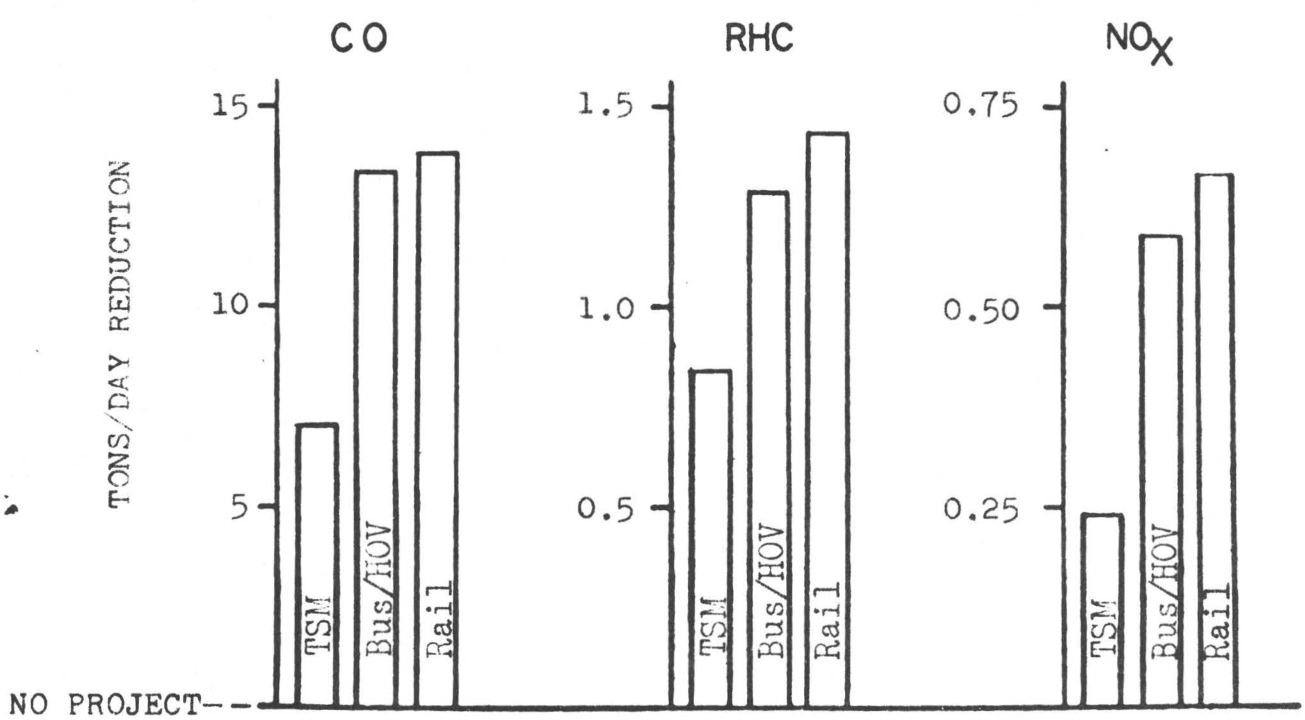
Existing noise levels at first line receptors along the Harbor Freeway are generally in excess of the FHWA design noise level of 67 dBA (L_{eq}). Noise levels will increase up to 3 dBA for the noisiest alternate (Light Rail #1).

FIGURE 3

ESTIMATED 1995 POLLUTION REDUCTION

IN TONS/DAY

IN THE ROUTE 110 CORRIDOR



Vermont Avenue does not have as high noise levels as the Harbor Freeway due to the much lower traffic volumes including trucks. However, noise sensitive receptors are much closer to Vermont Avenue therefore the impact of the heavy rail alternate on the noise environment will be substantially greater than any of the impacts on the Harbor Freeway. In addition satisfactory mitigation is not feasible on Vermont Avenue.

<u>Harbor Freeway Alignment</u>

Figure 6 shows the location of the 49 measurement sites along the Harbor Freeway. In addition the noise profile shows the predicted noise levels in 1995 for the no-project and the noisiest alternate (Light Rail Alternate #1). The noise levels of all of the remaining alternates fall between these extremes. The results indicate that in 1995, all project alternates including "no project" will in most cases equal or exceed the Federal Highway Administration (FHWA) design noise level of 67 dBA L_{eq} even though the actual impact of each alternative is relatively small. Therefore all of the build alternates will require mitigation at residential and other sensitive receptor locations. Reduction of the noise levels to or below 67 dBA L_{eq} standard can be accomplished with the construction of moderate height sound walls located on the freeway shoulder (fill sections) or at the right of way (cut sections) at the sensitive receptors along the Harbor Freeway. The estimated 1981 cost is $15 million dollars for 11 miles of sound wall.

<u>Vermont Avenue Alignment</u>

Figure 7 shows the location of the 25 measurement sites along the

Vermont Avenue alternative. The noise profile shows the no-project alternate and heavy rail transit alternate noise levels. Most of the sites will exceed the F.H.W.A. design noise level of 67 dBA (L_{eq}) with construction of the rail alternate. Mitigation by the construction of sound walls on the viaduct would not achieve significant noise reduction. Most locations would benefit by only a 1 to 3 dBA reductions. A 3 dBA or less reduction in noise levels is generally not noticeable to the average human ear. In order to achieve a significant noise reduction of at least 5 dBA it would be necessary to construct walls on Vermont Avenue as well as the viaduct. However, this is not practical because of the many access openings required.

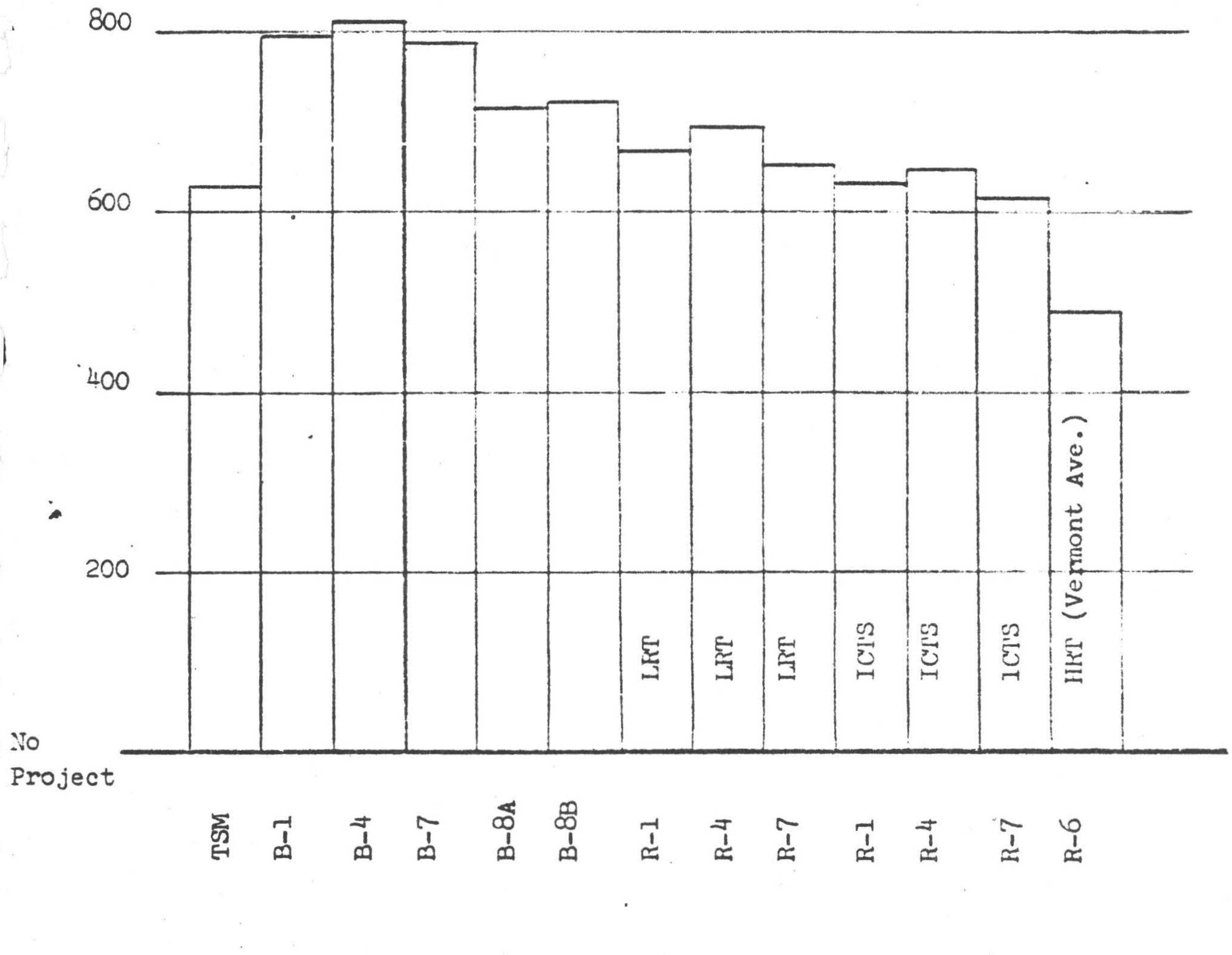
III. ENERGY CONSUMPTION

Table 1 shows a comparison of the energy consumption for the various alternates. All alternates are more efficient than the "no-project" alternate. Of the build alternates the most energy efficient proposals are the bus alternates followed closely by the rail alternates. The TSM and heavy rail on Vermont show the least energy savings.

For purposes of comparison all energy used, no matter what the source, is converted into equivalent barrels of oil (EBO). The results include direct and indirect energy consumption. Direct energy is the energy consumed to propel the vehicle while the indirect energy is the remaining energy consumed. Indirect energy includes constructing the vehicles and facilities, maintaining and replacing the vehicles and facilities, exploring for energy

TABLE 1

ENERGY SAVINGS IN BARRELS OF CRUDE OIL PER DAY



resources, power generation, mining or refining the fuel and transporting it to the user.

Daily savings of energy ranges between 490 EBO's for rail alternative 6 (Vermont Avenue) and 810 EBO's for bus alternative B-4. Although the energy consumption of the electric powered rail alternatives are indicated in barrels of oil, a number of other fuels could be used to generate the required electric energy.

The Los Angeles Department of Water and Power along with the Southern California Edison Company are the two chief suppliers of electrical energy for the region. Energy sources include hydroelectric and steam generating stations. The principle fuels for the steam generating plants are natural gas (when available) and low sulfur oil. The energy used for the electric rail alternates constitute less than 0.3% of the current 18 billion kilowatt-hours of electricity generated annually by the Los Angeles Department of Water and Power. In terms of peak-hour consumption, the rail lines would have a somewhat greater impact on the generating capacity because peak energy consumption for the household consumer occurs in the late afternoon corresponding closely with the evening rush hour traffic on the rail line. The Los Angeles Department of Water and Power forecasts future use of electricity will grow at a 2% annual rate and future capacity will be provided by two major coal fired projects located in eastern Nevada and Southern Utah.

The amount of fuel required annually to provide enough power to operate a rail system would range between 16,000 and 28,000 tons of coal, between 60,000 and 100,000 barrels of oil, or between 350 million and 590 million cubic feet of natural gas.

The energy consumption analysis of the rail and bus alternatives are based on operational plans furnished by Wilbur Smith and Associates and the Southern California Rapid Transit District. The transit portion of the analysis includes all of the transit energy consumption including feeder bus systems in the transportation corridor. The energy analysis for the vehicle miles travelled (VMT) reduction was performed using Energy 3 (corrected for 1981 dollars), a computerized model developed by the Transportation Laboratory of Caltrans for all rubber tired vehicles. VMT reduction was based on modeling performed by the Transportation Analysis and LARTS Branch of Caltrans.

IV. WATER QUALITY

There will be no significant impact on water quality in the study area during construction or operation of any of the alternates under consideration.

V. SOLID WASTE

There will be no significant effect on local or regional physical environment by solid wastes generated during construction or operation of any of the proposed alternates except the Vermont rail HRT 6. Construction of the subway portion of this alternate would generate 860,000 c.y. of material requiring disposal.

AIR QUALITY REPORT

This report addresses the impact the proposed project would have on the air environment. Figure 6 at the end of the report shows the location of the 49 calculation sites as well as the 4 measurement sites and the mechanical weather station. These 49 calculation sites are representative of all the adjacent sensitive receptors in the microscale area. This is the area immediately adjacent to the project along the Harbor Freeway. No separate analysis was made along Vermont Avenue for Alternate 6.

A corridor or mesoscale area analysis was made of emissions (burden) into the atmosphere using direct travel impact model (DTIM). DTIM is a regional travel impact model developed by Caltrans and ARB. The results are presented in tons per day on Table 9 in the analysis of results.

No further corridor analysis was deemed necessary since experience has shown that results on individual projects invariably show no significant difference between build and no-build alternatives.

Unless otherwise stated all quantities shown in this report are for the estimated completion date of 1995 with prediction being made for "worst" and "most probable" cases.

I. METEOROLOGY

The Route 110 Freeway lies within the South Coast Air Basin (SCAB), Figure 4, as defined by the California Air Resources Board (ARB). This basin was defined on the basis of similar meteorological and geographical conditions, as well as existing political boundaries.

AIR BASINS OF SOUTHERN CALIFORNIA

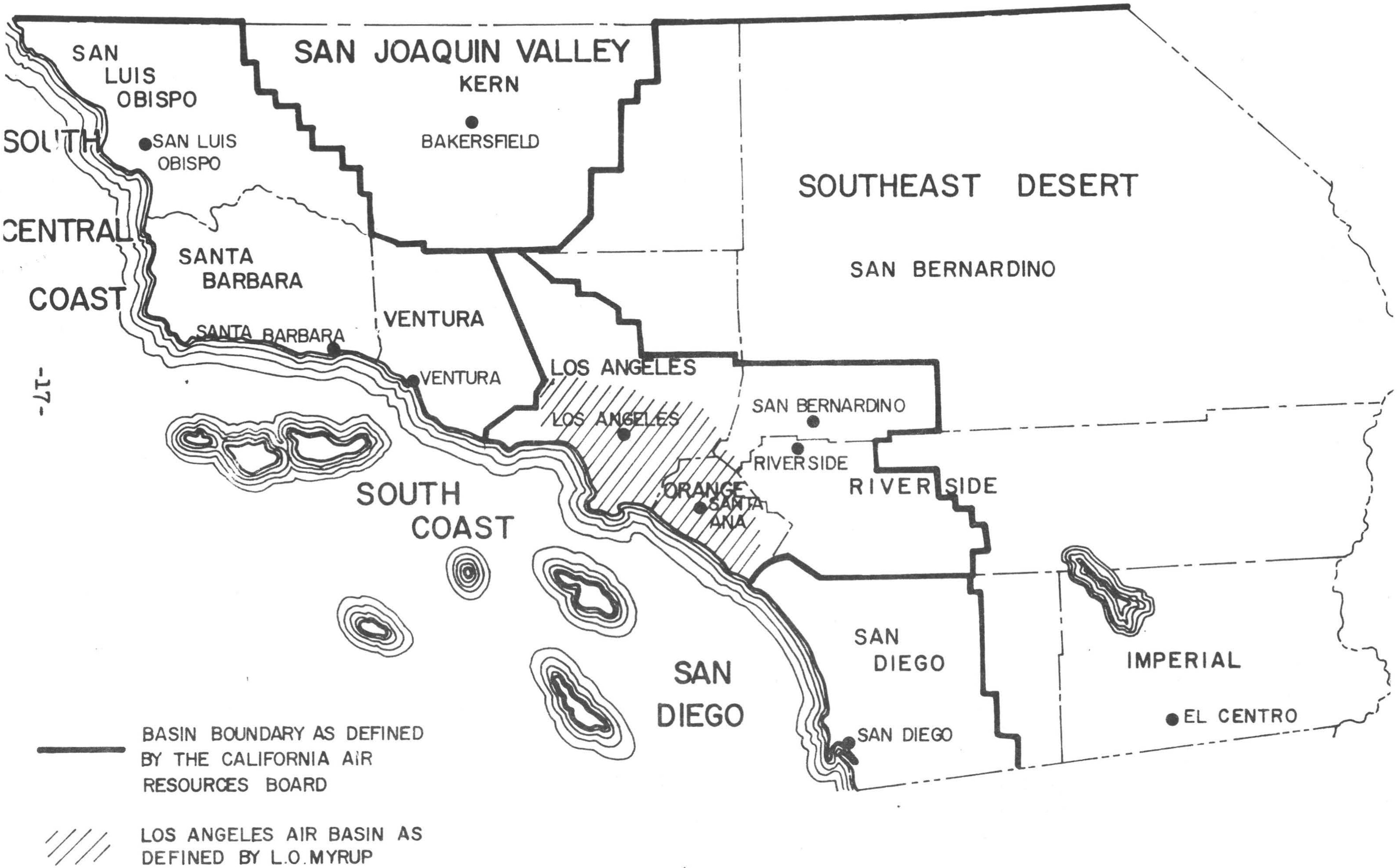


FIGURE 4

The limits of the basin were chosen to be readily identifiable as county lines or mountain crests. The area of the SCAB was made large enough to permit the organization of a regional air pollution control agency capable of dealing effectively with air pollution. The basin includes all of Orange County and portions of Los Angeles, San Bernardino and Riverside Counties.

Within the boundaries of the SCAB lies the Los Angeles Air Basin. It considers the similar meteorology and topography and disregards the political boundaries. It is estimated to contain 83% of the population in the SCAB and generates 65% of the daily vehicle mileage.

Local surface wind characteristics within the basin vary diurnally and seasonally. The prevailing daytime wind is usually an on-shore flow from the west. At night, light winds from a northeasterly sector drain across the project area.

During the summer months the sea breeze is generally stronger and provides greater transport quality. This breeze tends to move pollutants to more remote inland areas during the summer season. The on-shore flow begins early in the morning and continues into the evening. After midnight, the land breeze takes over with an opposite flow. The diurnal pattern is weighted strongly in favor of the daytime, on-shore flow. Typical daytime and nighttime streamlines are shown in Appendix B.

Wind reversals of a greater velocity occur temporarily preceding a cold frontal passage and occasionally 24 to 36 hours following the frontal passage. Preceding the frontal passage, winds vary from the southeast to southwest, veering to the northwest with passage of the front. Following passage of the front, a "Basin Cold High" sometimes settles in the Great Basin to the northeast of Southern California and the drainage winds from this high flow across the project area. Dry northeasterly winds are heated adiabatically by compression enroute from the higher altitudes of the basin to Southern California. These winds are known locally as "Santa Ana Winds."

To obtain data on wind speed, wind direction and temperature, Caltrans conducted its own survey. A Mechanical Weather Station was located within the Route 110 R/W. The site, which was located north of 49th Street and west of the freeway, was selected in an area clear of tall buildings or other structures that would interfere with normal air flow. The recording device was placed atop a 35'-40' mast. This height was above the surrounding canopy of trees and structures.

Wind roses (Figure 5) depicts conditions during the winter months for the A.M., midday and P.M. periods. Shown are speed, direction and percent occurrence for all stability classes.

The vertical temperature structure of the atmosphere near the ground surface has a great influence on how well ground releases of air pollutants are dispersed. Turner (4) developed a method to estimate, on an hourly basis, the atmosphere's ability to mix air pollutants near the ground surface. These estimates are measures of what is called surface atmospheric stability. They depend on wind speed,

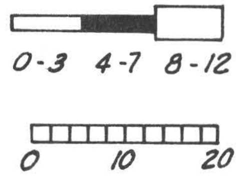
FIGURE 5

MICROSCALE WIND ROSES

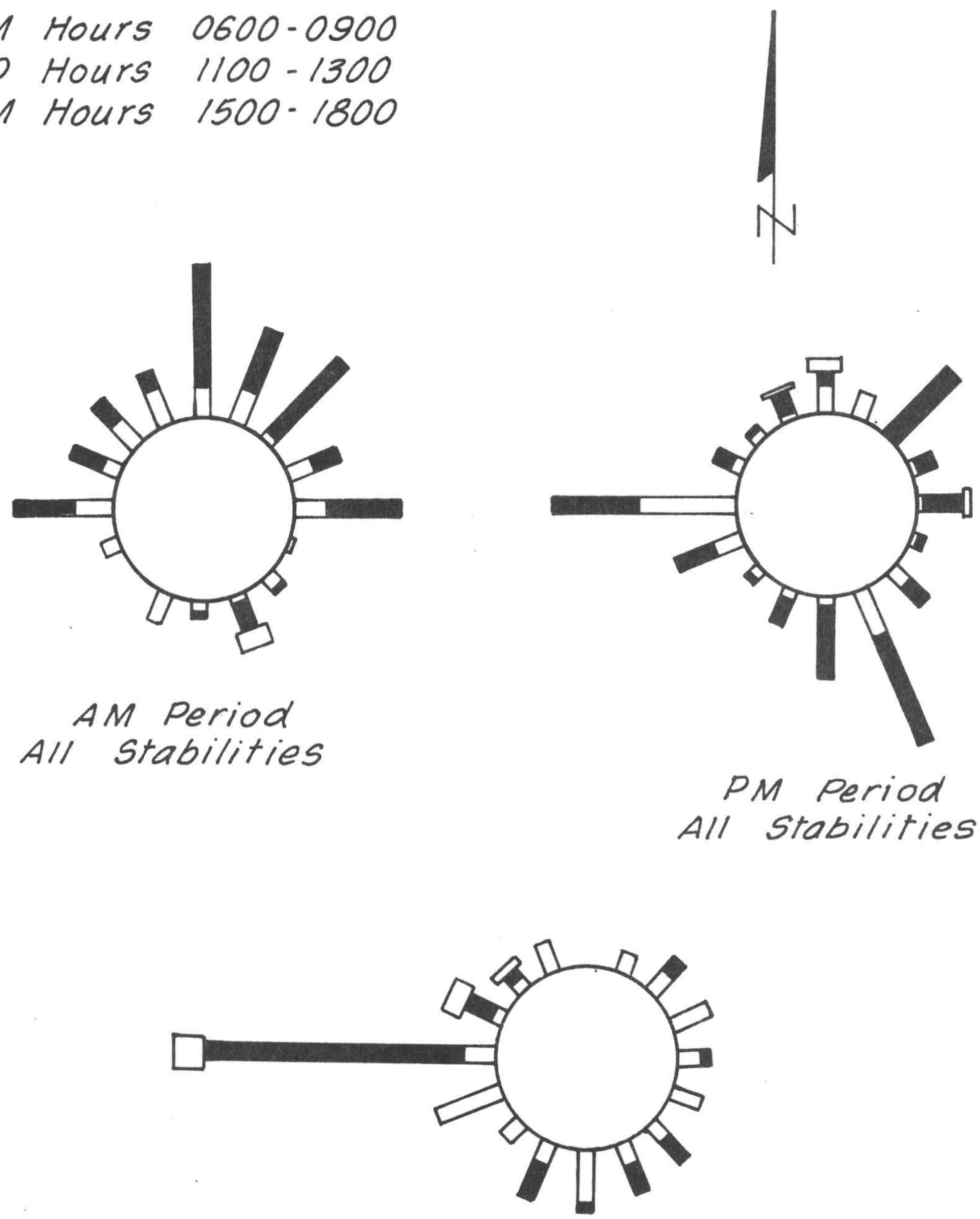
Location: Mechanical Weather Station No. 79
Period of Record: Nov. 1979 - Feb. 1980

Speed Class: (mph)

Scale: (% Occurrence)



AM Hours 0600-0900
MD Hours 1100-1300
PM Hours 1500-1800



amount of solar radiation, percent cloud cover, and ceiling height, time of day, month, and season of the year.

Stability estimates are categorized into classes ranging from A through F. Class A indicates a very unstable atmospheric condition resulting in good mixing with the air at higher levels. Class A is associated with light winds and strong solar radiation and is apt to occur during the midday hours of the warmer months. Class F, at the other extreme, indicates a very stable atmospheric condition with limited mixing so that pollutants emitted near the ground level tend to be trapped there. Class F is associated with light winds, clear skies, and is likely to occur from several hours after sunset through to the early morning hours. It is also associated with highest pollutant concentrations.

A Caltrans Report (8) was used to obtain data on the frequency of occurrence for all stability classes. The data on stability, wind speed and wind direction was used in the microscale analysis of the project.

II. AMBIENT AIR QUALITY

For the purpose of this report, ambient air quality is defined as the concentration of a pollutant at any location that is not being influenced by a single local pollutant source. To predict the impact of a transportation project on the air quality of the proposed project area, the predicted net effects of the new source of air pollutants will be added to the ambient air quality.

Ambient CO concentrations were obtained by bag sampling the air at various sites along the route. Figure 6 at the end of this report shows the locations of the sampling sites. The locations were selected to represent the project area and avoid significant single source influences. The location of the CO sampling sites are as follows:

Bag Site A - Identified as Bag Site #2 in previous report (8)

Bag Site B - Identified as Bag Site #4 in previous report (9)

Bag Site C - Vernon School

Bag Site D - 61st Street School

The on-site air sampling program measured CO hourly at all sites. Sites A and B were sampled for a continuous 12-hour period that included the AM, MD, and PM peak periods. Site A was sampled every third day from 4/17/73-2/28/75 and Site B on various days from 8/15/72-3/31/73. Sites C and D were sampled midnight to midnight every other day from January 79 to April 80. The one-hour sampling time was used because it provides values needed for comparison with the State and Federal Ambient Air Quality Standards.

Results of the air sample program are on file in the Environmental Investigation Section, Caltrans, District 07. The maximum levels occurred during the late morning and evening hours. The most frequent and maximum recorded values of CO in PPM for each site are as follows:

Site	Most Frequent	Maximum
A	2-3	34
B	2-3	22
C	1-2	27
D	1-2	24

The National and California Ambient Air Quality Standards for CO 1-hour were not exceeded at any of the four sites. However, both the National 8-hour and California 12-hour CO standards were exceeded at all of the sites. Applicable standards are shown in Table 2.

III. VEHICLE EMISSIONS

Concentrations of CO are chosen as the indicator of impact in the microscale area because of the relative inertness of the gas. This characteristic makes it possible to reliably predict dispersion and transport to receptors adjacent to the alternatives and also permits comparison of the estimated concentrations with ambient air quality standards.

NO_x and HC are not considered in the microscale because they are unstable and soon react or undergo change to become secondary pollutants. While concentrations of NO from the freeway are predictable for some time following emission, concentrations of NO_2 for which there is an ambient air quality standard are not directly predictable from conventional nonreactive models. Because of the instability and the variables that affect transformation, the origin of these primary emission concentrations or their secondary products found near the freeway cannot be reliably defined. Therefore, the freeway's impact

TABLE 2

AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Oxidant[10]	1 hour	0.10 ppm (200 ug/m^3)	Ultraviolet Photometry	—	—	—
Ozone	1 hour	—	—	240 ug/m^3 (0.12 ppm)	Same as Primary Standard	Chemiluminescent Method
Carbon Monoxide	12 hour	10 ppm (11 mg/m^3)	Non-Dispersive Infrared Spectroscopy	—	Same as Primary Standards	Non-Dispersive Infrared Spectroscopy
	8 hour	—		10 mg/m^3 (9 ppm)		
	1 hour	40 ppm (46 mg/m^3)		40 mg/m^3 (35 ppm)		
Nitrogen Dioxide	Annual Average	—	Saltzman Method	100 ug/m^3 (0.05 ppm)	Same as Primary Standards	Gas Phase Chemiluminescence
	1 hour	0.25 ppm (470 ug/m^3)		—		
Sulfur Dioxide	Annual Average	—	Conductimetric Method	80 ug/m^3 (0.03 ppm)	—	Paraosanilline Method
	24 hour	0.05 ppm (131 ug/m^3)[9]		365 ug/m^3 (0.14 ppm)	—	
	3 hour	—		—	1300 ug/m^3 (0.5 ppm)	
	1 hour	0.5 ppm (1310 ug/m^3)		—	—	
Suspended Particulate Matter	Annual Geometric Mean	60 ug/m^3	High Volume Sampling	75 ug/m^3	60 ug/m^3	High Volume Sampling
	24 hour	100 ug/m^3		260 ug/m^3	150 ug/m^3	
Sulfates	24 hour	25 ug/m^3	AIHL Method No. 61	—	—	—
Lead	30 day Average	1.5 ug/m^3	AIHL Method No. 54	—	—	—
	Calendar Quarter	—	—	1.5 ug/m^3	1.5 ug/m^3	Atomic Absorption
Hydrogen Sulfide	1 hour	0.03 ppm (42 ug/m^3)	Cadmium Hydroxide Stractan Method	—	—	—
Hydrocarbons (Corrected for Methane)	3 hour (6-9 a.m.)	—	—	160 ug/m^3 (0.24 ppm)	Same as Primary Standards	Flame Ionization Detection Using Gas Chromatography
Vinyl Chloride (Chloroethene)	24 hour	0.010 ppm (26 ug/m^3)	Gas Chromatography (ARB staff report 78-8-3)			
Ethylene	8 hour	0.1 ppm	—	—	—	—
	1 hour	0.5 ppm				
Visibility Reducing Particles	1 observation	In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70%	(8)	—	—	—
APPLICABLE ONLY IN THE LAKE TAHOE AIR BASIN:						
Carbon Monoxide	8 hour	6 ppm (7 mg/m^3)	NDIR	—	—	—
Visibility Reducing Particles	1 observation	In sufficient amount to reduce the prevailing visibility to less than 30 miles when the relative humidity is less than 70%	(8)	—	—	—

(FOOTNOTES ON REVERSE SIDE)

TABLE 2 (continued)

NOTE:

1. California standards are values that are not to be equaled or exceeded.

2. National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of Hg (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent procedure which can be shown to the satisfaction of the Air Resources Board to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the Environmental Protection Agency.(EPA).

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after implementation plan is approved by the EPA.

7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

8. Prevailing visibility is defined as the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

9. At locations where the state standards for oxidant and/or suspended particulate matter are violated. National standards apply elsewhere.

10. Measured as ozone.

on these pollutant concentrations cannot be accurately determined in the microscale region.

IV. METHODOLOGY

The microscale analysis estimates the concentration of CO near a roadway where vehicular emissions from the roadway cause ambient concentrations to be measurably affected. Future pollutant concentrations from vehicles on the roadway, when added to future ambient pollutant concentrations produce the future concentrations of pollutant impacting a roadside receptor.

The CO data for each site was entered into a mathematical model developed by Larsen (11). Dr. Larsen, through his investigation, determined that pollutant concentration are generally lognormally distributed for all averaging times. Larsen's program computes a frequency distribution from which a curve is plotted on probability two log cycle paper to check for lognormality. The data for all the sites were lognormal. Larsen's programs also calculates the expected maximum for 1, 8 and 12 hour averaging time. From the expected maximum, the 1995 expected maximum was predicted. This was accomplished by using the methodology in the air quality manual (2). The analysis for predicting future pollutant concentrations in the microscale is limited to CO because of its relative inertness.

The mesoscale analysis compares the amount of vehicular pollutants that would be emitted into the Los Angeles Air Basin by all alternatives. A corridor analysis was made for the various alternatives with a computer program (DTIM).

The DTIM model calculates emissions from transportation sources using emission factors, traffic and meteorological data as input. It divides the Los Angeles Air Basin into 5 kilometer square grid cells and computes the emissions for AM peak, PM peak, and off-peak periods for each grid cell within the corridor. The total of the three periods is the emissions in tons per day. The emissions factors used are the same as those used in CALINE3. The traffic data is the vehicle miles traveled at different speeds during the different periods.

Since electrical power for the rail alternatives is generated outside the corridor study area, the pollutant emissions for this power must be added to the rail study area emission for a comprehensive analysis of total emissions in the basin.

A. Traffic Data

All traffic data projections were furnished by the Los Angeles Regional Transportation Study (LARTS) group of Caltrans, District 07, Transportation Planning Branch. These estimates cover the year 1980 and 1995.

Besides the traffic volume, the estimate also provided speeds, vehicle mix (percent light duty vehicles, medium duty vehicles, motorcycles, heavy duty gasoline and diesel) and the operational condition (percent cold start, hot start and hot stabilized). These data were used in the dispersion model (CALINE3) and the emission factor program (EV028A). The 1995 Freeway Traffic Data are shown in Appendix C.

B. Emission Factors

The emission factors used in the report were developed by the Environmental Protection Agency (3), modified and updated for use in California by the California Air Resources Board, and are shown in Appendix C. Assumptions used were: cold starts 6%, hot starts 2% and ambient temperature 66° F.

C. Meteorological Data

In the microscale analysis each site was evaluated for "worst case" and also "most probable" conditions. These conditions are shown in Table 3.

A sensitivity search using CALINE3 was made to determine worst wind angle for each of the typical receptors. Additional data on wind speed and direction was obtained from the meteorological station. Stability class information was obtained from a previous report (8).

TABLE 3

Worst Case/Most Probable

Meteorological Conditions

Condition	Descriptor	AM	MD	PM
Worst Case	Wind speed (mph)	2	2	2
	Wind angle (azimuth)	Worst	Worst	Worst
	Stability class	F	D	F
Most Probable	Wind speed (mph)	5	5	5
	Wind angle	0	270	160
	Stability class	D	D	D

D. Geometrics

Geometrics refers to the vertical and horizontal relationships between source and receptor. The vertical components are related to roadway cross-sectional type (cut, at-grade, fill) and the elevation above or below the surrounding terrain. The receptor height used was 5' above the local ground elevation. The horizontal components of the roadway are a series of "links" composed of roadway widths, and X, Y coordinates for receptors and the beginning and ending of each roadway "link."

V. ANALYSIS OF RESULTS

The microscale study produces the total CO concentrations estimated to occur at sensitive receptors nearest to the project alternatives. Both "worst case" and "most probable" data were used in the studies performed. The results of "worst case" are shown in Tables 4 through 7 for the 1, 8 and 12 hour averaging periods for each of the alternates. While the results at each individual site are not shown, the range of volumes in each zone are shown. The results under the "worst case" indicate there will be no exceedance for the 1 hour standard. The 8-hour and 12-hour standard is exceeded in Zone 3 for all alternates.

There will be no exceedances in any zone for CO standards under "most probable" conditions. The results of roadway contribution for the 1-hour averaging time comparing "most probable" versus "worst case" are shown in Table 8. There is no difference in PPM between alternates in each zone for the "most probable" condition. "Worst case" conditions, however, indicate a maximum reduction of 1 PPM in

Zones 1 and 2 for all alternates. Zone 3 shows a 2 PPM reduction for the 1-hour averaging time for the Bus/HOV alternate.

The results of the mesoscale study are shown in Table 9. The TSM alternate reduces the corridor burden by approximately 1% while the Bus/HOV and Rail alternates provide approximately a 2% reduction.

TABLE 4

Maximum CO Concentrations

No Project

	AVERAGING TIME (HOURS)	ROADWAY CONTRIBUTION (PPM)	AMBIENT (PPM)	TOTAL (PPM)
Zone #1 (Range Sites 1-18)	1	2-5	5	7-10
	8	1-3	3	4-6
	12	1-3	3	4-6
Zone #2 (Range Sites 19-27)	1	3-9	4	7-13
	8	2-6	3	5-9
	12	2-7	2	4-9
Zone #3 (Range Sites 28-48)	1	3-12	10	13-22
	8	2-7	6	8-13
	12	2-8	6	8-14

TABLE 5

Maximum CO Concentrations PPM

TSM

	AVERAGING TIME (HOURS)	ROADWAY CONTRIBUTION (PPM)	AMBIENT (PPM)	TOTAL (PPM)
Zone #1 (Range Sites 1-18)	1	2-5	5	7-10
	8	1-3	3	4-6
	12	1-3	3	4-6
Zone #2 (Range Sites 19-27)	1	3-10	4	7-14
	8	2-6	3	5-9
	12	2-7	2	4-9
Zone #3 (Range Sites 28-48)	1	3-11	10	13-21
	8	2-7	6	8-13
	12	2-8	6	8-14

TABLE 6

Maximum CO Concentrations PPM

Bus/HOV

	AVERAGING TIME (HOURS)	ROADWAY CONTRIBUTION (PPM)	AMBIENT (PPM)	TOTAL (PPM)
Zone #1 (Range Sites 1-18)	1	2-4	5	7-9
	8	1-3	3	4-6
	12	1-3	3	4-6
Zone #2 (Range Sites 19-27)	1	3-9	4	7-13
	8	2-6	3	5-9
	12	2-6	2	4-8
Zone #3 (Range Sites 28-48)	1	3-10	10	13-20
	8	2-7	6	8-13
	12	2-7	6	8-13

TABLE 7

Maximum CO Concentrations PPM

Rail

	AVERAGING TIME (HOURS)	ROADWAY CONTRIBU-TION (PPM)	AMBIENT (PPM)	TOTAL (PPM)
Zone #1	1	2-4	5	7-9
(Range Sites 1-18)	8	1-3	3	4-6
	12	1-3	3	4-6
Zone #2	1	3-9	4	7-13
(Range Sites 19-27)	8	2-5	3	5-8
	12	2-6	2	4-8
Zone #3	1	3-11	10	13-21
(Range Sites 28-48)	8	2-7	6	8-13
	12	2-8	6	8-14

TABLE 8

Roadway CO Contribution

1-Hour Averaging Time in PPM

Most Probable/Worst Case

	NO PROJECT	TSM	BUS/HOV	RAIL
Zone 1	2/5	2/5	2/4	2/4
Zone 2	3/9	3/9	3/9	3/8
Zone 3	3/12	3/11	3/10	3/11

TABLE 9

Pollution Burden in Corridor

Tons/Day

	CO	RHC	NO	SOX	PARTIC-ULATES
No Project	515	52	37	4.5	8.7
TSM	508	51	37	4.4	8.5
Bus/HOV	502	51	36	4.4	8.4
Rail	501	50	36	4.3	8.4

NOISE REPORT

A noise study was made of the alternates along the Harbor Freeway corridor and the Vermont Avenue corridor.

This study assesses impacts of the alternates for the year 1995. Traffic estimates for the 1995 study year for all alternates was supplied by the LARTS Branch of Caltrans.

All measurements and predictions conform to Federal Highway Program Manual (FHPM) 7-7-3.

I. EXISTING NOISE LEVELS

A. Measurement

Existing noise levels were measured at the most representative sites within the limits of the project. The site locations are shown on Figures 6 and 7 at the end of the report. A 10-minute noise level recording was used to represent the noise environment for a 1-hour period at each site. Noise levels were recorded in the L_{eq} descriptor. The L_{eq} descriptor is described in terms of a constant noise level which would provide an equivalent total amount of acoustical energy for the given situation and time period.

A total of 49 sites were measured along the Harbor Freeway corridor including 16 at proposed station locations. Twenty five sites were measured along the Vermont Avenue alignment.

B. Instrumentation

The instrumentation consisted of a Noise Level Analyzer (Type 4426) and a Graphic Level Recorder (Type 4220) both manufactured by Bruel and Kjaer Company. The equipment was calibrated at the beginning and end of each day. The accuracy of the calibrator is maintained through a program established by the manufacturer, and is traceable to the National Bureau of Standards. All instrumentation meets the requirements of the American National Standards Institute Standard S 1.4-1971 and the International Electrotechnical Commission Publication 123, 1961.

The measurement strip charts produced by the graphic level recorder are on file with the Department of Transportation, District 07, Environmental Investigation Section.

II. PREDICTION METHODOLOGY

Noise predictions were determined using the F.H.W.A. Highway Traffic Noise Prediction Model (F.H.W.A.-RD-77-108), December 1978. The parameters for this prediction model include traffic data, topographical relationship of noise source to receptor and roadway geometrics. Sound level calculations (using computer model) were done for the year 1981 and 1995. This noise analysis, in terms of L_{eq} noise descriptor, meets the Federal criteria for residential facilities (Category B).

Noise predictions for the rail alternates were made using the commonly accepted peak levels for the various systems and applying formulas developed by L. G. Kurzweil in "Prediction of Community Noise for Rail Systems." The formula provided a method of computing L_{eq} for a single event and the summing of the number of events during the peak noise hour. The resulting L_{eq} is then added to the existing roadway noise by decibel addition to obtain the total noise level for the particular site.

III. ANALYSIS OF RESULTS

A. Harbor Freeway Alignment

In addition to Figure 6, Table 11 lists the 49 measurement sites as well as the measured and predicted (1995) noise levels for each alternate. The measurements were representative of all first line sensitive receptors within the project limits which include residential areas, schools, churches, hospitals as well as historic sites.

The 1995 noise levels will increase by 1 to 3 dBA depending on which alternate is chosen. The majority of sites will exceed the F.H.W.A. design noise level of 67 dBA for all alternates including the no-project alternative.

Noise barriers are a feasible mitigation measure and should be required for all build alternatives.

1. Alternate Transit Systems

a. No Project

The "No Project" alternative reflects the noise levels expected to be generated by 1995 traffic on the existing facility. These are expected to be about 1 dBA above existing noise levels.

b. Bus/HOV

Bus/HOV variations No. 1 and 8-B provide for an aerial roadway throughout the length of project. This variation is the noisiest of the bus/HOV alternatives.

TABLE 11

ANALYSIS OF ALTERNATE TRANSIT SYSTEMS

Sheet 1 of 4

			1995 ESTIMATED NOISE LEVELS									
			T.S.M.	BUS/HOV			L.R.T.			I.C.T.S.		
SITE	LOCATION	EXIST. MEAS.	& NO PROJ.	ALT. 1 & 8B	ALT. 4 & 8A	ALT. 7	ALT. 1	ALT. 4	ALT. 7	ALT. 1	ALT. 4	ALT. 7
1	Figueroa Place at Arabic Street	66	67	67	67	67	69	67	67	67	67	67
2	Figueroa Street at Arabic Street	65	66	66	66	66	68	66	66	66	66	66
3	Figueroa Street at Denni Street	70	71	71	71	71	71	71	71	71	71	71
4	Mobile Home Park south of Lomita	71	72	72	72	72	72	72	72	72	72	72
5	Menlo Avenue south of Belson St.	68	69	69	69	69	70	70	70	69	69	70
6	Orchard Street north of 228th St.	65	66	66	66	66	68	68	67	66	66	66
7	South of 223rd St. west of Freeway	67	68	68	68	68	69	69	69	68	68	68
8	Figueroa Street north of 223rd St.	64	65	65	65	65	67	67	67	65	65	65
9	220th Street west of Freeway	67	68	68	68	68	69	69	69	68	68	68
10	215th Street east of Freeway	70	71	71	71	71	72	72	71	71	71	71
11	Eastbound Artesia/northbound 110 connector	75	76	76	76	76	76	76	76	76	76	76
12	Westbound Artesia/southbound 110 Connector	74	75	75	75	75	75	75	75	75	75	75
13	168th Street near Figueroa Street	67	68	69	68	68	69	68	68	68	68	68

TABLE 11 (continued)

ANALYSIS OF ALTERNATE TRANSIT SYSTEMS

			1995 ESTIMATED NOISE LEVELS									
			T.S.M.	BUS/HOV			L.R.T.			I.C.T.S.		
SITE	LOCATION	EXIST. MEAS.	& NO PROJ.	ALT. 1 & 8B	ALT. 4 & 8A	ALT. 7	ALT. 1	ALT. 4	ALT. 7	ALT. 1	ALT. 4	ALT. 7
14	Estrella Avenue/south of Gardena Boulevard	65	66	67	67	67	67	66	66	66	66	66
15	Alondra Boulevard east of Freeway	72	73	73	73	73	73	73	74	73	73	73
16	Alondra Boulevard west of Freeway	73	74	74	74	74	74	74	75	74	74	74
17	157th Street near Bonsallo Avenue	72	73	73	73	73	73	73	73	73	73	73
18	154th Street near Bonsallo Avenue	68	69	69	69	69	70	69	69	69	69	69
19	Hoover Street north of 149th Drive	67	68	69	68	68	69	68	68	68	68	68
20	Rosecrans Avenue at Estrella Ave.	73	74	74	74	74	74	74	74	74	74	74
21	Rosecrans Avenue at Hoover Street	72	73	73	73	73	73	73	73	73	73	73
21-A	Hoover Street near 140th Street	63	64	66	66	64	67	67	66	64	64	64
22	127th Street west of Freeway	65	66	67	67	66	68	68	66	66	66	66
23	Grand Avenue north of 109th Place	70	71	71	71	71	72	72	71	71	71	71
24	Grand Avenue near 103rd Street	69	70	70	70	70	71	71	70	70	70	70
25	Southbound Freeway Off Ramp @ Century Boulevard	72	73	73	73	73	73	73	73	73	73	73

TABLE 11 (continued)

ANALYSIS OF ALTERNATE TRANSIT SYSTEMS

			1995 ESTIMATED NOISE LEVELS									
			T.S.M.	BUS/HOV			L.R.T.			I.C.T.S.		
SITE	LOCATION	EXIST. MEAS.	& NO PROJ.	ALT. 1 & 8B	ALT. 4 & 8A	ALT. 7	ALT. 1	ALT. 4	ALT. 7	ALT. 1	ALT. 4	ALT. 7
26	Northbound Freeway On Ramp @ Century Boulevard	71	72	72	72	72	72	72	72	72	72	72
27	Grand Avenue near 94th Street	69	70	70	70	70	71	70	70	70	70	70
28	Grand Avenue near 88th Street	69	70	70	70	70	71	70	70	70	70	70
29	Southbound Off Ramp @ Manchester	70	71	71	71	71	71	71	71	71	71	71
30	Northbound On Ramp @ Manchester	70	71	71	71	71	71	71	71	71	71	71
31	Flower Street @ 59th Street	69	70	70	70	70	71	70	70	70	70	70
32	Grand Avenue @ 60th Street	70	71	71	71	71	71	71	71	71	71	71
33	Southbound On Loop @ Slauson Ave.	70	71	71	71	71	71	71	71	71	71	71
34	Northbound Off Ramp @ Slauson Ave.	70	71	71	71	71	71	71	71	71	71	71
35	Flower Street @ 56th Street	72	73	73	73	73	73	73	73	73	73	73
36	Grand Avenue @ 56th Street	70	71	72	72	71	72	73	72	71	71	71
37	Flower Street near 42nd Street	68	69	70	70	70	70	71	70	69	69	69
38	At West Vernon School	64	65	67	67	66	67	68	67	65	65	65

TABLE 11 (continued)

ANALYSIS OF ALTERNATE TRANSIT SYSTEMS

			1995 ESTIMATED NOISE LEVELS								
			T.S.M.	BUS/HOV			L.R.T.			I.C.T.S.	
SITE	LOCATION	EXIST. MEAS.	& NO PROJ.	ALT. 1 & 8B	ALT. 4 & 8A	ALT. 7	ALT. 1	ALT. 4	ALT. 7	ALT. 1	ALT. 4
39	Grand Avenue @ 41st Place1	66	67	68	68	68	68	69	68	67	67
40	Flower Street and 41st Street	70	71	71	71	71	71	71	71	71	71
41	Northbound Off Ramp @ Santa Barbara	69	70	70	70	70	71	70	70	70	70
42	Southbound Off Ramp @ Santa Barbara Avenue	69	70	71	70	70	71	70	70	70	70
43	Flower Street near 38th Street	63	64	66	66	65	66	65	65	64	64
44	Hope Street near 37th Street	69	70	71	70	70	71	70	70	70	70
45	Southbound Off Ramp @ 37th Street	69	70	71	71	70	71	70	70	70	70
46	Southbound Off Ramp @ Exposition Boulevard	67	68	69	69	69	69	68	68	68	68
47	Hope Street @ 33rd Street	65	66	67	67	67	67	66	66	66	66
48	Flower Street @ 33rd Street	72	73	73	73	73	73	73	73	73	73

Variation No. 7 provides for an at-grade roadway in the median with freeway widening on the outside. This variation is the least obtrusive and is the quietest of the bus/HOV alternate.

Variations No. 4 and 8-A calls for an aerial roadway along the route where the freeway is depressed and at-grade where the freeway is in fill. Being a combination of the other variations the noise levels fall in between.

c. Light Rail Transit

Light rail transit (LRT) is the noisiest of the proposed alternates. The different noise projections for the variations of LRT show a similar pattern as bus/HOV with No. 1 being noisiest, No. 7 quietest and No. 4 falling between the other two.

d. Intermediate Capacity Transit System

Intermediate Capacity Transit System (ICTS) is an advanced technology rail system designed for minimal noise impact. The ICTS alternate is the quietest of all alternate including bus/HOV. This alternate would not cause any measurable increase in noise in the corridor.

Since there are not any existing ICTS systems in operation at this time it was necessary to rely on the Manufactures Publication for noise data used in this report.

B. Vermont Avenue Alignment

The Vermont Avenue Alignment only considers 2 alternatives, the no-project and the heavy rail. For purposes of this Noise Study construction of any of the alternatives on the Harbor Freeway alignment are considered to be no-project on Vermont Avenue.

Table 12 lists the receptors and measured and predicted noise levels at each site for both alternates. The elevated heavy rail line will increase noise levels up to 8 dBA over the no build alternate.

While noise levels exceed the F.H.W.A. design noise level for the "build" alternate at most of the sites, construction of a noise barrier on Vermont Avenue is not feasible. A wall on the guideway will only reduce noise by 1 to 3 dBA at most locations and a wall on Vermont Avenue would eliminate required pedestrian and vehicular access between the roadway and adjacent properties.

IV. CONSTRUCTION NOISE

Construction of any of the build alternatives will require use of equipment which has high noise level characteristics. Typically, the equipment ranges from concrete mixers producing noise levels in the 80 dBA range at a distance of 50 feet to jackhammers in the 90's and pile drivers with peaks over 100 dBA.

To reduce the impact, the noisiest construction activities should be confined where feasible to the daily period least disturbing to the neighboring inhabitants, between 7:00 a.m. and 5:00 p.m. Other measures to be considered in the use of this equipment are as follows:

1. Where there is close proximity to residential frontage, minimize operations from the city street side of the project

TABLE 12

Harbor Corridor-Vermont Alternate

SITE NO.	LOCATION	EXISTING MEASURED	PREDICTED L_{eq} 1995 NO PROJECT	PREDICTED L_{eq} 1995 RAIL TRANSIT
1	South of P.C.H. @ Kaiser Hospital	60	61	66
2	Vermont Avenue @ 255th Street	65	66	69
3	Vermont Avenue @ Stonebryn	70	71	72
4	Vermont Avenue @ 232nd Street	66	67	70
5	Vermont Avenue @ Gain Drive	68	69	71
6	Vermont Avenue @ UCLA/Medical Center Harbor General	55	56	64
7	Vermont Avenue @ Carson Street	67	68	71
8	Vermont Avenue @ Clarion	63	64	69
9	Vermont - 1/4 mile north Torrance Boulevard	67	68	70
10	Vermont Avenue @ Electric	68	69	71
11	Vermont Avenue @ Artesia Boulevard	63	64	68
12	Vermont Avenue @ 159th Street	70	71	73
13	Vermont Avenue @ Rosecrans	63	64	68
14	Vermont Avenue @ 134th Street	64	65	68
15	Vermont Avenue @ 124th Street	67	68	70
16	Vermont Avenue near Imperial	64	65	68
17	Vermont Avenue near Century	67	68	69
18	Vermont Avenue @ 90th Street	66	67	69
19	Vermont Avenue @ Manchester Boulevard	72	73	74
20	Vermont Avenue @ 78th Street	66	67	68
21	Vermont Avenue @ Florence Avenue	72	73	74
22	Vermont Avenue @ 65th Street	64	65	68
23	Vermont Avenue @ 62nd Street	70	71	71
24	Vermont Avenue @ 58th Place	68	69	69
25	Vermont Avenue @ Browning	69	70	70

Note: All noise levels shown are dBA.

to create the greatest distance between noise sources and receptors.

2. Arrange the noisiest operations together in the construction program to avoid continuing periods of greater annoyance.
3. Require that equipment shall be equipped and maintained with effective muffler exhaust systems.

ENERGY REPORT

This study assesses the impact that the various alternates would have on energy consumption. These alternates include TSM, Bus/HOV, LRT, ICTS and HRT.

The analysis relied on the Caltrans Transportation Laboratory's Report "Energy and Transportation Systems" for motor vehicle propulsion, construction and maintenance energy.(12)

The Southern California Regional Transit District through their consultant Wilbur Smith and Associates furnished the energy requirements for the bus and rail operations.

The methodologies and numerous assumptions used in the analysis should lead to caution in using the results. The only judgment to be made should be to compare alternates for relative energy efficiency while accepting the values as being state of the art approximations of expected energy usage.

In Southern California the fuel for electric generation comes substantially from the following sources: natural gas 39%, petroleum 30%, coal 15%, hydroelectric 9% and nuclear 7%.

The rail alternatives provide an opportunity to reduce somewhat the areas dependence on fossil fuel since the present transportation system relies on gasoline and diesel fuel to propel autos, trucks and buses.

I. METHODOLOGY

This section details the analysis used for evaluating the various alternates under consideration.

The study includes direct energy consumption (propulsion) and indirect (non propulsion) for the build alternatives and compares them with the base (no project).

Traffic projection were developed from the LARTS model for the year 1995 (Table 13). Since there were no traffic projections beyond 1995 the study encompassed a 1 year period. For purposes of pro-rating construction energy consumption over the life of the facility a 30-year life was assigned to the project. Table 13 also lists the estimated total cost for each alternate.

The conversion efficiency from fuel fired power generation plant to electric powered vehicle was assumed to be 33% (12). This includes generation and transmission losses. The resulting conversion is 10,000 BTU per KWH.

In determining VMT reduction and subsequent energy usage it is necessary to compare the energy savings for each alternate on an equal basis as well as how the passengers would have been transported in the no project condition. For this comparison reliance was made of the experience gained from surveys made of HOV and bus passengers on the San Bernardino Freeway. This survey determined the percentages that drove or were driven to the station, how they commuted before the busway was placed in operation and other travel characteristics. The VMT reduction figures take these factors into

TABLE 13

CONSTRUCTION COSTS AND VMT REDUCTIONS

ALTERNATE	CONSTRUCTION COST (MILLIONS OF DOLLARS)	VMT REDUCTION (THOUSANDS) (OF MILES)
No Build	0	0
TSM	26.2	650.1
Bus 1	509.8	921.0
Bus 4	450.7	921.0
Bus 7	565.5	921.0
Bus 8A	364.2	834.6
Bus 8B	359.7	834.6
LRT R-1	692.9	845.5
LRT R-4	609.2	845.5
LRT R-7	820.1	845.5
ICTS R-1	692.9	862.5
ICTS R-4	609.2	862.5
ICTS R-7	820.2	862.5
HRT (Vermont) R-6	908.3	870.0

account. The estimated energy savings for the project alternates is principally based on VMT reduction.

II. ANALYSIS OF RESULTS

Table 14 shows the estimated energy consumption in barrels of crude oil per day for each of the alternates. As discussed in the summary of results the total consumption shown for each alternate does not represent all of the transportation energy in the corridor. What is represented is the Harbor Freeway energy consumption for each of 3 segments and the transit energy for the line haul and feeder bus system. The energy savings through VMT reduction represents travel on both freeway and surface streets. The trip mileage was assumed to be divided 2/3 and 1/3 respectively between the freeway and the less efficient surface streets.

The annual operating energy of the bus and rail transit alternates in terms of millions of gallons of diesel fuel and/or millions of kilowatt hours of electricity is shown in Table 15.

TABLE 14

ROUTE 110 FREEWAY

BARRELS OF CRUDE OIL PER DAY

								LRT			ICTS			VERMONT CORRIDOR
	NO PROJECT	TSM	B-1	B-4	B-7	B-8A	B-8B	R-1	R-4	R-7	R-1	R-4	R-7	R-6
Route 47 to Route 405	1,120	953	904	901	905	920	919	929	924	933	928	930	932	937
Route 405 to Route 105	1,389	1,113	1,028	1,023	1,031	1,052	1,051	1,074	1,065	1,081	1,068	1,059	1,075	1,084
Route 105 to Route 10	2,327	1,899	1,765	1,759	1,768	1,807	1,806	1,795	1,784	1,802	1,820	1,809	1,828	1,842
Transit	951	1,194	1,294	1,294	1,294	1,293	1,293	1,322	1,322	1,322	1,341	1,341	1,341	1,437
Total Consumption	5,787	5,159	4,991	4,977	4,998	5,072	5,069	5,120	5,095	5,138	5,157	5,139	5,176	5,300
Difference from No-Project	0	628	796	810	789	715	718	667	692	649	630	648	611	487

Includes both direct and indirect energy consumption in Equivalent Barrels of Oil (E.B.O.).

NOTE: Route 110 Freeway energy includes freeway traffic only. Transit energy includes transit traffic throughout the corridor including feeder service.

TABLE 15

ANNUAL OPERATING ENERGY
BUS/RAIL

(in millions of Gallons of Diesel Fuel
or millions of KWH of Electricity)

ALTERNATE		BUS (DIESEL) LINE HAUL AND FEEDER	RAIL	
			OPERATING (KWHE)	FEEDER BUS (ADB-Diesel)
No Build	ADB* Art	12.21	--	--
TSM	ADB Art	15.34	--	--
Bus 1	ADB Art	16.61	--	--
Bus 4	ADB Art	16.61	--	--
Bus 7	ADB Art	16.61		
Bus 8A	ADB Art	16.60	--	--
Bus 8B	ADB Art	16.60	--	--
Rail 1	LRT	--	34.9	14.48
Rail 4	LRT	--	34.9	14.48
Rail 7	LRT	--	34.9	14.48
Rail 1	ICTS	--	41.7	14.21
Rail 4	ICTS	--	41.7	14.21
Rail 7	ICTS	--	41.7	14.21
Rail 6	HRT	--	58.5	14.25

*ADB - Advanced Design Bus - Used on city street only.
Art - Articulated Bus - Used for freeway travel.

WATER QUALITY REPORT

I. IMPACTS ON WATER QUALITY

At the southerly end of the project the freeway crosses several major drainage courses including Bixby Slough at two locations between Sepulveda Boulevard and Lomita Boulevard. Further north it crosses the Dominguez Slough and several of its branches. These natural water courses over the years have been channelized and effectively converted to flood control channels in the vicinity of the freeway crossings. The flow line elevations are below sea level therefore they are subject to tidal action.

To the north of the Route 110/91 Interchange the freeway grade line is alternately elevated and depressed as it approaches the central business district. Surface runoff in this area is confined to sheet flow in existing streets and to relatively minor drainage courses. The historic groundwater table elevation is at least 12 feet below the roadway surface throughout the project limits.

The project will not materially change existing drainage patterns. Runoff volumes are not expected to increase since this proposal is above the impervious roadways of the Harbor Freeway or Vermont Avenue.

Alternates 4, 7 and 8A would involve widening the freeway to accommodate the facility at grade in the median. This proposed widening will include construction of additional roadway embankment and require erosion control. Slope stabilization and erosion control during construction are controlled by contract specifications

(Section 7, Caltrans Standard Specifications, January, 1981). These specifications cover slope stabilization, placement of seed and straw as necessary and construction of earth dikes and settlement basins if required. The contractor must provide a comprehensive water pollution and erosion control plan. The plan must be approved by the Resident Engineer and submitted for approval to the Regional Water Quality Control Board.

After construction, landscaping will control erosion on the project. Landscaping not only has aesthetic value, but also stabilizes the slope areas and eliminates the possibility of large amounts of eroded material entering the aquatic environment.

A. Roadway Runoff

Constituents of roadway runoff consist of four basic categories: particulate automotive emissions, roadside litter, including eroded pavement materials, chemicals used in maintenance operations and spills due to accidents.

Except for spills, rain washes much of the pollutant load into downstream receiving waters. The amount of pollutants is a function of the traffic volume, roadway drainage area and storm intensity. The environmental response to the pollutants are dependent upon many variables. Foremost is the sensitivity of the receiving waters. Another item of importance is the change in volume of runoff into the receiving waters, either significant increases or decreases. This proposal will add very little additional impervious surfaces, nor will it materially change the existing drainage patterns.

B. Pesticides, Herbicides, Fertilizer

All pesticides, herbicides and fertilizers used in roadside maintenance must conform to the requirements of the State of California Agricultural Code and their use is governed by the rules and regulations of the Department of Health and Safety and the Department of Agriculture.

II. PERMIT REQUIREMENTS

Federal and State laws and regulations have been enacted to protect the quality of water resources. The following is a summary of permits, certifications or notifications that can be required prior to construction of this project:

1. Corps of Engineers Permit: Section 404 of the Federal Water Pollution Control Act Amendments of 1972 requires that a permit from the Corps for the discharge of dredged or fill material into waterways of the nation.
2. Regional Water Quality Control Board Permit: A permit from the Regional Board is required for the discharge of wastes, including those from construction activities. Also erosion control plans must be approved by the Regional Board.
3. California Department of Fish and Game: Section 1601 of the State Fish and Game Code requires notification to the Department when any project will alter stream bed flows.
4. Coastal Zone: Any applicant for a Federal permit is required to furnish certification that the activity will comply with the objective of the California Coastal Zone Management Act.

SOLID WASTE REPORT

I. COMMUNITY TRAFFIC AND SOLID WASTE SERVICES

All city streets as well as commercial and residential driveways will remain in service throughout the construction period. Therefore, traffic circulation will be as near normal as possible to provide unhampered waste pickup. Municipal solid waste disposal programs would not be hampered should the project be constructed.

II. CONSTRUCTION

During construction, solid wastes may be classified as decomposable material which must be removed from the construction area. These materials can include vegetation from clearing and grubbing operations and scrap lumber. Nondecomposable materials, such as broken asphalt pavements, concrete, brick, and rock, may remain within embankment areas. Excess excavation (dirt), although not classified as solid waste, will be handled and disposed of according to contract specifications.

Decomposable solid waste materials generated during construction will be placed in dump sites which the Contractor is obligated by contract specification to provide. All dump sites must be approved prior to construction and must be of a suitable class compatible with the type of material being deposited, such as:

Class 1 - Toxic Materials, Class II - Decomposable Materials and Class III - Non-water Soluble Material. These dump site classes have been established under the Hazardous Wastes Regulations, Title 22, Division 4, California Administrative Code.

If solid waste material is to be hauled on city streets, the determination of routes to the various dump sites will be a cooperative effort of the State, local authorities, and the contractor. The movement of project excavation and embankment is handled through a similar procedure. This will ensure the least disruption of local traffic service and the least damage to and pollution of local transportation facilities throughout the construction period.

Construction of the Vermont Avenue alternate would result in the removal of 860,000 c.y. of excess excavation (dirt) from the subway section northerly of Gage Avenue. This material would also be handled and disposed of in accordance with contract specifications. If a coordinated effort were possible this material could be beneficially used for embankment material on the Route 105 Freeway or other suitable locations.

REFERENCES

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(3) U.S. Environmental Protection Agency, Office of Air and Waste Management, "Mobile Source Emission Factors", Final Document EPA-400/9-78-005, Washington, D.C., March, 1978.

(4) Turner, D. B., "A Diffusion Model For An Urban Area", Journal of Applied Meteorology, Vol. 3, No. 1, February, 1964.

(5) U.S. Department of Transportation, Federal Highway Administration, "Federal-Aid Highway Program Manual; Volume 7, Right of Way and Environment; Chapter 7, Environment; Section 3 Procedures for Abatement of Highway Traffic Noise and Construction Noise", Transmittal 192; May 14, 1976; HEV-21.

(6) Barry, T. M. and Reagan, J. A., U.S. Department of Transportation; Federal Highway Administration; Office of Research, Office of Environmental Policy; "FHWA Highway Traffic Noise Prediction Model"; FHWA-RD-77-108; December 1978.

(7) "Energy 3" MOD-1. A Computer Program For the Estimation of Energy Consumption By Highways CA-DOT Transportation Laboratory Environmental - Chemical Branch.

(8) Air Quality Report, Route 91/11 Interchange, Caltrans District 07, April 1977.

(9) Air Quality Report, Route 105, El Segundo to Norwalk, Caltrans District 07, June 1974.

(10) __________. "Analysis of Ambient Air Quality for Highway Projects". State of California, Department of Public Works, Translab, Air Quality Manual No. CA-Hwy-MR 6570825-5-72-13, May, 1972.

(11) Larsen, R. I. A Mathematical Model For Relating Air Quality Measurements to Air Quality Standards. U.S. Environmental Protection Agency, Office of Air Programs Publication No. AP-89, November, 1971.

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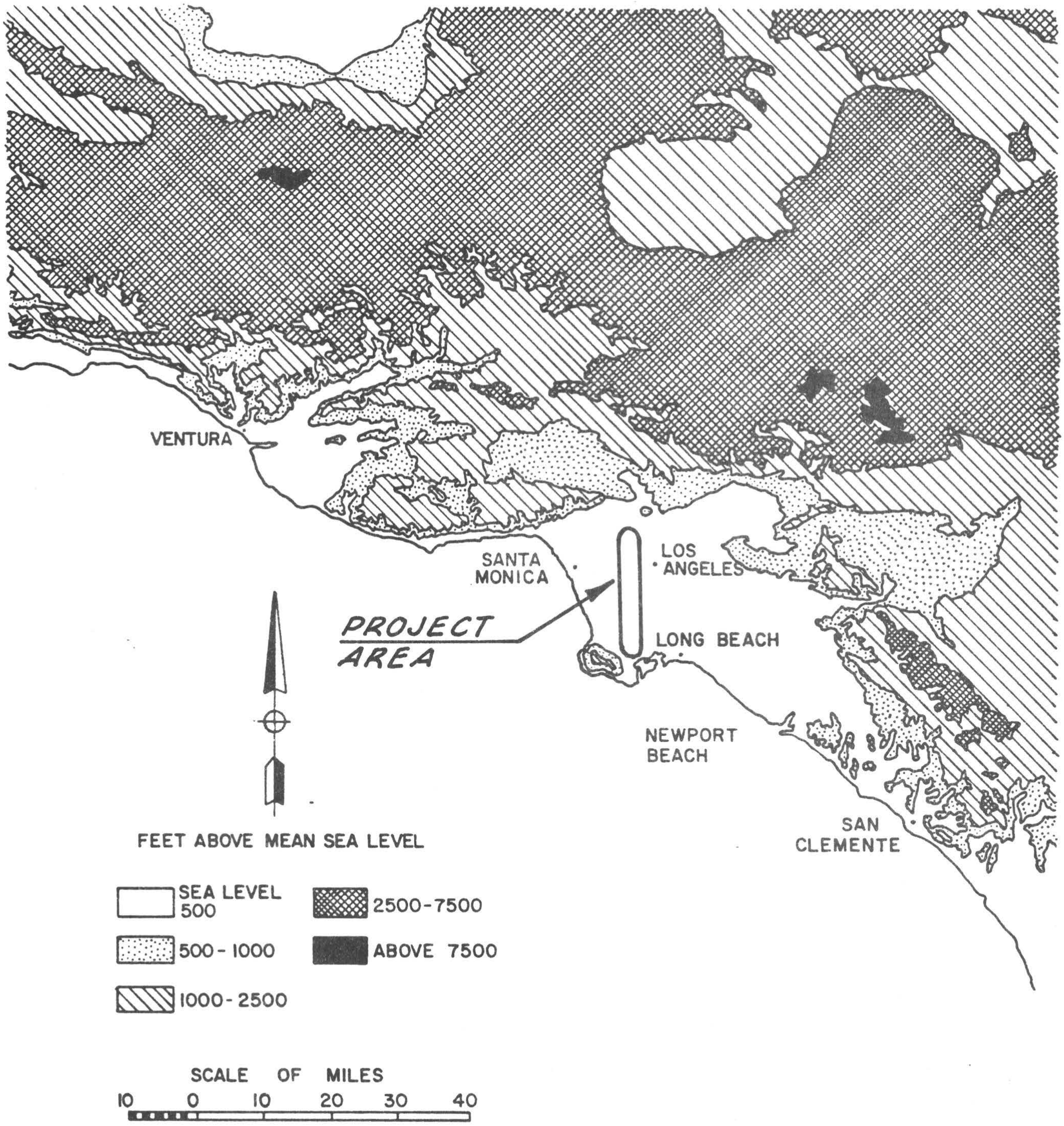
A P P E N D I X

APPENDIX A

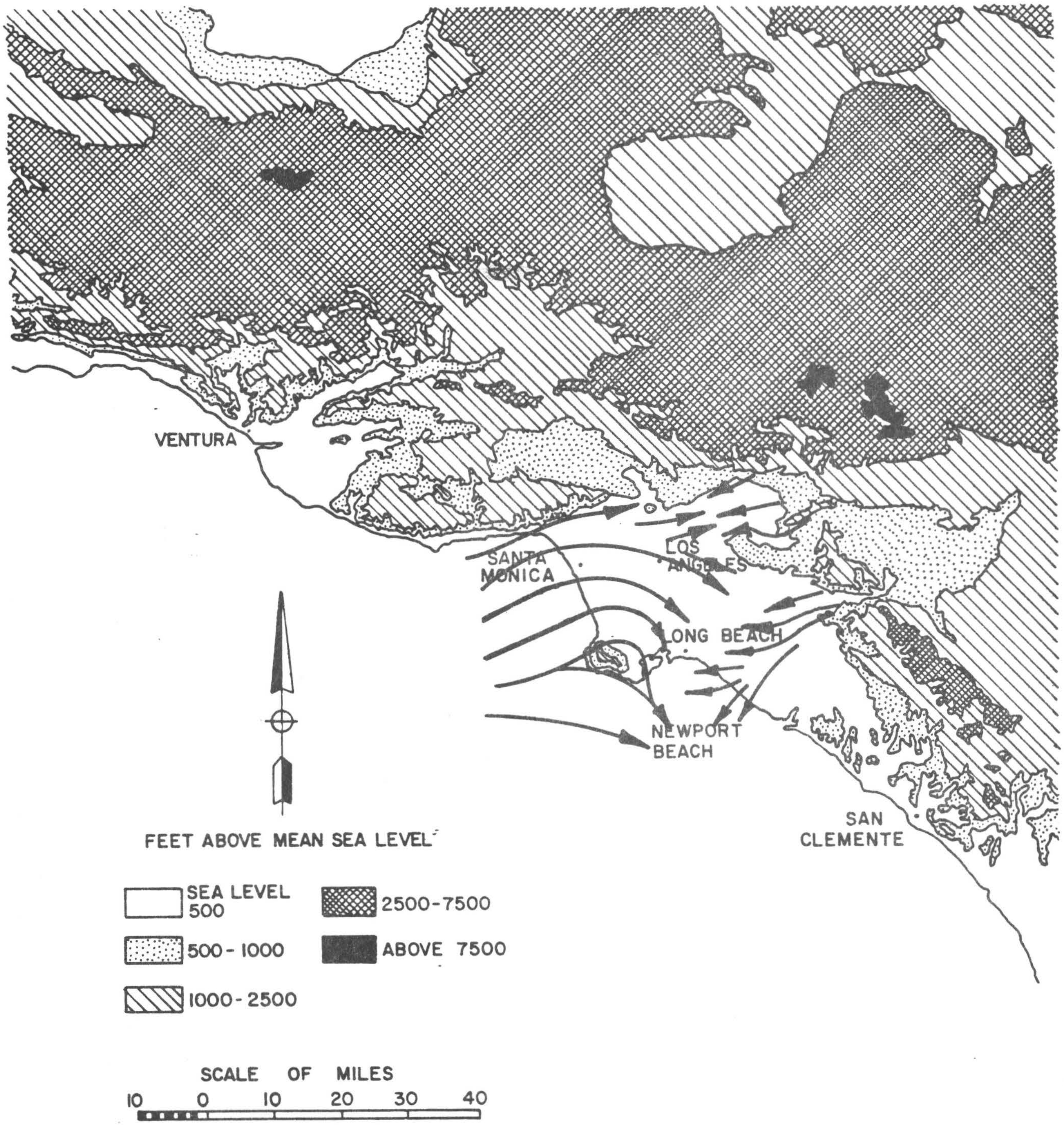
ABBREVIATIONS

ADB	-	Advance Design Bus
ART	-	Articulated Bus
ARB	-	Air Resources Board
BTU	-	British Thermal Unit
CEQA	-	California Environmental Quality Act of 1970
DTIM	-	Direct Transportation Impact Model
EBO	-	Equivalent Barrels of Oil
EPA	-	Environmental Protection Agency
EIR	-	Environmental Impact Report (State)
EIS	-	Environmental Impact Statement (Federal)
HRT	-	Heavy Rail Transit
Kg	-	Kilogram
ICTS	-	Intermediate Capacity Transit System
LARTS	-	Los Angeles Regional Transportation Study
LRT	-	Light Rail Transit
KW	-	Kilowatt
mpg	-	miles per gallon
mph	-	miles per hour
NEPA	-	National Environmental Policy Act of 1969
PPM	-	Parts per million
R/W	-	Right-of-Way
SCAQMD	-	Southern California Air Quality Management District
SCAG	-	Southern California Association of Governments
TSM	-	Transportation Systems Management
VMT	-	Vehicle Miles Traveled

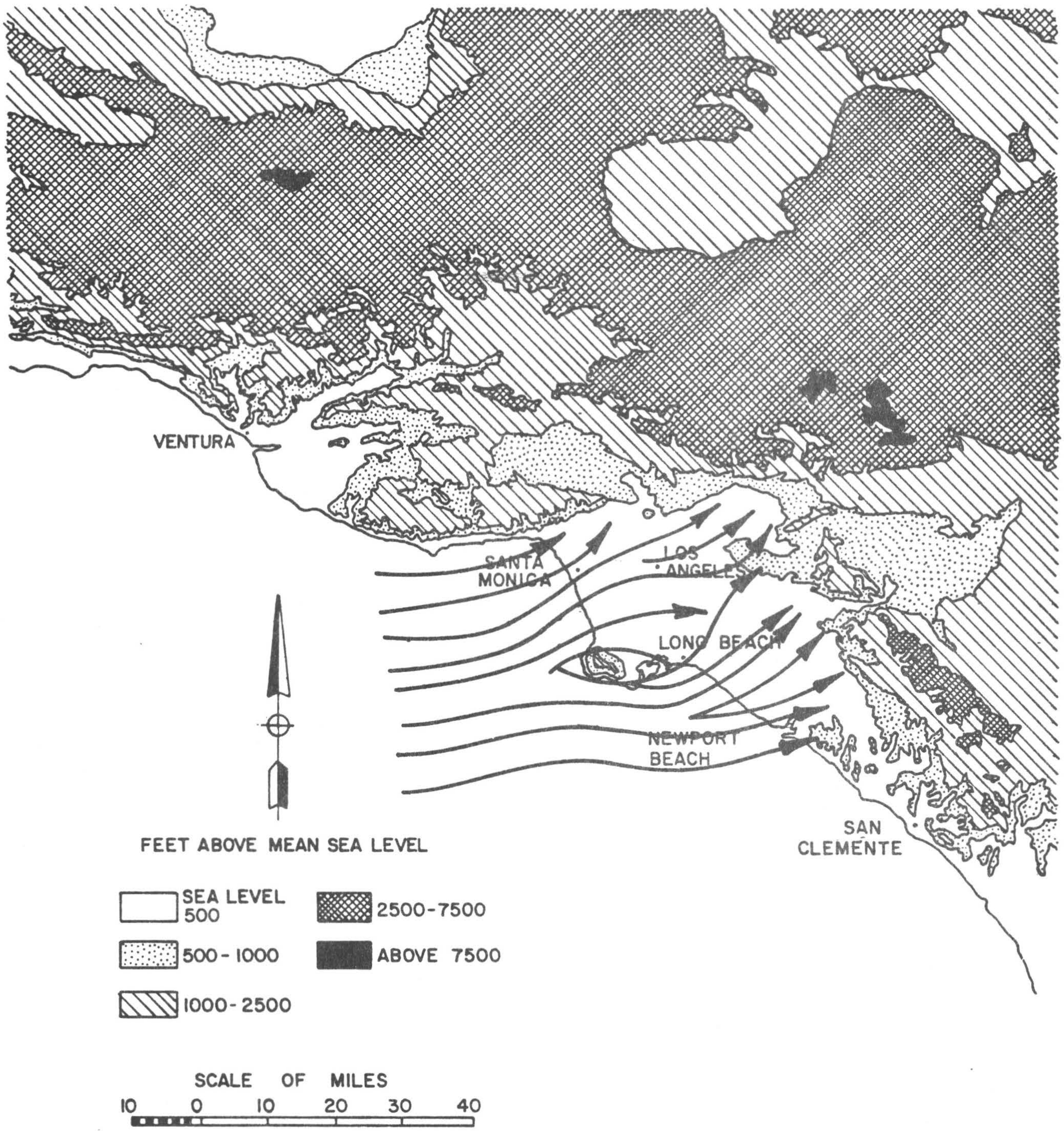
APPENDIX B


VENTURA
SANTA MONICA
LOS ANGELES
LONG BEACH
PROJECT AREA
NEWPORT BEACH
SAN CLEMENTE
FEET ABOVE MEAN SEA LEVEL
SEA LEVEL 500
500 - 1000
1000 - 2500
2500-7500
ABOVE 7500
SCALE OF MILES
10 0 10 20 30 40

STREAMLINE CHART FOR JULY 0000-0500 LST
INERTIA-RELATED NIGHT SEA BREEZE



STREAMLINE CHART FOR JULY 1200 - 1800 LST



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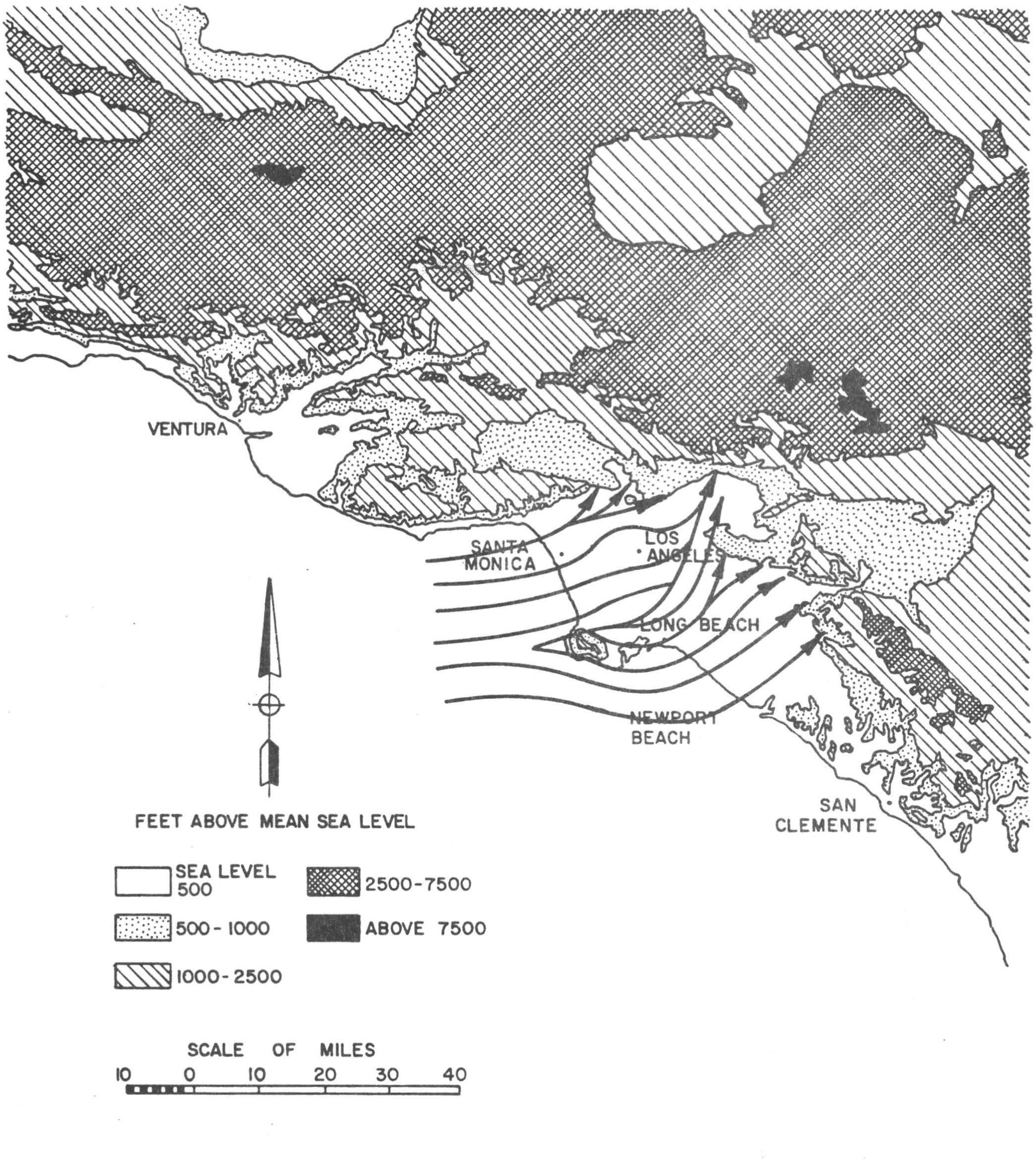
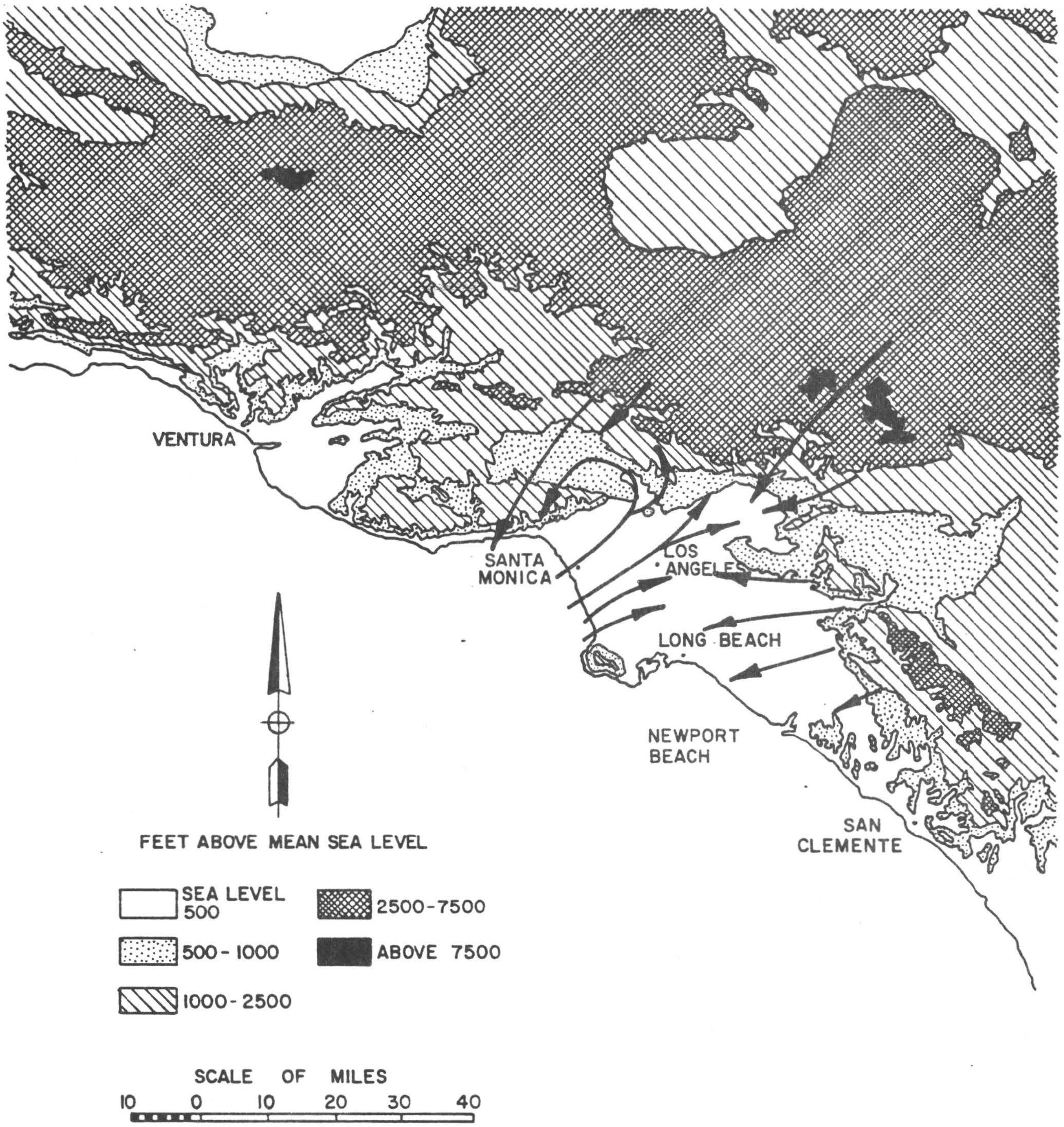
SEA BREEZE CONDITION



STREAMLINE CHART FOR JANUARY 1200-1800 LST
MILD SANTA ANA CONDITION



APPENDIX C

TABLE 16

1995 FREEWAY TRAFFIC DATA

NO BUILD ALTERNATIVE

Sheet 1 of 2

			DIRECTION	ANAHEIM TO "B" ST.	SEPULVEDA TO PCH	190th TO I-405	ALONDRA TO ARTESIA	EL SEGUNDO TO ROSECRANS
AM	Volume	vph	NB	4800	6000	8000	7200	7700
			SB	4500	4700	6900	5900	6300
	Speed	mph	NB	49	41	22	30	26
			SB	52	50	34	40	37
	Vehicle	Mix* %	NB/SB					
	LDV			77.3	77.3	78.9	78.9	78.9
	LDT			10.5	10.5	10.7	10.7	10.7
	MDT			5.3	5.3	5.4	5.4	5.4
	HDG			2.1	2.1	1.4	1.4	1.4
	HDD			3.9	3.9	2.6	2.6	2.6
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	5.97	6.21	10.69	7.95	9.22
	Factors	gms/mi	SB	5.89	5.96	6.95	6.02	6.40
MD	Volume	vph	NB	3200	3700	5300	4700	5000
			SB	3200	3700	5300	4700	5000
	Speed	mph	NB/SB	55/55	55/55	50/50	55/55	55/55
	Vehicle	Mix* %	NB/SB					
	LDV			74.0	74.0	77.3	77.3	77.3
	LDT			10.1	10.1	10.5	10.5	10.5
	MDT			5.0	5.0	5.3	5.3	5.3
	HDG			3.5	3.5	2.1	2.1	2.1
	HDD			6.5	6.5	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	6.16	6.16	5.96	5.60	5.60
	Factors	gms/mi	SB	6.16	6.16	5.96	5.60	5.60
PM	Volume	vph	NB	4500	4700	6900	5900	6300
			SB	4800	6000	8200	7200	7700
	Speed	mph	NB/SB	52/49	50/41	34/24	40/30	37/26
	Vehicle	Mix* %	NB/SB					
	LDV			75.6	75.6	78.1	78.1	78.1
	LDT			10.3	10.3	10.6	10.6	10.6
	MDT			5.2	5.2	5.3	5.3	5.3
	HDG			2.8	2.8	1.8	1.8	1.8
	HDD			5.2	5.2	3.2	3.2	3.2
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	6.16	6.22	7.13	6.18	6.57
	Factors	gms/mi	SB	6.23	6.50	10.19	8.16	9.45

*Vehicle Mix

LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

TABLE 16 (continued)

1995 FREEWAY TRAFFIC DATA

NO BUILD ALTERNATIVE

			DIRECTION	IMPERIAL TO I-105	MANCHESTER TO CENTURY	SLAUSON TO FLORENCE	SANTA BARBARA TO VERNON	ADAMS TO RODEO
AM	Volume	vph	NB	8300	8400	8000	8100	8400
			SB	6800	6800	6000	7000	7300
	Speed	mph	NB	21	20	23	22	20
			SB	33	30	33	32	30
	Vehicle	Mix* %	NB/SB					
	LDV			78.9	78.9	78.9	78.9	78.9
	LDT			10.7	10.7	10.7	10.7	10.7
	MDT			5.4	5.4	5.4	5.4	5.4
	HDG			1.4	1.4	1.4	1.4	1.4
	HDD			2.6	2.6	2.6	2.6	2.6
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	11.09	11.51	10.30	10.69	11.51
	Factors	gms/mi	SB	7.17	6.95	7.17	7.41	7.95
MD	Volume	vph	NB	5300	5300	5600	5700	5800
			SB	5300	5300	5600	5700	5800
	Speed	mph	NB/SB	50/50	50/50	50/50	50/50	50/50
	Vehicle	Mix* %	NB/SB					
	LDV			77.3	77.3	77.3	77.3	77.3
	LDT			10.5	10.5	10.5	10.5	10.5
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			2.1	2.1	2.1	2.1	2.1
	HDD			3.9	3.9	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	5.96	5.96	5.96	5.96	5.96
	Factors	gms/mi	SB	5.96	5.96	5.96	5.96	5.96
PM	Volume	vph	NB	6900	6900	6900	7000	7300
			SB	8400	8400	8000	8100	8400
	Speed	mph	NB/SB	34/20	23/30	33/23	32/22	30/20
	Vehicle	Mix* %	NB/SB					
	LDV			78.1	78.1	78.1	78.1	78.1
	LDT			10.6	10.6	10.6	10.6	10.6
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			1.8	1.8	1.8	1.8	1.8
	HDD			3.2	3.2	3.2	3.2	3.2
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	7.13	10.57	7.36	7.61	8.16
	Factors	gms/mi	SB	11.82	8.16	10.57	10.97	11.82

*Vehicle Mix

LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

TABLE 17

1995 FREEWAY TRAFFIC DATA

TSM ALTERNATIVE

			DIRECTION	ANAHEIM TO "B" ST.	SEPULVEDA TO PCH	190TH TO I-405	ALONDRA TO ARTESIA	EL SEGUNDO TO ROSECRANS
AM	Volume	vph	NB	4800	6000	8200	7200	7700
			SB	4500	4700	6900	5900	6200
	Speed	mph	NB	49	41	22	30	26
			SB	52	50	34	40	28
	Vehicle	Mix* %	NB/SB					
	LDV			77.3	77.3	78.9	78.9	78.9
	LDT			10.5	10.5	10.7	10.7	10.7
	MDT			5.3	5.3	5.4	5.4	5.4
	HDG			2.1	2.1	1.4	1.4	1.4
	HDD			3.9	3.9	2.6	2.6	2.6
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	5.92	6.21	10.69	7.95	9.22
	Factors	gms/mi	SB	5.82	5.96	6.95	6.02	8.56
MD	Volume	vph	NB	3200	3700	5300	4700	5000
			SB	3200	3700	5300	4700	5000
	Speed	mph	NB/SB	55	55	50	55	55
	Vehicle	Mix* %	NB/SB	55	55	50	55	55
	LDV			74.0	74.0	77.3	77.3	77.3
	LDT			10.1	10.1	10.5	10.5	10.5
	MDT			5.0	5.0	5.3	5.3	5.3
	HDG			3.5	3.5	2.1	2.1	2.1
	HDD			6.5	6.5	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	6.16	6.16	5.96	5.60	5.60
	Factors	gms/mi	SB	6.16	6.16	5.96	5.60	5.60
PM	Volume	vph	NB	4500	4700	6900	5900	6300
			SB	4800	6000	8200	7200	7700
	Speed	mph	NB/SB	52	50	34	40	37
	Vehicle	Mix* %	NB/SB	49	41	24	30	26
	LDV			75.6	75.6	78.1	78.1	78.1
	LDT			10.3	10.3	10.6	10.6	10.6
	MDT			5.2	5.2	5.3	5.3	5.3
	HDG			2.8	2.8	1.8	1.8	1.8
	HDD			5.2	5.2	3.2	3.2	3.2
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	6.16	6.22	7.13	6.18	6.42
	Factors	gms/mi	SB	6.23	6.50	10.19	8.16	9.45

*Vehicle Mix

- LDV - Light Duty Vehicle
- LDT - Light Duty Truck
- MDT - Medium Duty Truck
- HDG - Heavy Duty Gasoline
- HDD - Heavy Duty Diesel
- MC - Motorcycle

TABLE 17 (continued)

1995 FREEWAY TRAFFIC DATA

TSM ALTERNATIVE

			DIRECTION	IMPERIAL TO I-105	MANCHESTER TO CENTURY	SLAUSON TO FLORENCE	SANTA BARBARA TO VERNON	ADAMS TO RODEO
AM	Volume	vph	NB	8200	8400	7900	8100	8300
			SB	6700	6700	6800	7000	7200
	Speed	mph	NB	22	20	24	22	21
			SB	34	34	34	32	31
	Vehicle	Mix* %	NB/SB					
	LDV			78.9	78.9	78.9	78.9	78.9
	LDT			10.7	10.7	10.7	10.7	10.7
	MDT			5.4	5.4	5.4	5.4	5.4
	HDG			1.4	1.4	1.4	1.4	1.
	HDD			2.6	2.6	2.6	2.6	2.6
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	10.69	11.51	9.93	10.69	11.0
	Factors	gms/mi	SB	6.95	6.95	6.95	7.41	7.6
MD	Volume	vph	NB	5300	5300	5600	5700	5800
			SB	5300	5300	5600	5700	5800
	Speed	mph	NB/SB	50	50	50	50	50
	Vehicle	Mix* %	NB/SB	50	50	50	50	50
	LDV			77.3	77.3	77.3	77.3	77.
	LDT			10.5	10.5	10.5	10.5	10.5
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			2.1	2.1	2.1	2.1	2.1
	HDD			3.9	3.9	3.9	3.9	3.
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	5.96	5.96	5.96	5.96	5.
	Factors	gms/mi	SB	5.96	5.96	5.96	5.96	5.
PM	Volume	vph	NB	6800	6800	6800	7000	7200
			SB	8300	8400	7900	8100	8300
	Speed	mph	NB/SB	35	34	34	32	31
	Vehicle	Mix* %	NB/SB	21	20	24	22	21
	LDV			78.1	78.1	78.1	78.1	78.
	LDT			10.6	10.6	10.6	10.6	10.
	MDT			5.3	5.3	5.3	5.3	5.
	HDG			1.8	1.8	1.8	1.8	1.
	HDD			3.2	3.2	3.2	3.2	3.
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	6.92	7.13	7.13	7.61	7.
	Factors	gms/mi	SB	11.38	11.82	10.19	10.97	11.

*Vehicle Mix

LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

TABLE 18

1995 FREEWAY TRAFFIC DATA

BUS 1 ALTERNATIVE

Sheet 1 of 2

			DIRECTION	ANAHEIM TO "B" ST.	SEPULVEDA TO PCH	190TH TO I-405	ALONDRA TO ARTESIA	EL SEGUNDO TO ROSECRANS
AM	Volume	vph	NB	4700	5900	8000	6400	7500
			SB	4500	4700	6700	5700	6100
	Speed	mph	NB	50	42	23	32	28
			SB	52	50	35	41	39
	Vehicle	Mix* %	NB/SB					
	LDV			77.3	77.3	78.9	78.9	78.9
	LDT			10.5	10.5	10.7	10.7	10.7
	MDT			5.3	5.3	5.4	5.4	5.4
	HDG			2.1	2.1	2.1	1.4	1.4
	HDD			3.9	3.9	2.6	2.6	2.6
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	5.96	6.14	10.30	7.41	8.56
	Factors	gms/mi	SB	5.89	5.96	6.74	5.93	6.13
MD	Volume	vph	NB	3200	3700	5200	4600	4900
			SB	3200	3700	5200	4600	4900
	Speed	mph	NB/SB	55	55	50	55	55
	Vehicle	Mix* %	NB/SB	55	55	50	55	55
	LDV			74.0	74.0	77.3	77.3	77.3
	LDT			10.1	10.1	10.5	10.5	10.5
	MDT			5.0	5.0	5.3	5.3	5.3
	HDG			3.5	3.5	2.1	2.1	2.1
	HDD			6.5	6.5	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	6.16	6.16	5.96	5.60	5.60
	Factors	gms/mi	SB	6.16	6.16	5.96	5.60	5.60
PM	Volume	vph	NB	4500	4700	6700	5700	6000
			SB	4700	5900	8000	6900	7500
	Speed	mph	NB/SB	52	50	35	41	40
	Vehicle	Mix* %	NB/SB	49	42	23	32	28
	LDV			75.6	75.6	78.1	78.1	78.1
	LDT			10.3	10.3	10.6	10.6	10.6
	MDT			5.2	5.2	5.3	5.3	5.3
	HDG			2.8	2.8	1.8	1.8	1.8
	HDD			5.2	5.2	3.2	3.2	3.2
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	6.16	6.22	6.92	6.09	6.18
	Factors	gms/mi	SB	6.22	6.42	10.57	7.61	8.78

*Vehicle Mix

LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

TABLE 18 (continued)

1995 FREEWAY TRAFFIC DATA

BUS 1 ALTERNATIVE

			DIRECTION	IMPERIAL TO I-105	MANCHESTER TO CENTURY	SLAUSON TO FLORENCE	SANTA BARBARA TO VERNON	ADAMS TO RODEO
AM	Volume	vph	NB	7900	8000	7300	7400	7700
			SB	6400	6400	6400	6600	7000
	Speed	mph	NB	24	23	37	28	25
			SB	36	36	50	35	32
	Vehicle	Mix* %	NB/SB					
	LDV			78.9	78.9	78.9	78.9	78.9
	LDT			10.7	10.7	10.7	10.7	10.7
	MDT			5.4	5.4	5.4	5.4	5.4
	HDG			1.4	1.4	1.4	1.4	1.4
	HDD			2.6	2.6	2.6	2.6	2.6
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	9.93	10.30	6.40	8.56	9.57
	Factors	gms/mi	SB	6.56	6.56	5.69	6.74	7.41
MD	Volume	vph	NB	5100	5100	5500	5600	5700
			SB	5100	5100	5500	5600	5700
	Speed	mph	NB/SB	50	50	50	50	50
	Vehicle	Mix* %	NB/SB	50	50	50	50	50
	LDV			77.3	77.3	77.3	77.3	77.3
	LDT			10.5	10.5	10.5	10.5	10.5
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			2.1	2.1	2.1	2.1	2.1
	HDD			3.9	3.9	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	5.96	5.96	5.96	5.96	5.96
	Factors	gms/mi	SB	5.96	5.96	5.96	5.96	5.96
PM	Volume	vph	NB	6400	6400	6400	6600	7000
			SB	7900	8000	7300	7500	8000
	Speed	mph	NB/SB	38	36	37	35	32
	Vehicle	Mix* %	NB/SB	42	23	29	27	23
	LDV			78.1	78.1	78.1	78.1	78.1
	LDT			10.6	10.6	10.6	10.6	10.6
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			1.8	1.8	1.8	1.8	1.8
	HDD			3.2	3.2	3.2	3.2	3.2
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	6.42	6.74	6.57	6.92	7.61
	Factors	gms/mi	SB	10.19	10.57	8.46	9.11	10.57

*Vehicle Mix

LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

TABLE 19

1995 FREEWAY TRAFFIC DATA

BUS 8 ALTERNATIVE

			DIRECTION	ANAHEIM TO "B" ST.	SEPULVEDA TO PCH	190TH TO I-405	ALONDRA TO ARTESIA	EL SEGUNDO TO ROSECRANS
AM	Volume	vph	NB	4700	5900	6900	6900	7500
			SB	4500	4700	6700	5700	6200
	Speed	mph	NB	50	42	23	32	26
			SB	52	50	35	40	38
	Vehicle	Mix* %	NB/SB					
	LDV			77.3	77.3	78.9	78.9	78.9
	LDT			10.5	10.5	10.7	10.7	10.7
	MDT			5.3	5.3	5.4	5.4	5.4
	HDG			2.1	2.1	1.4	1.4	1.4
	HDD			3.9	3.9	2.6	2.6	2.6
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	5.96	6.14	10.30	7.41	9.22
	Factors	gms/mi	SB	5.89	5.96	6.74	6.02	6.25
MD	Volume	vph	NB	3200	3700	5200	4700	5000
			SB	3200	3700	5200	4700	5000
	Speed	mph	NB/SB	55	55	50	55	55
	Vehicle	Mix* %	NB/SB	55	55	50	55	55
	LDV			74.0	74.0	77.3	77.3	77.3
	LDT			10.1	10.1	10.5	10.5	10.5
	MDT			5.0	5.0	5.3	5.3	5.3
	HDG			3.5	3.5	2.1	2.1	2.1
	HDD			6.5	6.5	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	6.16	6.16	5.96	5.60	5.60
	Factors	gms/mi	SB	6.16	6.16	5.96	5.60	5.60
PM	Volume	vph	NB	4500	4700	6700	5900	6200
			SB	4700	5900	8000	6900	7500
	Speed	mph	NB/SB	52	50	35	40	38
	Vehicle	Mix* %	NB/SB	50	42	23	32	28
	LDV			75.6	75.6	78.1	78.1	78.1
	LDT			10.3	10.3	10.6	10.6	10.6
	MDT			5.2	5.2	5.3	5.3	5.3
	HDG			2.8	2.8	1.8	1.8	1.8
	HDD			5.2	5.2	3.2	3.2	3.2
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	6.16	6.22	6.92	6.18	6.42
	Factors	gms/mi	SB	6.22	6.42	10.57	7.61	8.78

*Vehicle Mix
- LDV - Light Duty Vehicle
- LDT - Light Duty Truck
- MDT - Medium Duty Truck
- HDG - Heavy Duty Gasoline
- HDD - Heavy Duty Diesel
- MC - Motorcycle

TABLE 19 (continued)

1995 FREEWAY TRAFFIC DATA

BUS 8 ALTERNATIVE

Sheet 2 of 2

Period	Item	Unit	DIRECTION	IMPERIAL TO I-105	MANCHESTER TO CENTURY	SLAUSON TO FLORENCE	SANTA BARBARA TO VERNON	ADAMS TO RODEO
AM	Volume	vph	NB	7900	8000	7300	7400	7700
			SB	6700	6700	6800	7000	7200
	Speed	mph	NB	24	23	29	28	25
			SB	34	34	34	32	31
	Vehicle	Mix* %	NB/SB					
	LDV			78.9	78.9	78.9	78.9	78.9
	LDT			10.7	10.7	10.7	10.7	10.7
	MDT			5.4	5.4	5.4	5.4	5.4
	HDG			1.4	1.4	1.4	1.4	1.4
	HDD			2.6	2.6	2.6	2.6	2.6
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	9.93	10.30	8.25	8.56	9.5[illegible]
	Factors	gms/mi	SB	6.95	6.95	6.95	7.41	7.6[illegible]
MD	Volume	vph	NB	5300	5300	5600	5700	5800
			SB	5300	5300	5600	5700	5800
	Speed	mph	NB/SB	50	50	50	50	50
	Vehicle	Mix* %	NB/SB	50	50	50	50	50
	LDV			77.3	77.3	77.3	77.3	77.3
	LDT			10.5	10.5	10.5	10.5	10.5
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			2.1	2.1	2.1	2.1	2.1
	HDD			3.9	3.9	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	5.96	5.96	5.96	5.96	5.9[illegible]
	Factors	gms/mi	SB	5.96	5.96	5.96	5.96	5.9[illegible]
PM	Volume	vph	NB	6800	6800	6800	7000	7200
			SB	7900	8000	7300	7500	8000
	Speed	mph	NB/SB	35	34	34	32	31
	Vehicle	Mix* %	NB/SB	24	23	29	27	23
	LDV			78.1	78.1	78.1	78.1	78.[illegible]
	LDT			10.6	10.6	10.6	10.6	10.[illegible]
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			1.8	1.8	1.8	1.8	1.[illegible]
	HDD			3.2	3.2	3.2	3.2	3.[illegible]
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	6.92	7.13	7.13	7.61	7.[illegible]
	Factors	gms/mi	SB	10.19	10.57	8.46	9.11	10.[illegible]

*Vehicle Mix

- LDV - Light Duty Vehicle
- LDT - Light Duty Truck
- MDT - Medium Duty Truck
- HDG - Heavy Duty Gasoline
- HDD - Heavy Duty Diesel
- MC - Motorcycle

TABLE 20

1995 FREEWAY TRAFFIC DATA

RAIL ALTERNATIVES (ALL)

Sheet 1 of 2

			DIRECTION	ANAHEIM TO "B" ST.	SEPULVEDA TO PCH	190TH TO I-405	ALONDRA TO ARTESIA	EL SEGUNDO TO ROSECRANS
AM	Volume	vph	NB	4800	5900	8000	7000	7500
			SB	4500	4700	6700	5800	6100
	Speed	mph	NB	50	42	23	31	28
			SB	52	50	35	41	29
	Vehicle	Mix* %	NB/SB					
	LDV			77.3	77.3	78.9	78.9	78.9
	LDT			10.5	10.5	10.7	10.7	10.7
	MDT			5.3	5.3	5.4	5.4	5.4
	HDG			2.1	2.1	1.4	1.4	1.4
	HDD			3.9	3.9	2.6	2.6	2.6
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	5.96	6.14	10.30	7.68	8.56
	Factors	gms/mi	SB	5.89	5.96	6.74	5.93	6.13
MD	Volume	vph	NB	3200	3700	5200	4600	4900
			SB	3200	3700	5200	4600	4900
	Speed	mph	NB/SB	55	55	50	55	55
	Vehicle	Mix* %	NB/SB	55	55	50	55	55
	LDV			74.0	74.0	77.3	77.3	77.3
	LDT			10.1	10.1	10.5	10.5	10.5
	MDT			5.0	5.0	5.3	5.3	5.3
	HDG			3.5	3.5	2.1	2.1	2.1
	HDD			6.5	6.5	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	6.16	6.16	5.96	5.60	5.60
	Factors	gms/mi	SB	6.16	6.16	5.96	5.60	5.60
PM	Volume	vph	NB	4500	4700	6700	5800	6000
			SB	4800	5900	8000	7000	7500
	Speed	mph	NB/SB	52	50	35	41	40
	Vehicle	Mix* %	NB/SB	50	42	23	31	28
	LDV			75.6	75.6	78.1	78.1	78.1
	LDT			10.3	10.3	10.6	10.6	10.6
	MDT			5.2	5.2	5.3	5.3	5.3
	HDG			2.8	2.8	1.8	1.8	1.8
	HDD			5.2	5.2	3.2	3.2	3.2
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	6.16	6.22	6.92	6.09	6.18
	Factors	gms/mi	SB	6.22	6.42	10.57	7.87	8.78

*Vehicle Mix

LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

TABLE 20 (continued)

1995 FREEWAY TRAFFIC DATA

RAIL ALTERNATIVES (ALL)

Sheet 2 of 2

			DIRECTION	IMPERIAL TO I-105	MANCHESTER TO CENTURY	SLAUSON TO FLORENCE	SANTA BARBARA TO VERNON	ADAMS TO RODEO
AM	Volume	vph	NB	8100	8100	7700	7800	7900
			SB	6500	6500	6600	6800	7000
	Speed	mph	NB	23	22	25	24	23
			SB	36	35	35	33	32
	Vehicle	Mix* %	NB/SB					
	LDV			78.9	78.9	78.9	78.9	78.9
	LDT			10.7	10.7	10.7	10.7	10.7
	MDT			5.4	5.4	5.4	5.4	5.4
	HDG			1.4	1.4	1.4	1.4	1.4
	HDD			2.6	2.6	2.6	2.6	2.6
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	10.30	10.69	9.57	9.93	10.30
	Factors	gms/mi	SB	6.56	6.74	6.74	7.17	7.41
MD	Volume	vph	NB	5100	5100	5500	5600	5700
			SB	5100	5100	5600	5700	5700
	Speed	mph	NB/SB	50	50	50	50	50
	Vehicle	Mix* %	NB/SB	50	50	50	50	50
	LDV			77.3	77.3	77.3	77.3	77.3
	LDT			10.5	10.5	10.5	10.5	10.5
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			2.1	2.1	2.1	2.1	2.1
	HDD			3.9	3.9	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	5.96	5.96	5.96	5.96	5.96
	Factors	gms/mi	SB	5.96	5.96	5.96	5.96	5.96
PM	Volume	vph	NB	6500	6500	6600	6800	7000
			SB	8100	8100	7700	7900	8200
	Speed	mph	NB/SB	36	35	35	32	32
	Vehicle	Mix* %	NB/SB	231	22	25	22	22
	LDV			78.1	78.1	78.1	78.1	78.1
	LDT			10.6	10.6	10.6	10.6	10.6
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			1.8	1.8	1.8	1.8	1.8
	HDD			3.2	3.2	3.2	3.2	3.2
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	6.74	6.92	6.92	7.61	7.61
	Factors	gms/mi	SB	10.57	10.97	9.81	10.97	10.97

*Vehicle Mix

LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

APPENDIX D

GLOSSARY

AIR QUALITY

Air Quality - the degree of contamination in the air.

Air Quality Standards - Maximum allowable contaminant concentrations set by State and Federal agencies to protect public health and welfare. The standards were developed to protect those people who are especially susceptible to the effects of air pollutants. These susceptible individuals are primarily the very old and the very young, those with cardiac insufficiencies and anemia, and those with respiratory insufficiencies.

AM - The morning hours 0600 to 0900 Local Time.

Ambient Level - The pollution concentration at any location that is not being influenced by a single local pollutant source.

Averaging Time - The time interval over which measured pollutant concentrations are integrated.

Carbon Monoxide (CO) - A toxic colorless gas, odorless under atmospheric conditions, having molecular form CO. It is formed as a product of incomplete combustion of carbon.

Daytime - Any hour or series of hours from 0600 to 1800 Local Time.

Diurnal - Having a daily cycle.

Downwind - The direction toward which the wind is blowing.

Drainage Wind - The gravity-induced, downslope flow of relatively cold air that results from cooling of the ground surface.

Emission Factor - A pollutant discharge rate. For vehicles, an emission factor is the amount of a pollutant discharged over a distance traveled. Units are grams per mile.

Evening (EVE) - The hours 1800 to 2200 Local Time.

Heavy-Duty Vehicle (HDV) - Vehicles having gross weight in excess of 6000 lbs.

Hydrocarbons (HC) - A collective term used to describe a long list of organic air contaminants. A major component in total hydrocarbons is methane which is considered unreactive. Hydrocarbons other than methane are considered capable of entering into photochemical reaction and, therefore, are referred to as being reactive.

Inversion - See Temperature Inversion.

LT - Local Time as reported by Federal Aviation Authority weather observers. In California, LT is the same as Pacific Standard Time November through April, and it is the same as Daylight Savings Time May through October.

MD - The midday hours 1100 to 1400 Local Time.

Meteorology - The study dealing with the phenomena of the atmosphere.

Night - The hours 2200 to 0600 Local Time.

Nitric Oxide (NO) - A colorless, odorless, highly toxic gas under atmospheric conditions, caused by oxidation of nitrogen.

Nitrogen Dioxide (NO_2) - A red-brown, toxic gas under atmospheric conditions, pungent odor.

Nitrogen Oxides (NO_x) - A highly toxic gas under atmospheric conditions, essentially nitric oxide (NO) and nitrogen dioxide (NO_2) not including N_2O.

Oxidant - Any of several oxidizing gases monitored collectively as total oxidants. Included are ozone, organic peroxides, and peroxyacyl nitrates. In California, the oxidant level is the measure of what is commonly called smog.

Ozone (O_3) - A bluish irritating gas of pungent odor formed by photochemical reaction, mainly from HC and NO_x.

Peak Hour Traffic - The movement of vehicles during brief but frequently repeated periods of heavier than normal congestion.

Photochemical - Resulting from the chemical action of radiant energy, especially light.

PM - The evening hours 1500 to 1800 Local Time.

Primary Pollutants - Airborne contaminants which are emitted directly into the atmosphere from vehicle exhausts. These are mainly CO, HC and NO_x.

Radiation Inversion - A temperature inversion formed near the surface and caused by the cooling of the earth's surface and the adjacent air.

Sea Breezes - A flow of air induced by the differential heating of land and sea masses and directed toward the land from the ocean.

Secondary Pollutants - Airborne contaminants which have undergone transformation (largely via photochemical processes) in the atmosphere. Ozone (O_3) is the main example.

Stability - A state in which the vertical distribution of temperature is such that an air parcel will resist vertical displacement from its level.

Streamline - A line that is everywhere tangent to the wind direction at a given time.

Subsidence Inversion - A temperature inversion formed aloft by the sinking motion of a large mass of air associated with a high pressure area. The air mass is warmed as it descends and eventually finds a resting place atop a cool marine air layer.

Surface Atmospheric Stability - The tendency, near the ground surface, of the atmosphere to enhance vertical motions or to damp out vertical motions. The stability of the atmosphere is highly dependent upon the vertical distribution of temperature with height.

Temperature Inversion - A layer of the atmosphere through which the temperature increases with altitude. A temperature inversion may be found at the ground surface (ground based) or aloft. (See Radiation Inversion, and Subsidence Inversion.)

Vehicle Operating Mode - A term used to describe the type of speed changes undergone by traveling vehicles. Operating modes are a function of acceleration and deceleration, periods of idle, and steady-state or cruise conditions that vehicles experience on a traffic facility.

Wind Direction - The direction from which the wind is blowing, based on a 16-point compass.

NOISE

Ambient Noise Level - The total noise level associated within a given environment and usually comprising sounds from many sources both near and far without the project.

A-Weighting Network - A filtering system with characteristics matching the response of the human ear at levels below 55 decibels.

dBA - The sound pressure level in decibels measured with a frequency-weighting network corresponding to the A-weighting network on a standard sound level meter. The A-weighting network tends to suppress lower frequencies; e.g., below 1000 Hz.

Decibel (dB) - A logarithmic "unit" which indicates the ratio between two powers. A ratio of 10 in power corresponds to a difference in 10 decibels.

Design Noise Level - The noise levels established by FHPM 7-7-3 for various land uses or activities to be used for determining traffic noise design impacts and the assessment of the need for and type of noise abatement treatment.

Environment - The combination of external conditions that affect the growth and development of organisms.

Impact - The change in the acoustic environment, expressed in dBA:

(1) Total impact - the difference between future noise levels from the project and future background noise levels.

(2) Design impact - the difference between future noise levels from the project and design noise levels.

Level - An adjective used to indicate that the quantity referred to is in the logarithmic notation of decibels, with a standardized reference quantity used as the denominator in the decibel ratio expression.

L_{eq} - A noise descriptor whereby a fluctuating noise level such as traffic noise, is described in terms of a constant noise level which would provide an equivalent total amount of acoustical energy for the given situation and time period.

Noise - Any undesired sound. By extension, noise is any unwanted disturbance within a useful frequency band.

Noise Level - the weighted sound pressure level obtained by the use of a metering characteristic and weighting as specified in American National Standard Specification S 1.4-1971.

Receptor (or Receiver) - A living or non-living object affected by sound.

Sound-Level Meter - A device which measures sound pressure. The sound-level meter consists of a microphone, an amplifier, a calibrated attenuator, and an instrument to indicate the measured sound level.

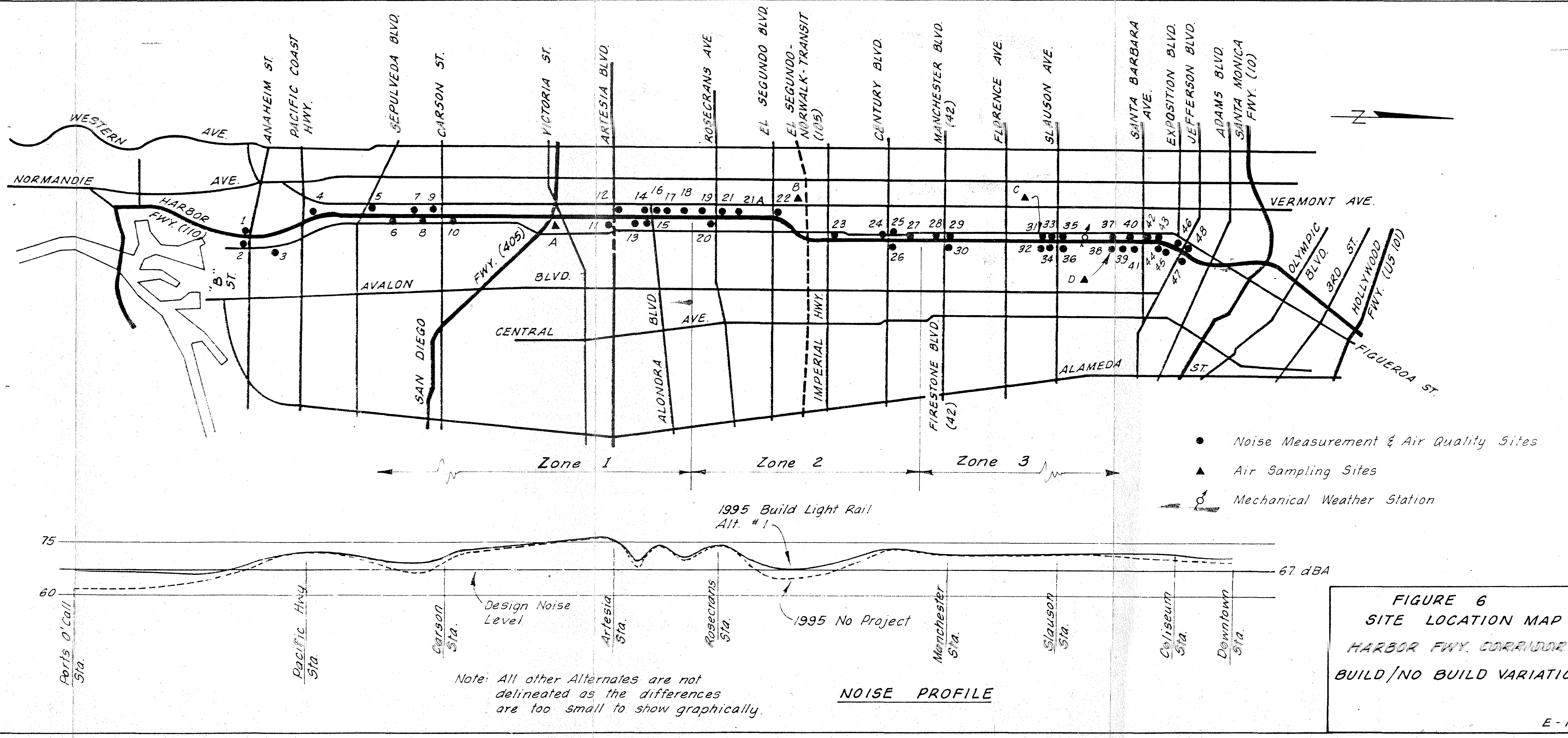
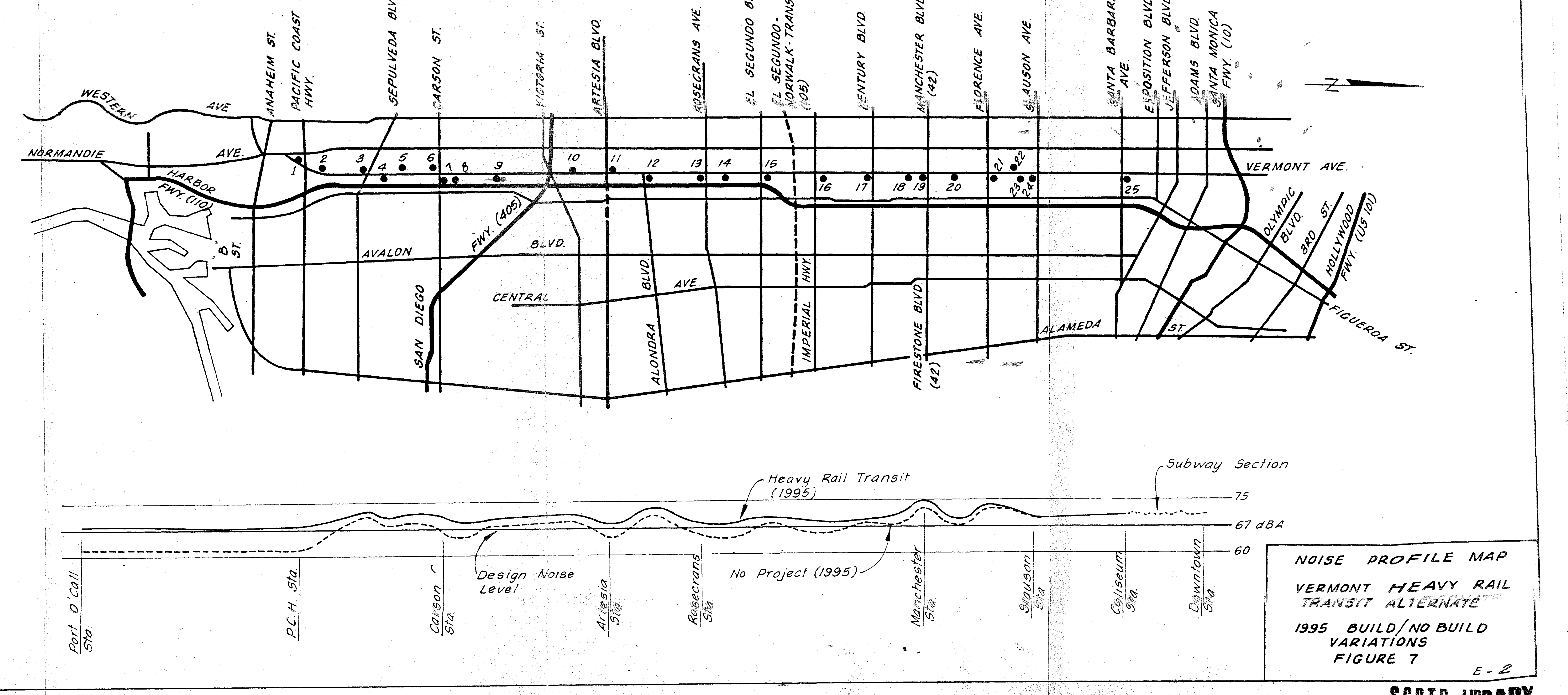


FIGURE 6
SITE LOCATION MAP
HARBOR FWY. CORRIDOR
BUILD/NO BUILD VARIATION

E-1



NOISE PROFILE MAP

VERMONT HEAVY RAIL TRANSIT ALTERNATE

1995 BUILD/NO BUILD VARIATIONS

FIGURE 7

Appendix F
For the Physical Environmental Report
ADDENDUM
May, 1984

I-110 FREEWAY TRANSIT

This addendum addresses the impact that several minor modifications will have on the recommended alternative. Since completion of the Physical Environmental Report in August, 1982, traffic has been expanded from the year 1995 to 2005 and widening of the existing 6-lane freeway to 8-lanes south of Pacific Coast Highway is proposed in order to accommodate the expected increase in traffic. In addition, Bus/HOV #4 has been selected as the recommended alternative.

Revised traffic data for the year 2005 for both the no-build and the Bus/HOV alternatives are included in Tables F-1 and F-2 respectively.

AIR QUALITY

Traffic projections increased in the year 2005 within certain reaches and in some cases average traffic speed was reduced. This will result in a slight degradation in air quality due to increased emissions from the freeway. This will occur for both the "bus/HOV" and "no project" conditions. The air quality degradation is expected to occur throughout the basin due to the overall increase in traffic between the year 1995 and 2005 and is not unique to this transportation corridor.

The previous air quality study concluded there would be no significant impact caused by the construction of any of the proposed alternatives. These revisions will not affect the conclusions.

There are changes in traffic zone 3 (Firestone Boulevard to M. L. King Jr. Boulevard). Zone 3 was the only zone which did not meet the State and Federal 8-hour ambient air quality standards. There are no increased emissions expected from the transportation corridor.

NOISE

There will be no significant increase in the estimated noise levels due to increase in traffic volumes in the year 2005. The reason for this are two-fold. 1. Under similar conditions of speed and vehicle mix, an increased volume of more than 25% is required to increase noise by 1 dBA. 2. Level of Service C is considered to provide the combination of speed and volume that produces the highest noise level. Since Level of Service C is reached or exceeded under the 1995 traffic volumes, any increases in traffic volume expected in the year 2005 will reduce speed. This effect will not increase noise levels.

These results were verified using the F.H.W.A. Highway Traffic Noise Prediction Model (F.H.W.A.-RD-77-108) December 1978. This same model was used to estimate the expected noise in the area south of Pacific Coast Highway which will be widened from 6 to 8 lanes under the proposal. The results were slight but insignificant increase in noise from the previous results.

The location of proposed noise walls for freeway cross-sections on embankment or in cut are shown on Figure F-1.

Noise sensitive land uses are listed on Table F-3 along with estimated noise wall limits, heights and locations. Table F-4 lists the F.H.W.A.-Noise Abatement Criteria by activity category.

The following noise abatement measures are considered most likely to be incorporated into the proposed project:

1. Noise walls of sufficient height to reduce the predicted 2005 noise level to the FHWA abatement criteria of 67 dBA or below at residential and other activity category B sites along the Harbor Freeway where highway-transitway noise is the dominate source. These barriers will be of sufficient height to reduce noise levels a minimum of 5 dBA, and when feasible to intercept the intrusive noise emitted from exhausts of truck.
2. Noise walls will be considered at all residential locations within the project limits since all first line residential receptors are projected to have noise levels equal to or greater than 65 dBA (L_{eq}).

The current noise study has not identified any length of highway or sensitive land use where noise abatement measures appear impracticable or imprudent. However, no mitigation is proposed for the following general locations:

1. Where no physical work is proposed within the R/W. This includes the freeway north of 23rd Street (and between PCH on the south and Redondo Beach Boulevard on the north).

2. The second story and above of dwelling units where no outside activity is occurring.
3. Isolated residential units in commercial or industrial zoned areas where noise levels are not approaching or in excess of 72 dBA.
4. Locations where local opposition is sufficient to be considered general.
5. Any locations where noise abatement benefits and determined to not outweigh the overall adverse social, economic and environmental effects and the cost of the noise abatement measures.

ENERGY CONSUMPTION

The traffic projections for the year 2005 show a slight increase therefore, there would be a slight but proportional increase on VMT for both the "bus/HOV" and "no project". Since the impacts and assumptions used in the computer Model "Energy 3" are accurate only for comparing alternatives rather than establishing a precise daily consumption rate for each alternative, no additional model runs were considered necessary. The recommended alternative was the most energy efficient alternative in the previous report. The 2005 traffic update did not change this result.

WATER QUALITY AND SOLID WASTE

The water quality and solid waste portions of the previous report adequately addressed the impact of the project north of Pacific Coast Highway.

The widening of the freeway from 6-lanes to 8-lane south of Pacific Coast Highway will necessitate the placement of additional roadway embankment material. This material is susceptible to erosion from rainfall. The contractor will be required to mitigate this impact by appropriate methods.

TABLE F-1

2005 FREEWAY TRAFFIC DATA

NO BUILD ALTERNATIVE

Sheet 1 of 2

			DIRECTION	ANAHEIM TO "B" ST.	SEPULVEDA TO PCH	190th TO I-405	ALONDRA TO ARTESIA	EL SEGUNDO TO ROSECRANS
AM	Volume	vph	NB	5600	6300	8000	7200	7700
			SB	4700	4800	6900	5900	6300
	Speed	mph	NB	41	37	22	30	26
			SB	49	49	34	40	37
	Vehicle	Mix* %	NB/SB					
	LDV			77.3	77.3	78.9	78.9	78.9
	LDT			10.5	10.5	10.7	10.7	10.7
	MDT			5.3	5.3	5.4	5.4	5.4
	HDG			2.1	2.1	1.4	1.4	1.4
	HDD			3.9	3.9	2.6	2.6	2.6
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	5.97	6.21	10.69	7.95	9.22
	Factors	gms/mi	SB	5.89	5.96	6.95	6.02	6.40
MD	Volume	vph	NB	3700	3800	5600	4700	5000
			SB	3700	3800	5600	4700	5000
	Speed	mph	NB/SB	55/55	55/55	50/50	55/55	55/55
	Vehicle	Mix* %	NB/SB					
	LDV			74.0	74.0	77.3	77.3	77.3
	LDT			10.1	10.1	10.5	10.5	10.5
	MDT			5.0	5.0	5.3	5.3	5.3
	HDG			3.5	3.5	2.1	2.1	2.1
	HDD			6.5	6.5	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	6.16	6.16	5.96	5.60	5.60
	Factors	gms/mi	SB	6.16	6.16	5.96	5.60	5.60
PM	Volume	vph	NB	4700	4800	7000	5900	6300
			SB	5300	6000	8200	7200	7700
	Speed	mph	NB/SB	49/41	50/41	34/24	40/30	37/26
	Vehicle	Mix* %	NB/SB					
	LDV			75.6	75.6	78.1	78.1	78.1
	LDT			10.3	10.3	10.6	10.6	10.6
	MDT			5.2	5.2	5.3	5.3	5.3
	HDG			2.8	2.8	1.8	1.8	1.8
	HDD			5.2	5.2	3.2	3.2	3.2
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	6.16	6.22	7.13	6.18	6.57
	Factors	gms/mi	SB	6.23	6.50	10.19	8.16	9.45

*Vehicle Mix

LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

TABLE F-1 (continued)

2005 FREEWAY TRAFFIC DATA

NO BUILD ALTERNATIVE

Sheet 2 of 2

			DIRECTION	IMPERIAL TO I-105	MANCHESTER TO CENTURY	SLAUSON TO FLORENCE	SANTA BARBARA TO VERNON	ADAMS TO RODEO
AM	Volume	vph	NB	8300	8400	8000	8100	8400
			SB	6800	6800	6000	7000	7300
	Speed	mph	NB	21	20	23	22	20
			SB	33	30	33	32	30
	Vehicle	Mix* %	NB/SB					
	LDV			78.9	78.9	78.9	78.9	78.9
	LDT			10.7	10.7	10.7	10.7	10.7
	MDT			5.4	5.4	5.4	5.4	5.4
	HDG			1.4	1.4	1.4	1.4	1.4
	HDD			2.6	2.6	2.6	2.6	2.6
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	11.09	11.51	10.30	10.69	11.51
	Factors	gms/mi	SB	7.17	6.95	7.17	7.41	7.95
MD	Volume	vph	NB	5300	5300	5600	5700	5800
			SB	5300	5300	5600	5700	5800
	Speed	mph	NB/SB	50/50	50/50	50/50	50/50	50/50
	Vehicle	Mix* %	NB/SB					
	LDV			77.3	77.3	77.3	77.3	77.3
	LDT			10.5	10.5	10.5	10.5	10.5
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			2.1	2.1	2.1	2.1	2.1
	HDD			3.9	3.9	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	5.96	5.96	5.96	5.96	5.96
	Factors	gms/mi	SB	5.96	5.96	5.96	5.96	5.96
PM	Volume	vph	NB	6900	6900	6900	7000	7300
			SB	8400	8400	8000	8100	8400
	Speed	mph	NB/SB	34/20	23/30	33/23	32/22	30/20
	Vehicle	Mix* %	NB/SB					
	LDV			78.1	78.1	78.1	78.1	78.1
	LDT			10.6	10.6	10.6	10.6	10.6
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			1.8	1.8	1.8	1.8	1.8
	HDD			3.2	3.2	3.2	3.2	3.2
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	7.13	10.57	7.36	7.61	8.16
	Factors	gms/mi	SB	11.82	8.16	10.57	10.97	11.82

*Vehicle Mix

LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

TABLE F-2

2005 FREEWAY TRAFFIC DATA

BUS 4 ALTERNATIVE

Sheet 1 of 2

			DIRECTION	ANAHEIM TO "B" ST.	SEPULVEDA TO PCH	190TH TO I-405	ALONDRA TO ARTESIA	EL SEGUNDO TO ROSECRANS
AM	Volume	vph	NB	5600	6400	8000	8000	8000
			SB	4700	5700	6700	8000	8000
	Speed	mph	NB	41	35	23	23	23
			SB	55	41	35	23	23
	Vehicle	Mix* %	NB/SB					
	LDV			77.3	77.3	78.9	78.9	78.9
	LDT			10.5	10.5	10.7	10.7	10.7
	MDT			5.3	5.3	5.4	5.4	5.4
	HDG			2.1	2.1	2.1	1.4	1.4
	HDD			3.9	3.9	2.6	2.6	2.6
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	5.96	6.14	10.30	7.41	8.56
	Factors	gms/mi	SB	5.89	5.96	6.74	5.93	6.13
MD	Volume	vph	NB	3700	4600	5200	4600	5200
			SB	3700	4600	5200	4600	5200
	Speed	mph	NB/SB	55	55	50	55	50
	Vehicle	Mix* %	NB/SB	55	55	50	55	50
	LDV			74.0	74.0	77.3	77.3	77.3
	LDT			10.1	10.1	10.5	10.5	10.5
	MDT			5.0	5.0	5.3	5.3	5.3
	HDG			3.5	3.5	2.1	2.1	2.1
	HDD			6.5	6.5	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	6.16	6.16	5.96	5.60	5.60
	Factors	gms/mi	SB	6.16	6.16	5.96	5.60	5.60
PM	Volume	vph	NB	4700	5700	6700	5700	6000
			SB	5600	6400	8000	8000	8000
	Speed	mph	NB/SB	55	42	35	41	40
	Vehicle	Mix* %	NB/SB	41	35	23	23	23
	LDV			75.6	75.6	78.1	78.1	78.1
	LDT			10.3	10.3	10.6	10.6	10.6
	MDT			5.2	5.2	5.3	5.3	5.3
	HDG			2.8	2.8	1.8	1.8	1.8
	HDD			5.2	5.2	3.2	3.2	3.2
	MC			0.9	0.9	1.0	1.0	1.0
	Emission		NB	6.16	6.22	6.92	6.09	6.18
	Factors	gms/mi	SB	6.22	6.42	10.57	7.61	8.78

*Vehicle Mix

LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

TABLE F-2 (continued)

2005 **FREEWAY TRAFFIC DATA**

BUS 4 ALTERNATIVE

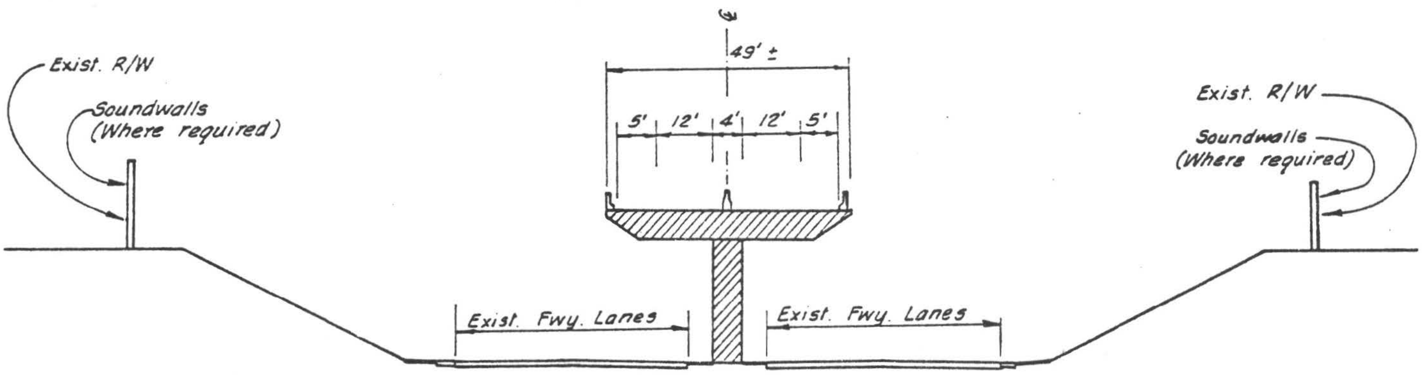
Period	Item	Unit	DIRECTION	IMPERIAL TO I-105	MANCHESTER TO CENTURY	SLAUSON TO FLORENCE	SANTA BARBARA TO VERNON	ADAMS TO RODEO
AM	Volume	vph	NB	7900	8000	7300	7400	7700
			SB	6400	6400	6400	6600	7000
	Speed	mph	NB	24	23	37	28	25
			SB	36	36	50	35	32
	Vehicle	Mix* %	NB/SB					
	LDV			78.9	78.9	78.9	78.9	78.9
	LDT			10.7	10.7	10.7	10.7	10.7
	MDT			5.4	5.4	5.4	5.4	5.4
	HDG			1.4	1.4	1.4	1.4	1.4
	HDD			2.6	2.6	2.6	2.6	2.6
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	9.93	10.30	6.40	8.56	9.57
	Factors	gms/mi	SB	6.56	6.56	5.69	6.74	7.41
MD	Volume	vph	NB	5100	5100	5500	5600	5700
			SB	5100	5100	5500	5600	5700
	Speed	mph	NB/SB	50	50	50	50	50
	Vehicle	Mix* %	NB/SB	50	50	50	50	50
	LDV			77.3	77.3	77.3	77.3	77.3
	LDT			10.5	10.5	10.5	10.5	10.5
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			2.1	2.1	2.1	2.1	2.1
	HDD			3.9	3.9	3.9	3.9	3.9
	MC			0.9	0.9	0.9	0.9	0.9
	Emission		NB	5.96	5.96	5.96	5.96	5.96
	Factors	gms/mi	SB	5.96	5.96	5.96	5.96	5.96
PM	Volume	vph	NB	6400	6400	6400	6600	7000
			SB	7900	8000	7300	7500	8000
	Speed	mph	NB/SB	38	36	37	35	32
	Vehicle	Mix* %	NB/SB	42	23	29	27	23
	LDV			78.1	78.1	78.1	78.1	78.1
	LDT			10.6	10.6	10.6	10.6	10.6
	MDT			5.3	5.3	5.3	5.3	5.3
	HDG			1.8	1.8	1.8	1.8	1.8
	HDD			3.2	3.2	3.2	3.2	3.2
	MC			1.0	1.0	1.0	1.0	1.0
	Emission		NB	6.42	6.74	6.57	6.92	7.61
	Factors	gms/mi	SB	10.19	10.57	8.46	9.11	10.57

*Vehicle Mix

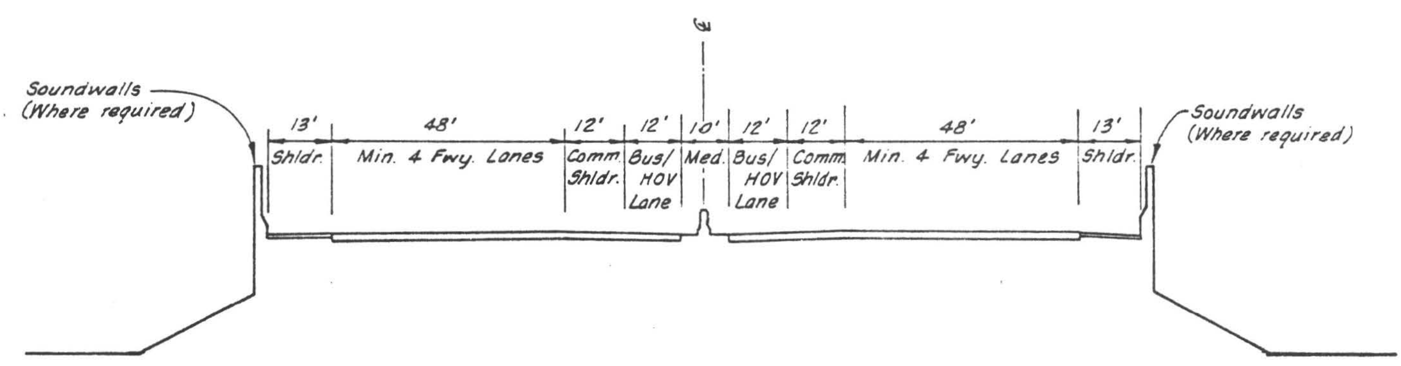
LDV - Light Duty Vehicle
LDT - Light Duty Truck
MDT - Medium Duty Truck
HDG - Heavy Duty Gasoline
HDD - Heavy Duty Diesel
MC - Motorcycle

Figure-1

TWO-WAY BUS/HOV
TYPICAL SOUNDWALL LOCATIONS



ELEVATED SECTION



AT-GRADE SECTION

Table F-3

			2005 ESTIMATED NOISE LEVELS							
					NOISE BARRIER DATA					
SITE	LOCATION	MEAS.	NO PROJ.	BUS/HOV	LOCATION[1]	AVERAGE WALL HEIGHT	WALL LIMITS	SIDE	LAND USE[2]
1	Figueroa Place at Arabic Street	66	67	67	Shoulder	8'	E Street to I Street	West	R,C
2	Figueroa Street at Arabic Street	65	66	66	Shoulder	8'	Emden to Anaheim	East	R,C,S
3	Figueroa Street at Denni Street	70	71	71	Shoulder	10' min.	Anaheim to M Street	East	R,C
4	Mobile Home Park south of Lomita	71	72	73	Shoulder	10' min.	PCH to Lomita	West	R,C
5	Menlo Avenue south of Belson Street	68	69	69	R/W	10'	235th to 228th	West	R
6	Orchard Street north of 228th Street	65	66	66	R/W	10'	235th to 220th	East	R,C
7	South of 223rd Street west of Freeway	67	68	68	R/W	10'	228th to 223rd	West	R
8	Figueroa Street north of 223rd Street	64	65	65	R/W	10'	220th to Carson	East	R,C
9	220th Street west of Freeway	67	68	68	R/W	10'	220th to Torrance	West	R,C
10	215th Street east of Freeway	70	71	71	R/W	10'	Carson to212th	East	R,C

(1) See Figure F-1 for Typical Location of Noise Walls.
(2) Residential - R Commercial - C Industrial - I School - S Park - P

Table F-3 (continued)

SITE	LOCATION	MEAS.	2005 ESTIMATED NOISE LEVELS: NO PROJ.	BUS/ HOV	NOISE BARRIER DATA: LOCATION (1)	AVERAGE WALL HEIGHT	WALL LIMITS	SIDE	LAND USE (2)
11	Eastbound Artesia/northbound 110 Connector	75	76	76	Shoulder	No Wall	---	East	I
12	Westbound Artesia/southbound 110 Connector	(3) 74	67	67	Shoulder	Existing Wall	173rd to 168th	West	R
13	168th Street near Figueroa Street	(3) 67	63	63	Shoulder	Existing Wall	173rd to Alondra	East	R,C
14	Estrella Avenue/south of Gardena Boulevard	(3) 65	60	61	Shoulder	Existing Wall	168th to Alondra	West	R,S,C
15	Alondra Boulevard east of Freeway	72	73	73	Shoulder	10' min.	Alondra to 154th	East	R,C
16	Alondra Boulevard west of Freeway	(3) 73	67	67	Shoulder	Existing Wall	Alondra to 159th	West	R
17	157th Street near Bonsallo Avenue	(3) 72	66	66	Shoulder	Existing Wall	159th to 155th	West	R
18	154th Street near Bonsallo Avenue	(3) 68	62	62	Shoulder	Existing Wall	155th to Redondo Bch. Bl.	West	R,C
19	Hoover Street north of 149th Drive	67	68	68	Shoulder	10' min.	149th to Rosecrans	West	R
20	Rosecrans Avenue at Estrella Avenue	73	74	74	R/W	10'	149th to Rosecrans	East	R

(1) See Figure F-1 for Typical Location of Noise Walls.
(2) Residential - R   Commercial - C   Industrial - I   School - S   Park - P
(3) Noise Readings Taken Prior to Construction of Walls.

Table F-3 (continued)

SITE	LOCATION	MEAS.	2005 ESTIMATED NOISE LEVELS: NO PROJ.	BUS/ HOV	NOISE BARRIER DATA: LOCATION (1)	AVERAGE WALL HEIGHT	WALL LIMITS	SIDE	LAND USE (2)
21	Rosecrans Avenue at Hoover Street	72	73	73	R/W	10'	Rosecrans to 141st	West	R
21-A	Hoover Street near 140th Street	63	64	66	R/W	10'	141st to El Segundo	West	R,S,C
22	127th Street west of Freeway	65	66	67	--	--	Future Route 105 Interchange Area	West	R
23	Grand Avenue north of 109th Place	70	71	71	--	--	Future Route 105 Interchange Area	West	R
24	Grand Avenue near 103rd Street	69	70	70	--	--	Future Route 105 Interchange Area	West	R
25	Southbound Freeway Off Ramp @ Century Boulevard	72	73	73	--	--	Future Route 105 Interchange Area	West	R,S
26	Northbound Freeway On Ramp @ Century Boulevard	71	72	72	--	--	Future Route 105 Interchange Area	East	R,C,I
27	Grand Avenue near 94th Street	69	70	70	Shoulder	10' min.	Colden to 92nd	West	R
28	Grand Avenue near 88th Street	69	70	70	Shoulder	10' min.	92nd to 89th	West	R
29	Southbound Off Ramp @ Manchester	70	71	71	Shoulder	10' min.	89th to Manchester	West	R,C

(1) See Figure F-1 for Typical Location of Noise Walls.
(2) Residential - R Commercial - C Industrial - I School - S Park - P

Table F-3 (continued)

			2005 ESTIMATED NOISE LEVELS						
					NOISE BARRIER DATA				
SITE	LOCATION	MEAS.	NO PROJ.	BUS/HOV	LOCATION (1)	AVERAGE WALL HEIGHT	WALL LIMITS	SIDE	LAND USE (2)
30	Northbound On Ramp @ Manchester	70	71	71	Shoulder	10' min.	Colden to 87th	East	R,S
31	Flower Street @ 59th Street	69	70	70	Shoulder	10' min.	Manchester to 59th	West	R,C,S
32	Grand Avenue @ 60th Street	70	71	71	Shoulder	10' min.	Manchester to 59th	East	R,C
33	Southbound On Loop @ Slauson Avenue	70	71	71	Shoulder	10' min.	59th to Slauson	West	R,C
34	Northbound Off Ramp @ Slauson Avenue	70	71	71	Shoulder	10' min.	59th to Slauson	East	R,C
35	Flower Street @ 56th Street	72	73	73	Shoulder	14'	Slauson to 54th	West	R,C
36	Grand Avenue @ 56th Street	70	71	72	Shoulder	14'	Slauson to 54th	East	R,C
37	Flower Street near 42nd Street	68	69	70	R/W	10'	54th to 42nd	West	R
38	At West Vernon School	64	65	67	R/W	10'	54th to 42nd	East	R,S
39	Grand Avenue @ 41st Place	66	67	68	R/W	10'	42nd to 40th	East	R,C

(1) See Figure F-1 for Typical Location of Noise Walls.
(2) Residential - R Commercial - C Industrial - I School - S Park - P

Table F-3 (continued)

			2005 ESTIMATED NOISE LEVELS						
					NOISE BARRIER DATA				
SITE	LOCATION	MEAS.	NO PROJ.	BUS/ HOV	LOCATION (1)	AVERAGE WALL HEIGHT	WALL LIMITS	SIDE	LAND USE (2)
40	Flower Street and 41st Street	70	71	71	R/W	10'	42nd to 40th	West	R,C
41	Northbound Off Ramp @ M. L. King Jr. Blvd.	69	70	70	Shoulder	10' min.	40th to M. L. King Jr.	East	R
42	Southbound Off Ramp @ M. L. King Jr. Blvd.	69	70	70	Shoulder	10' min.	M. L. King Jr. to 39th	West	R,C
43	Flower Street near 38th Street	63	64	66	Shoulder	10' min.	39th to 37th	West	R,C
44	Hope Street near 37th Street	69	70	70	Shoulder	10' min.	M. L. King Jr. to 38th	East	R,C
45	Southbound Off Ramp @ 37th Street	69	70	71	Shoulder	10' min.	38th to 37th	East	R,C
46	Southbound Off Ramp @ Exposition Boulevard	67	68	69	Shoulder	No Wall	--	West	C
47	Hope Street @ 33rd Street	65	66	67	Shoulder	10' min.	Jefferson to 33rd	East	R
48	Flower Street @ 33rd Street	72	73	73	Shoulder	No Wall	--	West	C

(1) See Figure F-1 for Typical Location of Noise Walls.
(2) Residential - R Commercial - C Industrial - I School - S Park - P

TABLE F-4 -Noise Abatement Criteria

Hourly A-Weighted Sound Level - decibels (dBA) 1/

Activity Category	Leq(h)	$L_{10}(h)$	Description of Activity Category
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	--	Undeveloped lands.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

1/Either $L_{10}(h)$ or Leq(h) (but not both) may be used on a project.

appendix h

PUBLIC COMMENTS

This appendix records all public comments so far received on the I-110 Corridor and Caltrans' response to those comments.

PUBLIC COMMENTS

During the course of this study a preliminary Environmental Assessment was circulated and a variety of meetings was held to obtain input from the public and government agencies (see Section XI C). The comments which were obtained during this process and our responses to them are discussed in this appendix.

<u>Comments from the Environmental Scoping Meeting</u>

- All three recommended a transitway alternative outside the Harbor Freeway right-of-way, preferably Vermont Avenue, be studied. They suggested that greater transit patronage, better joint-use development and community revitalization opportunities, and better transit access could be realized with respect to a transit alignment outside the existing freeway right-of-way. (The Vermont alignment was added to the corridor transit study.)

- One individual also indicated that an alternative located on the east side of the existing freeway right-of-way between Santa Barbara Avenue and 92nd Street would be more favorable for joint use development potential than the preliminary transitway study alternatives. (The feasibility of rail transit on existing rails for the Watts-Willowbrook corridor is being studied as a separate project.)

- All raised questions regarding the long term cost-benefits of a Bus/HOV Transitway alternative. They indicated that the long term (10 years) operational and maintenance costs will require substantial subsidies for a Bus/HOV alternative in comparison to a rail alternative. They also implied that the economic benefits, if any, to the communities would likewise be substantially less (comment noted for financial impact study).

- One questioned the seismic safety related to single column structures and recommended this concern be adequately addressed in the DEIS/R (comment noted for seismic impacts and mitigation measures study).
- Finally one recommended that public hearings or meetings be scheduled on weekends so that the working public has a better opportunity to attend and participate in the future planning efforts. (Comment noted, the subsequent public meeting at USC was held on a Saturday.)

Comments on Preliminary Environmental Assessment

- An off freeway alignment along Vermont Avenue should be studied (incorporated into this study).
- Complete noise and air quality studies should be included in the DEIS (incorporated into this study).
- A complete detailing of parkland acquisitions should appear in the DEIS. (No parkland acquisitions are necessary for this project.)
- A complete detailing of environmental impacts on historic and cultural sites should appear in the DEIS (incorporated into this study).
- A TSM alternative should be studied (incorporated into this study).

- Bicycle facilities should be included in the system. (All park and ride facilities will include locked bicycle storage cabinets. Some transit vehicles should be equipped with a limited number of bicycle racks.)
- The transitways facilities should be accessible to the handicapped (incorporated into this study).
- A generally at grade transitway within the Harbor Freeway right-of-way should be considered (see discussions on bus/ HOV and rail alternatives #7)
- Sufficient parking should be included at station sites. (Parking will be provided at station sites.)
- Construction of a transitway will result in changed traffic patterns and lead to street congestion. (Surface street impacts and mitigation measures are discussed in this study.)
- Traffic detours necessitated by construction should be addressed in the DEIS (incorporated into this study).
- The proposed transportation center near the intersection of Artesia Boulevard and Vermont Avenue will generate noise and create traffic, pedestrian, and bicycle hazards. (The proposed transportation center site near the intersection of Artesia and Vermont is isolated from sensitive noise receptors by Artesia and Vermont is isolated from sensitive noise receptors by Artesia Boulevard, vacant State-owned land, and the Willows marshy woodland. Therefore, noise will not be a problem. (Other impacts will be reduced by mitigation.)

- Construction of the transitway and its associated parking facilities would reduce the tax base (tax base impacts incorporated into this study).
- Freeway transitway lanes should operate in a contra flow manner to facilitate operations. (Traffic operations studies indicate that this transitway would operate most effectively by standard flow rather than contra flow.)
- The relationship between the Harbor Freeway corridor transitway and other proposed components of the regional transportation system should be discussed in the DEIS (incorporated into this study).
- Joint Development and Value Capture should be discussed in the DEIS (incorporated into this study).
- Freeway transit stations would not be attractive or healthy. (Transit stations will be designed to be aesthetically pleasing to transit patrons. The station locations would be no more unhealthy than current freeway bus stops, bus stops along congested arterial streets, or the conditions faced by freeway drivers and transit users.)
- The use of elevated structures is costly and the structures are excessively tall. (The cost for each alternative is detailed in Chapter III. Impacts due to the height of the structures are discussed in Chapter IV.)
- The transitway should be coordinated with and serve proposed city centers and urban modes. (See Chapter IV for the relationships between the proposed transitway and community plans.)
- Open cut construction should be used on Vermont Avenue south

of the subway section. (Open cut trenches on Vermont Avenue would have negative noise, aesthetic, and material disposal impacts. Consequently, this mode of construction was considered and eliminated.)

- Allowing HOV's to use a transitway would increase the cost of the transitway and degrade bus service. (Studies on the El Monte Busway indicate that allowing HOV's on a transitway does not degrade bus service. Additionally, HOV use allows better utilization of the transitways capacity and promotes significant reduction in the amount of vehicle miles traveled at no significant increase in costs.

Comments from Public Meetings and Information Van Displays

- That funds to construct and operate the transitway may not be available. (Financing plans are discussed in Chapter III).
- That the effects of the proposed transitway on taxes and the tax base be examined. (Financial impacts are discussed in Chapter IV).
- The alignment that has the highest potential for job production and joint development should be constructed. (Studies on the potential for joint development and job production for the various alternatives were incorporated into this study).
- Projected 1995 data is not adequate to determine the adequacy or the long term effects of the proposed transitway. (Due to constraints imposed by currently available data 1995 projections are currently more accurate than projections made for later dates).

- Some sort of transportation improvement is needed to reduce congestion on I-110 (a part of this study).
- Assumptions for patronage projections should be explicitly stated and patronage projections should be as accurate as possible. (Assumptions for patronage projections are discussed in Appendix A).
- Feeder service is essential for the success of any transitway and many potential patrons will depend on bus feeder service for access to station sites. (SCRTD operational plans including feeder service are incorporated into this DEIS).
- Large volumes of truck traffic on the Harbor Freeway make it dangerous. A truck bypass should be constructed to remove trucks from the freeway. (While this project would not remove trucks from the freeway, it would expand the transportation capacity of the corridor and remove transit patrons from the mixed flow lanes of the freeway).
- Public transit service in San Pedro and South Los Angeles should be expanded. (This project is an attempt to expand transit service in these areas).
- All transitway facilities should be accessible to the elderly and the handicapped. (Incorporated into this study).
- The impacts due to relocation because of right-of-way acquisition are difficult for many people to adjust to, so right-of-way takings should be minimized. (The amounts of additional right-of-way necessary for each alternative are minimized as much as possible. The impacts of such takings are discussed in Chapter IV.)

- Parking lots should be located so that neighborhoods are not disrupted. (Incorporated into this study).

Comments from the Corridor Planning Committee Meeting

- Will cities have continuing opportunity to provide input into study? (Cities have had input through a variety of committees, meetings, and reviews. Cities will be able to provide input by commenting on this DEIS.)
- NAACP opposes project. They feel buses are a poor idea, and that the Harbor Freeway is not the Harbor Freeway is not the best corridor for South Central L.A. They would prefer a rail system on Vermont. They also disagreed with J. Baxter that the 1976 RTD analysis included the Harbor Freeway. (Comment noted.)
- Several people indicated a feeling that the various transportation committees and agencies (LACTC, SCAG, RTD, etc.) do not represent the people and that past transportation decisions by them should be discounted. (These agencies as public agencies are empowered to make decisions. Other avenues of input are provided so private citizens can comment.)
- Two suggestions were made for State implementation which we acknowledge as constructive: (1) define acronyms such as CPS, CBD, etc., and (2) be certain to add San Pedro Chamber of Commerce to list of CPC members. (Comments implemented.)
- Much of the area through which the transitway would pass has high crime rates. People must feel safe using transitway facilities otherwise they will not utilize the transitway. (Public security is a part of this study).

- People perceive subways to be more dangerous than other types of transportation systems, consequently a subway would be used less than another configuration. (Comment noted. Patron security is a part of this study).

appendix i

TRANSIT TECHNOLOGY

This appendix describes the current state of the art in transit technology and discusses the appropriateness of each type of technology for the Harbor Freeway corridor transitway project.

TRANSIT TECHNOLOGIES

A wide range of transit technologies (modes) were evaluated for their applicability to the needs of the I-110 corridor. The following discussion is a comparative evaluation of each modes advantages and disadvantages. Conclusions as to which technologies are appropriate are at the end of each mode discussion.

1. Bus Modes

Buses, whether manufactured in the United States or in foreign countries, follow 3 basic designs: a 40 foot standard bus with seating for approximately 45 passengers, a 55-60 foot articulated bus with seating for approximately 65 passengers, and a double-deck bus for approximately 85 passengers.

For a high-volume corridor with numerous stops the articulated bus is the most appropriate. It has large 2-person doorways that allow rapid entering and exiting. Thus, it is anticipated this vehicle will be the most frequently used for the service. Most articulated buses have less power than conventional buses so that acceleration and hill-climbing are slower. However, since the profiles of the I-110 guideway would be relatively flat as a result of rail conversion requirements, the low power would not be a problem. For low patronage periods, such as off-peak and weekends, the smaller, standard buses could be used. These could also be used for lines that self-distribute or self-collect off the guideway.

For express service involving large volumes and few stops, such as park-and-ride, double-deck buses may be appropriate. They should not be used for routes with frequent stops as quick boarding and alighting cannot be accomplished, particularly on the upper deck.

The chief advantages of buses are:

- low initial capital costs per unit (approximately $160,000 standard, $300,000 articulated, $260,000 double deck)
- route flexibility
- by-passing capability
- generally, buses are more readily available from manufactures than rail cars
- different sized vehicles can be used for specialized purposes
- can share usage of transitway with HOV's

- can also be used for feeder service
- operational flexibility
- does not require separate track or R/W
- minimal or no direct guideway maintenance costs (could be absorbed into and indistinguishable from freeway maintenance costs)

The chief disadvantages are:

- limited capacity per vehicle
- lower system patronage capability than rail
- each additional vehicle requires an additional driver
- environmentally undesirable (smoke, noise, fuel burning, etc.)
- unpopular with many commuters
- low longevity (12 years) in comparison to rail (30 years)
- subject to fuel shortage problems
- reduced service capabilities in inclement weather
- inferior elderly and handicapped access

Conclusions

The projected daily patronage levels are approximately 58,200 in the highest link. With peak period headways of 50 seconds, buses are just capable of providing Freeway Transit service for this volume on an exclusive guideway. This holds true for either a one-way or two-way structure. Therefore buses are a feasible mode for this project, especially when considering the increased effectiveness of a transitway by allowing HOV's carrying three or more people per vehicle.

2. Light Rail Transit (LRT)

This system consists of electrically powered articulated rail cars called Light Rail Vehicles (LRV's) operating singly or in short trains. It usually operates in exclusive or semi-exclusive right of way, but can operate on a street in mixed-flow traffic similar to a street car. It can also operate in a rapid rail transit manner on grade-separated tracks with high platforms. It is usually powered from overhead catenary.

Most LRV cars are about 75 feet long with 3 or 4 double doors on each side, 65 seats, and a full load capacity of about 125 people. It accelerates and decelerates quickly and operates at speeds up to 60 MPH. With close headways and multi-car trains it could handle passenger levels up to 15,000 people per hour in one direction.

Some of the main advantages are:

- present technology is environmentally quiet
- popular with patrons
- can operate singly
- capacity can be increased by training vehicles
- each additional vehicle does not necessarily need an additional operator
- fewer vehicles than buses required for comparable level of patronage
- quick loading and unloading of passengers
- with sufficient patronage light rail is more energy-efficient than bus
- environmentally clean
- good longevity of vehicles (approximately 30 years)
- higher system patronage capability than bus
- very low capital costs for at-grade construction
- not subject to fuel shortage problems
- lower guideway construction costs than bi-directional Bus/HOV
- has potential for incremental upgrading

Some disadvantages are:

- fixed route
- no by-passing capability unless additional tracks are provided
- high initial capital cost ($900,000/vehicle)

- Additional funding for rail guideway maintenance must be secured.

- requires more feeder buses than buses which can self-feed

Conclusions

It is quite logical to consider light rail transit as a feasible technology. The state-of-the-art is quite advanced and light rail now offers fast, reliable, and very quiet equipment. It will easily accommodate the corridor's projected transit patronage and has ample reserve capacity for even greater patronage. Where an at-grade system is possible it offers the opportunity for a low expense installation.

3. Intermediate Capacity Transit Systems (ICTS)

This technology (ICTS) is one of the more recent developments in rail transit systems. It consists of light weight vehicles that can operate singly or in trains up to 6 vehicles. The lengths of vehicles vary from 30 to 50 feet (shorter than LRV) and the operating capabilities allow it to operate in a manner similar to either light or heavy rail. ICTS has the flexibility to carry passenger volumes as low as 5000 persons/hour in the peak direction to a high of 25,000 persons/hour peak direction.

This system also offers two types of electrical propulsion: 1) linear induction motors that require an all exclusive right of way, and 2) conventional rotary motors which usually use catenary and pantograph for electrical pickup.

There are two types of LIM systems that are now being tested in Canada and Germany. The Canadian system uses steel wheels on steel rails and the German System uses magnetic levitation.

The latter is capable on an at-grade operation with 45 MPH cruising speeds, but where possible, grade-separated operations are preferred in order to fully utilize its capabilities. Length limitations are often imposed due to traffic or geometric concerns.

The main advantages of ICTS are:

- operational versatility

- very quiet

- attractive

- has been constructed and tested

- added capacity without additional operators

- lower energy requirements
- good longevity of vehicles expected
- lower capital construction costs
- low maintenance costs
- lower capital vehicle cost than LRV; $750,000 (Canadian), $400,000 (German Mag-lev), versus $900,000 (LRV)

Some disadvantage are:

- no existing system is in operation yet. (Some are now under construction and test systems have been built.)
- fixed route
- no by-passing capability unless tracks are provided
- higher capital costs than buses
- Additional funding for rail guideway maintenance must be secured.

Linear induction motor systems are incompatible with conventional systems, particularly Mag-lev, and will require separate rail facilities.

Conclusions

This technology is a feasible freeway transit mode. It could accommodate any future passenger demands. Environmentally, it has an advantage due to its quiet operation and attractiveness to passengers. For at-grade operations, however, LRT has superior characteristics.

4. Heavy Rail Transit (HRT)

An HRT System consists of electrically powered rail vehicles operating singly or in trains up to a maximum of 10 cars, which is 750 feet long. This type of system always operates in an exclusive grade separated right-of-way. Normally, the station platforms are high level and the vehicles generally receive their power via third rail. (However, a catenary power supply is feasible).

Most HRV's are 75' in length with 3 or 4 double doors per side, have approximately 75 seats and a full capacity load (crush load) of 189 patrons. An HRV accelerates quickly and has a top speed of approximately 70 mph. With close headways (90 sec.), a 6 car train has the capacity of transporting approximately 45,000 persons one way in the peak hour. However, with 2-1/2 minute headways, this capacity is reduced to just over 27,000 persons/hour.

Capital construction costs are high due to the requirements of an exclusive guideway and the high design standards. An aerial guideway has an average cost of $32 million per mile while a subway section would cost approximately $70 million per mile. Although vehicle costs are high ($975,000 per) as compared to articulated bus ($300,000 per), this is offset by an expected lifespan of 30 years, for an HRV versus 12 years for articulated bus.

Some of the main advantages of heavy rail transit are:

- environmentally quiet and clean
- very high level of public acceptance
- single or multiple vehicle operations without any additional operators
- higher capacity than buses at comparable level of service/patronage
- efficient boardings and alightings
- excellent reliability record
- not subject to petroleum based fuel shortages
- higher operating speeds than bus

Some of the disadvantages of heavy rail transit are:

- fixed route
- high capital construction costs
- no bypass capability without additional trackage
- requires an extensive feeder bus network
- distribution problems at termini
- vertical and horizontal curve radii and grade restrictions
- excessive right-of-way requirements due to alignment restrictions

Conclusions

Heavy Rail Transit would be attractive in the Vermont corridor if the projected patronage could support such a system. However, the Vermont Avenue alignment does not have the projected patronage necessary to support a heavy rail system and would be well served by either a light rail or intermediate capacity. Also, the high capital costs of a heavy rail system on this alignment could possibly discourage this mode choice given the current funding sources.

Modal Alternatives Rejected

1. Cable-Suspended Systems

This technology was developed during the 1970's and consists of articulated vehicles suspended from segmented rails that are cable-supported. The support system employs the principles of a cable-suspension bridge supported on widely spaced towers. Originally developed in Switzerland as the Mueller Aerobus, a small operating system was built in Mannheim, Germany for a six month garden show in 1975. An improved version of this system is now being promoted in the United States under the name of Sky Shuttle.

The support towers are 65 feet high on 10 foot diameter columns and are spaced up to 750 feet apart. The maximum deflection of the rails at each tower is 3^{o}-5^{o} without special rail features that will cause reduction in speed. To avoid the necessity of installing these special rails the towers must be constructed at 200'-300' intervals through freeway curves of 2000-3000 feet radius in order to maintain the 3^{o}-5^{o} deflection maximums. The alternative is to space the towers farther apart resulting in the rails meandering outside the freeway median over traffic lanes and in some cases outside the R/W.

Each vehicle has 62 seats with a crush load of 156 persons. Based upon a nominal crush load of 120 passengers per vehicle and a minimum of 90 second headways (90 seconds is the least of any world-wide rail system), the maximum capacity is approximately 5000 persons per hour in one direction. (The developer of Sky Shuttle claims up to 18,000 persons is possible with 30 second headways and 150 person crush loads.) Construction costs are estimated (by Sky Shuttle) to be:

- $7 million/mile for double tracks guideway (includes service facilities, electrification, and support towers spaced about 750 feet).
- $2-4 million per station
- $1 million per vehicle
- $100,000 per additional tower

The principle advantages claimed for this system are:

- totally grade-separated and capable of being suspended in long spans above the traffic or any other ground-level features
- relatively inexpensive and faster construction than other grade-separated systems
- minimal right-of-way requirements
- very quiet
- capable of operating on steeper grades than LRT or ICTS

The principle disadvantages appear to be:

- unproven and untested (applies to all performance claims)
- inability to couple vehicles
- emergency evacuation problems
- incompatible with conventional rail systems
- visual impacts
- general public non-acceptance of suspended vehicles
- inability to remain in either the right median or R/W of freeway
- potential P.U.C. limitations of facilities over which this system can be suspended

Conclusions

It was concluded that this system should not be considered for a Freeway Transit system. A 1979 UMTA analysis by N. D. Lea and Associates and a 1982 analysis by Kaiser Engineering of cable-suspended systems for New Orleans both concluded that this type of system would be inadequate for needs similar to those of the Route I-110 corridor. The Sky Shuttle should also be eliminated from consideration until a system has been constructed, operated, and fully analyzed.

It is highly unlikely that any funding agency will favorably consider an unproven technology for a full system without a prior demonstration project.

2. <u>Monorail</u>

There are two types of monorail systems: a suspended vehicle system such as that constructed in Wuppertal, West Germany and at the Los Angeles County fairgrounds, and the more common above-the-rail system such as that constructed at Disneyland. At Disneyworld, in Florida, a more advanced system has been in operation since 1971. This advanced system is now being promoted by WED Transportation Systems, Inc. as the Mark IV monorail system.

Both types of systems operate on the principle of a vehicle straddling a large singular beam that provides lateral guidance to the vehicle as well as support. Structurally the modern design of this type of guideway is much less complex and more attractive than past designs or those of other types of elevated guideways and should be considerably less expensive to build.

According to the WED specifications the dual rail guidway would be 14 feet wide and supported by tapered columns as narrow as 3 feet and up to 65 feet high, spaced up to 110 feet apart. With a minimum radius of 500 feet it should be capable of following a freeway median. The 6% grade rate capability would allow profiles identical to LRT, but only grade separated. The vehicles can be trained up to a maximum of 6 cars, which is 200 feet long, and has a seating capacity of 244 passengers. Provisions for standees have not been provided or permitted by the Disney Corporation.

The vehicles run on rubber tires, are reversible, and operate manually with an automatic override monitor. The claimed system capacity is 10,000 passengers per hour (one-way) at 90 second headways which exceeds our projected peak link volume of 7000 (one-way). At 5-1/2 minute headways this would be about 2700 passengers.

Of major concern for Freeway Transit adaptability is the rail switching system that allows merging or variable routing. The switching system incorporates a "beam replacement" switch that requires 30 seconds to complete. The physical switching limitations and the relatively long switching time greatly reduce the system's versatility in creating a combined network. Although the cars are reversible all of the existing systems are loop systems that avoid reversing or switching.

The main advantages of monorail are:

- much less expensive than grade-separated LRT
- Much less construction time due to prefabricated structural elements
- less obtrusive in appearance
- Totally grade-separated to avoid traffic and other groundlevel features

- minimal right-of-way requirements
- very quiet
- proven technology
- excellent reliability record
- very high level of public acceptance

The chief disadvantages are:

- emergency evacuation problems
- no bypassing capability
- visual impacts
- limited training abilities
- limited switching capabilities
- closed loop operation may be necessary
- less capacity than LRT
- cannot operate at-grade
- incompatible with conventional rail systems
- unconventional doorway and compartmental design

Conclusions

Based upon limited data it appears that monorail has insufficient capacity to meet the I-110 corridor patronage projections.

appendix j

MEASURES OF EFFECTIVENESS

This appendix defines criteria for the evaluation of the transit alternatives in the I-110 corridor and selects a limited set of criteria which will define key differences among the alternatives.

INTRODUCTION

The purpose of the measures of effectiveness (MOE) are to define criteria for the evaluation of project level transit alternatives in the Harbor Freeway (I-110) corridor, and to select a limited set of criteria which will define the key differences among the alternatives.

Evaluation criteria consist of quantifiable measures of the prospective effectiveness of an alternative in supporting the achievements of specified project goals and objectives. These measures are defined primarily in terms of cost; patronage; transportation service benefits; social, economic and environmental impacts; and cost-effectiveness. Although numerous MOE's can be identified, it was important to limit the number used to facilitate, rather than obscure decision-making.

B. IMPROVED TRANSPORTATION SERVICES

Table A is a summary of improved transportation services and while some are self-explanatory, others bear further illustration. The first item is a comparison of the reduced transit travel time between Route 47 in San Pedro and the Convention Center (CC) in the LACBD. Utilizing the no project alternative as the basis of the comparison with a 54 minute one-way trip, the bus alternatives time saving is 11 minutes while the rail alternative saves 21 minutes. The rail alternatives have the highest time savings from Route 47 to the CC.

TABLE A

SUMMARY OF IMPROVED TRANSPORTATION SERVICES FOR 2005

ALTERNATIVE / MEASURES OF EFFECTIVENESS	NO PROJECT	TSM	BUS ALTERNATIVES: TWO-WAY 1,4,7	BUS ALTERNATIVES: PEAK DIRECTIONAL 8a & 8b	RAIL ALTERNATIVES: ICTS 1,4,7	RAIL ALTERNATIVES: LRT 1,4,7	RAIL ALTERNATIVES: HRT 6
1. Reduced Transit Travel Time (AM Peak Route 47 to Convention Center (Minutes/Trip)	Base	+2	-11	-11	-21	-21	-21
2. Improved Transit Service Levels a. Vehicles/Trains	4	4	68	68	27	11	7
b. Daily Linehaul Vehicles (000's)	17.8	30.7	25.6	26.1	40.2	15.9	20.7
c. Daily Vehicle Miles on Transitway (000's)	0	0	11.0	11.0	40.2	15.9	20.7
d. Transit Passengers per Vehicle Mile	0.9	0.9	2.5	2.1	2.0	4.7	4.0
3. Travel Safety (Annual Reduction of Accidents in Corridor)	0	460	690	610	620	600	630
4. Annual 2005 Transit Patronage (000,000's)	5.0	8.8	20.1	16.6	25.0	23.0	25.8
a. Annual Transit Patronage in Corridor (000,000's)	158.4	182.2	189.6	187.4	190.4	189.5	190.7
b. Annual Patronage Utilizing Transitway (HOV & Transit) (000,000's)	0	0	26.8	20.2	25.0	23.0	25.8
c. Annual Peak Hour Transit Trips in Corridor (000,000's)	25.3	21.1	30.3	30.0	30.5	30.4	30.5
d. Annual Peak Hour Trips Utilizing Transitway (HOV & Transit) (000,000's)	0	0	4.4	3.3	4.0	3.7	4.1

The other item bearing further illustration is Travel Safety. This item relates the total annual reduction of accidents across the entire corridor. While there is very little difference between the alternatives, they all have a reduction which ranges from between 460 and 690 annual accidents. This is based on the annual corridor reduction of VMT.

C. SOCIOECONOMIC FACTORS

Table B is a review of the 2005 socioeconomic factors. Bus/HOV 7 of the freeway alternatives has the highest displacement of housing units and business (167 total) but results in improved operation and safety standards on the existing freeway. However, Rail 6 on the Vermont Avenue alignment, has the highest total business displacements (29). The number of new jobs created, direct and indirect, is merely a factor of the amount of capital expenditures for each alternative. The factor used was 10 direct jobs and 20 indirect jobs per million spent. As Rail 6 has the highest expenditures, it follows that it would generate the most jobs. The number of joint development/value capture opportunities is fairly constant with the freeway alternatives each having the same 14, and the Vermont Avenue alternative having only 9.

D. ENVIRONMENTAL FACTORS

Table C is a review of the 2005 environmental factor and include the reduction of daily emissions expressed in tons, the sensitive noise receptors impacted, and the visual impacts of the elevated structure and stations. The reduction of daily emissions varies from 8.1 tons for TSM to 16 tons for the rail alternative.

TABLE III-B

SUMMARY OF SOCIOECONOMIC FACTORS 2005

MOE'S / Alternatives	Number of Housing Units Displaced	Number of Businesses Displaced	Number of New Jobs Created		Number of Joint Development/Value Capture Opportunities
			Direct	Indirect	
No Project	0	0	0	0	0
TSM	0	0	600	1,200	0
Bus 1	20	14	6,300	12,600	14
4	114	27	5,800	11,600	14
7	140	27	7,000	14,000	14
Bus 8a	16	14	4,800	9,600	14
8b	16	14	4,800	9,600	14
ICTS 1	16	14	8,600	17,200	14
4	16	14	7,700	15,400	14
7	29	14	9,900	19,800	14
LRT 1	16	14	8,300	16,600	14
4	16	14	7,500	15,000	14
7	29	14	9,600	19,200	14
HRT 6	43	29	11,000	22,000	9

TABLE C

SUMMARY OF 2005 ENVIRONMENTAL FACTORS

MOE's / ALTERNATIVES	REDUCTION OF DAILY EMISSIONS (TONS) $CO/RHC/NO_x/TOTAL$	SENSITIVE NOISE RECEPTORS IMPACTED*	VISUAL IMPACTS	
			ELEVATED STRUCTURE (MILES)	STATIONS WITHIN 1000' OF RESIDENTIAL UNITS
No Project	Base	37	0	0
TSM	7.1/0.8/0.2/8.1	38	0	3
Bus 1	13.1/1.3/0.6/15	40	8.2	9
Bus 4	13.1/1.3/0.6/15	40	4.3	9
Bus 7	13.1/1.3/0.6/15	40	1	9
Bus 8a	13.1/1.3/0.6/15	40	8.2	9
Bus 8b	13.1/1.3/0.6/15	40	4.3	9
ICTS 1	13.8/1.5/0.7/16	38	19.0	10
ICTS 4	13.8/1.5/0.7/16	38	10.3	10
ICTS 7	13.8/1.5/0.7/16	38	5.1	10
LRT 1	13.8/1.5/0.7/16	43	19.0	10
LRT 4	13.8/1.5/0.7/16	42	10.3	10
LRT 7	13.8/1.5/0.7/16	39	5.1	10
HRT 6	13.8/1.5/0.7/16	23	15.6	13

*The Harbor Freeway was measured at 49 sites. The Vermont alignment was measured at 25 sites. The no project alternative on Vermont has 13 impacted receptors.

The bus alternatives are only slightly less than the rail alternatives with a 15 ton per day reduction. The above emission reductions, whether TSM, bus or rail are insignificant when viewing the daily Harbor corridor emissions (604 tons, mobile and stationary sources, Caltrans 1981) or the South Coast Air Basin daily emissions (10,424 tons, mobile and stationary sources, 1979 average annual day, South Coast Air Quality Management District, 1982).

The number of sensitive noise receptor ranges from 23 on the Vermont alignment to 43 for LRT alternative 1. The reason the Vermont alignment is so low is that when the alignment is in subway the only receptors would be in the vicinity of the subway station entrances. The no project, TSM and ICTS alternative all have the lowest number of impacted (other than the Vermont alignment) receptors at 38 which is no change over the base. The visual impacts are directly related to the length of elevated guideway which varies from 1.0 mile for Bus/HOV 7 (the at-grade alternative) to 19.0 miles for rail alternative 1 (LRT and ICTS), the elevated alternative. Again with the Bus/HOV alternative guideways ending north of Route 91, while the rail extends further south to Route 47, the rail alternatives have a higher visual impact.

E. ENERGY CONSERVATION

Table D is a comparison of the annual energy conservation in equivalent barrels of oil (EBO's) and is broken down into four sections: annual operating energy required - including cars, trucks, transit vehicles and maintenance; annual construction

TABLE D

SUMMARY OF 2005 ENERGY CONSERVATION

ENERGY CONSUMPTION IN THOUSANDS OF EBO's*

MOE's / Alternatives	Annual Operating Energy Required	Annual Construction Energy Required	Total Annual Energy Required	Annual Energy Savings
No Project	2058	0	2058	0
TSM	1812	3	1815	243
Bus 1	1710	38	1748	310
Bus 4	1710	33	1743	315
Bus 7	1710	41	1751	307
Bus 8a	1749	29	1778	280
Bus 8b	1748	28	1776	282
ICTS 1	1753	53	1806	252
ICTS 4	1753	46	1799	259
ICTS 7	1753	60	1813	245
LRT 1	1740	53	1793	265
LRT 4	1740	44	1784	274
LRT 7	1740	60	1800	258
HRT 6	1779	74	1853	205

*EBO = Equivalent Barrels of Oil.

energy required - this is the total construction energy required factored by 30 years (the economic lifespan of the project) and includes roadway improvements and the construction of new structure (guideway, stations, etc.). (The construction energy required for the bus alternatives is low when compared to the rail but the bus guideway ends north of Route 91 while the rail guideway continues an additional 9.0 miles to Route 47 in San Pedro.) Total annual energy required is merely the addition of the annual operating energy required and the annual construction energy required. The last column, annual energy savings is the difference between the no project alternative (base) and the other alternatives. These annual savings range from 205,000 EBO's for Rail 6 (Vermont Avenue alignment) to 315,000 EBO's for Bus/HOV 4. These savings, when translated into 1984 dollars range from 5.9 million to 9.2 million dollars annually when using \$ 29 as the cost of a barrel of crude oil.

F. COST EFFECTIVENESS

Cost-effectiveness measures are of critical concern to the decision-makers. They represent the "bottom line" of the comparative project worth. These measures are intended to relate costs to goal attainment. In practice, they typically relate costs of effectiveness in terms of the transit system and the patronage.

Table E illustrates the cost effectiveness of each of the proposed alternatives. Items 4, 8, 9 and 13 are the most important and will be described more fully here. Item 4 is the total annual costs based on the capital recovery factors (CRF) of 10%. These costs

TABLE E

I-110 SUMMARY OF COST/EFFECTIVENESS MEASURES
(All cost are in Millions of 1984 $ Except as Noted)

	NO PROJECT	TSM	B 1	B 4	B 7	B 8a	B 8b
1. Capital	0.0	63.2	633.3	578.0	700.4	482.6	484.0
2. Annualized 10% Capital Cost	0.0	8.2	69.2	63.4	76.3	53.3	53.6
3.* Operating Cost	13.4	26.6	30.4	30.4	30.4	29.8	29.8
4. Total Anuual 10% Cost (Cap. & Op.)	N.A.	34.8	99.6	93.8	106.7	83.1	83.4
5.** Total Annual Transit Patrons (Millions)	5.0	8.8	20.1	20.1	20.1	16.6	16.6
6.** Total Annual HOV Users (Millions)	0.0	0.0	9.9	9.9	9.9	5.2	5.2
7.** Total Patronage (Millions)	5.0	8.8	30.0	30.0	30.0	21.8	21.8
8.* Total Annualized 10% Cost/Patron (Transit & HOV) $	N.A.	3.95	3.32	3.13	3.55	3.81	3.82
9. Total Annualized 10% Cost/Patron $ (Transit)	N.A.	3.95	4.96	4.67	5.31	5.01	5.02
10.*** Total Annual Transit Patron Miles (Millions)	49.9	88.0	201.0	201.0	201.0	166.0	166.0
11.*** Total Annual HOV Passenger Miles (Millions)	0.0	0.0	137.8	137.8	137.8	72.5	72.5
12. Total Annual Passenger Miles (Millions)	49.9	88.0	338.8	338.8	338.8	238.5	238.5
13.* Annualized Transit/ 10% HOV Cost/Passenger Mile $	N.A.	0.40	0.29	0.28	0.32	0.35	0.35

*Linehaul operating costs contain intra-CBD trips; capital costs do not contain CBD trips.
**Patronage does not include intra-CBD trips; HOV trips are person trips.
***Average trip length for transit = 10.0 miles; average trip length for HOV's = 13.9 miles.

Updated: December, 1984

TABLE E

I-110 SUMMARY OF COST/EFFECTIVENESS MEASURES
(All cost are in Millions of 1984 $ Except as Noted)

	ICTS			LRT			HRT
	R 1	R 4	R 7	R 1	R 4	R 7	R 6
1. Capital	855.7	770.2	991.1	832.7	747.2	968.1	1063.0
2. Annualized 10% Capital Cost	91.8	82.8	106.2	89.6	80.6	103.9	114.0
3.* Operating Cost	43.5	43.5	43.5	35.0	35.0	35.0	39.8
4. Total Annual 10% Cost (Cap. & Op.)	135.3	126.3	149.7	124.6	115.6	138.9	153.8
5.** Total Annual Transit Patrons (Millions)	25.0	25.0	25.0	22.7	22.7	22.7	25.8
6.** Total Annual HOV Users (Millions)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.** Total Patronage (Millions)	25.0	25.0	25.0	23.0	23.0	23.0	25.8
8.* Total Annualized 10% Cost/Patron (Transit & HOV) $	5.41	5.05	5.99	5.49	5.09	6.12	5.96
9. Total Annualized 10% Cost/Patron $ (Transit)	5.41	5.05	5.99	5.49	5.09	6.12	5.96
10.*** Total Annual Transit Patron Miles (Millions)	250.0	250.0	250.0	227.0	227.0	227.0	258.0
11.*** Total Annual HOV Passenger Miles (Millions)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12. Total Annual Passenger Miles (Millions)	250.0	250.0	250.0	227.0	227.0	227.0	258.0
13.* Annualized Transit/ 10% HOV Cost/Passenger Mile $	0.54	0.50	0.60	0.55	0.51	0.61	0.60

*Linehaul operating costs contain intra-CBD trips; capital costs do not contain CBD trips.
**Patronage does not include intra-CBD trips; HOV trips are person trips.
***Average trip length for transit = 10.0 miles; average trip length for HOV's = 13.9 miles.

Updated: December, 1984

reflect the total annual costs of each alternative including the annualized capital cost (construction and vehicles) and the operational and maintenance costs. Item 8 is the total annualized cost per patron (transit and HOV) and Item 9 is the total annualized cost per patron (transit only). Again, these costs are reflected in using the CRF's of 10%. These two items are differentiated in that some of the alternatives have no new HOV trips, i.e. the no project, TSM, and all the rail alternatives. Item 13 is the annualized transit/HOV cost per passenger mile. All of these items are based on patronage, level of service, capital and operating costs. The bus alternatives have lower annualized cost per passenger mile due primarily to lower capital and operating costs but do not provide the high level of service as do the rail alternatives. For example, Bus 4 has an annualized cost per passenger mile (CRF = 10%) of $0.28 and travels 338.8 million passenger miles (including HOV mileage). ICTS 4, on the other hand, has an annualized cost per passenger (CRF= 10%) of $0.50 but travels 250.0 million passenger miles.

appendix k

SELECTION PROCESS FOR RECOMMENDED ALTERNATIVE

This appendix outlines the procedure used to select the preferred alternative for the project.

SELECTION PROCESS

FOR THE HARBOR (I-110) FREEWAY

TRANSIT PROJECT

Recommended Alternative

On May 24, 1983, a project development team (PDT) meeting was held in the District 7 office to select the preferred alternative for the proposed Harbor (I-110) Freeway transit project between San Pedro and the Convention Center in the City of Los Angeles, a distance of 22 miles. PDT members in attendance (see Exhibit A) selected the two-way bus alternative located in the median of the Harbor Freeway as the recommended alternative for the project.

This alternative provides 10.3 miles of exclusive guideway facilities for buses and high occupancy vehicles between Route 91 Freeway and 23rd and Figueroa Streets, with intermediate access at nine locations. South of Route 91 Freeway, all bus/HOV transitway vehicles would travel 9.3 miles in mixed flow freeway traffic to San Pedro. Direct transitway connectors would be provided to I-105 transitway.

Alternatives Evaluated

Thirteen possible build alternatives, including TSM, were evaluated by the PDT members for final selection of the recommended alternative. The no project alternative was used as the base to develop the data for the evaluation of the build alternatives. PDT members were not required to directly evaluate this (no project) alternative since it did not meet the transit-related goals and objectives outlined in the DEIS for the transitway project, i.e., improved transportation service.

The following table provides a brief description of the alternatives evaluated for the transitway project.

ALTERNATIVE	GENERAL DESCRIPTION
T.S.M.	Low cost improvements to the existing transit and highway system
Bus 1	Elevated in I-110 median
Bus 4	At-grade and elevated in I-110 median
Bus 7	At-grade in I-110 median
Bus 8a	Peak-directional elevated in I-110 median
Bus 8b	Peak-directional at-grade and elevated in I-110 median
LRT or ICTS	
Rail 1	Elevated in I-110 median
Rail 4	At-grade and elevated in I-110 median
Rail 7	At-grade in I-110 median
HRT	
Rail 6	Elevated and subway in Vermont Avenue median

Evaluation Criteria

The evaluation criteria used in ranking the alternatives were based in the following measures of effectiveness (MOE):

A. Financial Feasibility

B. Cost Effectiveness

C. Improved Transportation

D. Community/Institutional Acceptance

E. Socio-Economic Impacts

F. Environmental Impacts

G. Energy Conservation

These measures were identified and approved by the PDT, early in the study (Stage I), as quantifiable in defining the key difference which support the proposed transit project's goal and objectives. The items for each MOE are defined in terms of costs, patronage, transportation service benefits, social, economic and environmental impacts. Although numerous items can be identified, it was important for the PDT members to limit the number to those which were considered significant with respect to the project.

The significant quantitative and qualitative items are listed on the attached Evaluation Matrix for the Measures of Effectiveness (see Exhibits B and C).

Ranking Process

PDT members were asked to make a comparative evaluation of the data shown for each alternative on the evaluation matrix. The data listed under each item of the measure were given a ranking value of either High (+), Average (0) or Low (-). An algebraic summation was used to obtain the total rating column on the matrix. The weighted value assigned to each measure of effectiveness was approved by the PDT members. The approved weighted values and the equation for its application to determine the overall rating are shown at the bottom of the matrix sheet.

The overall rating placed the two-way bus alternatives 1 and 4 tied for first and Bus 7 a close second. The PDT members decided to rate these three alternatives between themselves. The same categories and methods were used and the final ranking established Bus 4 as number 1, Bus 1 as number 2 and Bus 7 as number 3 (see Exhibit D).

The final ranking of all the project alternatives is shown in the last column (Exhibit C) of the evaluation matrix.

Conclusions

- o All the Bus Alternatives rated higher than any rail alternative.
- o When rating the two-way Bus Alternatives separately, Bus 4 ranked higher than Bus 1 or 7.
- o Two-way Bus 4 Alternative rated highest for five of the seven measures of effectiveness (see Exhibits B and C).
- o Rail Alternative 6, the Vermont Avenue alignment for HRT, rated the lowest of all the build alternatives.
- o PDT members considered financial feasibility, cost effectiveness and improved transportation as the most importat measures of effectiveness.
- o ICTS Rail 1 and 4 Alternatives ranked the highest of the rail alternatives.

May 24, 1983
Room 3004
9:30 A.M.
District 7

I-110 FREEWAY TRANSIT STUDY

ATTENDANCE SHEET

NAME	ORGANIZATION	PHONE NO.
Ted Berg	H.Q. Trans. Ops.	ATSS 485-9233
Steve Guhin	FHWA	916-440-3578
Ron Kosinski	Environmental Planning Br.	ATSS 640-3755
Harlan Weatherholt	Project Development D	ATSS 640-2300
Bjorn Brodahl	Traffic Ops.	ATSS 640-4094
Howard Bolten	Environmental Investigations	ATSS 640-2549
Jack Boda	Structures Design	ATSS 454-4341
Paul Gonzales	Public Transportation Br.	ATSS 640-5655
Bob Goodell	Citizen Participation	ATSS 640-2722
Dean Larson	H.Q. Caltrans	ATSS 485-3397
Ross Keeling	Project Development D	ATSS 640-3833
Dale Ratzlaff	Public Transportation Br.	ATSS 640-3405
Chuck Morton	Environmental Planning Br.	ATSS 640-3992
Dean Anderson	Trans. Analysis & LARTS	ATSS 640-2520
Emery C. Fawcett	Public Transportation Br.	ATSS 640-4445
Norman P. Roy	Public Transportation Br.	ATSS 640-4428

EXHIBIT A

I—110 TRANSIT ALTERNATIVES

MEASURE OF EFFECTIVENESS

ALTERNATIVES	FINANCIAL FEASIBILITY					COST EFFECTIVENESS						IMPROVED TRANSPORTATION					1
	CAPITAL COST ($ MILLIONS)	FEDERAL SUPPORT (% MAXIMUM)	OPERATING & MAINTENANCE ($ MILLIONS)	TOTAL	WEIGHTED VALUE 20	2005 ANNUAL TRANSITWAY PASSENGERS (MILLIONS)	2005 OPERATING COST PER PASSENGER ($)	ANNUAL COST PER PASSENGER (CAPITAL & OPER.) ($)	COST PER PASSENGER MILE ($)	TOTAL	WEIGHTED VALUE 20	REDUCED TRANSIT TRAVEL TIME (MINUTES/TRIP)	REDUCED TRAFFIC CONGESTION (VMT REDUCTION) (000'S)	IMPROVED TRANSIT SERVICE (PK. HEADWAYS)	TOTAL	WEIGHTED VALUE 20	SUB—TOTAL
NO PROJECT	0	N/A	13.4			4.9	2.73	N/A	N/A			0	N/A	N/A			
TSM	60.3 -	75% -	26.6 +	2	13.3	8.8 -	3.02 -	3.91	0.39 0	-2	-10	+2 -	643 -	15' -	-3	-20.0	-16.7
BUS 1	553.6 0	92% +	30.4 0	1	6.7	26.8 +	1.13 +	3.39 +	0.31 +	4	20	-8 0	940 +	50" +	2	13.3	40.0
BUS 4	494.5 +	+	30.4 0	2	13.3	26.8 +	1.13 +	3.16 +	0.29 +	4	20	-8 0	940 +	50" +	2	13.3	46.6
BUS 7	609.3 0	+	30.4 0	1	6.7	26.8 +	1.13 +	3.61 +	0.33 +	4	20	-8	940 +	50" +	2	13.3	40.0
BUS 8a	409.9 +	+	29.8 0	2	13.3	20.2 0	1.48 0	3.72 +	0.35 +	2	10	-7 0	838 0	53" +	1	6.7	30.0
BUS 8b	405.4 +	+	29.8 0	2	13.3	20.2 0	1.48 0	3.70 +	0.35 +	2	10	-7 0	838 0	50" +	1	6.7	30.0
LRT RAIL 1	780.9 0	75% -	35.0 0	-1	-6.7	23.0 0	1.52 0	5.17 -	0.52 -	-2	-10	-17 +	848 0	5.5' -	0	0	-16.7
LRT RAIL 4	697.2 0	-	35.0 0	-1	-6.7	23.0 0	1.52 0	4.79 0	0.48 0	0	0	-17 +	848 0	5.5' -		0	-6.7
LRT RAIL 7	908.1 -	-	35.0 0	-2	-13.3	23.0 0	1.52 0	5.76 -	0.58 -	-2	-10	-17 +	848 0	5.5' -	0	0	-23.3
ICTS RAIL 1	803.9 0	-	43.5 -	-2	-13.3	25.0 +	1.74 0	5.19 0	0.52 0	1	5	-17 +	865 0	2.0' 0	1	6.7	-1.6
ICTS RAIL 4	720.2 0	-	43.5 -	-2	-13.3	25.0 +	1.74 0	4.84 0	0.48 0	1	5	-17 +	865 0	2.0' 0	1	6.7	-1.6
ICTS RAIL 7	931.1 -	-	43.5 -	-3	-20	25.0 +	1.74 0	5.73 -	0.58 -	-1	-5	-17 +	865 0	2.0' 0	1	6.7	-18.3
HRT RAIL 6	995.0 -	< 75% -	39.8 -	-3	-20	25.8 +	1.54 0	5.68 -	0.57 -	-1	-5	-15 +	873 0	8.5 -	0	0	-25.0

RANKING

HIGH	+
AVERAGE	0
LOW	—

WEIGHTED VALUE

A.	FINANCIAL FEASIBILITY	20
B.	COST EFFECTIVENESS	20
C.	IMPROVED TRANSPORTATION	20
D.	COMMUNITY/INSTITUTIONAL ACCEPTANCE	15
E.	SOCIO-ECONOMIC	10
F.	ENVIRONMENTAL	10
G.	ENERGY	5
		100

$$\text{PERCENT OF WEIGHTED VALUE} = \frac{\text{TOTAL (ALGEBRAIC) X WEIGHTED VALUE}}{\text{NUMBER OF ITEMS IN MOE CATEGORY}}$$

SHEET 1 OF 2

Exhibit B

K-6

I-110 TRANSIT ALTERNATIVES
MEASURE OF EFFECTIVENESS

ALTERNATIVES	COMM/INSTITUTIONAL ACCEPTANCE					SOCIO—ECONOMIC					ENVIRONMENTAL					ENERGY			SUB—TOTAL 2	SUB—TOTAL 1	OVERALL RATING 1 - 2	FINAL RANKING
	COMMUNITY PRO CON	AGENCY PRO CON	[illegible] DISTRIBUTION	TOTAL	WEIGHTED VALUE 15	NUMBER OF RESIDENTIAL UNITS DISPLACED	NUMBER OF BUSINESSES DISPLACED	TOTAL JOINT DEVELOPMENTS	TOTAL	WEIGHTED VALUE 10	IMPACTED WETLANDS	IMPACTED CULTURAL RESOURCES	[illegible] IMPACTS [illegible] STRUCTURES	TOTAL	WEIGHTED VALUE 10	EQUIVALENT BARRELS SAVED	TOTAL	WEIGHTED VALUE 5				
NO PROJECT	1/0	0/5	N/A			0	0	0			NO	0	0			0						
TSM	0/1	0/4	NO DIFFICULTY	-1	-5	0	0	0	1	3.3	NO	0	0	3	10	628	0	0	8.3	-16.7	-8.4	6
BUS 1	5/4	7/0	MINOR DIFFICULTY	1	5	10	6	14	1	3.3	INDIRECT MINOR	4	8.2	0	0	796	1	5	13.3	40.0	53.3	2
BUS 4	6/4	7/0		1	5	41	13	14	-1	-3.3		4	4.3	0	0	810	1	5	6.7	46.6	53.3	1
BUS 7	5/4	7/0		1	5	51	14	14	-1	-3.3		4	1	1	3.3	789	1	5	10.0	40.0	50.0	3
BUS 8a	5/4	7/1		1	5	6	6	14	1	3.3		4	8.2	0	0	715	1	5	13.3	30.0	43.3	5
BUS 8b	5/4	7/1		1	5	6	6	14	1	3.3		4	4.3	0	0	718	1	5	13.3	30.0	43.3	4
LRT RAIL 1	6/3	4/4	MAJOR - DIFFICULTY	0	0	6	8	14	1	3.3	DIRECT - MODERATE	7	19.0	-3	-10	667	0	0	-6.7	-16.7	-23.4	10
LRT RAIL 4	6/3	4/4		0	0	6	8	14	1	3.3		7	10.3	-3	-10	642	0	0	-6.7	-6.7	-13.4	9
LRT RAIL 7	6/3	4/4		0	0	14	8	14	1	3.3		7	5.1	-2	-6.7	649	0	0	-3.4	-23.3	-26.7	11
ICTS RAIL 1	7/3	2/4		-1	-5	6	8	14	1	3.3		7	19.0	-3	-10	630	0	0	-11.7	-1.6	-13.3	8
ICTS RAIL 4	7/3	2/4		-1	-5	6	8	14	1	3.3		7	10.3	-3	-10	648	0	0	-11.7	-1.6	-13.3	7
ICTS RAIL 7	7/3	2/4		-1	-5	6	8	14	1	3.3		7	5.1	-2	-6.7	611	0	0	-8.4	-18.3	-26.7	12
HRT RAIL 6	4/7	1/4		-3	-15	43	26	6	-2	-6.7		8	15.6	-3	-10	487	-1	-5	-36.7	-25.0	-61.7	13

RANKING
HIGH +
AVERAGE 0
LOW -

WEIGHTED VALUE	
A. FINANCIAL FEASIBILITY	20
B. COST EFFECTIVENESS	20
C. IMPROVED TRANSPORTATION	15
D. COMMUNITY/INSTITUTIONAL ACCEPTANCE	15
E. SOCIO ECONOMIC	10
F. ENVIRONMENTAL	10
G. ENERGY	10
	100

PERCENT OF WEIGHTED VALUE = TOTAL (ALGEBRAIC) X WEIGHTED VALUE / NUMBER OF ITEMS IN MOE CATEGORY

SHEET 2 OF 2
Exhibit C

RANKING OF BUS 1,4 AND 7

FINANCIAL FEASIBILITY	BUS 1	BUS 4	BUS 7
CAPITAL COST ($ Millions)	0	+	-
FEDERAL SUPPORT (% MAXIMUM)	+	+	+
OPERATING & MAINTENANCE ($ Millions)	0	0	0
	+1	+2	0

COST EFFECTIVENESS	BUS 1	BUS 4	BUS 7
2005 ANNUAL TRANSITWAY PASSENGERS ($ Millions)	+	+	+
2005 OPERATING COST PER PASSENGER ($)	0	+	+
ANNUAL COST PER PASSENGER (CAPITAL & OPER.) ($)	0	+	-
COST PER PASSENGER ($)	+	+	-
	+2	+4	0

IMPROVED TRANSPORTATION	BUS 1	BUS 4	BUS 7
REDUCE TRANSIT TRAVEL TIME (VMT REDUCTION) (MINUTES/TRIP)	0	0	0
REDUCE TRAFFIC CONGESTION (VMT REDUCTION) (1000 $)	+	+	+
IMPR[...] SERVICE (PR. HEADWAYS)	+	+	+
	+2	+2	+2

TABLE III —7

COMM/INSTITUTIONAL ACCEPTANCE	BUS 1	BUS 4	BUS 7
COMMUNITY PRO/CON	0	0	0
AGENCY PRO/CON	+	+	+
CBO DISTRIBUTION	0	0	0
	+1	+1	+1

SOCIO-ECONOMIC	BUS 1	BUS 4	BUS 7
NUMBER OF RESIDENTIAL UNITS DISPLACED	+	0	-
NUMBER OF BUSINESS DISPLACES	0	-	-
POTENTIAL JOINT DEVELOPMENTS	+	+	+
	+2	0	-1

ENVIRONMENTAL	BUS 1	BUS 4	BUS 7
IMPACTS WETLANDS	0	0	0
IMPACTED CULTURAL RESOURCES	0	0	0
VISUAL IMPACTS ELEVATED STRUCTURE (MILES)	0	0	+
	0	0	+1

ENERGY	BUS 1	BUS 4	BUS 7
EQUIVALENT BARRELS SAVED (PER DAY)	0	+	-
	+0	+1	-1

	BUS 1	BUS 4	BUS 7
OVERALL TOTAL	+8	+10	+2

Exhibit D

CONCEPTUAL STAGE HOUSING AVAILABILITY
AND BUSINESS IMPACT STUDY
FOR THE RECOMMENDED BUS/HOV 4 ALTERNATE
OF THE HARBOR (I-110) FREEWAY

PROJECT: R/O.9-21.4 EA: 444301

MARCH 29, 1984

PREPARED BY: ANNA MARIA SAIL
Associate R/W Agent

RECOMMENDED FOR APPROVAL: JOHN DALIS
Senior R/W Agent

APPROVED: JAMES A. DUSINI, CHIEF
R/W RAP AND HOUSING BRANCH

Interstate 110 Freeway Transit

HARBOR FREEWAY CORRIDOR

appendix I

CONCEPTUAL STAGE HOUSING AVAILABILITY AND BUSINESS IMPACT STUDY

This appendix supplies detailed information about housing availability and business impacts for the recommended Bus/HOV 4 ALTERNATIVE of the Harbor (I-110) FREEWAY.

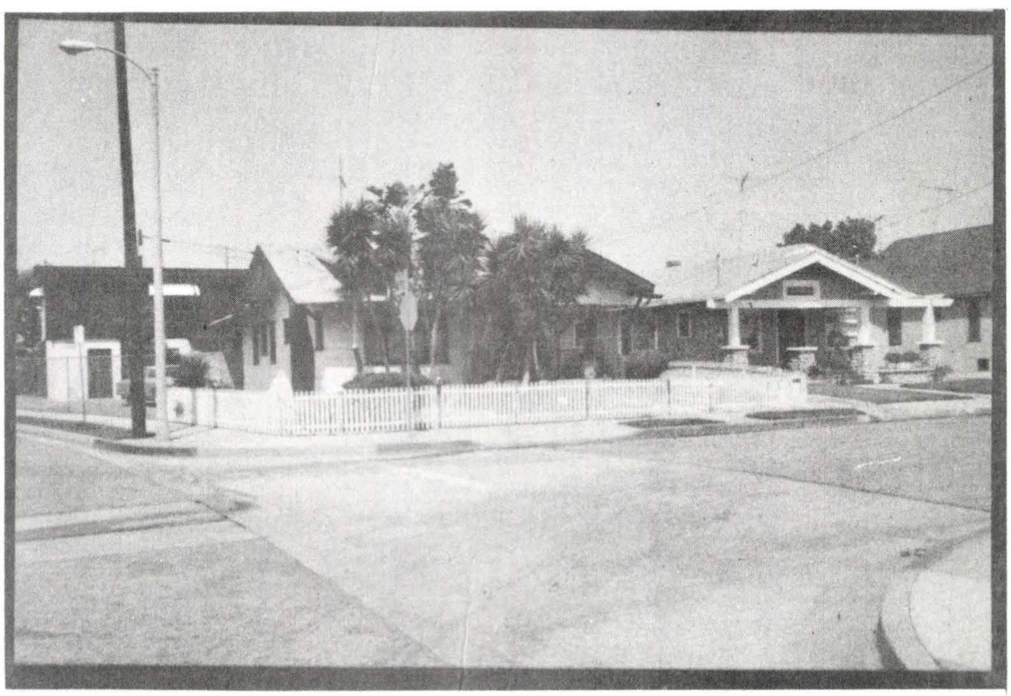
DESCRIPTION OF PROJECT

The project is located between the Los Angeles Central Business District and San Pedro, along 22 miles of the existing Harbor (I-110) Freeway.

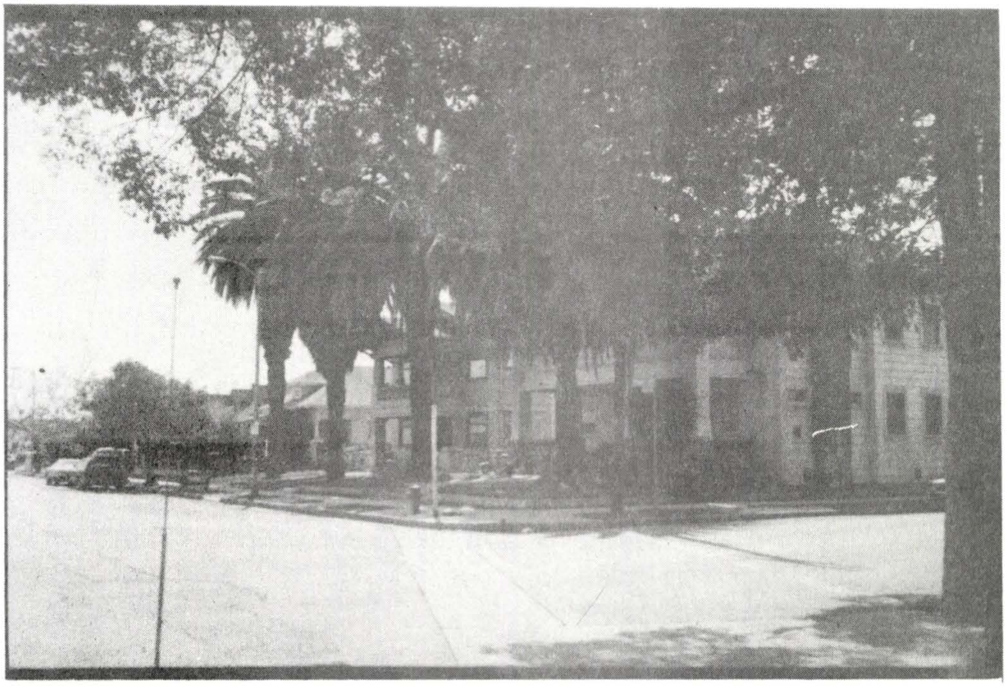
RECOMMENDED ALTERNATIVE (BUS/HOV 4)

The recommended alternative, Bus HOV/4, is a new mass transportation facility with exclusive lanes for buses and high occupancy vehicles (HOVS) which are vehicles carrying three or more passengers. This two directional (50'± wide) Bus/HOV transitway will be located in the median of the Harbor (I-110) Freeway, at-grade where the freeway is in a fill section and elevated when the freeway is in a cut section. It provides 10.3 miles of exclusive guideway facilities for buses and HOVs between Route 91 Freeway and 23rd and Figueroa Streets. South of Route 91 Freeway, all Buses and HOVs would travel 10.6 miles in mixed flow freeway traffic to San Pedro.

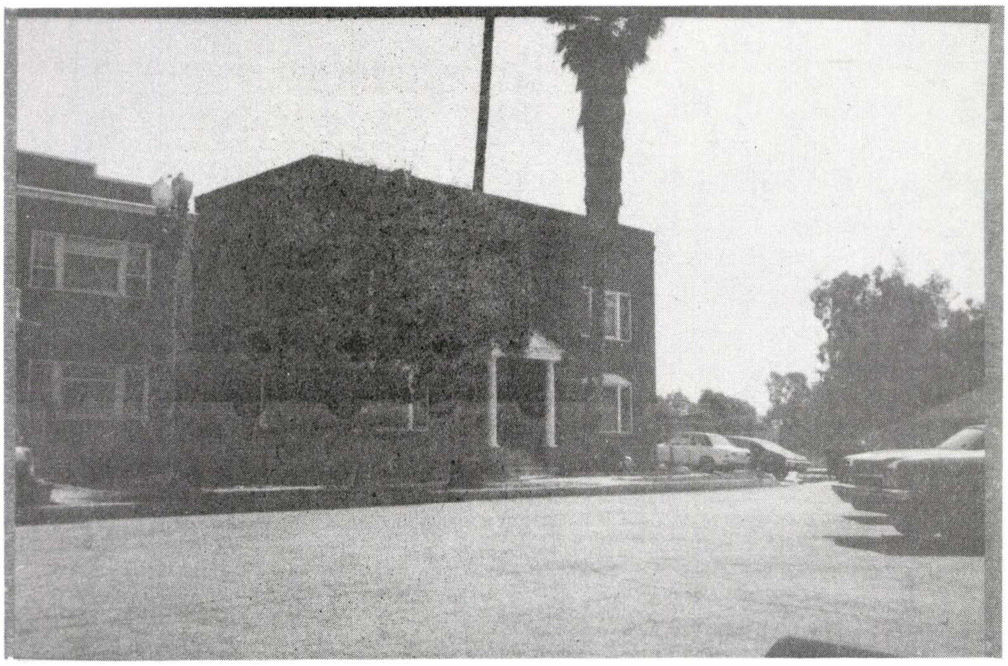
The following photographs were taken to illustrate typical single and multiple family residences and business and non-profit organizations to be displaced.



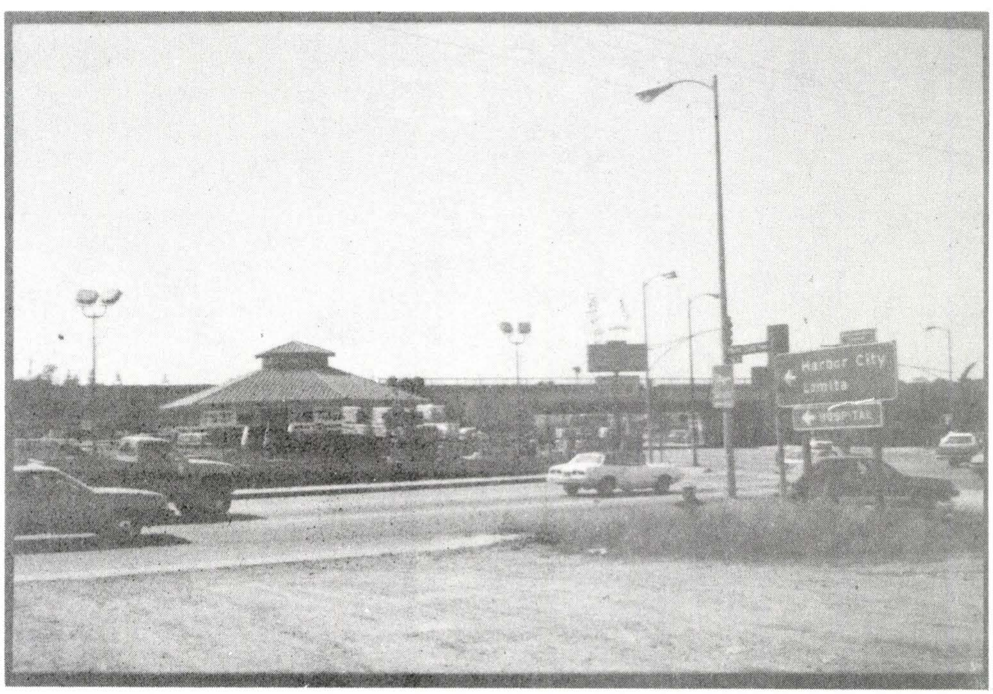
TYPICAL SINGLE FAMILY RESIDENCES



TYPICAL SMALL MULTI FAMILY RESIDENCES

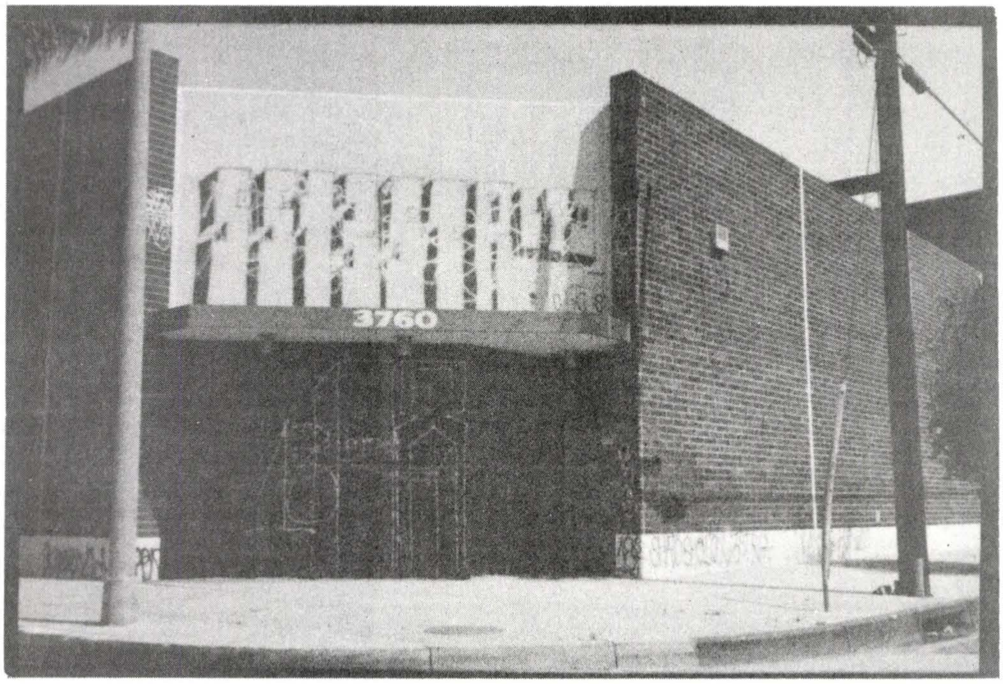


TYPICAL LARGE APARTMENT HOUSE

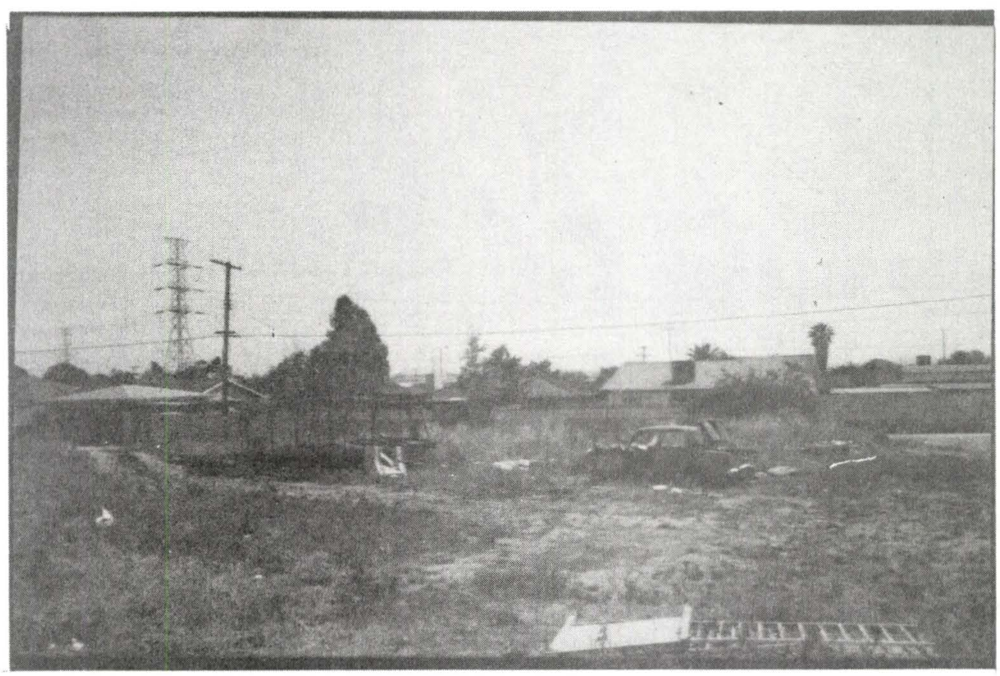


TYPICAL SMALL BUSINESS ESTABLISHMENTS

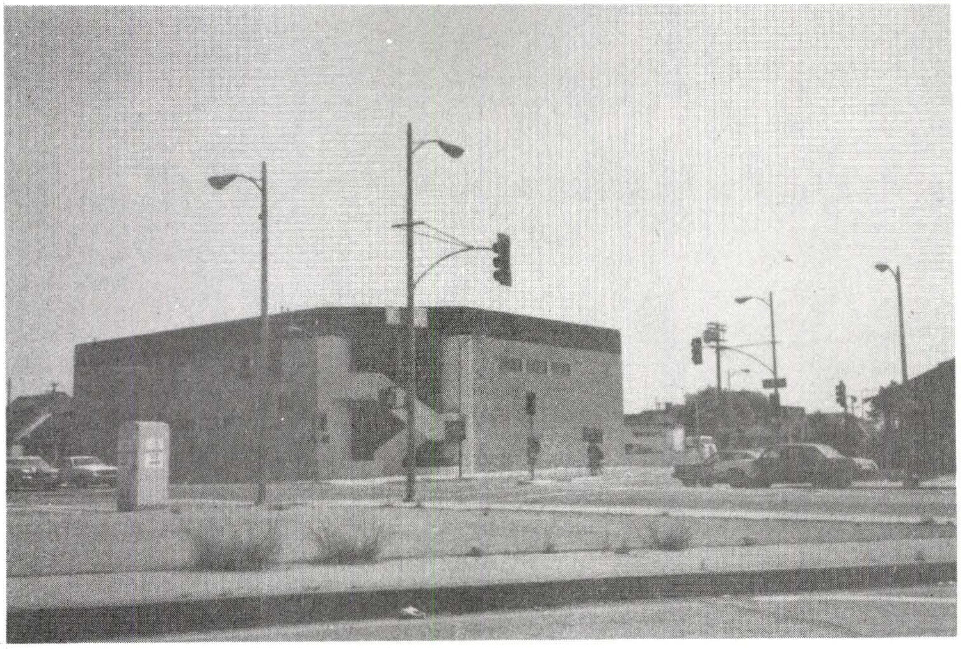
SMALL SHOPPING CENTER

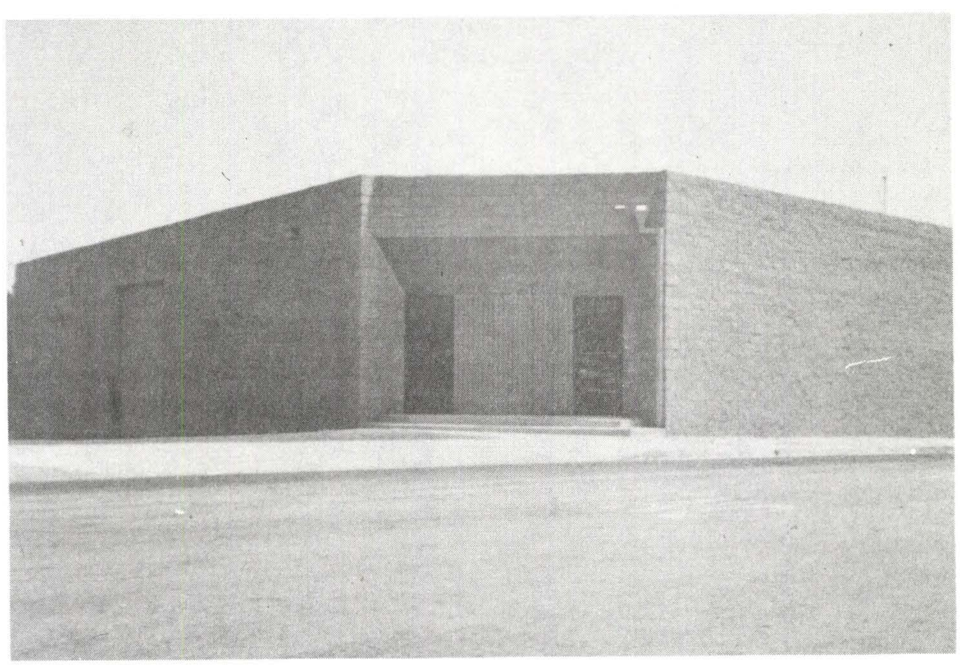


ABANDONED BUSINESSES

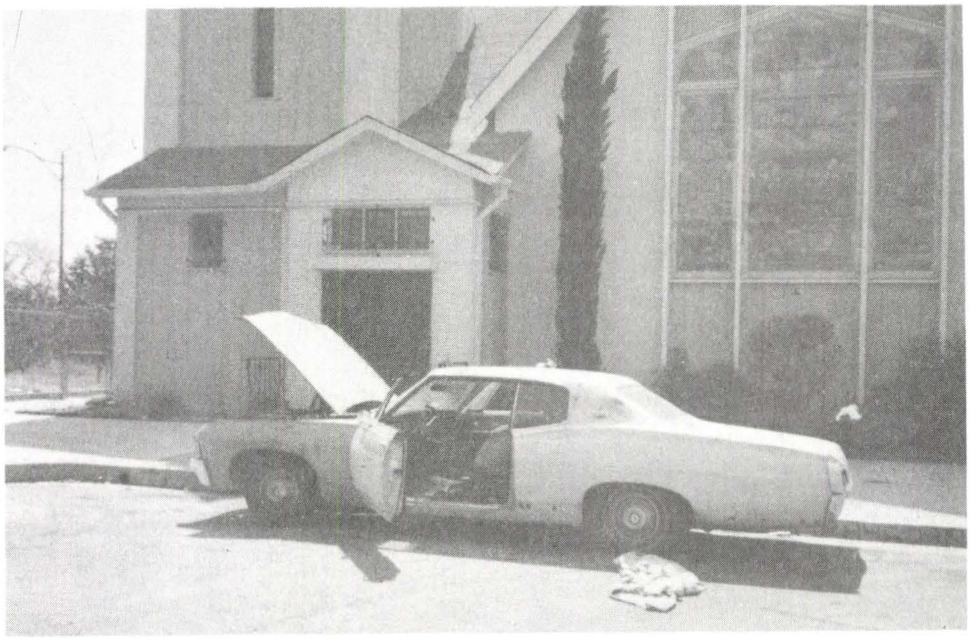


VACANT LAND





NEW COMMERCIAL BUILDINGS



NON-PROFIT ORGANIZATION

ESTIMATED DISPLACEMENTS

The project would necessitate the displacement of 34 single family residences and 80 multiple family residences. Taking the length of the project into consideration, impact on housing is minimal.

As we were unable to survey personally the residents to be displaced at this time, we had to rely totally on the 1980 census data and base our findings on that information. We requested data by blocks, thereby further refining our analysis.

Residential displacements are concentrated mainly in the Central Los Angeles area between 35th and 85th Streets.

A block by block examination of the 1980 census data shows that in some blocks Spanish surname residents comprise 77%-91.2% of the population, in other affected blocks, Blacks represent 49%-100% of the population. Only a small group are elderly (65+). For age and ethnic distribution, please see Tables I and II. There is no available census information regarding disability.

Based on the Los Angeles Regional Transportation, study estimated for 1980, we estimate the current applicable median income for the affected Census Tracts - blocks in question to be $10,586.00, the moderate income (120% of the median) to be $12,703.00 and the low income to be $8,468. According to affordability calculations, none of the single family owner occupied residences are in the affordable range.

However, some of the multiple family residences are in the affordable rent ranges. Please see Table III (affordability price and rent calculations).

An examination of the Block Displacement Distribution shows that heaviest impact is on Census Tract 2318, Block 408, - a predominantly Hispanic area (91.2%); in Census Tract 2311, Block 236, also mainly Hispanic (89.8%) and in Census Tract 2328, Block 205, where the ethnic split is 67.6% Black, 29.7% Hispanic and 2.7% Asian.

Further studies indicate that most of the single-family residences are renter occupied (see Table VI). The multiple family residences have a very limited ownership units (mainly duplexes and fourplexes) where one of the units is usually occupied by the owner.

In order to determine the availability of single-family residences, an analysis of the real estate market was made. Information from the multiple listing services, serving the displacement area, newspaper ads and for sale signs, indicated a steady supply of single-family residences for sale. As we expect all the displacees to be fully Relocation Assistance Program (RAP) eligible, relocation for those families owning single-family residences does not seem to present a problem. A study of available low rent residential properties shows that the vacancy rate in the displacement area is low; therefore, there might be a problem in locating comparable low rent apartments. We have to keep in mind though, that affordable contract rent for moderate and low income families in the area is $267 - $214. Our research shows that most available apartments in the displacement area rent for more. We found the lowest rent for a one bedroom apartment to be $260.00 (for a tabulation of available rental units according to price and number of bedroom, see Table IV).

Those displacees from multi-family residential units will also be fully RAP eligible. They would receive rental supplement payments including, when applicable, "last resort" payments to meet displacees' needs in order to make existing higher price private sector rental housing affordable. For a detailed description of Relocation Benefits, please see Appendix A.

The displacees could potentially relocate in housing available in the adjacent areas of Central and So. Central Los Angeles, thus their ability to get to work and community services will not be diminished, but should be enhanced by the added mobility resulting from the project.

In addition, it should be pointed out that Caltrans and HUD are in the process of constructing up to 3700 housing units in conjunction with the Century Freeway Replenishment Housing Program.

The primary zones for the replenishment construction corresponds with the logical replacement area for this project's displacees. If this project is funded and R/W purchase and displacement occur within the next five years it can be assumed that a large number of displacees can be accommodated by the existing replenishment program at affordable rates.

TABLE I

ETHNIC DISTRIBUTION

Tract	Block	Total Pop.	White %	Black %	Asian %	Other %	Spanish %
2311	299	N/A	N/A	N/A	N/A	N/A	N/A
"	236	244	3.7	5.7	.8	-0-	89.8
2318	404	71	8.4	49.3	-0-	-0-	42.3
"	408	113	-0-	8.8	-0-	-0-	91.2
2328	204	83	4.8	63.9	-0-	-0-	31.3
"	205	111	-0-	67.6	2.7	-0-	29.7
"	208	79	1.3	67.1	-0-	-0-	31.6
"	302	72	-0-	91.6	-0-	4.2	4.2
"	303	36	2.8	97.2	-0-	-0-	-0-
2371	109	87	2.3	97.7	-0-	-0-	-0-
"	119	11	-0-	100.0	-0-	-0-	-0-
2383	110	93	-0-	92.5	-0-	-0-	-0-
"	208	26	3.8	19.2	-0-	-0-	77.0
"	209	18	-0-	77.8	-0-	-0-	22.2

TABLE II

AGE DISTRIBUTION

Tract	Block	Total Pop.	0 - 19 %	20 - 64 %	65+ %
2311	229	N/A	N/A	N/A	N/A
"	236	244	33.6	60.3	6.1
2318	404	71	32.4	53.5	14.1
"	408	113	43.4	52.2	4.4
2328	204	83	25.3	56.6	18.1
"	205	111	37.9	45.9	16.2
"	208	79	36.7	57.0	6.3
"	302	72	36.1	48.6	15.3
"	303	36	13.9	58.3	27.8
2371	109	87	37.9	42.5	19.6
"	119	11	N/A	N/A	N/A
2383	110	93	50.6	45.1	4.3
"	208	26	26.9	73.1	-0-
"	209	18	55.6	38.9	5.5

TABLE III

Affordable Sales Price Calculations

Gross Annual Income	Gross Monthly Income	Federal Withholding	Net Effective Income	Affordable Monthly Housing Cost	Monthly Utilities Maintenance Insurance	Affordable Principal, Interest, and Taxes	Affordable Sales Price
		1.		2.	3.	4.	
Moderate $12,703 (120% Median)	1,058	145	913	320	99	221	23,830
Median $10,586	882	105	777	271	99	172	18,676
Low $ 8,468 (80% Median)	705	81	624	218	99	119	13,100

1. Assumes Family of 4; 3 of whom are Dependents.
2. Includes Payments for Principal, Interest, Taxes, Insurance, Utilities and Maintenance (FHA Underwriting Standards).
3. Based on FHA Cost Schedule of 1400 sq. foot, one-story Home Built within Past 20 Years - Utilities, Maintenance, Insurance - Total $99.
4. FHA Interest Rate of 13%.

Affordable Rent Calculations

	Gross Rent				Contract Rent
Gross Annual Income	Gross Monthly Income	Affordability Factor	Affordable Gross Rent	Monthly Utility Cost	Affordable Contract Rent
Moderate $12,703 (120% Median)	1,058	30%	317	50	267
Median $10,586	882	30%	264	50	214
Low $ 8,468 (80% Median)	705	30%	211	50	161

TABLE IV

RENTAL RATE DISTRIBUTION

SFR	One Bedroom	Two Bedrooms	Three Bedrooms
$100 - 200			
201 - 300	17	3	
301 - 400	47	19	1
401 - 500	5	24	5
501 - 600		7	1
601 - 700		4	2
701 - 750			4
MFR			
$100 - 200			
201 - 300	10	1	
301 - 400	2	9	3
401 - 500	2	10	9
500 - 600		9	7
601 - 700		1	6
701 - 750		1	1

TABLE V

BLOCK DISPLACEMENT DISTRIBUTION

TRACT	BLOCK	Total No. of Units	Displacement SFR	Displacement MFR
2311	229	No Data Available	1	4
2311	236	72	0	22
2318	404	24	3	0
2318	408	26	4	16
2328	204	41	3	2
	205	41	4	6
	208	23	2	2
	302	24	2	0
	303	16	2	0
2371	109	32	3	4
2371	119	3	2	0
2383	110	32	2	2
	208	No Data Available	3	22
	209	6	1	0
5435	211	No Data Available	2	0
		TOTAL	34	80

TABLE VI

RATIO OF OWNER OCCUPIED VERSUS RENTER OCCUPIED
SINGLE + MULTIPLE UNITS

Tract	Total Occupied Singles	Total Renter Occupied	Total Owner Occupied	Percentage Owner Occupied	Total Occupied MFU	Renter Occupied MFU	Total Owner Occupied MFU	Percentage Owner Occupied MFU
2311	18	18	-0-	-0-	563	524	39	6.9%
2318	145	86	59	40.6%	356	318	38	10.7%
2328	437	228	209	47.8%	348	275	73	20.9%
2371	81	34	47	58.0%	23	23	-0-	-0-
2383	410	225	185	45.1%	517	471	46	8.9%

IMPACT ON BUSINESS

PURPOSE

The purpose of this report is to comply with regulation RWPH-6-4 that provides, with regard to conceptual stage studies, that the numbers, types, location and trade area characteristics of businesses and the general availability of replacement properties be assessed. It also requires that the project be evaluated by business groups and governmental entities and that a summary of the interaction and discussion be reported.

METHODOLOGY

Maps for the alternate routes were obtained and field surveys were conducted on the basis of the maps.

RWPH 81-6-4 specifies that "no personal contact with individual businesses will be required." Thus the general characteristics of the businesses were noted and their trade areas estimated on the basis of these characteristics. Numbers of employees were estimated on the basis of observation. It should be remembered that employee complements are subject to fluctuation according to seasonal conditions and general economic trends. The inventory of business establishments, listed at the time of surveying, is also subject to change.

The projects' impact on business is minimal given the length of the corridor. Twenty-four businesses and two non-profit organizations would be full takes resulting in the displacement of 116 employees.

Most of the businesses under consideration are local serving and since their clientele are not impacted they are expected to relocate within the area. From observation and discussion with several real estate brokers specializing in commercial property, it appears there is sufficient space available to relocate all affected businesses within the local community.

The project would also displace two churches, the 7th Day Adventist Church at 650 W. 21st Street and the United Church of Christ at 37th and Hope Street.

Our investigation of the two churches to be displaced by the project indicates that neither of the two churches serve exclusively the immediate neighborhoods in which they are located.

The United Church of Christ, also known as the Dae Kwang Church serves an English, a German and a Korean-speaking congregation.

The Church on 21st Street is one of the oldest established 7th Day Adventist Churches. Church services draw worshipers from all areas of the Los Angeles basin.

GOVERNMENT AND BUSINESS ORGANIZATIONS CONTACTED

The State of California Department of Economic and Business Development

They informed us over the phone that if any of the businesses wished to relocate within the Century Freeway Area, they could assist them.

United States Department of Housing and Urban Developement (HUD)

They provide financial aid to cities and counties in the form of grants authorized by the Housing and Community Development Act of 1974 (CDBG Grant). Subject to HUD Approval, a locality may be part of this grant to provide relocation assistance.

United States Small Business Administration

They provide a 90% loan guarantee through banks to qualified applicants. Relocation counseling is available through the Management Assistance Division.

State and Federal Regulations provide that the owner of an eligible displaced business is entitled to receive payment for moving and related expenses which include moving costs, payment for losses of personal property and search costs or in lieu of the above payments he may be eligible for a payment based upon average annual net earnings called the "In-Lieu Payment". The specific nature of compensation and assistance to be provided in each instance will depend on the individual circumstances of the displacee.

BUSINESS AND NON PROFIT ORGANIZATIONS DISPLACED BY

BUS/HOV 4

	NAME	LOCATION	Service Area	Full Take	Part Take	Est No. of Employees
1.	Furniture Mfg. Sales Agency Inc.	2027 S. Figueroa	Local		X	0
2.	Capital Western Insurance	2599 S. Flower St.	Local	X		10
3.	7th Day Adventist Church	650 W. 21st St.	Local	X		6
4.	United Church of Christ	37th & Hope St.	Local	X		6
5.	Office Bldg. (Vacant)	3851 S. Grand	Local	X		0
6.	Office Bldg. (New/Vacant)	Grand/Martin Luther King	Local	X		0
7.	Wrought Iron Works	4125 Flower St.	Local	X		2
8.	Beauchamp Dist. Co. Warehouse	330 W. 58th St.	Local	X		8
9.	King's Tires & Auto Repair	452 W. Slauson Ave.	Local	X		5
10.	International Trucks	432 W. Manchester	Local	X		7
11.	Union 76 Station	Manchester/Figueroa	Local	X		6
12.	Mini Market & 2 small stores	8626 S. Figueroa	Local	X		6
13.	Record Industry	8514 S. Figueroa	Local	X		3
14.	Two for One Pizza	8518 S. Figueroa	Local	X		3
15.	Baskin Robbins 31 Flavors	8520 S. Figueroa	Local	X		3
16.	Popeye Chicken	8530 S. Figueroa	Local	X		4
17.	Holy Faith Apostolic Church(Abandoned)	469 W. Manchester	Local	X		0
18.	State Rehab. Facility	369 W. Manchester	Local	X		6
19.	Mfg. Bldg. (being built)	El Segundo/Hoover	Local	X		0
20.	Abandoned Restaurant	711 W. Carson	Local	X		0
21.	D & C Construction	1180 Menlo	Local	X		3
22.	Pete's Road Service	630 Channel	Local	X		2
23.	Jerry Young's Radiator Exch.	637 Battery St.	Local	X		2
24.	Moto Cross Bikes	1204 N. Gaffey St.	Local	X		4
25.	W.W.C. Rogers Landscape	1224 N. Gaffey St.	Local	X		8
26.	El Dorado Car Wash & Gas Sta.	Pacific Coast Hwy & Figueroa	Local	X		12
27.	Western Bldg. Supply Co.	1350 W. Pacific Coast Hwy.	Local	X		6
	TOTAL	27				112

L-23

Conceptual Stage R.A.P. Study
Project Information

March 29, 1984

PROJECT DESCRIPTION		DIST.	CO.	RTE.	P.M.
HARBOR FREEWAY TRANSITWAY		07	LA	110	0.9/21.5
		PLANNING E.A. 444301			
F.Y. REGULAR R/W ACQ START: Future	R/W CERTIFICATION DATE Future	ADVERTISING DATES			
REMARKS.		DISTRICT Future		HEADQUARTERS Future	

RAP UNIT INVENTORY

PROPERTY TYPE RAP UNIT	ROUTE ALTERNATE								
	BUS/HOV4								
1. Single Family Residences	34								
2. Multiple Dwelling Units	80								
3. Other Types Dwelling Units	0								
4. Mobile Homes	0								
5. Estimated Total Dwelling Units (Lines 1 through 4)	114								
6. Nonresidential Units	27								
7. Estimated Total RAP Units (Lines 5 and 6)	141								

STAFFING NEEDS FOR R/W STAGE R.A.P. STUDY

Estimated Fiscal Year Right of Way Stage R.A.P. Study: Future

ROUTE ALTERNATE NUMBER	EST. TOTAL DWEL UNITS ON ROUTE	Est. Total Bus. & Non-Profit Org.	TOTAL	÷	DIST. WK NORM R/W STAGE RAP STUDY	=	EST MY NEEDED FOR R/W STAGE RAP STUDY
BUS/HOV4	114	27	141.		1100		.1282

APPENDIX A

I. RELOCATION ASSISTANCE ADVISORY SERVICES

The Department of Transportation will provide relocation advisory assistance to any person, business, farm or non-profit organization displaced because of the acquistion of real property for public use. In giving such assistance, the Department will assist displacees in obtaining replacement facilities by providing current and continuing information on the availability, prices, and rentals of comparable decent, safe, and sanitary housing for persons and families, and of comparable commercial properties, and sites for displaced businesses. To the extent it can be reasonably accomplished, these replacement properties will be in areas not generally less desirable, at rents or prices within the financial means of the individuals and families displaced, and reasonably accessible to their places of employment. This assistance will also include the supplying of information concerning Federal and State housing programs offering assistance to displaced persons, disaster loan programs and any other services being offered by other agencies in the area. In addition, the Department will endeavor to determine, on a current basis, the needs of all displaced persons for relocation assistance, in order to minimize hardships to such persons.

II. <u>REPLACEMENT HOUSING PAYMENTS PROGRAM</u>

The Replacement Housing Payments Program will help residential occupants as well as businesses, farms, or nonprofit organizations to pay certain costs and expenses involved in finding, purchasing or renting, and moving to a new location within a 50-mile radius of the property to be acquired by the Department. Since business, farms, and nonprofit organizations have different options for payments under this program, a separate section will be devoted to them somehwere else in this study. The Replacement Housing Payments Program as it relates to individuals and families, occupants of residential properties, can be summarized as follows:

(1) <u>Moving Costs</u>

Occupants of residential properties, to be acquired by the Department, at the time of the first written offer to purchase the property is made, and move or are required to move as a result of the Department's acquisition, will be eligible for reimbursement of moving costs. Displacees will receive, either the actual reasonable costs involved in moving their families and personal property up to a maximum of 50 miles, or a payment based on the number of furnished or unfurnished rooms of their present dewlling, not to exceed $300.00. In addition, residential displacees will be granted a flat $200.00 dislocation allowance for a maximum $500.00 under the fixed moving cost schedule. The dislocation allowance is designed to cover incidental moving expenses.

(2) Purchase Supplement

In addition to moving and related expense payments, displaced homeowners and tenants may also be eligible for payments for increased costs of replacement housing, if any.

Homeowners who have owned and occupied the property to be acquired by the State for 180 days prior to the date of the first written offer to purchase may qualify to receive a purchase differential payment if it will cost more to buy a replacement dwelling than the amount being paid by the Department for the dwelling currently occupied. In addition, these owner-occupants may also qualify to receive payments for certain costs incidental to the purchase of a replacement property, and an Interest Differential Payment if the interest rate for the loan on the replacement property is higher than the one on the currently occupied property. The maximum combined supplemental payments that these owner-occupants can receive is $15,000.00. Homeowners who have owned and occupied the property to be acquired by the Department for at least 90 days but less than 180 days are generally eligible for the same payments as tenants of 90 days or more, up to a maximum total payment of $4,000.00.

(3) Rent Supplement

Tenants who have occupied the property to be acquired by the Department for 90 days or more prior to the date of the first written offer to purchase may qualify to receive a rental differential payment if it will cost more to rent a replacement dwelling than it costs to rent the dwelling in which they presently reside. Or, as an alternative, the tenant may qualify for a down payment benefit designed to assist in the purchase of a replacement property and the payment of certain costs incidental to its purchase. The maximum amount payable to any tenant of 90 days or more and an owner-occupant of 90 to 179 days, in addition to moving expenses will be $4,000.00. The rent supplement of $4,000.00 or less will be paid in a lump sum unless the displacee requests that it be paid in installments. In addition to the occupancy requirements, the displaced person must rent and occupy a "decent, safe, and sanitary" replacement dwelling within one year from the date the Department takes legal possession of the property, or from the date displacee vacates the Department acquired property, whichever is later.

(4) Down Payment

The down payment option has been designed to aid owner occupants of 90 to 179 days and tenants with no less than 90 days of continuous occupancy prior to the Department's first written offer to purchase the property. The down payment and incidental expenses cannot exceed the maximum payment of $4,000.00. The Department will determine the maximum down payment that the displacee may be eligible to receive based on typical down payments required for the financing of a comparable dwelling with a conventional loan. There is a "matching requirement," however, if the total required down payment and other eligible costs exceed $2,000.00. The displacee will receive $2,000.00 plus 50 percent of any amount required in excess of $2,000.00 on a matching basis up to the maximum of $4,000.00. Simply, this means that the displaced person, eligible as defined above, will be required to invest $2,000.00 of his own funds in order to receive the maximum $4,000.00 under this option. The one-year eligibility period in which to purchase and occupy a "decent, safe, and sanitary" replacement dwelling will apply.

(5) <u>Last Resort Housing</u>

The Federal-Aid Highway Program Manual 7-5-6 contains the policy and procedure for implementing the Last Resort Housing Program on Federal-Aid highway projects, effective on March 1, 1977. The State Department of Transportation, with full knowledge of the hardships created by the consequential displacement of individuals and families because of highway construction, and in a humane and fair effort to ameliorate the direct impact on a few for the public betterment of the rest, has adopted these Federal guidelines on non-Federal-Aid highway projects as well. This effort and adoption of Federal guidelines constitute a real concern for displaced persons and a needed step to unify the provisions of the Federal and State Relocation Assistance Acts.

Last resort housing benefits are, except for the amounts of payments and the methods of making them, the same as those benefits for standard relocation as explained above. Last resort housing has been designed to primarily cover situations where displacees cannot be relocated because of the lack of available replacement housing, replacement housing is not available within their financial means, or when their anticipated replacement housing payments exceed the $4,000.00 and $15,000.00 limits of the standard relocation procedures.

In the situation described above, after the first written offer to acquire the property has been made, the Department will, within seven working days, personnally contact the displacees to gather important information relating to:

(a) Preferences in area of relocation;

(b) Number of people to be displaced and distribution of adults and children according to age and sex;

(c) Location of schools and employment;

(d) Special arrangements needed to accommodate any handicapped member of the family;

(e) Financial ability to relocate into a "decent, safe, and sanitary" replacement dwelling which will house all members of the family decently;

(f) Financial ability to purchase or rent a replacement dwelling.

Once the needs and preference of displacees have been determined, the Department, through one of its Relocation Advisors, will work in close contact with each displacee in order to see that all payments and benefits are fully utilized, and that all regulations are observed, therefore, avoiding the possibility of displacees jeopardizing or forfeiting any of their benefits or payments.

ADDITIONAL INFORMATION

Reimbursement for moving cost and replacement housing payments are neither considered income nor resources for the purpose of the Internal Revenue Code of 1954, or for the purposes of determining the extent of eligibility of a displacee for assistance under the Social Security Act or any other Federal law.

Persons who are eligible for relocation payments and who are legally occupying the property required for the project will not be asked to move without first being given at least 90 days advance notice, in writing. Occupants of any type of dwelling, eligible for relocation payments, will not be required to move unless adequate "decent, safe, and sanitary" replacement housing, which is available to all persons regardless of race, color, religion, sex, or national origin, has been made available to them by the State or they have secured such housing for themselves.

Any person, business, farm, or nonprofit organization which has been refused a relocation payment by the Department of Transportation or believes that the payments offered are inadequate may appeal for a special hearing of their complaint. No legal assistance is required. Information about the appeal procedure is available from a Department of Transportation Relocation Advisor.

The preceding information is not intended to be a complete statement of all the Department's laws and regulations which must be complied with in order to receive all applicable payments. At the time of the first written offer to purchase, owner-occupants are given a more detailed explanation of the State's relocation services. Tenant occupants of required properties are contacted immediately after first written offers to purchase, and also given a more detailed explanation of the Department's Relocation Programs.

Important Notice

In most instances, no person will be eligible to receive any monetary relocation payments until the State has actually completed the purchase or acquired possession of property currently occupied. To avoid loss of possible benefits, no individual, family, business, firm, or nonprofit organization should commit to purchase or rent a replacement property without first contacting a Department of Transportation Relocation Advisor.

Additional information or copies of the Department regulations regarding the Relocation Assistance Program can be obtained on request by writing:

State of California
Department of Transportation
P. O. Box 2304, Terminal Annex
Los Angeles, California 90051

UPDATED
BUSINESS IMPACT STUDY
FOR THE RECOMMENDED BUS/HOV 4 ALTERNATE
OF THE HARBOR (I-110) FREEWAY

PROJECT: R/O.9-21.4 EA: 444301

SEPTEMBER 4, 1984

PREPARED BY:

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RECOMMENDED FOR APPROVAL:

GARY C. SPENCER
Senior R/W Agent

APPROVED:

JAMES A. DUSINI, CHIEF
R/W RELOCATION ASSISTANCE
BRANCH

INTRODUCTION

At this time the Bus/HOV (High Occupancy Vehicle) Alternate 4 of the I-110 Freeway would displace 19 operating businesses and two nonprofit organizations along the entire length of the corridor. Additionally, one business parcel, possibly to be displaced, is being remodeled and should be in operation within a month. Five other displacements are not presently occupied. (See Table I, page 2.)

In order to discuss possible mitigating measures for these displacements, the corridor has been broken into four areas: the vicinity of the University of Southern California, Central Los Angeles, Gardena and San Pedro/Carson/Torrance areas.

Please see sources of information, page 9, for names of those providing the information included in this updated report.

TABLE I

BUSINESS AND NON PROFIT ORGANIZATIONS DISPLACED BY

BUS/HOV 4

	NAME	LOCATION	Service Area	Full Take	Part Take	Est No. of Employees
	Vicinity of University of Southern California					
1.	Capital Western Insurance	2599 S. Flower St.	Local	X		10
2.	Seventh-Day Adventist Church	650 W. 21st St.	Local	X		6
3.	United Church of Christ	37th & Hope St.	Local	X		6
4.	Office Bldg. (Vacant)	3851 S. Grand	Local	X		0
5.	Manufacturing Bldg. (New)	Hill/Martin Luther King	Local	X		38
6.	Wrought Iron Works	4125 Flower St.	Local	X		2
	Central Los Angeles Area					
7.	Beauchamp Dist. Co. Warehouse (Vacant)	330 W. 58th St.	Local	X		0
8.	King's Tires & Auto Repair	452 W. Slauson Ave.	Local	X		5
9.	International Trucks	432 W. Manchester	Local	X		7
10.	Union 76 Station	Manchester/Figueroa	Local	X		6
11.	Olympic Gift Center & Video Games	8622 S. Figueroa	Local	X		2
12.	Olympic Mini-Mart	8626 S. Figueroa	Local	X		2
13.	Record Industry	8514 S. Figueroa	Local	X		3
14.	Two for One Pizza	8518 S. Figueroa	Local	X		3
15.	Baskin Robbins 31 Flavors	8520 S. Figueroa	Local	X		3
16.	Popeye Chicken	8530 S. Figueroa	Local	X		4
17.	Holy Faith Apostolic Church(Abandoned)	469 W. Manchester	Local	X		0
18.	State Rehab. Facility	369 W. Manchester	Local	X		6
	Gardena Area					
19.	Mfg. Bldg. (New/Vacant)	El Segundo/Hoover	Local	X		0

TABLE I (Cont'd)

BUSINESS AND NON PROFIT ORGANIZATIONS DISPLACED BY

BUS/HOV 4

	NAME	LOCATION	Service Area	Full Take	Part Take	Est No. of Employees
	Carson/San Pedro Area					
20.	Naugles Fast Food Rest. (Under Constr.)	711 W. Carson	Local	X		0
21.	D & C Construction	1180 Menlo	Local	X		3
22.	Pete's Road Service	630 Channel	Local	X		2
23.	Jerry Young's Radiator Exch.	637 Battery St.	Local	X		2
24.	Moto Cross Bikes	1204 N. Gaffey St.	Local	X		4
25.	W.W.C. Rogers Landscape	1224 N. Gaffey St.	Local	X		8
26.	El Dorado Car Wash & Gas Sta.	Pacific Coast Hwy & Figueroa	Local	X		12
27.	Western Bldg. Supply Co.	1350 W. Pacific Coast Hwy.	Local	X		6
	TOTAL	27				140

AREA I

VICINITY OF THE UNIVERSITY OF SOUTHERN CALIFORNIA

The commercial properties located in this area should not be a relocation problem. Knowledgeable commercial brokers indicate a plentiful supply of space available at $1.50 to $2.00 per square foot.

The large manufacturing concern located at Hill/Martin Luther King Boulevard is in a new building, probably built to their specifications. This building could be rebuilt in the area since the single family residences east of the 110 are zoned M-2 and M-3. Additionally, knowledgeable industry brokers have stated that there has been an increase in manufacturing zoned properties available for lease. Older M-1 zoned properties lease for $0.22 to $0.25 per square foot in this area. New M-1 zoned properties, such as the above property, lease for about $0.45 per square foot. Leases are usually for 3 to 5 years with increases in rental rates tied to either the consumer product index or cost of living adjustment.

The two nonprofit organizations are two churches which present more difficult relocation problems. If these churches want to continue in this area, rebuilding is possible. Leasing an appropriate building, however, would be more difficult. If these churches' congregation are not from the local area, then there is more latitude in relocating. More information will be gathered at the time of the right of way stage study.

Since the time of the first study and this updated study, more information has been gathered concerning one property listed as a part take in the first report.

The warehouse on this parcel is an old brick structure constructed prior to the Field's Act of 1933. Although the City of Los Angeles Earthquake Safety Division stated that a permit would be issued and only the new portion would have to meet the new earthquake resistant standards, the costs involved in constructing a replacement ramp and freight elevator possibly could result in a full take. Public Transportation has been advised of this problem and agreed to request engineering to redesign, eliminating this parcel as a taking at this time.

AREA II

CENTRAL LOS ANGELES

Commercial property is fairly plentiful in this area, leasing at $1.50 to $2.00 per square foot. However, replacing the gas station, possibly to be dislocated, could be a problem. A representative from the Los Angeles City Zoning Department stated that locations previously zoned for gas stations are not automatically rezoned once these stations are vacated. Since several vacated gas stations were noted in the area, finding a replacement site should not be a problem.

Manufacturing sites (in this area most are zoned M-1) lease for $0.20 to $0.25 per square foot. All manufacturing properties to be displaced in this area are zoned M-1.

One problem should be noted concerning the smaller commercial operations and, in particular, the two "mom and pop" operations on Figueroa. These operations may not have sufficient funds to relocate and may have to take an in lieu of moving expense payment, a payment equal to the average annual net earnings of the business for the two years prior to relocation. Such payment may not be less than $2,500.00 nor more than $10,000.00.

AREA III

GARDENA AREA

There is only one take in this area, a new manufacturing building (relatively small in size). These smaller manufacturing buildings generally lease for more than the larger sites because they are in greater demand. This particular building probably leases for about $0.35 per square foot. There has been an increase in availability of these smaller sites in the past few years.

AREA IV

SAN PEDRO/CARSON/TORRANCE AREA

The small commercial properties in this area could be relocated relatively easily. However, the cost of leasing has significantly increased. Some of the businesses could pay as much as three times their current rental rates. The present commercial rate is $1.50 to $1.75 per square foot.

The following discusses possible relocation problems. The Moto-Cross Bike property and the Naugles would both need highly visible locations. The nursery would need an M-1 zoned location. The car wash with six gas pumps would need a large area plus zoning for a gas station. Presently one block away is a vacated gas station with sufficient square footage for a car wash. However, if this business is required, there may not be a suitable site zoned properly in the nearby vicinity when required.

These are the only foreseeable problems given the businesses are financially secure enough to pay market lease prices. However, if some of the smaller commercial properties have insufficient funds, they may opt for the in lieu of moving payment previously discussed.

REAL ESTATE ASSOCIATIONS AND FIRMS CONTACTED

American Industrial Real Estate Association 350 South Figueroa Los Angeles, CA	
Coldwell Banker Commercial Real Estate Services 533 South Fremont Los Angeles, CA	Mark Mattingly
W. H. Daum and Associates Industrial Real Estate 1200 West 8th Los Angeles, CA	Bobby Day
Charles Dunn Company Commercial Real Estate 1200 Wilshire Boulevard Los Angeles, CA	Brian Urf
Grubb and Ellis Commercial Brokerage 1126 Wilshire Boulevard Los Angeles, CA	
Industrial Realty 15225 So. Broadway Gardena, CA	Doug Duggan
Major Properties 1200 W. Olympic Boulevard Los Angeles, CA	Richard Anderson
Mattox Industrial Real Estate 755 Channel San Pedro, CA	Stanley Mattox

GOVERNMENT AGENCIES CONTACTED

Los Angeles City
  Building Permits

Los Angeles City
  Planning Department
  Zoning Administration

Los Angeles City
  Department of Building and Safety
  Earthquake Safety Division

appendix m

GEOTECHNICAL REPORT

This appendix supplies detailed information about the geologic elements and the effects on the project.

GEOTECHNICAL REPORT
FOR THE
ROUTE 110
PROPOSED TRANSIT WAY

By

DISTRICT 7 MATERIALS SECTION

Supervised by

O. STANKOV, E.G.1187; CEG 445

Prepared by

M.E. KEESEY

CALIFORNIA DEPARTMENT OF TRANSPORTATION

NOVEMBER 1980

TABLE OF CONTENTS

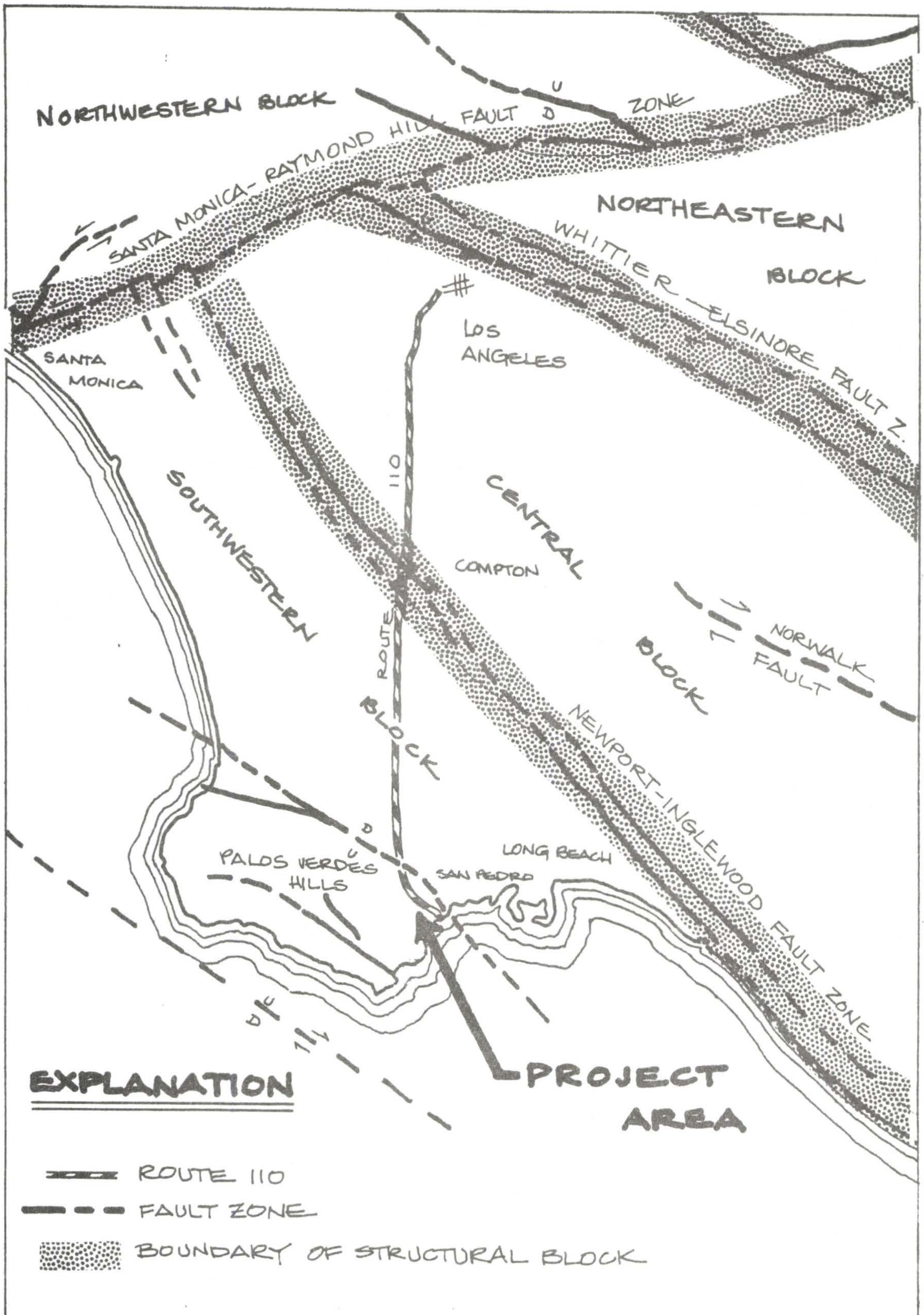

Fig 1. Los Angeles Basin

I. INTRODUCTION AND SCOPE

In the construction of large-scale engineering works such as the proposed high-speed transit project in the Harbor Freeway (Route 110), it is likely certain geologic elements will be affected by the facility in some manner. In turn, geologic phenomena can affect the ultimate usefulness of the project itself. The purpose of this report is to examine elements which the project will affect, predict the magnitude of the effect and suggest what measures may be taken, if necessary, to mitigate the resulting impact. Similarly, the potential effects of geologic phenomena on the facility are also examined, magnitudes estimated and mitigation recommended.

To provide background for the topics discussed, the regional and local geology is first presented. Specific subjects, which will be either influenced by construction of the project or will themselves be an influence on the facility, are then analyzed.

Several sources have been utilized in compiling the information required for this report. A literature search yielded references from which the necessary technological abilities were evolved. Further publications and reports from both private publishers and public agencies were used as an aid in preparing the discussions on geology. Reports by other agencies were utilized to determine subsurface conditions.

II. PROJECT DESCRIPTION

The Harbor Freeway corridor has been identified for priority project development of much needed transit service improvements. The proposed project will consider alternatives for the development of a high-speed transit facility, either bus or rail, within the freeway right-of-way. This report will also comment on tunneling conditions.

III. GEOLOGICAL SETTING

A. Regional Geology

The existing Harbor Freeway extends north-south through the Los Angeles Basin. The basin is a northwest trending alluviated lowland bordered on the north, east and southeast by hilly or mountainous terrain, and on the west and south by the Pacific Ocean. About fifty miles long and twenty miles wide, it was formed by discontinuous deposition of marine and continental sediments into a deep structural trough or depression in crystalline basement rock. Today its surface forms a broad seaward-sloping plain broken by anticlinal folding where sedimentary rocks are thought to drape over bulges in the basal complex.

Several rivers, most notably the Los Angeles, Rio Hondo, San Gabriel and Santa Ana Rivers, drain south-southwesterly across the basin and empty into San Pedro Bay. River and stream systems such as these probably formed the present gently sloping plain as they migrated back and forth across the coastal lowland. The sedimentary stratigraphy reflects the fluctuations in sea level, climatic changes and varying tectonic regimes in past time. Within the study area, fine-grained estuarine deposits and peat layers are found at shallow depth at Dominguez Channel and Bixby Slough (near Harbor City).

Zones of faulting and flexure divide the basin into four primary structural blocks: the Northeastern, Central, Southwestern and Northwestern blocks. The project area traverses two of these, as shown in Figure 1. The basin continues to be actively folded and faulted. Portions of the surrounding highlands reportedly have annual relative uplifts of between 4 to 6 mm, and numerous earthquakes have been recorded in historic time. Two major fault zones, the Newport-Inglewood and the Palos Verdes Hills, trend northwesterly across the project area.

B. Local Geology

For the most part, Route 110 is constructed on relatively flat-lying alluvial sediments; however, in the vicinity of Harbor City and the Dominguez Channel, it traverses estuarine deposits, and in the downtown area, the overlying alluvium has been eroded, exposing Pliocene and Upper Miocene sedimentary formations at the surface.

Within the study area, recent alluvial sediments, Qal and Qalo, may be up to several hundred feet thick. These units consist of slightly consolidated silty to sandy gravel, locally with cobbles and boulders. The estuarine or deltaic sediments are generally dark, weakly consolidated and organic-rich. Alternating layers of clayey sands and sandy clays reflect the cyclic nature of this type of sedimentation.

Stratigraphically below the surficial deposits are massive soft siltstone of the Fernando Formation (Tfsl) and interbedded siltstone (Tpsl), fine sandstone (Tpss) and diatomaceous shale (Tpds) of the Puente Formation (as described by Lamar, 1970). North of Wilshire Boulevard, these bedrock units are exposed at the surface. They are tightly folded along generally east-west trending axes and vary in thickness. The degree of consolidation varies with depth of burial. For tunneling and penetration conditions, see Table 1 (after Yerkes, 1977).

IV. EARTHQUAKES AND RELATED PHENOMENA

A. Regional Seismicity

Determination of regional seismicity for this project was done by using historical records and simple probability. The maximum earthquake history of Southern California is for a time period of only 200 years. DePortola recorded a major earthquake in 1769, while he was camped near the Santa Ana River. Since that time, a record of large events exists, but many of these were not observed with instruments. Magnitude has been assigned by reading the historical accounts of the events. Accurate records exist only for events since about 1930. The time period of 200 years of incomplete data is not sufficient to produce accurate probability tables for any site in Southern California. The probability table (Table No. 4) in this report must be viewed as just setting general limits to the probability of earthquake occurrence in the area and is not definitive.

No method exists at this time to predict when, where, or how powerful the next earthquake in Southern California will be; therefore, the assumption made when developing information for this study was that earthquakes will occur where they have occurred before. This assumption is generally accepted by the majority of seismologists, geologists and engineers.

The study area was taken as an area with a 100-mile radius centered near the midpoint of the project. Within this area, all known epicenters of Richter magnitude 4.0 or greater are tabulated by whole magnitude divisions and are summarized in Table No. 2 . From this information, frequency per year for the study area can be plotted along with the data for Southern California from the work of other investigators, and a frequency curve developed for the study area. This information is used along with acceleration influence data and the number of bedrock accelerations given in Table No. 3 to determine the occurrence probability. Table No. 4 gives the probability of occurrence of a particular acceleration (g) occurring within a given number of years. Tables No. 3 and No. 4 do not consider local geologic conditions at the study site. This means the tables are statistical and that any small site "a" within the much larger study area "A" has the same set of probabilities.

B. Seismic Phenomena

The Route 110 project is located in a seismically-active area. A number of faults are found within the 100-mile study limit which could affect the corridor. These are listed in Table No. 5. The faults must be considered active with the potential of producing earthquakes.

Greensfelder in his investigations has assigned a maximum credible capability of Richter magnitude 7.1 to the Newport-Inglewood Fault. This would be a major earthquake. A maximum earthquake on the San Andreas could be magnitude 8.3; this would be a great earthquake. Both of these events would be damaging to the area through which the project would pass. Damage would also result from an earthquake on the Palos Verdes Fault.

In the following discussion under particular subject headings, it is necessary to remember that prediction of damage is based on historical records of what has happened in past seismic events. Damage estimated at some particular magnitude is somewhat arbitrary. This is true because each earthquake of even the same magnitude is different; therefore, the response and exact damage may be different from that predicted by application of existing data.

1. Tsunami and Seiche

Tsunamis (or more accurately, seismically-induced ocean waves) and seiche are not anticipated in association with activity on the Newport-Inglewood Fault Zone; however, numerous offshore faults between San Pedro and Santa Catalina Island continue to be active and have induced seismic sea waves at least twice in recorded time (1855 and 1879). Possible damage from these phenomena should be considered in the design of structures in low-lying nearshore areas.

2. Liquefaction

Liquefaction of cohesionless soils has produced severe damage, such as the ground failure at the Lower San Fernando Dam (Sylmar) during the 1971 earthquake.

Empirically, the highest potential for liquefaction occurs where saturated clay-poor granular sediments with relative densities less than 65% are within 50 feet of the ground surface (Yerkes and others, 1977). While the potential for liquefaction within the project area is generally minimal, it is reasonable to assume conditions conducive to this phenomena exist locally in areas where the groundwater level is shallow, particularly in the vicinity of the Dominguez Channel and Bixby Slough. Analyses of liquefaction potential of the soils at these locations should be made so the planned design takes into consideration possible damage from surface or near surface ground failure, in the event of an earthquake.

3. <u>Ground-Shaking and Ground Rupture</u>

Ground-shaking and ground rupture are the primary causes of structural damage during an earthquake; they are considered the most likely damage-producing earthquake phenomena on this project.

Ground-shaking, magnitude, duration and vibration-frequency characteristics will vary greatly, depending upon the particular causative fault and its distance from the project corridor.

The nearest known active fault is the Newport-Inglewood, which passes through the project limits. A maximum credible magnitude for this fault system has been given in the literature as 7.1 Richter.

Estimates of horizontal acceleration during the first few seconds of the 1933 Long Beach Earthquake range as high as 1.0 gravity.

The maximum magnitude earthquake considered to affect the study area would be produced by movement on the San Andreas Fault Zone. This zone is at its closest point 36 miles from the study area. The maximum credible magnitude is 8.3 Richter. Characteristically, this earthquake would produce moderate ground accelerations at the project site with a relative long duration of 40 or more seconds.

Some consolidation of foundation soils can be expected because of ground-shaking. The amount is difficult to predict without site-to-site dynamic response analysis of the soils. It would be expected that the maximum amount would take place with a seismic event along the Newport-Inglewood Zone. More distant earthquakes might produce little, if any, consolidation, depending upon both magnitude and distance.

Scientists generally agree the intensity of ground-shaking during an earthquake is affected by depth to bedrock. Historical records of past earthquakes in this area document this relationship and also indicate ground surface disruption is likely to occur during any future seismic event of magnitude 5 or larger on most California faults. The greatest hazard may occur as a result of ground-lurching, particularly in artificially-filled areas. While it is possible to predict that surface ruptures will form, it is not possible to anticipate where the damage will be incurred.

4. Landslides and Embankment Slipout

Earthquake ground motion can produce landslides. While it is possible that a landslide could take place in excavations within the downtown area, it is considered to be a very minor chance. There are no known or previously mapped landslides in the project area.

Embankment slipout will be a minor problem.

C. Seismic Mitigation

Seismic mitigation measures are different from mitigation measures associated with other types of impact studies. In the case of an engineering project, the project will not increase or decrease the earthquake hazard of an area. It is the project itself, and the people who use it, which are affected by the earthquake hazard.

The following is a list of mitigation measures in relationship to earthquake hazard on this project:

1. The construction of embankments will reduce the potential for liquefaction since this consolidates and constrains the foundation soils.

2. In the case of structures constructed on this project, the following mitigating measures will be included:

   a. The structures on this project will be designed in accordance with a criteria which utilizes a seismic design force that is approximately 2.5 times greater than that used for structures prior to the San Fernando Earthquake of 1971. Factors which were considered in the seismic design of the structures include:

1. Seismicity of the site.

2. Soil response at the site.

3. Dynamic characteristics of the structure.

b. Improved structural features following the San Fernando Earthquake of 1971 will be incorporated in the design of these structures and include:

1. The use of hinge restrainers to hold together superstructure elements during extreme motions.

2. The use of heavy keys to limit movement between the superstructure and abutments.

3. The use of increased column tie reinforcement in regions of maximum flexure to permit dynamic excursions into the inelastic range without failure.

Dynamic analysis and nonlinear studies by the Department of Transportation and others indicate that structures designed using these improved design forces and details will be able to withstand heavy seismic excitations from a major earthquake without collapse.

V. SUBSIDENCE AND SETTLEMENT

Settlement of the roadway can occur through any or all of three natural phenomena: subsidence, consolidation, and compaction. Subsidence is generally considered to be large scale areal settlement due to the pumping of oil or water from soil strata.

Settlement occurs through the action of soil compaction and consolidation. Compaction is the readily progressive rearrangement of soil particles under loading in a partially saturated, constant water content soil layer. The rearranged particles become more closely knit and the soil layer is thereby compressed. Consolidation also involves the readjustment of soil particles under loading; but in this case, the soil (specifically clay) is saturated and of very low permeability. The clay cannot compress until the water filling the voids between the particles can flow into a free-draining layers such as sand or silt.

In general, although the embankments will settle, the strength of the foundation soil is adequate to support the proposed load without shear failure. Where the freeway crosses zones of estuarine deposits, the weak highly compressible nature of these sediments will cause considerable differential settlement and foundation instability unless this material is removed. Nonorganic material may be incorporated in the embankment and is provided for in the Standard Specifications.

Settlement in most areas will occur during construction and the embankments can be built by ordinary construction methods and specifications. Specific duration of settlement periods and surcharging of embankments will be specified for each structure site investigated.

VI. NATURAL GAS AND OIL SEEPS

Where tunneling is under consideration, an important potential hazard will be accumulations of petroleum gas, oil, natural asphalt and pockets of hydrogen sulfide. These collect in bedrock and in the alluvial deposits as they transgress the petroliferous strata of the Fernando formation. Generally encountered at shallow depth, adequate ventilation and proper testing techniques should be employed to reduce the risk of explosion.

VII. SUBSURFACE WATER

The study area crosses two groundwater basins as described by Thomas and others in 1961. The northernmost section of the Harbor Freeway traverses the Los Angeles Forebay Area and Central Basin Pressure Area of the Central Basin, and to the south, it crosses the West Coast Basin. Depth to groundwater varies, and current groundwater data is not sufficient to determine areas of perched water. Tunneling conditions are greatly affected by the occurence of groundwater, therefore the exact depth to the water table, the distribution of groundwater below the water table and areas of perched water should be determined as accurately as possible. In addition, the distinction between the permanent groundwater level and perched water must be made as the latter has adverse and temporary effects on tunneling conditions (Yerkes and others, 1977).

The Newport-Inglewood fault zone acts as a groundwater barrier and effectively restricts seawater intrusion along most of its length. The southern portion of this project, however, lies west of the fault zone and thus corrosion by seawater should be anticipated (due to high sulfate concentrations).

VIII. BURIED FAULTS

An important geologic aspect for this project, particularly if tunnel construction is planned, is the detection of possible buried faults. Although these faults or fault zones may be considered seismically "dead", they often represent tens of feet of sheared, weak material and may also cause water seepage problems. Precise locations of these areas are obtained by exploratory coring and geophysical logging.

TABLE I

TUNNELING AND PENETRATION CONDITIONS
(After Yerkes, 1977)

Symbol	Soil/Rock Type	Approximate Penetration Resistance[1] 50 Ft. Subsurface (BPF)	Inferred Tunneling Conditions[2] Dry	Wet
Qal	Alluvium: Silty to sandy gravel, locally with cobbles and boulders; locally petroliferous; locally slightly consolidated.	> 40	4-5 10*	6 10*
Qalo	Old Alluvium: Slightly consolidated gravel; commonly uncemented.	> 40	3-5 10*	5-6 10*
Tfsl	Siltstone, Fernando Fm. (Lamar, 1970) Soft, massive siltstone, local layers hard pebble (< 1/4 in.) conglomerate; rare hard calcareous beds; locally petroliferous.	> 22	3-4	4-5
Tpds	Diatomaceous shale and diatomite, Puente Fm. (Lamar, 1970). Soft, blocky weathering, thinly laminated; rare beds soft friable sandstone and massive hard limestone.	Damp: >38 Dry: 24-38	3-4	4-5
Tpsl, Tpss	Siltstone and fine sandstone, Puente Fm. (Lamar, 1970). Poorly to well cemented, jointed, blocky, interbedded with shale, fragmented shale and hard limestone.	> 30	3-4	4-5 3-4

KEY: [1] 2" split spoon, 140 lb. hammer, 30" drop

[2] Tunneling conditions: (3) very firm ground; (4) firm ground, may ravel when wet; (5) very blocky or seamy, may ravel when wet; (6) unconsolidated or crushed materials, may run or flow when wet; (10) bouldery (hard rock fragments > 10 inches in diameter)

* If bouldery

TABLE NO. II

SUMMARY OF STUDY AREA SEISMICITY

Richter Magnitude	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.5
Study Period	1934-1971	1934-1971	1916-1971	1800-1971	1800-1971
Number of Epicenters In Study Area	473	46	7	1	1
Average Number of Epicenters In Study Area Per Year	12.78	1.243	0.127	0.0059	0.0059
Average Number of Epicenters Per 1000 Km^2 Per Year	0.157	0.015	0.0016	0.00007	0.00007

TABLE NO. III

100-YEAR BEDROCK ACCELERATIONS

Magnitude Range	Acceleration (g)							
	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7
4.75-5.25	0.2	.08	*	*	*	*	*	*
5.25-5.75	2.9	1.2	0.3	0.12	0.03	*	*	*
5.75-6.25	2.7	1.2	0.4	0.16	0.08	0.03	*	*
6.25-6.75	1.5	0.8	0.30	0.14	0.07	0.04	0.020	*
6.75-7.25	0.9	0.6	0.21	0.11	0.07	0.03	0.020	0.011
7.25-7.75	0.6	0.4	0.21	0.11	0.06	0.03	0.018	0.011
7.75+	0.4	0.3	0.20	0.12	0.07	0.04	0.021	0.010
Total from all Earthquakes	9.2	4.6	1.6	0.76	0.38	0.16	0.079	0.032

Notes

(1) Tables lists average number (n) of bedrock accelerations equal to or greater than those indicated which are anticipated to occur at site in a 100-year period without consideration of local geologic conditions.

(2) * Means that the given bedrock accelerations are considered too great for earthquake of given magnitude.

(3) n is determined by use of simple probability concepts.

TABLE NO. IV

PROBABILITY OF OCCURRENCE

No. of Years	Acceleration (g) 0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7
1	0.09	0.05	0.02	0.01	<0.01	<0.01	<0.01	<0.01
10	0.60	0.37	0.15	0.07	0.04	0.02	0.01	<0.01
25	0.90	0.69	0.33	0.17	0.09	0.04	0.02	0.01
50	0.99	0.90	0.55	0.32	0.17	0.08	0.04	0.02
100	0.99	0.99	0.80	0.53	0.32	0.15	0.08	0.03

Notes

(1) Table lists estimated probability of at least one occurrence at the site of a bedrock acceleration equal to or greater than the value indicated without consideration of local geologic conditions.

(2) The table has no calendar time frame, e.g. a 0.6g acceleration has a probability of 4% in 50 years but it could occur tomorrow.

TABLE V

MAJOR NAMED ACTIVE FAULTS

THAT MAY AFFECT THE PROJECT AREA

FAULT NAME	Closest Distance To Project Area (Miles)	Maximum Credible Earthquake Magnitude[1]	Estimated[2] Rock Acceleration (g)
NEWPORT-INGLEWOOD	0	7.1	1.0 (?)
PALOS VERDES HILLS	0	7.2	1.0 (?)
MALIBU-SANTA MONICA	6	7.5	.5+
RAYMOND HILL	6	7.5	.5+
NORTHRIDGE HILLS	9	6.5	.3+
SAN FERNANDO	15	6.5	.2+
SIERRA MADRE	15	6.6	.2+
WHITTIER-ELSINORE	15	7.5	.35
SANTA SUSANA	24	6.5	.1+
SIMI HILLS	30	6.5	.05+
CUCAMONGA	36	6.5	.05+
SAN ANDREAS, CENTRAL	36	8.3	.2+
SAN JACINTO	48	7.5	.1
GARLOCK	63	7.8	.05+

(1) Greensfelder, C.C.M.G. Map Sheet 23 (1974).

(2) Based on maximum credible earthquake magnitude and fault distance, after Schnabel and Seed (1972).

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Interstate 110 Freeway Transit

HARBOR FREEWAY CORRIDOR

appendix n

FLOODPLAIN HYDRAULIC STUDY

This appendix supplies information regarding floodplains and the recommended alternative.

FLOODPLAIN HYDRAULIC STUDY

1. LOCATION: Dist. 07, Co. L.A., Rte. 110, P.M. 0.9/21.4

2. NAME OF STREAM: Harbor Lake

3. GEOGRAPHICAL REFERENCE: This project runs from Route 10 in the City of L.A. south to Route 47 in the City of San Pedro along the Harbor Freeway, Route 110.

4. DESCRIPTION OF PROPOSAL: Construct an at grade and elevated BUS and HOV transitway in the median of the Harbor Freeway. This is designated as the BUS-4 Alternate in the EIS.

5. ADT Current: 63,000 vpd Wilmington, C Street Interchange.
   82,000 vpd Wilmington, Pacific Coast Highway Interchange.

6. HYDRAULIC DATA:
   $*WS_{100}$ = 16.0 ft. elev. (WS elevation in Harbor Lake)
   *WS = Water Surface

7. MAP WITH FLOOD LIMITS OUTLINED: See attached FIRM map. This map is taken from FIRM map panels 060137 0106 C, 060137 0107 C, 060137 0109 C, and 060137 0110 C.

8. Q_{100} BACKWATER DAMAGES:

   A. Residences? No
   B. Other Bldgs.? No
   C. Crops? No

9. TYPE OF TRAFFIC:

   A. Emergency supply or evacuation route? Yes
   B. Emergency vehicle access? Yes
   C. Practicable detour available? Yes
   D. School bus or mail route? Yes

10. ESTIMATED DURATION OF TRAFFIC INTERRUPTION FOR 100-YEAR EVENT. 0 Hours

RISK STATEMENT

This project does not significantly encroach on any floodplain. No alternative would be affected by a 100-year return frequency flood. Harbor Lake (see FIRM map), is the only floodplain near the project and would not be affected by the construction of the project.

The Harbor Freeway alignment would cross two major urban flood control channels, the Dominquez Channel and the Wilmington Drain. None of the proposed construction would reduce the capacity of the channels.

I have determined that this is a Low Risk Project based on the above stated reasons.

DISCLAIMER

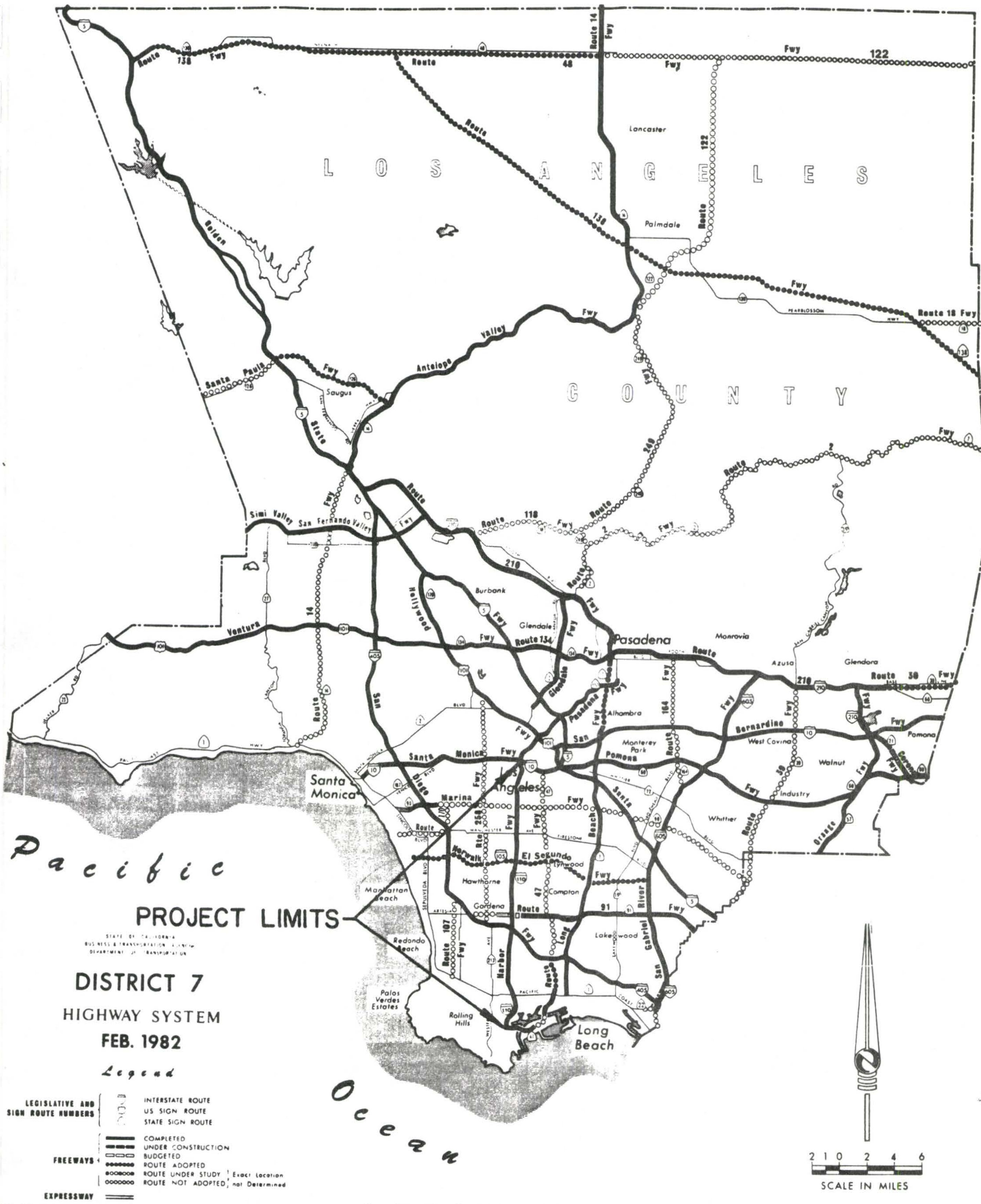
Floodplain data are based upon information available when the report was prepared and are shown hereon to meet Federal Requirements; the accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.

PREPARED BY:

Peter C. Hom — 6/6/84
Signature - District Hydraulic Engineer — Date

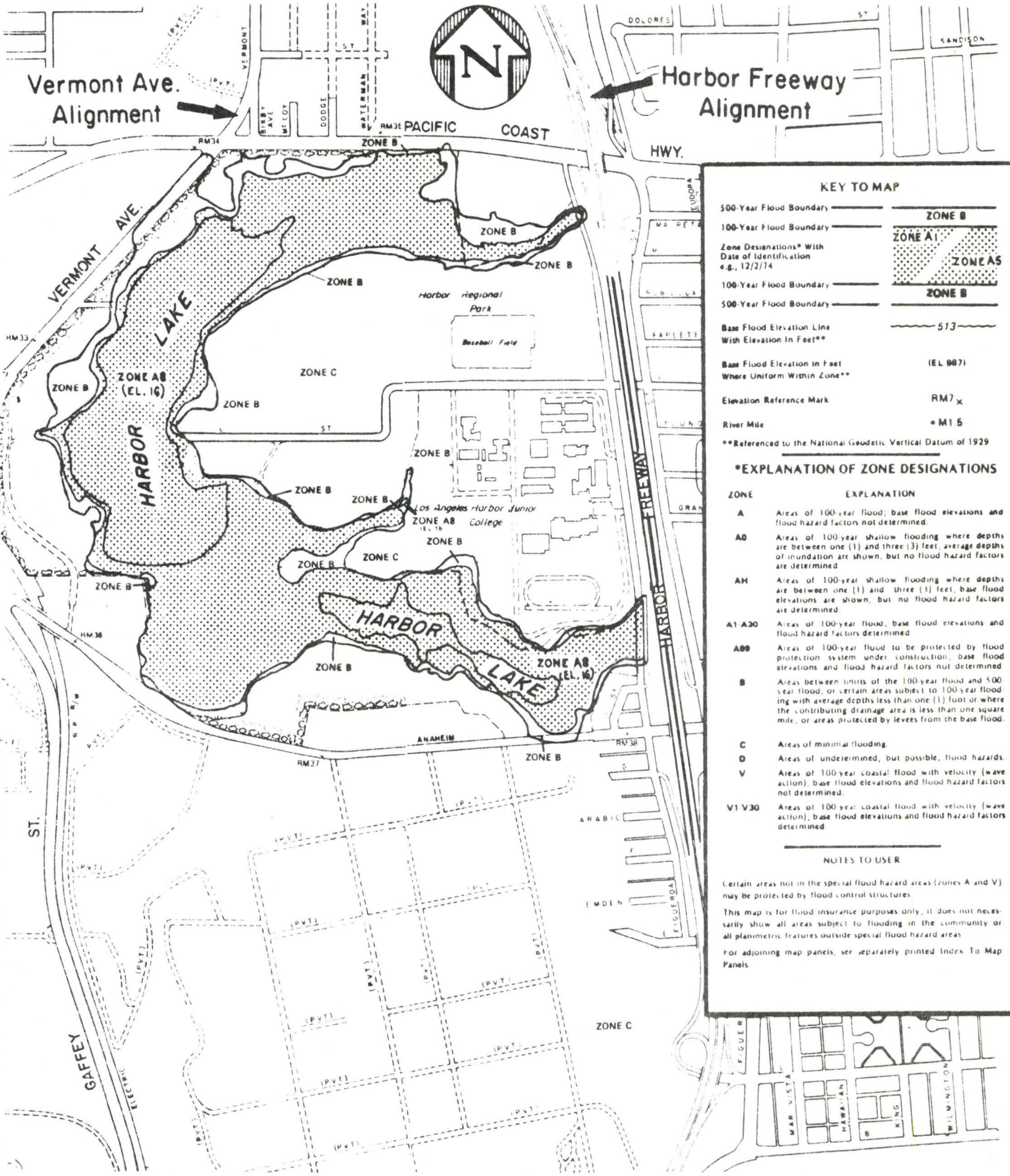
Harlan Weatherholt — 6-13-84
Signature - District Project Engineer — Date

LOS ANGELES COUNTY



LOCATION MAP

FLOOD PLAIN AREA AFFECTING THE I-110 TRANSITWAY



KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	
Zone Designations* With Date of Identification e.g., 12/2/74	ZONE A1 / ZONE A5
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7 ×
River Mile	• M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

***EXPLANATION OF ZONE DESIGNATIONS**

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet, average depths of inundation are shown, but no flood hazard factors are determined
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet, base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood, base flood elevations and flood hazard factors determined
A@@	Areas of 100-year flood to be protected by flood protection system under construction, base flood elevations and flood hazard factors not determined
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile, or areas protected by levees from the base flood.
C	Areas of minimal flooding.
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action), base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action), base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only, it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

Source : Federal Insurance Administration

Interstate 110 Freeway Transit
HARBOR FREEWAY CORRIDOR

appendix o

DETERMINATION OF NO EFFECT ON THE NATIONAL REGISTER PROPERTIES

This appendix documents the determination of no effect on The National Register Properties.

RECEIVED

JUN 18 1984

Environmental Planning Branch

State of California — The Resources Agency
OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P. O. Box 2390
Sacramento, CA 95811
(916) 445-8006

JUN 13 1984

830107A:

RE: FHWA[illegible] I-110 HOV Transitway, Los Angeles, CA

The item cited above was received in this office on 4/25/84.
Thank you for consulting us pursuant to 36 CFR 800.

We concur in your determination that this undertaking:

☐ does not involve National Register and/or eligible properties.

XXX will not affect National Register and/or eligible properties.

An official National Register eligibility determination (36 CFR 63) is unnecessary in cases of no effect. However, the provisions of 36 CFR 800.7 apply if previously unidentified National Register or eligible resources are discovered during construction.

Contact H. Kreutzberg of our staff if you have any questions.

K. Mellon
Dr. Knox Mellon
State Historic Preservation Officer