



EXECUTIVE CHAMBERS  
HONOLULU

JOHN WAIHEE  
GOVERNOR

July 23, 1992

Mr. Joseph M. Magaldi, Jr., Director  
Department of Transportation Services  
City and County of Honolulu  
650 South King Street, Third Floor  
Honolulu, Hawaii 96813

Dear Mr. Magaldi:

I am pleased to accept the Final Environmental Impact Statement for the Honolulu Rapid Transit Program as satisfactory fulfillment of the requirement of Chapter 343, Hawaii Revised Statutes.

This environmental impact statement will be a useful tool in the process of deciding if the action described therein should be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws and does not constitute an endorsement of the proposed action.

When the decision is made regarding the proposed action itself, I expect the appropriate legislative bodies and governmental agencies to consider if the societal benefits justify the economic, social, and environmental impacts which will likely occur. These impacts are adequately described in the statement and, together with the comments made by reviewers, provide useful analysis of the proposed action.

With kindest regards,

Sincerely,

A handwritten signature in black ink, appearing to read "John Waihee".

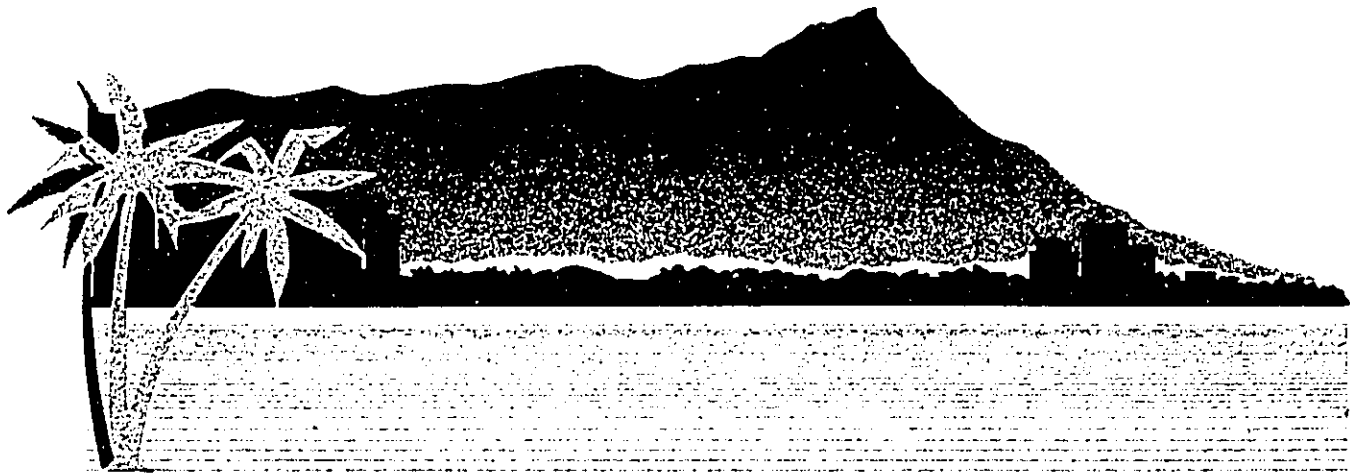
JOHN WAIHEE

cc: Hon. John C. Lewin

1992-07-0A-FEIS-HONOLULU RAPID TRANSIT PROGRAM

OEQC LIBRARY

# Final Environmental Impact Statement



HONOLULU RAPID TRANSIT PROGRAM  
H O N O L U L U , H A W A I I



U.S. Department of Transportation  
Federal Transit Administration

City and County of Honolulu  
Department of Transportation Services

July 1992



**FINAL  
ENVIRONMENTAL IMPACT  
STATEMENT**

**HONOLULU RAPID TRANSIT PROGRAM  
Honolulu, Hawaii**

**U.S. Department of Transportation  
Federal Transit Administration**

**City and County of Honolulu  
Department of Transportation Services**

**July 1992**

**HONOLULU RAPID TRANSIT PROGRAM  
HONOLULU, HAWAII**

**FINAL  
ENVIRONMENTAL IMPACT STATEMENT**

**Submitted Pursuant to the National Environmental Policy Act  
42 U.S.C. 4332(2) (c)  
and  
Chapter 343, Hawaii Revised Statutes**

**by the**

**U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL TRANSIT ADMINISTRATION**

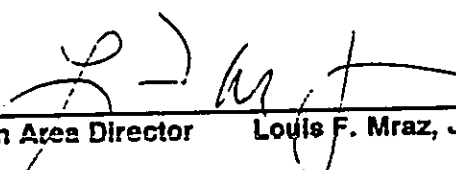
**and**

**CITY AND COUNTY OF HONOLULU  
DEPARTMENT OF TRANSPORTATION SERVICES**

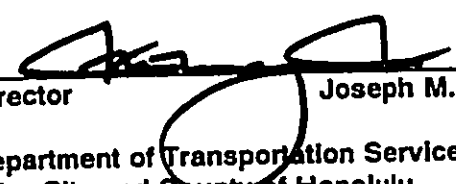
**Cooperating Agency**

**U.S. Department of the Navy**

7-21-92  
**Date of Approval**

  
\_\_\_\_\_  
**Western Area Director Louis F. Mraz, Jr.**  
**For Federal Transit Administration**

July 21, 1992  
**Date of Approval**

  
\_\_\_\_\_  
**Director Joseph M. Magaldi, Jr.**  
**Department of Transportation Services  
For City and County of Honolulu**

The following persons may be contacted for additional information concerning this document:

Mr. Robert Horn  
Program Manager  
Federal Transit Administration  
U.S. Department of Transportation  
211 Main Street, Room 1160  
San Francisco, California 94105  
(415) 744-3116

Mr. Frank Doyle  
Manager and Chief Engineer  
Office of Rapid Transit  
Department of Transportation  
Services  
City and County of Honolulu  
650 South King Street, 3rd Floor  
Honolulu, Hawaii 96813  
(808) 527-6975

Mr. Donald J. Emerson, TGM-22  
Chief, Planning Analysis and Support Division  
Federal Transit Administration  
U.S. Department of Transportation  
400 7th Street, SW, Room 9301  
Washington, D.C. 20590  
(202) 366-0096

#### Abstract

The proposed action is an improvement to the transit system in the urban Honolulu, Hawaii area from Waiawa, through Downtown Honolulu, and to the University of Hawaii. The amended Locally Preferred Alternative consists of a 15.9 mile, elevated fixed guideway and computer-controlled automated (driverless) vehicles. The Ewa (west) end of the project is in the vicinity of Waiawa, from which it will follow Kamehameha Highway until past the Honolulu International Airport and Dillingham Boulevard into the CBD. The CBD segment will be a standard aerial structure along Nimitz Highway, then it will follow Halekauwila Street, Ward Avenue, Waimanu Street, and Kona Street to the Ala Moana Center. The alignment will continue on Kona Street, Atkinson Drive, and Kapiolani Boulevard to University Avenue, terminating at the University Quarry.

The analysis and impact assessment considered potential effects on transportation service, traffic, transit ridership, accessibility, neighborhoods, economic factors, natural resources, air quality, noise, parklands, and historic sites. The analysis also considered the financial feasibility and cost effectiveness of the alternatives.

This analysis is documented in this Final Environmental Impact Statement, its appendices, and supporting technical studies. Copies of these documents are available for review at the Office of Rapid Transit, Office of Environmental Quality Control, Legislative Reference Bureau Library, Municipal Reference and Records Center, University of Hawaii Hamilton Library, State Main and Regional Libraries.

**HONOLULU RAPID TRANSIT PROGRAM  
FINAL ENVIRONMENTAL IMPACT STATEMENT  
TABLE OF CONTENTS**

	<u>Page</u>
<b>PREFACE</b> .....	P-1
P.1 PROJECT HISTORY .....	P-1
P.2 ORGANIZATION OF THE FEIS .....	P-4
P.3 COMPLETION OF THE EIS PROCESS .....	P-6
 <b>EXECUTIVE SUMMARY</b> .....	 S-1
INTRODUCTION .....	S-1
S.1 NEED FOR THE PROPOSED ACTION .....	S-1
S.2 ALTERNATIVES CONSIDERED .....	S-7
S.2.1 Alternative 1: No-Build .....	S-8
S.2.2 Alternative 2: Transportation System Management (TSM) .....	S-13
S.2.3 Alternatives 3 to 11: Fixed Guideway Alternatives .....	S-13
S.2.4 The Amended Locally Preferred Alternative .....	S-16
S.2.5 Capital Costs .....	S-16
S.2.6 Operating and Maintenance (O&M) Costs .....	S-20
S.3 IMPACTS AND MITIGATION .....	S-21
S.3.1 Transportation Impacts .....	S-21
S.3.1.1 Transit .....	S-21
S.3.1.2 Highway and Parking .....	S-23
S.3.2 Environmental Impacts .....	S-24
S.3.2.1 No-Build Alternative .....	S-24
S.3.2.2 TSM Alternative .....	S-24
S.3.2.3 Amended Locally Preferred Alternative .....	S-26
S.3.3 Mitigation Commitments .....	S-28
S.4 FINANCIAL AND COST EFFECTIVENESS ANALYSIS .....	S-30
S.4.1 Rapid Transit Capital Financial Plan .....	S-30
S.4.2 Bus Capital Financial Plan .....	S-32
S.4.3 Operations and Maintenance Financial Plan .....	S-32
S.4.4 Effectiveness .....	S-33
S.4.5 Cost-Effectiveness .....	S-33
S.5 EQUITY .....	S-33
S.5.1 Impact on Low Income Areas .....	S-33
S.5.2 Environmental/Socioeconomic Equity and Benefit .....	S-34
S.5.3 Local Financing Options Equity and Burden .....	S-34
S.6 SIGNIFICANT TRADE-OFFS BETWEEN ALTERNATIVES .....	S-34

**Table of Contents (continued)**

	<u>Page</u>
S.7 ISSUES TO BE RESOLVED .....	S-35
S.7.1 Implementation of the Financing Plan .....	S-35
S.7.2 Signing the Phase II Notice to Proceed (NTP) with the System Contractor .....	S-35
S.7.3 Finalization of Trade of Land With the U.S. Navy .....	S-35
S.7.4 Finalization of the Location of the Traction Power Substation at the Makalapa Gate Station in Cooperation with the U.S. Navy .....	S-35
S.7.5 Adoption of a Policy on Bicycles on the Rapid Transit System .....	S-35
S.7.6 Completion of Proposed Mitigation Plan and Environmental Permits .....	S-35
<b>CHAPTER 1.0 PURPOSE AND NEED .....</b>	<b>1-1</b>
<b>1.1 NEED FOR TRANSPORTATION IMPROVEMENTS .....</b>	<b>1-1</b>
1.1.1 Transportation Facilities and Services in the Corridor .....	1-6
1.1.1.1 Highways .....	1-6
1.1.1.2 Transit .....	1-9
1.1.1.3 Paratransit .....	1-10
1.1.1.4 Parking .....	1-11
1.1.2 Transportation Related Goals and Objectives .....	1-11
1.1.2.1 City and County of Honolulu .....	1-11
1.1.2.2 State of Hawaii .....	1-12
1.1.2.3 Oahu Metropolitan Planning Organization .....	1-13
1.1.2.4 Federal Transit Administration .....	1-14
1.1.2.5 Other Goals Important in the Selection of an Alternative .....	1-14
1.1.3 Specific Transportation Problems in the Region .....	1-15
<b>1.2 PLANNING CONTEXT .....</b>	<b>1-15</b>
1.2.1 Planning and Development Process .....	1-15
1.2.2 The Environmental Impact Statement Role in Project Development and Decision Making .....	1-16
1.2.3 Preliminary Engineering and Turnkey Procurement .....	1-17
1.2.4 Final Environmental Impact Statement .....	1-17
<b>CHAPTER 2.0 ALTERNATIVES CONSIDERED .....</b>	<b>2-1</b>
<b>2.1 SCREENING AND SELECTION PROCESS .....</b>	<b>2-1</b>
2.1.1 Summary of Relevant System Planning Activities .....	2-1
2.1.2 Selection of the Amended Locally Preferred Alternative .....	2-2
<b>2.2 DEFINITION OF ALTERNATIVES .....</b>	<b>2-3</b>
2.2.1 Alternatives Considered in the AA/DEIS and SDEIS .....	2-4
2.2.1.1 Alternative 1: No-Build .....	2-6
2.2.1.2 Alternative 2: Transportation System Management .....	2-6
2.2.1.3 Alternatives 3 to 11: Fixed Guideway Alternatives .....	2-6
2.2.2 The Amended Locally Preferred Alternative .....	2-11
2.2.2.1 Operating Characteristics .....	2-14



**Table of Contents (continued)**

	<u>Page</u>
2.2.2.2 Physical Characteristics .....	2-23
2.3 CAPITAL COSTS .....	2-55
2.4 OPERATING AND MAINTENANCE COSTS .....	2-56
2.4.1 Cost Estimation Methods .....	2-56
2.4.2 Comparative Discussion .....	2-57
<b>CHAPTER 3.0 AFFECTED ENVIRONMENT .....</b>	<b>3-1</b>
3.1 LAND USE AND ECONOMIC ACTIVITY .....	3-1
3.1.1 Regional Summary .....	3-1
3.1.2 General Study Area .....	3-1
3.1.2.1 The Primary Urban Center .....	3-1
3.1.2.2 Ewa and Central Oahu Development Plan Areas .....	3-7
3.1.3 Corridor Land Uses .....	3-7
3.1.4 Proposed Development Projects .....	3-8
3.1.5 General Plans and Zoning .....	3-8
3.1.5.1 State of Hawaii Plans .....	3-8
3.1.5.2 City and County of Honolulu Plans .....	3-10
3.1.5.3 Military Installation Planning .....	3-10
3.1.6 Activity Centers and Growth Attractions .....	3-10
3.1.7 Population and Employment Trends .....	3-11
3.1.7.1 Population Trends and Projections .....	3-11
3.1.7.2 Employment .....	3-16
3.1.7.3 Commercial Space .....	3-17
3.1.8 Socio-Economic Trends and Distribution .....	3-17
3.1.8.1 Housing .....	3-17
3.1.8.2 Resident Income .....	3-17
3.1.8.3 Statewide Age Distribution .....	3-18
3.1.8.4 Neighborhood Data .....	3-18
3.2 TRANSPORTATION .....	3-18
3.2.1 Highway Network .....	3-18
3.2.2 Transit Network .....	3-20
3.2.2.1 Bus Routes and Operations .....	3-20
3.2.2.2 Passenger Facilities .....	3-21
3.2.2.3 Current Ridership .....	3-21
3.2.2.4 TheHandi-Van Paratransit Program .....	3-21
3.2.2.5 Management .....	3-22
3.2.2.6 TheBus and TheHandi-Van Programs - Fiscal Years (FY) 1992 - 1997 .....	3-22
3.2.3 Travel Behavior .....	3-23
3.2.3.1 Oahu Model Update Study - 1982 .....	3-23
3.2.3.2 Hali 2000 Study .....	3-24
3.2.3.3 1991 On-Board Ridership Survey .....	3-25
3.2.4 Bicycle Travel and Pedestrian Facilities .....	3-25
3.2.5 Parking .....	3-26

**Table of Contents (continued)**

	<u>Page</u>
3.3 NEIGHBORHOODS .....	3-28
3.3.1 Demographic Descriptions .....	3-28
3.3.1.1 Population Characteristics .....	3-28
3.3.1.2 Economic Characteristics .....	3-28
3.3.1.3 Housing Characteristics .....	3-28
3.3.2 Community Facilities and Services .....	3-31
3.4 VISUAL AND AESTHETIC RESOURCES .....	3-31
3.5 AIR QUALITY .....	3-31
3.6 NOISE AND VIBRATION .....	3-33
3.6.1 Noise Measurements .....	3-33
3.6.2 Vibration .....	3-36
3.6.3 Noise and Vibration Criteria .....	3-36
3.7 ECOSYSTEMS .....	3-38
3.7.1 Fish and Wildlife .....	3-38
3.7.2 Vegetation .....	3-38
3.7.3 Soils .....	3-39
3.8 WATER .....	3-39
3.8.1 Surface Waters .....	3-39
3.8.2 Groundwater .....	3-43
3.8.3 Floodplains .....	3-44
3.8.4 Wetlands .....	3-44
3.8.5 Navigable Waters .....	3-49
3.8.6 Coastal Zone Management (CZM) Zones .....	3-49
3.8.7 Water Recreation .....	3-50
3.9 HISTORIC AND ARCHAEOLOGICAL RESOURCES .....	3-50
3.9.1 Historic Resources .....	3-50
3.9.2 Archaeological Resources .....	3-57
3.10 PARKLANDS .....	3-58
<b>CHAPTER 4.0 TRANSPORTATION IMPACTS .....</b>	<b>4-1</b>
4.1 TRANSIT IMPACTS .....	4-1
4.1.1 Levels of Service .....	4-1
4.1.2 Patronage .....	4-9
4.1.3 Farebox Revenues .....	4-13
4.2 HIGHWAY AND PARKING IMPACTS .....	4-16
4.2.1 Congestion .....	4-16
4.2.1.1 Corridor Travel Demands .....	4-16
4.2.1.2 Localized Traffic Impacts .....	4-19
4.2.2 Parking at Stations .....	4-24
4.2.3 Parking Supply .....	4-24

Table of Contents (continued)

	<u>Page</u>
<b>CHAPTER 5.0 ENVIRONMENTAL CONSEQUENCES</b> .....	<b>5-1</b>
5.1 LAND USE AND ECONOMIC DEVELOPMENT .....	5-1
5.1.1 Regional Impacts .....	5-1
5.1.2 Corridor Level Impacts .....	5-1
5.1.2.1 Accessibility .....	5-1
5.1.2.2 Land Use and Development .....	5-2
5.1.2.3 Consistency With Land Use Plans .....	5-3
5.1.2.4 Consistency With Proposed Development Projects .....	5-4
5.1.2.5 Socioeconomic Trends and Distribution .....	5-4
5.1.2.6 Impacts on Existing Business Community .....	5-4
5.1.3 Station Area Impacts .....	5-5
5.1.4 Impacts on Services and Tax Base .....	5-15
5.1.5 Economic Impacts .....	5-17
5.2 DISPLACEMENTS AND RELOCATIONS .....	5-18
5.2.1 Acquisitions .....	5-19
5.2.2 Relocation Assistance Program .....	5-21
5.3 NEIGHBORHOODS .....	5-21
5.3.1 Barriers To Social Interaction .....	5-22
5.3.2 Pedestrian and Bicycle Travel .....	5-22
5.3.3 Safety and Security .....	5-22
5.3.4 Community Facilities and Services .....	5-23
5.4 VISUAL AND AESTHETIC RESOURCES .....	5-24
5.4.1 Description of Fixed Guideway System .....	5-24
5.4.2 Analysis of Significant Visual Changes .....	5-24
5.4.3 Mitigation .....	5-31
5.5 AIR QUALITY .....	5-31
5.5.1 Mesoscale Analysis .....	5-31
5.5.2 Microscale Analysis .....	5-32
5.5.3 Electrical Generation Impacts .....	5-34
5.5.4 Conformity With State Implementation Plan (SIP) and the Provisions of the Federal Clean Air Act .....	5-34
5.6 NOISE .....	5-34
5.6.1 Assumptions on Technology .....	5-34
5.6.2 Peak Pass-by Noise Levels, Fixed Guideway Alternative .....	5-35
5.6.3 Vibration and Groundborne Noise .....	5-37
5.6.4 TSM Alternative .....	5-38
5.6.5 Road Traffic Noise Impact .....	5-38
5.6.6 Noise Impact at Park-and-Ride Lots .....	5-39
5.6.7 Yard and Substation Noise .....	5-41
5.6.8 Noise and Vibration Mitigation .....	5-42
5.7 ECOSYSTEMS .....	5-42
5.7.1 Vegetation .....	5-42

Table of Contents (continued)

	<u>Page</u>
5.7.2 Wildlife .....	5-43
5.7.3 Farmland .....	5-44
5.8 WATER .....	5-45
5.8.1 Water Quality .....	5-45
5.8.2 Groundwater .....	5-46
5.8.3 Floodplain Encroachment .....	5-51
5.8.4 Wetlands .....	5-51
5.8.5 Navigation .....	5-52
5.8.6 Coastal Zones .....	5-52
5.8.7 Recreational Use .....	5-52
5.9 ENERGY .....	5-52
5.10 HISTORIC AND ARCHAEOLOGICAL RESOURCES .....	5-53
5.10.1 Archaeological Resources .....	5-54
5.10.2 Finding Of No Adverse Effect .....	5-55
5.10.3 Finding of Adverse Effect and Mitigation .....	5-63
5.11 PARKLANDS .....	5-69
5.12 SECTION 4(f) EVALUATION .....	5-71
5.12.1 Pearl Harbor Naval Base .....	5-73
5.12.1.1 Proposed Action .....	5-73
5.12.1.2 Description of the 4(f) Resource .....	5-73
5.12.1.3 Impact on the 4(f) Resource by the Proposed Action .....	5-73
5.12.1.4 Avoidance Alternatives .....	5-75
5.12.1.5 Mitigation Measures .....	5-75
5.12.2 Keehi Lagoon Beach Park .....	5-75
5.12.2.1 Proposed Action .....	5-75
5.12.2.2 Description of the 4(f) Resource .....	5-75
5.12.2.3 Impact on the Resource by the Proposed Action .....	5-75
5.12.2.4 Avoidance Alternatives .....	5-77
5.12.2.5 Mitigation Measures .....	5-77
5.12.3 OR&L Station Property .....	5-77
5.12.3.1 Proposed Action .....	5-77
5.12.3.2 Description of the 4(f) Resource .....	5-77
5.12.3.3 Impact on the Resource By the Proposed Action .....	5-77
5.12.3.4 Avoidance Alternatives .....	5-77
5.12.3.5 Mitigation Measures .....	5-77
5.12.4 Aloha Stadium .....	5-78
5.12.4.1 Proposed Action .....	5-78
5.12.4.2 Description of 4(f) Resource .....	5-78
5.12.4.3 Impact on the Resource by the Proposed Action .....	5-78
5.12.4.4 Avoidance Alternatives .....	5-78
5.12.4.5 Mitigation Measures .....	5-80
5.13 CONSTRUCTION IMPACTS .....	5-80
5.13.1 Traffic .....	5-81

**Table of Contents (continued)**

	<u>Page</u>	
5.13.2	Neighborhoods and Businesses . . . . .	5-81
5.13.3	Air Quality . . . . .	5-83
5.13.4	Noise and Vibration . . . . .	5-83
5.13.5	Water . . . . .	5-83
5.13.5.1	Water Quality . . . . .	5-83
5.13.5.2	Groundwater . . . . .	5-84
5.13.5.3	Floodplains . . . . .	5-85
5.13.6	Solid Wastes . . . . .	5-85
5.13.7	Hazardous Wastes . . . . .	5-85
5.13.8	Utilities . . . . .	5-87
5.13.9	Summary of Committed Construction Mitigation . . . . .	5-87
<b>CHAPTER 6.0</b>	<b>FINANCIAL AND COST-EFFECTIVENESS ANALYSIS . . . . .</b>	<b>6-1</b>
<b>6.1</b>	<b>FINANCIAL ANALYSIS . . . . .</b>	<b>6-1</b>
6.1.1	Existing Revenue Sources . . . . .	6-1
6.1.1.1	FTA Section 9 Apportionment Program . . . . .	6-1
6.1.1.2	City Funds . . . . .	6-2
6.1.1.3	Fares . . . . .	6-2
6.1.2	New Revenue Sources . . . . .	6-2
6.1.2.1	FTA Section 3 Discretionary New Starts Program . . . . .	6-2
6.1.2.2	FTA Section 3 Discretionary Bus Program . . . . .	6-3
6.1.2.3	General Excise and Use Tax (GET) Surcharge . . . . .	6-3
6.1.2.4	Federal Highway Surface Transportation Program (ISTEA) . . . . .	6-3
6.1.2.5	Private Source Revenues and Value Capture . . . . .	6-4
6.1.3	Projected Capital Expenditures . . . . .	6-4
6.1.4	Projected Operating Expenditures . . . . .	6-6
6.1.5	Financial Plans . . . . .	6-6
6.1.5.1	Rapid Transit Capital Financial Plan . . . . .	6-6
6.1.5.2	Bus Capital Financial Plan . . . . .	6-9
6.1.5.3	Operations and Maintenance Financial Plan . . . . .	6-9
6.1.5.4	Risk Factors . . . . .	6-12
<b>6.2</b>	<b>EFFECTIVENESS . . . . .</b>	<b>6-13</b>
6.2.1	Transportation Effectiveness . . . . .	6-13
6.2.2	Overall Environmental Assessment . . . . .	6-16
<b>6.3</b>	<b>COST-EFFECTIVENESS ANALYSIS . . . . .</b>	<b>6-17</b>
6.3.1	Introduction . . . . .	6-17
6.3.2	Comparative Analysis of Transit Alternatives . . . . .	6-17
<b>6.4</b>	<b>EQUITY . . . . .</b>	<b>6-17</b>
6.4.1	Impact on Low Income Areas . . . . .	6-18
6.4.2	Environmental/Socioeconomic Equity and Benefit . . . . .	6-18
6.4.3	Local Financing Options Equity and Burden . . . . .	6-19
<b>6.5</b>	<b>SIGNIFICANT TRADE-OFFS BETWEEN ALTERNATIVES . . . . .</b>	<b>6-19</b>

**Table of Contents (continued)**

	<u>Page</u>
<b>7.0 COMMENTS AND RESPONSES</b> .....	7-1
7.1 PUBLIC REVIEW PROCESS .....	7-1
7.2 DESCRIPTION OF COMMENTS RECEIVED .....	7-1
7.3 ORGANIZATION OF COMMENTS AND RESPONSES .....	7-2
7.4 COMMENTS AND RESPONSES - AA/DEIS .....	7-3
7.4.1 Alternatives .....	7-3
7.4.1.1 Comparison of Alternatives .....	7-3
7.4.1.2 TSM Alternative .....	7-5
7.4.1.3 Section I Alternatives - Waiawa to Aloha Stadium .....	7-8
7.4.1.4 Section II Alternatives - Aloha Stadium to Keehi Interchange .....	7-8
7.4.1.5 Section III Alternatives - Keehi Interchange to Iwilei .....	7-9
7.4.1.6 Section IV Alternatives - Downtown/West Kakaako .....	7-9
7.4.1.7 Section V Alternatives - East Kakaako to Kalakaua/Kapiolani .....	7-10
7.4.1.8 Section VI - Waikiki Branch .....	7-11
7.4.1.9 Section VII Alternatives - University Branch .....	7-11
7.4.1.10 Station Alternatives .....	7-12
7.4.1.11 Transit Vehicle Alternatives .....	7-12
7.4.1.12 Other Alternatives .....	7-13
7.4.2 Accessibility to the Fixed Guideway .....	7-16
7.4.2.1 Fixed Guideway Alignment Access .....	7-16
7.4.2.2 Station Access .....	7-17
7.4.2.3 Feeder Service .....	7-18
7.4.2.4 Park-and-Ride Lot Access .....	7-20
7.4.2.5 Pedestrian and Bicycle Access .....	7-20
7.4.3 Station Design .....	7-21
7.4.4 Traffic and Parking .....	7-22
7.4.4.1 Traffic .....	7-22
7.4.4.2 Parking .....	7-27
7.4.5 Land Use .....	7-28
7.4.6 Community and Social Concerns .....	7-30
7.4.7 Aesthetics/Urban Design .....	7-34
7.4.8 Noise and Vibration .....	7-39
7.4.9 Ecosystems .....	7-41
7.4.10 Hydrology/Water Quality .....	7-42
7.4.11 Construction .....	7-44
7.4.12 Financial Evaluation .....	7-46
7.4.12.1 Capital Costs .....	7-46
7.4.12.2 Excise Tax Surcharge as a Revenue Source .....	7-49
7.4.12.3 Other Revenue Sources for Capital Costs .....	7-50
7.4.12.4 Operation and Maintenance Costs and Revenue Sources .....	7-52
7.4.12.5 Fare Structure .....	7-53
7.4.13 Public Participation .....	7-54
7.4.14 Historic Sites and Parklands .....	7-54
7.4.15 Patronage and Cost Effectiveness .....	7-55

**Table of Contents (continued)**

	<u>Page</u>
7.4.15.1 Forecasting Methodology .....	7-55
7.4.15.2 Patronage .....	7-58
7.4.15.3 Cost Effectiveness .....	7-61
7.4.16 Energy .....	7-62
7.4.17 Economic Impacts .....	7-63
7.4.18 Miscellaneous .....	7-65
<b>7.5 COMMENTS AND RESPONSES - SDEIS .....</b>	<b>7-80</b>
7.5.1 Alternatives .....	7-80
7.5.1.1 TSM Alternative .....	7-80
7.5.1.2 Amended LPA .....	7-80
7.5.1.3 Other Alternatives .....	7-82
7.5.2 Station Design .....	7-82
7.5.3 Traffic and Parking .....	7-83
7.5.3.1 Traffic .....	7-83
7.5.3.2 HOV Lanes .....	7-87
7.5.3.3 Parking .....	7-88
7.5.4 Land Use .....	7-89
7.5.5 Community and Social Concerns .....	7-91
7.5.6 Aesthetics/Urban Design .....	7-96
7.5.7 Noise and Vibration .....	7-98
7.5.8 Ecosystems .....	7-98
7.5.9 Hydrology/Water Quality .....	7-98
7.5.10 Construction .....	7-101
7.5.11 Financial Evaluation .....	7-102
7.5.11.1 Capital Costs .....	7-102
7.5.11.2 Excise Tax Surcharge as a Revenue Source .....	7-105
7.5.11.3 Other Revenue Sources for Capital Costs .....	7-106
7.5.11.4 Operation and Maintenance Costs and Revenue Sources .....	7-108
7.5.11.5 Fare Structure .....	7-108
7.5.12 Historic Sites and Parklands .....	7-109
7.5.13 Patronage and Cost Effectiveness .....	7-110
7.5.13.1 Forecasting Methodology .....	7-110
7.5.13.2 Patronage .....	7-113
7.5.13.3 Transit Travel Times .....	7-122
7.5.13.4 Cost Effectiveness .....	7-123
7.5.14 Energy .....	7-124
7.5.15 Economic Impacts .....	7-125
7.5.16 Miscellaneous .....	7-128
<b>Appendix A COORDINATION AND CONSULTATION .....</b>	<b>AA-1</b>
A.1 PUBLIC INVOLVEMENT .....	AA-1
A.1.1 Public Involvement Program .....	AA-1
A.1.2 Project Sponsors .....	AA-1
A.1.3 Community Participation .....	AA-2
A.1.4 Scoping Meetings and Public Hearings .....	AA-2
A.1.5 Public Information Program .....	AA-2

**Table of Contents (continued)**

	<u>Page</u>
A.1.6 Public Involvement .....	AA-3
A.1.6.1 Schedule of Community Coordination Activities .....	AA-4
A.1.6.2 Community Concern .....	AA-4
A.2 AGENCY COORDINATION .....	AA-5
A.2.1 Scoping .....	AA-5
A.2.2 Coordination During Study Process .....	AA-5
A.3 ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE .....	AA-7
A.4 SECTION 4(f) CORRESPONDENCE - DEPARTMENT OF INTERIOR .....	AA-8
A.5 SECTION 106 MEMORANDUM OF AGREEMENT .....	AA-9
<b>Appendix B TRACK PLAN AND PROFILE DRAWINGS (Provided under separate cover) ..</b>	<b>AB-1</b>
<b>Appendix C PUBLIC AND AGENCY COMMENTS (Available at the Office of Rapid Transit) .....</b>	<b>AC-1</b>
<b>Glossary .....</b>	<b>G-1</b>
<b>Acronyms .....</b>	<b>AAA-1</b>
<b>Bibliography .....</b>	<b>B-1</b>
<b>List of Preparers .....</b>	<b>P-1</b>
<b>FEIS Recipients .....</b>	<b>R-1</b>



## LIST OF FIGURES

	<u>Page</u>
<b>EXECUTIVE SUMMARY</b>	
Figure S.1 Study Corridor: Regional Context .....	S-2
Figure S.2 Island of Oahu .....	S-3
Figure S.3 Transportation Screenlines .....	S-5
Figure S.4 Regional Transportation Plan - High Occupancy Vehicle Network .....	S-14
Figure S.5 Location of Park-and-Ride Lots .....	S-15
Figure S.6 Example of Fixed Guideway Aerial Structure .....	S-17
Figure S.7 Amended Locally Preferred Alternative .....	S-19
 <b>CHAPTER 1.0</b>	
Figure 1.1 Study Corridor: Regional Context .....	1-2
Figure 1.2 Island of Oahu .....	1-3
Figure 1.3 Transportation Screenlines .....	1-5
Figure 1.4 Highway System: Island of Oahu .....	1-7
Figure 1.5 Major Facilities Serving Study Corridor .....	1-8
 <b>CHAPTER 2.0</b>	
Figure 2.1 Regional Transportation Plan - High Occupancy Vehicle Network .....	2-5
Figure 2.2 Location of Park-and-Ride Lots .....	2-7
Figure 2.3 Selected Guideway/Vehicle Combination .....	2-12
Figure 2.4 Amended Locally Preferred Alternative .....	2-15
Figure 2.5 Downtown Shuttle Service .....	2-17
Figure 2.6 Hourly Bus Volumes Around Downtown and Kakaako Stations .....	2-18
Figure 2.7 Waikiki Shuttle Service .....	2-20
Figure 2.8 Hourly Bus Volumes Around Ala Moana and Kalakaua/Kapiolani Stations .....	2-21
Figure 2.9 Navy Ewa Drum Storage Site and Sewage Treatment Plant Site .....	2-24
Figure 2.10 Side-Platform Station .....	2-25
Figure 2.11 Stacked-Platform Station .....	2-26
Figure 2.12 Conceptual Station .....	2-27
Figure 2.13 Waiawa Transit Facilities .....	2-29
Figure 2.14 Waiawa Station and Park-And-Ride Lot .....	2-30
Figure 2.15 Waiawa Maintenance and Storage Facility .....	2-32
Figure 2.16 Aloha Stadium Station and Park-and-Ride Lot .....	2-34
Figure 2.17 Makalapa Gate Station (Pearl Harbor Naval Base) .....	2-35
Figure 2.18 Lagoon Station and Park-and-Ride Lot .....	2-36
Figure 2.19 Dillingham Plaza Station .....	2-38
Figure 2.20 Honolulu Community College Station .....	2-39
Figure 2.21 Kaaahi Station .....	2-41
Figure 2.22 Nimitz/Smith Station .....	2-42
Figure 2.23 Nimitz/Fort Station .....	2-43

**List of Figures (continued)**

	<u>Page</u>
Figure 2.24 Halekauwila/South Station .....	2-44
Figure 2.25 Halekauwila/Ahui Station .....	2-45
Figure 2.26 Piikoi/Kona Station .....	2-47
Figure 2.27 Ala Moana Center Station .....	2-48
Figure 2.28 Isenberg Station .....	2-50
Figure 2.29 University/King Station .....	2-51
Figure 2.30 University/Quarry Station .....	2-52
Figure 2.31 University Area Park-and-Ride Locations .....	2-53
Figure 2.32 University Area Park-and-Ride Lots .....	2-54

**CHAPTER 3.0**

Figure 3.1 Distribution of Designated Land Uses .....	3-2
Figure 3.2 Development Plan Areas .....	3-3
Figure 3.3 Generalized Development Plan Land Use Map .....	3-4
Figure 3.4 Population Growth By Neighborhood, 1980-1989 .....	3-13
Figure 3.5 Population Growth By Transportation District, 1985-2005 .....	3-15
Figure 3.6 Income Level By Neighborhood .....	3-19
Figure 3.7 Noise and Air Quality Analysis Sites .....	3-34
Figure 3.8 Floodplains .....	3-40
Figure 3.9 Southern Oahu Sole Source Aquifer Designated Boundaries .....	3-45
Figure 3.10 Streams and Wetlands .....	3-46
Figure 3.11 Parklands and Historic Sites .....	3-51

**CHAPTER 4.0**

Figure 4.1 Change in Weighted Travel Time to Downtown - TSM Compared to No-Build (Year 2005) .....	4-7
Figure 4.2 Change in Weighted Travel Time to Downtown - Amended LPA Compared to TSM (Year 2005) .....	4-8
Figure 4.3 A.M. Peak Hour Volume on Rapid Transit Line .....	4-15

**CHAPTER 5.0**

Figure 5.1 Waiawa Station Existing Land Use & Impact Area .....	5-7
Figure 5.2 Pearl City Station Existing Land Use & Impact Area .....	5-7
Figure 5.3 Pearlridge Station Existing Land Use & Impact Area .....	5-7
Figure 5.4 Aloha Stadium Station Existing Land Use & Impact Area .....	5-7
Figure 5.5 Arizona Memorial Station Existing Land Use & Impact Area .....	5-9
Figure 5.6 Makalapa Gate Station Existing Land Use & Impact Area .....	5-9
Figure 5.7 Airport Station Existing Land Use & Impact Area .....	5-9
Figure 5.8 Lagoon Station Existing Land Use & Impact Area .....	5-9
Figure 5.9 Dillingham Plaza Station Existing Land Use & Impact Area .....	5-11
Figure 5.10 Honolulu Community College Station Existing Land Use & Impact Area .....	5-11
Figure 5.11 Kaaahi Station Existing Land Use & Impact Area .....	5-11

**List of Figures (continued)**

	<u>Page</u>
Figure 5.12	Nimitz/Smith Station Existing Land Use & Impact Area . . . . . 5-11
Figure 5.13	Nimitz/Fort Station Existing Land Use & Impact Area . . . . . 5-13
Figure 5.14	Halekauwila/South Station Existing Land Use & Impact Area . . . . . 5-13
Figure 5.15	Halekauwila/Ahui Station Existing Land Use & Impact Area . . . . . 5-13
Figure 5.16	Neal Blaisdell Center Station Existing Land Use & Impact Area . . . . . 5-13
Figure 5.17	Piikoi/Kona Station Existing Land Use & Impact Area . . . . . 5-14
Figure 5.18	Ala Moana Center Station Existing Land Use & Impact Area . . . . . 5-14
Figure 5.19	Kalakaua/Kapiolani Station Existing Land Use & Impact Area . . . . . 5-14
Figure 5.20	Isenberg Station Existing Land Use & Impact Area . . . . . 5-14
Figure 5.21	University/King Station Existing Land Use & Impact Area . . . . . 5-16
Figure 5.22	University/Quarry Station Existing Land Use & Impact Area . . . . . 5-16
Figure 5.23	Existing View Dillingham Boulevard at Honolulu Community College Looking Koko Head . . . . . 5-26
Figure 5.24	Projected Visual Change Dillingham Boulevard at Honolulu Community College Looking Koko Head . . . . . 5-26
Figure 5.25	Existing View Nimitz Highway at Bishop Street Looking Ewa . . . . . 5-27
Figure 5.26	Projected Visual Change Nimitz Highway at Bishop Street Looking Ewa . . . . . 5-27
Figure 5.27	Existing View Nimitz Highway at Nuuanu Avenue Looking Koko Head . . . . . 5-28
Figure 5.28	Projected Visual Change Nimitz Highway at Nuuanu Avenue Looking Koko Head . . . . . 5-28
Figure 5.29	Existing View at Fort Street Mall from King Street Looking Makai . . . . . 5-30
Figure 5.30	Projected Visual Change at Fort Street Mall from King Street Looking Makai . . . . . 5-30
Figure 5.31	Groundwater Conditions . . . . . 5-47
Figure 5.32	Arizona Memorial Station (Pearl Harbor Naval Base) . . . . . 5-57
Figure 5.33	Makalapa Gate Station (Pearl Harbor Naval Base) . . . . . 5-58
Figure 5.34	Merchant Street Historic District . . . . . 5-59
Figure 5.35	Old Police Station (Merchant Street Historic District) . . . . . 5-60
Figure 5.36	Ala Wai Park Clubhouse . . . . . 5-61
Figure 5.37	Church of the Crossroads . . . . . 5-62
Figure 5.38	OR&L Station . . . . . 5-64
Figure 5.39	Chinatown Historic District/Special District/Historic Core Precinct . . . . . 5-65
Figure 5.40	Aloha Tower/Dillingham Transportation Building . . . . . 5-67
Figure 5.41	Existing View of Dillingham Transportation Building . . . . . 5-68
Figure 5.42	Projected Visual Change of Dillingham Transportation Building . . . . . 5-68
Figure 5.43	Mother Waldron Park . . . . . 5-70
Figure 5.44	Walker Park/Irwin Park . . . . . 5-72
Figure 5.45	Pearl Harbor Naval Base Historic Property . . . . . 5-74
Figure 5.46	Keehi Lagoon Beach Park . . . . . 5-76
Figure 5.47	Aloha Stadium . . . . . 5-79

## LIST OF TABLES

<b>EXECUTIVE SUMMARY</b>		<u>Page</u>
Table S.1	Person Trips by Area .....	S-4
Table S.2	Change in Daily Travel Volumes Across Key Screenlines .....	S-6
Table S.3	Average Bus Operating Speeds .....	S-7
Table S.4	Summary Description of AA/DEIS Alternatives .....	S-9
Table S.5	Summary Description of the Amended Locally Preferred Alternative .....	S-18
Table S.6	Capital Cost Estimates and Annual Operating and Maintenance Costs .....	S-20
Table S.7	year 2005 — Peak Period Transit Travel Times .....	S-22
Table S.8	Daily Transit Trips and Travel Time Saved by TSM Riders (2005) .....	S-23
Table S.9	Change in Projected Annual Vehicle Miles Traveled (VMT) Compared to the No-Build Alternative (2005) .....	S-24
Table S.10	Summary of Key Evaluation Measures .....	S-25
Table S.11	Required Permits and Approvals .....	S-37
<b>CHAPTER 1.0</b>		
Table 1.1	Person Trips By Area .....	1-4
Table 1.2	Change in Daily Travel Volumes Across Key Screenlines .....	1-6
Table 1.3	State Department of Transportation 24-Hour Screenline Traffic Volumes .....	1-9
Table 1.4	Average Bus Operating Speeds .....	1-10
<b>CHAPTER 2.0</b>		
Table 2.1	Summary Description of the AA/DEIS Fixed Guideway Alternatives .....	2-8
Table 2.2	Summary Description of the Amended Locally Preferred Alternative .....	2-13
Table 2.3	Weekday Transit Vehicle Requirements - Year 2005 .....	2-14
Table 2.4	Number of Peak Hour Buses .....	2-16
Table 2.5	Number of Peak Hour Buses .....	2-22
Table 2.6	Amended Locally Preferred Alternative Fixed Guideway Capital Costs .....	2-56
Table 2.7	Capital Cost Estimates .....	2-56
Table 2.8	Year 2005 Annual Operating and Maintenance Costs .....	2-57
<b>CHAPTER 3.0</b>		
Table 3.1	Proposed Development Projects* Within the Amended Locally Preferred Alternative Corridor .....	3-9
Table 3.2	Major Activity Center and Growth Areas .....	3-11
Table 3.3	Population Growth 1980-1989 (By Neighborhood) .....	3-12
Table 3.4	Population Growth 1985-2005 (By Transportation District) .....	3-14

**List of Tables (continued)**

	<u>Page</u>
Table 3.5	Employment Growth 1985 - 2005 (By Transportation District) . . . . . 3-16
Table 3.6	Personal and Per Capita Income (1985 - 2005) . . . . . 3-17
Table 3.7	1985 Estimate of Person Trips and Travel Time for all Modes of Travel . . . . . 3-23
Table 3.8	1980 Oahu Resident Person Trips by Purpose for all Modes of Travel . . . . . 3-24
Table 3.9	1980 Downtown Parking Supply and Demand Comparison . . . . . 3-27
Table 3.10	Part 1 Summary of Population and Income Characteristics - 1980 . . . . . 3-29
Table 3.10	Part 2 Summary of Population and Income Characteristics - 1980 . . . . . 3-30
Table 3.11	Sensitive Visual Resources Along the Amended Locally Preferred Alternative . . . . . 3-31
Table 3.12	Summary of State of Hawaii and Federal Ambient Air Quality Standards . . . . . 3-32
Table 3.13	Estimated or Measured Noise Levels . . . . . 3-35
Table 3.14	General Categories of Communities . . . . . 3-36
Table 3.15	Criteria for Maximum Airborne Noise From Train Operations . . . . . 3-37
Table 3.16	Criteria for Maximum Groundborne Vibration From Train Operations . . . . . 3-37
Table 3.17	Navigable Waterways Within the Study Corridor . . . . . 3-49
Table 3.18	List of Historic Properties Along the Amended Locally Preferred Alternative . . . . . 3-54
Table 3.19	Parkland Resources Along the Amended Locally Preferred Alternative . . . . . 3-59

**CHAPTER 4.0**

Table 4.1	2005 Service Characteristics . . . . . 4-3
Table 4.2	Year 2005 — Peak Period Transit Travel Times . . . . . 4-4
Table 4.3	Year 2005 — Peak Period Transit Travel Times . . . . . 4-5
Table 4.4	Systemwide Travel Time Savings Amended LPA Alternative Over TSM . . . . . 4-6
Table 4.5	Transfers Per Transit Trip . . . . . 4-9
Table 4.6	Distribution of Daily Transit Trips to Selected Activity Centers/Districts (2005) . . . . . 4-11
Table 4.7	Transit Trips from Selected Low-Income Areas (2005 — All Trip Purposes) . . . . . 4-11
Table 4.8	Regional Impact on Travel (2005) . . . . . 4-12
Table 4.9	Daily Transit Trips by Purpose (2005) . . . . . 4-12
Table 4.10	Fixed Guideway Station Volumes by Mode of Access, Amended LPA (2005) . . . . . 4-14
Table 4.11	Estimated Annual Farebox Revenue - 2005 (1991 Dollars in Millions) . . . . . 4-16
Table 4.12	Daily Traffic Conditions at Key Screenlines . . . . . 4-17
Table 4.13	Peak Hour, Peak Direction Traffic Conditions at Key Screenlines . . . . . 4-18
Table 4.14	Change in Projected Annual Vehicle Miles Traveled (VMT) Compared to the No-Build Alternative . . . . . 4-19

**List of Tables (continued)**

	<u>Page</u>
Table 4.15 Summary of Significant Capacity Impacts (Year 2005 Intersection Levels of Service) .....	4-21

**CHAPTER 5.0**

Table 5.1 Amended Locally Preferred Alternative Station Area Land Use Impacts .....	5-6
Table 5.2 Construction Expenditures .....	5-17
Table 5.3 Relocation Impact Summary .....	5-18
Table 5.4 Comparison of Estimated Annual Mobile Source Emissions by Mode of Travel and Transportation Solution (1995, 2000, and 2005) .....	5-32
Table 5.5 Estimates of Maximum 1-Hour Carbon Monoxide Concentrations (2005) .....	5-33
Table 5.6 Estimated Maximum Passby Noise Levels - (dBA) .....	5-35
Table 5.7 Estimated Required Distance (Feet) .....	5-36
Table 5.8 Evaluation of the Amended Locally Preferred Alternative Effect on Historic Resources .....	5-55

**CHAPTER 6.0**

Table 6.1 Amended Locally Preferred Alternative Fixed Guideway Capital Costs .....	6-5
Table 6.2 Capital Cost Estimates .....	6-6
Table 6.3 Year 2005 Annual Operating and Maintenance Costs .....	6-6
Table 6.4 City and County of Honolulu Rapid Transit Capital Financial Plan .....	6-7
Table 6.5 City and County of Honolulu Bus Capital Financial Plan for Buses and Facilities to be in Place by 2005 .....	6-10
Table 6.6 City and County of Honolulu Operations and Maintenance Financial Plan .....	6-11
Table 6.7 Transportation Effectiveness (Year 2005) .....	6-14
Table 6.8 Year 2005 Transit Travel Times -- Peak Period .....	6-15
Table 6.9 Systemwide Travel Time Savings, Amended LPA Alternative Over TSM .....	6-15
Table 6.10 Transfers Per Transit Trip .....	6-15
Table 6.11 FTA Cost-Effectiveness Index .....	6-18
Table 6.12 Summary of Key Evaluation Measures .....	6-20

## PREFACE

This *Final* Environmental Impact Statement (*FEIS*) is prepared in compliance with the National Environmental Policy Act and Chapter 343, Hawaii Revised Statutes. The Federal Transit Administration (FTA), formerly the Urban Mass Transportation Administration, is the lead federal agency for this project, and the City and County of Honolulu's Department of Transportation Services, Office of Rapid Transit, is the local lead agency. The U.S. Department of the Navy is a cooperating agency. This *FEIS* has been prepared in accordance with the FTA guidelines, Procedures and Technical Methods for Transit Project Planning; FTA/Federal Highway Administration (FHWA) regulations, Environmental Impact and Related Procedures (August 1987); Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (July 1986); and State of Hawaii Title 11, Chapter 200, Environmental Impact Statement Rules (December 1985).

*Italics are used throughout this document to indicate portions of the text where substantive changes have occurred from the text in the Supplemental Draft Environmental Impact Statement (SDEIS).*

*This FEIS and subsequent Record of Decision (ROD) will complete the federal environmental review requirements in anticipation of applying for a federal grant to implement the amended Locally Preferred Alternative (LPA). The FEIS builds on the analyses reported in the SDEIS by:*

- a) Responding to comments received on the Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) and the SDEIS during their formal review periods; and*
- b) Updating the analysis in the SDEIS and defining plans to mitigate the adverse impacts associated with the amended Locally Preferred Alternative.*

*In addition, this FEIS includes comments received on the EIS preparation notice and responses to those comments, and it has been submitted to the Governor for acceptance to complete the State EIS process.*

The SDEIS, issued March 20, 1992, supplemented the information in the March 19, 1990, AA/DEIS, which reported on the second stage of a five-stage project development process for major capital investment planning. Major capital investment planning is a process to consider, plan, and develop new or extended fixed guideway mass transportation systems. This process begins with the initial recognition that fixed guideway transit systems may be a part of a transportation solution to local travel problems. This local planning process in cooperation with the U.S. Department of Transportation (USDOT) began in the 1960s.

### P.1 PROJECT HISTORY

The 1967 Oahu Transportation Study defined a transit corridor based on travel demand. This transit corridor lies between Pearl City and Hawaii Kai, and its existence has been retained with slight modifications in all subsequent transit development reports. Subsequent studies in the 1972 Preliminary Engineering and Evaluation Program Phase I (PEEP I) and in the 1976 Preliminary Engineering and Evaluation Program Phase II (PEEP II) explored various transit technologies and alignments or routes, including fixed guideway alternatives. More recently, systems planning for fixed guideway and other transit alternatives in Honolulu has occurred under the auspices of the Oahu Metropolitan Planning Organization (OMPO), a joint City/State planning body with a policy board comprised of three members each from the State House of Representatives and State Senate, five Honolulu City Council members, an appointee of the Governor, and an appointee of the Mayor. The OMPO is responsible for developing and

updating the region's comprehensive transportation plan. The latest plan is The Oahu Regional Transportation Plan, adopted in June 1991, which includes a rapid transit line.

In the 1970s Honolulu proceeded into detailed planning, environmental, and engineering studies for the Honolulu Area Rail Rapid Transit (HART) project. The City and County of Honolulu (hereinafter referred to as City), which is authorized by State statute to plan and operate public mass transit on Oahu, served as the lead agency for these studies. These culminated in 1982 with the acceptance of the HART Final Environmental Impact Statement by the Secretary of the USDOT. However, at that time there was a change in the City Administration and the decision was made not to proceed with the HART project.

A re-examination of fixed guideway options began in 1985. The HART project had completed the preliminary engineering/final environmental impact statement (PE/FEIS) phase and was at the point of entering final design. However, in the re-examination, it was decided to explore new technologies, to examine alignment variations that would take advantage of the new technologies, and to evaluate alternative public-private financial/implementation options. The alternatives analysis, built on the previous planning and engineering studies, incorporated the key decisions that had already been made. These decisions, such as definition of the corridor, the need for full grade separation, and specification of fixed guideway technical requirements, were not re-examined in the revised alternatives analysis.

The AA/DEIS addressed the social, economic, and environmental issues and likely impacts associated with implementing the No-Build, Transportation System Management (TSM), and nine fixed guideway alternatives studied in the Honolulu Rapid Transit Development Project. The AA/DEIS was prepared to comply with federal and State EIS requirements and to comply with numerous other federal and state guidelines and regulations. It summarized the information presented in individual results reports prepared throughout the study's course, and covered such topics as the purpose and need for the proposed project, alternatives under consideration, affected environment, transportation impacts, financial analysis, capital costs, and operating and maintenance costs. The document also acted as a public disclosure document by presenting the anticipated environmental consequences of each alternative and mitigation measures that would be reasonable and feasible. The impacts that could not be mitigated were clearly stated, enabling decision makers to make an informed choice among alternatives. The AA/DEIS also addressed issues raised at the formal public meetings (called scoping meetings) held on March 2, 4, and 5, 1987, and comments received in response to formal public notifications on the preparation of the environmental document (published in the Federal Register on February 11, 1987, and the state's Office of Environmental Quality Control Bulletin on October 8, 1988).

The Federal Transit Administration (FTA) of the USDOT approved the AA/DEIS for circulation on March 19, 1990, and the document was distributed to the community and to local, state, and federal agencies for their review and comment. Formal public hearings were held to solicit additional comments on likely environmental impacts of the alternatives presented in the AA/DEIS. Those comments and the comments on the subsequent SDEIS have been responded to in *Chapter 7.0* of this *FEIS*. Unresolved issues are included in Section S.7.

During its 1990 Session, the State of Hawaii Legislature passed Acts 183 and 184 which provided a financing mechanism to assist with the capital costs involved in developing a fixed guideway system on Oahu and mass transportation projects in the other counties. Act 183 (1990) established the State Transit Capital Development Fund to be used to match private sector (or City) funds on a dollar-for-dollar basis. Based on the assumption of 30% federal funding, this fund would provide 35% of the capital costs for the total project with private sector participation (or City funds) providing the remaining 35%. In the event that the 35% private participation is not achieved, Act 184 (1990) authorized the City to impose a 0.5% general excise and use tax surcharge to fund the entire local share for a period up to ten years.



*After a review of the System Contractor's Best and Final Offer (BAFO), the City determined that sufficient private sector and/or City funding was not available to utilize Act 183. Therefore, the City is proceeding per Act 184, using the 0.5% increase in the general excise and use tax (GET). The development agreement that the City and the State have mutually entered into is based on the following funding plan:*

- *Thirty percent: FTA Section 3 New Starts funds, and*
- *Seventy percent: 0.5% local GET surcharge (in addition to the current 4.0% GET) would be assessed during the taxable years beginning on 1/1/93 and ending on 12/31/2002 (10 years). The financial plan is structured so as to allow borrowing against future tax revenues during the 5-year period of construction in those years in which construction costs, less FTA funds, exceed annual GET surcharge revenues.*

*Implementation of the financial plan depends on the City Council enactment of the 0.5% increase in the GET by October 1, 1992 and finalization of the Full Funding Grant Agreement with the FTA.*

The information received during the review and comment process for the AA/DEIS was considered when making the decision on a locally preferred alternative. The first part of the decision on a locally preferred alternative was between an all-bus solution and a fixed guideway solution. The fixed guideway solution was selected, then decisions were made on the alignment, the termini, and a financing plan.

On July 25, 1990, the City Council voted to select AA/DEIS Alternative 3 (Kamehameha/Hotel) as the Locally Preferred Alternative (LPA). The City Council in making its decision also directed the City Administration to study, during the PE/FEIS stage, the feasibility of relocating the University of Hawaii branch terminus to the Lower Campus (Quarry) area. This relocation involves moving the terminus from Metcalf Street to the Quarry area to allow for a future extension of the system to East Honolulu. The Locally Preferred Alternative Report (August 1990), which included an implementing financial plan, was prepared by the City Administration to document the results of the public review process and the City Council selection of the LPA from among those presented in the AA/DEIS.

On October 23, 1990, FTA authorized the City to proceed with preliminary engineering on the LPA. Work on refining the project began shortly after that date. The primary focus of the early work was to continue the "turnkey" procurement process to select a System Contractor. The System Contractor, under the direction of the City and its General Engineering Consultant (GEC), will be responsible for the design, construction, and operation of the rapid transit system for the initial five years.

Toward this end, the City prepared a Request for Proposals. Five proposals were received from potential System Contractors. The proposals were rigorously evaluated by a selection committee and a selection was made on October 2, 1991, of Oahu Transit Group (OTG) as the System Contractor. On November 14, 1991, the City Council authorized the Mayor to enter into a development agreement with the Governor of the State of Hawaii, as required by the legislation that created the financial plan for the construction of the system.

As a result of progress made in the turnkey selection process and the preliminary engineering efforts to date, the City amended the description of the LPA. For budgetary and environmental reasons, the project was shortened by eliminating the Waikiki segment of the rapid transit line, which would be replaced by shuttle bus service.

The original LPA included a subway section along Hotel Street in downtown Honolulu. Detailed soil boring information obtained during preliminary engineering and further engineering studies indicated that subway construction would not be cost-effective. Therefore, the adopted alignment was moved to Nimitz Highway.

As requested by the City Council, the University of Hawaii alignment was studied further. The Quarry terminus was found to be better than the University/Metcalf terminus because it allowed for a future extension to East Honolulu and reduces the impacts at the Isenberg Station because of the elimination of the branch.

*On November 14, 1991, the City Council adopted a resolution amending the LPA. The amended LPA is similar to the Kamehameha/Nimitz alternative (Alternative 8) in the AA/DEIS except the Waikiki segment is eliminated and the Metcalf terminus is changed to the Quarry area at the university.*

*In addition, the City also explored an alignment option in a section of the amended LPA. This option was analyzed as part of the SDEIS. This option involves shifting the guideway from Pohukaina Street one block mauka, to Halekauwila Street between Nimitz Highway and Ward Avenue. Subsequent to the SDEIS, the City Council voted on July 8, 1992 to include the Halekauwila Option as part of the amended LPA. The Halekauwila Option avoids impacts to the Prince Kuhio Federal Building and Ala Moana Mini-Park, located on the makai side of Nimitz Highway near the HECO power plant. From an engineering standpoint, this alignment eliminates the need for the short turning radii off Nimitz Highway.*

*Subsequent to adoption of the amended LPA by the City Council on November 14, 1991, the City Administration considered the addition of park-and-ride lots at Lagoon Station and in the University area. These park-and-ride lots were presented as part of the SDEIS. The park-and-ride lot (450 spaces) for the Lagoon Station would be located in a structure adjacent to the station. The following three alternative locations for the University area park-and-ride lot (100-200 spaces) are still under consideration: (1) Oasis Nightclub and Lounge, (2) Varsity Theater parking lot, and (3) a commercial complex at the University Avenue/King Street intersection. The LPA does not currently include a park-and-ride lot in the University area.*

## **P.2 ORGANIZATION OF THE FEIS**

This FEIS has an Executive Summary and seven chapters. The Executive Summary presents the major findings of the document in summary form. This summary is intended to provide the reader with a basic understanding of the transportation problems in Honolulu, the alternatives considered to solve the transportation problems, and the significant impacts associated with the No-Build and TSM alternatives in addition to that of the amended LPA. Information also is provided on costs, cost-effectiveness, and financing.

Chapter 1.0, Purpose and Need, describes the study area and existing transportation facilities. A discussion of regional and local transportation goals is presented. Specific transportation problems in the region are discussed. Finally, the planning context and the process and decisions leading up to the selection of the amended LPA are reviewed.

Chapter 2.0, Alternatives Considered, provides an overview of the screening and selection process, a definition and description of the amended LPA and options for the University area park-and-ride lot, and a summary of other alternatives considered in the AA/DEIS. This chapter also discusses the capital and operating and maintenance costs.

Chapter 3.0, Affected Environment, describes the existing social and natural environmental conditions in the study area. The discussion provides an understanding of the environment in which the project would take place and identifies the significant sensitive resources in the study area.

Chapter 4.0, Transportation Impacts, presents both transit and highway impacts as a result of the No-Build, TSM, and amended LPA Alternatives.

Chapter 5.0, Environmental Consequences, discusses potential impacts of the amended LPA on the built and natural environments. It identifies construction-related and long-term impacts. Mitigation measures to address impacts are defined where appropriate. Specific elements analyzed in this chapter include:

- Land Use and Economic Development,
- Displacements and Relocations,
- Neighborhoods,
- Visual and Aesthetic Resources,
- Air Quality,
- Noise,
- Ecosystems,
- Water, and
- Energy.

Chapter 5.0 also includes a summary of applicable federal laws governing historic, archaeological, and parkland resources known as Section 106 and Section 4(f). The process for determining impacts to these resources and appropriate mitigation is discussed. The historic, archaeological, and parkland resources in the study area are described and impacts and mitigation measures discussed.

Chapter 6.0, Financial Analysis and Evaluation of Alternatives, presents updated information on the costs, effectiveness, impacts, and financial feasibility of the amended LPA and the TSM and No-Build Alternatives.

*Chapter 7.0, Comments and Responses, presents, in summary form, the substantive comments received during the public review periods for both the AA/DEIS and the SDEIS. This includes both written comments and oral comments submitted during the public hearings. Responses to these comments are provided.*

*Copies of the actual written comments are contained in the Public and Agency Comments (July 1992). Copies of these documents are available at the Office of Rapid Transit, Office of Environmental Quality Control, Legislative Reference Bureau Library, Municipal Reference and Records Center, University of Hawaii Hamilton Library, State Main and Regional Libraries. The transcripts of the public hearings are available for review at the Office of Rapid Transit.*

*The following technical reports that support this FEIS are available at the Office of Rapid Transit and the above repositories:*

*Transportation Impacts Results Report (July 1992)  
1991 On-Board Bus Survey Final Report (March 1992)  
Final Service and Patronage Forecasting Methodology (March 1992)  
Oahu Visitor Travel Survey Final Report (January 1992)  
Report on the Findings of a White Tern (*Gygis alba*)  
Survey Along Portions of the Proposed Route for the  
Honolulu Rapid Transit (May 1992)  
Hazardous Waste -- Technical Memorandum (June 1992)  
Phase II Environmental Site Assessment, Ewa Junction Navy Drum Site,  
Areas 1, 2, and 4 (April 1992)  
Section 106 Documentation (July 1992)  
Section 4(f) Documentation (July 1992)  
Displacement and Relocation Technical Memorandum (July 1992)  
Economic and Financial Impacts of the Honolulu Rapid Transit Project (June 1992)*

### **P.3 COMPLETION OF THE EIS PROCESS**

*This FEIS is being distributed to all persons, organizations, and agencies noted on the distribution list, or who have requested a copy. A separate response to comments has been sent to all persons, organizations, and agencies that made substantive comments. The FEIS also will be made available to interested people and groups. No action can be taken on the project for 30 days following the announcement of the FEIS availability in the Federal Register, to allow federal agencies the opportunity to refer interagency disagreements to the Council on Environmental Quality. Federal funds for final design and construction cannot be committed to the project until the EIS process has been completed, and a Record of Decision issued. Pursuant to Chapter 343, HRS, the Governor of the State of Hawaii is the accepting authority for this FEIS. Therefore, this completed FEIS has been submitted as required for this acceptance.*



## **Executive Summary**

## EXECUTIVE SUMMARY

### INTRODUCTION

The Supplemental Draft Environmental Impact Statement (SDEIS) supplemented the information in the March 19, 1990, Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS). Alternatives considered in the AA/DEIS included the No-Build, a Transportation System Management (TSM) Alternative, six full-length (approximately 18 miles) fixed guideway alternatives, and three Minimum Operable Segment (MOS) fixed guideway alternatives. The SDEIS evaluated the social, environmental, and economic impacts of the amended Locally Preferred Alternative (LPA), which is similar to AA/DEIS Alternative 8 (Kamehameha/Nimitz) except that the Waikiki segment is eliminated and the University/Metcalf terminus is changed to the University/Quarry terminus. One alignment option, the Halekauwila Option, which moves the alignment one block mauka of Pohukaina Street, was also evaluated, as were three alternative locations for a University area park-and-ride lot. The impacts were evaluated based on revised patronage forecasts following the procedure found in the Service and Patronage Forecasting Methodology (March 1992).

*This Final Environmental Impact Statement (FEIS) completes the federal environmental review requirements in anticipation of applying for a federal grant to implement the amended LPA. The FEIS builds on the analyses reported in the SDEIS by:*

- a) *Responding to comments received on the AA/DEIS and the SDEIS during their formal review periods; and*
- b) *Updating the analysis in the SDEIS and defining plans to mitigate the adverse impacts associated with the amended LPA.*

*The FEIS is designed to address National Environmental Policy Act (NEPA) requirements, other federal regulations, and the guidelines of the Federal Transit Administration (FTA). It is also being used to comply with the requirements of Chapter 343, Hawaii Revised Statutes, Environmental Impact Statements.*

#### S.1 NEED FOR THE PROPOSED ACTION

The need for transportation improvements on Oahu has been evident for many years, as described in Chapter 1.0 of this *FEIS*. The study corridor, as shown on Figure S.1, has a long, narrow shape confined between the Koolau mountain range and the ocean. *This study corridor is the focus of most of the existing travel on Oahu. Table S.1 shows the number of person trips generated in each of eight areas of the island, displayed in Figure S.2. In 1980 nearly 58 percent of all trips were generated in the Honolulu area, with nearly 20 percent generated in the Pearl Harbor-Central Oahu area, the two areas that encompass the study corridor. The third leading generator of trips was Koolaupoko.*

The examination of transportation needs and possible solutions in this report focuses on a horizon year of 2005. By that year, the population on Oahu is expected to exceed 930,000 persons, an increase of 11% since 1990, and employment is expected to exceed 585,600 jobs, an increase of more than 16% from 505,400 jobs in 1990.

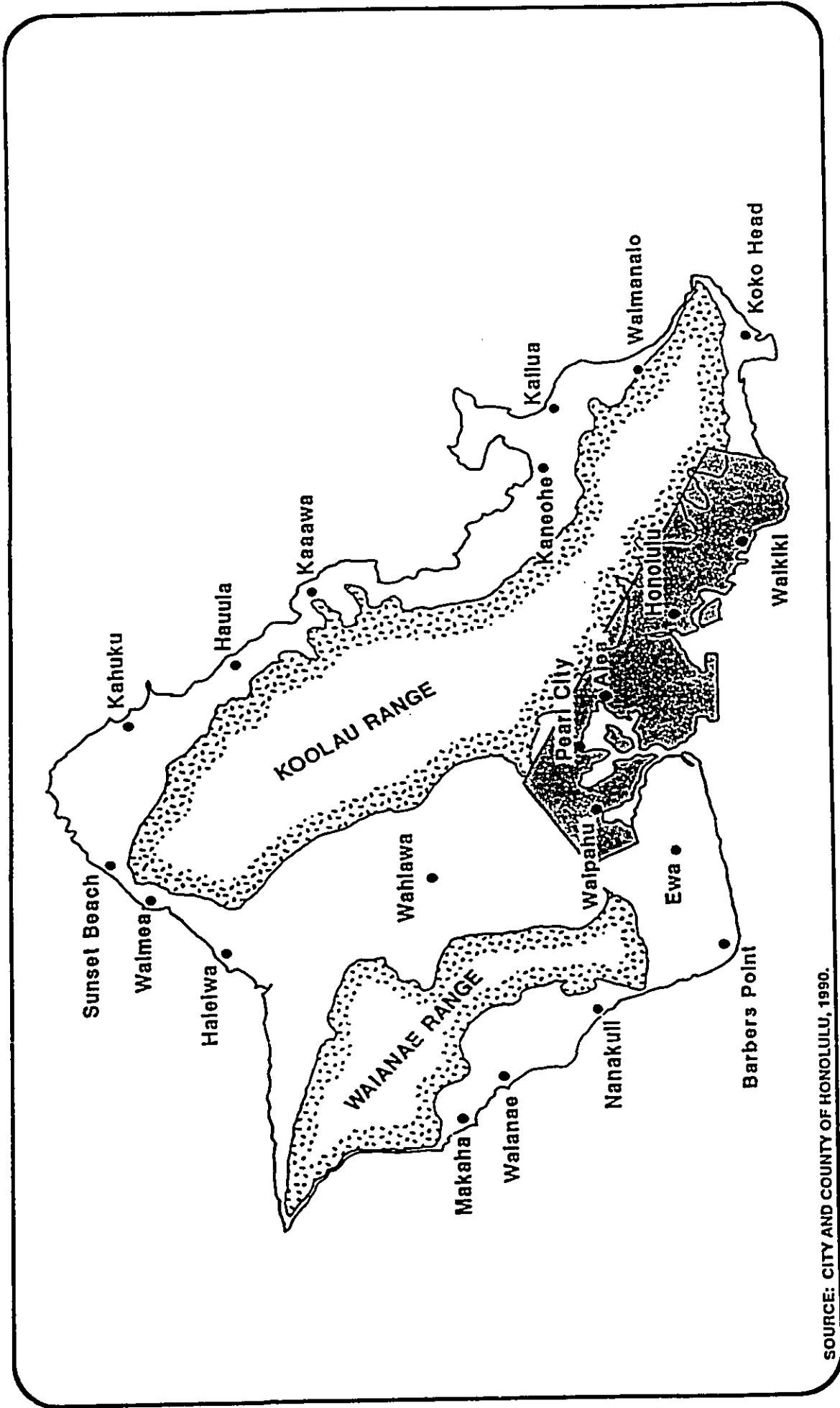
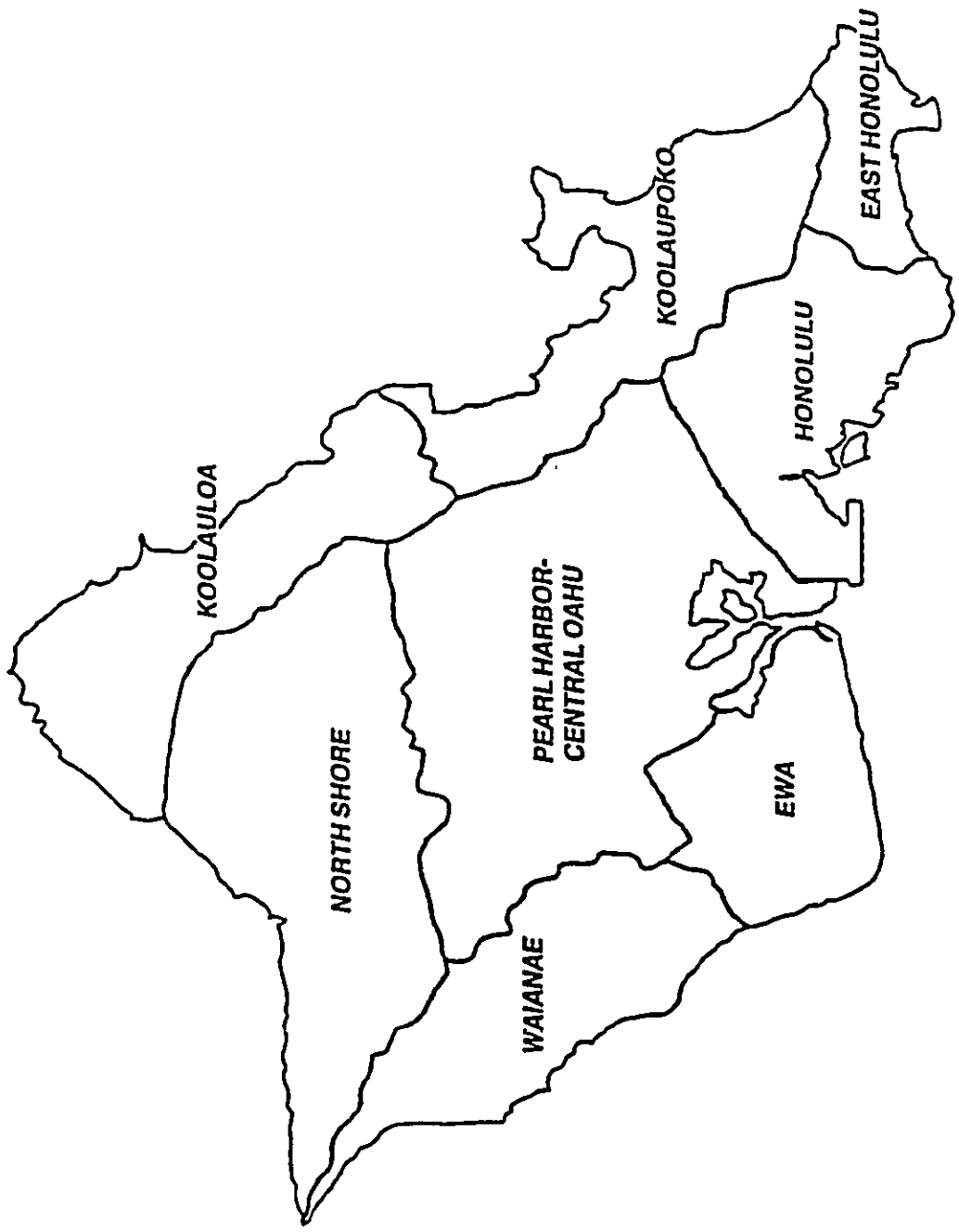


FIGURE S.1

STUDY CORRIDOR: REGIONAL CONTEXT

HONOLULU RAPID TRANSIT PROGRAM



SOURCE: CITY AND COUNTY OF HONOLULU, 1992.



**FIGURE S.2**

**ISLAND OF OAHU**

**HONOLULU RAPID TRANSIT PROGRAM**



Table S.1 PERSON TRIPS BY AREA <sup>1</sup>					
Area	Person Trip Origins and Destinations				Percent Increase
	1980		2005 <sup>2</sup>		
	Number	% of Total	Number	% of Total	
Honolulu	2,507,200	57.7	3,152,100	51.9	26
Pearl Harbor-Central Oahu	857,100	19.7	1,309,500	21.6	53
Ewa	124,400	2.9	372,300	6.1	199
East Honolulu	167,900	3.9	245,000	4.0	46
Koolaupoko	459,500	10.6	598,700	9.9	30
Koolauloa	58,700	1.3	119,600	2.0	104
North Shore	42,800	1.0	66,100	1.1	55
Waianae	127,700	2.9	208,700	3.4	63
Total	4,345,300	100.0	6,072,000	100.0	40

Source: Barton-Aschman Associates, 1992.

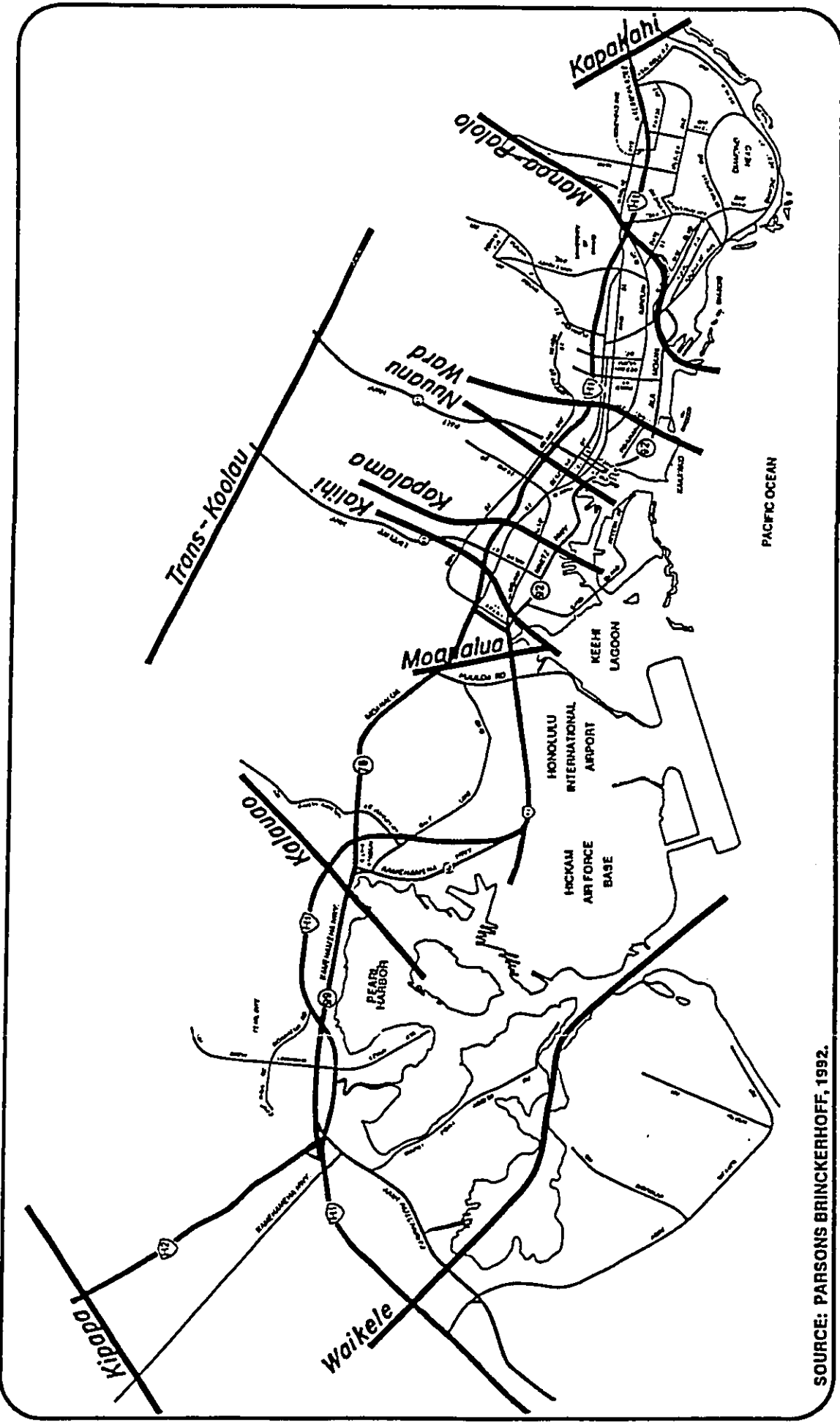
Notes: <sup>1</sup> Trips by Oahu residents only; excludes tourist trips.

<sup>2</sup> From the Hali 2005 Study, modified to reflect latest household and employment forecasts.

If recent trends continue, travel demand can be expected to increase at an even greater rate than population and employment between now and 2005. Over the 15-year period from 1975 to 1990, the number of vehicles in Honolulu increased by more than 57% while population grew by less than 17%. During the same period, annual vehicle miles of travel increased by almost 73% while the number of licensed drivers increased by less than 14%. Thus, over the 15 years, the average annual miles traveled per driver increased by more than 50%, from less than 7,300 miles per year to more than 11,000 miles per year. This likely reflects both an increased average trip distance, as the urban area has expanded geographically, and an increased number of trips made, particularly an increase in work trips by women whose labor-force participation rate has grown by nearly 40% nationwide.

As travel demand increases between now and 2005, the geographic pattern of travel will change. From Table S.1 it can be seen that in 2005 the Honolulu area will continue to generate most of the trips on the island, followed by Pearl Harbor-Central Oahu and Koolaupoko. By 2005, Ewa will also become a significant generator of trips.

Another view of the change in travel patterns can be seen by examining travel volumes across imaginary lines called screenlines. Figure S.3 shows the location of several screenlines in and around the study corridor. Table S.2 shows forecast changes in daily travel volumes across some of the screenlines. As can be seen, the largest percentage increases in travel from 1980 to 2005 are expected at peripheral screenlines such as Waialeale, Kipapa, Kalauao, and Kapakahi. Nevertheless, the largest volumes in 2005 will continue to be those across central screenlines from Kapalama to Manoa-Palolo. These screenlines in the heart of the study corridor will also experience the largest absolute increase in travel volumes over the 25-year period.



**FIGURE S.3**  
**TRANSPORTATION SCREENLINES**  
**HONOLULU RAPID TRANSIT PROGRAM**

<i>Table S.2</i> <b>CHANGE IN DAILY TRAVEL VOLUMES ACROSS KEY SCREENLINES</b>					
<i>Screenline</i>	<i>Person Trips</i>				
	<i>1980</i>	<i>2005<sup>1</sup></i>	<i>Increase</i>	<i>Total Percentage Increase</i>	<i>Average Annual Increase</i>
<i>Waikale</i>	<i>145,000</i>	<i>242,100</i>	<i>97,100</i>	<i>67%</i>	<i>2.1%</i>
<i>Kipapa</i>	<i>144,000</i>	<i>188,700</i>	<i>44,700</i>	<i>31%</i>	<i>1.1%</i>
<i>Kalauao</i>	<i>330,000</i>	<i>437,000</i>	<i>107,000</i>	<i>32%</i>	<i>1.1%</i>
<i>Moanalua</i>	<i>365,000</i>	<i>458,100</i>	<i>93,100</i>	<i>26%</i>	<i>0.9%</i>
<i>Kapalama</i>	<i>417,000</i>	<i>524,100</i>	<i>107,100</i>	<i>26%</i>	<i>0.9%</i>
<i>Nuuanu</i>	<i>497,000</i>	<i>607,100</i>	<i>110,100</i>	<i>22%</i>	<i>0.8%</i>
<i>Ward</i>	<i>520,000</i>	<i>628,100</i>	<i>108,100</i>	<i>21%</i>	<i>0.8%</i>
<i>Manoa-Palolo</i>	<i>496,000</i>	<i>625,600</i>	<i>129,600</i>	<i>26%</i>	<i>0.9%</i>
<i>Kapakahi</i>	<i>100,000</i>	<i>150,700</i>	<i>50,700</i>	<i>51%</i>	<i>1.7%</i>
<i>Trans-Koolau</i>	<i>178,000</i>	<i>198,300</i>	<i>20,300</i>	<i>11%</i>	<i>0.4%</i>

Source: Barton-Aschman Associates, 1992.

Note: <sup>1</sup> From the Hali 2005 Study, adjusted to reflect latest household and employment forecasts.

With increasing traffic congestion, a mobility option other than the highway system becomes even more necessary. However, the increasing congestion on the highway and street system frustrates the ability of the bus system to provide this mobility option. As shown in Table S.3, a downward trend in bus operating speed has occurred, which has resulted in a continuing decline in productivity, measured in passengers per vehicle hour. An increase in operating expense per passenger has occurred over the same period. If this trend in speeds continues to 2005, average systemwide bus speeds would decline to 12.4 mph and speeds for local buses would decline to 11.5 mph.

Service Type	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92
Urban	11.30	11.03	10.76	10.65	10.50	10.30	10.11	10.03	9.95	9.87
Suburban	19.41	19.32	19.23	19.10	18.76	18.71	18.66	18.68	18.71	18.69
Feeder	18.24	16.81	15.50	15.97	15.29	15.03	14.77	14.91	15.03	15.06
Local Total	14.42	14.18	13.95	13.85	13.61	13.49	13.32	13.27	13.22	13.16
Express	22.23	22.31	22.39	21.85	22.35	22.29	22.25	22.25	22.25	22.06
System Total	14.61	14.40	14.19	14.11	14.00	13.86	13.72	13.71	13.70	13.64

Source: City and County of Honolulu, Department of Transportation Services, Short-Range Transit Plan and Updates, Fiscal Years 1985 to 1993.

Notes: Speeds are in miles per hour, calculated by dividing average weekday revenue vehicle miles by average weekday revenue vehicle hours. FY 1984, FY 1988, and FY 1990 speeds are calculated by interpolation.

These reduced speeds diminish the attractiveness of the bus as an alternative to the private automobile, and the resulting congestion reduces bus schedule reliability. As the number of bus passengers increases and the total volumes of traffic approach the capacity of the streets, the benefits of the bus will be further diminished.

Without the development of facilities and operational strategies to maintain and improve bus operating speeds and conditions, further declines in bus productivity can be expected by 2005. Declines in bus speeds will also produce a decline in transit's share of the travel market in 13 years. Thus, the No-Build Alternative for transit results in a future with no greater percentage of trips on transit than today, an increased cost to the community, and a continuing poorer level of service. The TSM Alternative provides for an increase in bus service; however, as with the No-Build Alternative, it offers fewer mobility options for all persons, especially the mobility-impaired, in direct conflict with the City and State of Hawaii objectives to offer attractive and convenient, multi-modal transportation options.

## S.2 ALTERNATIVES CONSIDERED

Building on previous studies and public input, the City and County of Honolulu (hereafter referred to as the "City") conducted a series of three public scoping meetings during 1987. A number of community workshops were also held during 1987 and 1988 in six neighborhoods that would potentially be affected by a fixed guideway system. The input from these meetings and subsequent discussions with specific interest groups and agencies helped to identify and better define potential alternatives. For a discussion of the modifications to the set of alternatives in the scoping process, refer to the AA/DEIS (March 1990) (page 2-2).

Based on the screening presented in the AA/DEIS, eleven alternatives, of which three were Minimum Operable Segments (MOS), were developed for consideration in the AA/DEIS. The AA/DEIS, approved for circulation by the Federal Transit Administration (FTA) on March 19, 1990, provided a comparative analysis of the alternatives.

Subsequent to the public review process on July 25, 1990, the City Council selected a Locally Preferred Alternative (LPA) from those presented in the AA/DEIS (Resolution No. 90-284, CD-1). The fixed guideway alignment adopted by the City Council was Alternative 3 (Kamehameha/Hotel) as defined in the AA/DEIS.

The City Council, in making its decision, also directed the City Administration to study, during the PE/FEIS phase, the feasibility of relocating the University of Hawaii terminus from Metcalf Street to the Quarry area of the Lower Campus. This examination found that moving the University/Metcalf terminus will allow for future extension of the system to East Honolulu, eliminating the need for branching the guideway at the Isenberg Station, responding to the concerns of area residents. Therefore, the University segment was amended to terminate in the Quarry. The Council resolution also directed the City Administration to commence with the PE/FEIS phase, including further detailed and comprehensive hydrological and geotechnical studies. These studies indicated that the Hotel Street subway segment in Alternative 3 was financially infeasible; therefore, the adopted alignment was moved to Nimitz Highway. Also, for budgetary and environmental reasons, the project was shortened by eliminating the Waikiki segment of the rapid transit line and replacing it with shuttle bus service.

On November 14, 1991, the City Council adopted a resolution amending the LPA. The amended LPA is similar to AA/DEIS Alternative 8 (Kamehameha/Nimitz) with elimination of the Waikiki segment and change to the Quarry alignment at the University. The impacts of eliminating the Waikiki segment and changing the Quarry alignment were addressed in the SDEIS.

*The SDEIS also addressed the possibility of shifting the fixed guideway alignment one block mauka from Pohukaina Street to Halekauwila Street. In subsequent action by the City Council on July 8, 1992, the Halekauwila Option replaced the guideway alignment on Pohukaina Street and is now part of the amended LPA.*

Even though the City Council adopted the amended LPA with an aerial guideway along Nimitz Highway, they were concerned about the elimination of direct rapid transit service to the heart of the downtown area. As a result of that concern, the City Council directed the Administration to re-evaluate the feasibility of a downtown subway along a King Street alignment. The study had two primary objectives. The first objective was to determine if a King Street subway alignment would cost significantly less to build than the previously studied Hotel Street alignment, primarily due to better geologic conditions. The second objective was to determine whether additional local financial resources could be found to pay for any increase in cost over and above the cost of the adopted amended LPA. *The King Street subway alignment was found to be similar in cost to build as compared to the Hotel Street subway and it was further determined that local financial resources could not pay for the increase in cost over the amended LPA. Therefore, the King Street subway was dropped from further consideration.*

*The City Administration has also pursued the possibility of adding park-and-ride lots at the Lagoon Station and in the University area. The park-and-ride lot (450 spaces) for the Lagoon Station will be located in a structure adjacent to the station. The following three alternative locations for the University area park-and-ride lot also remain under consideration: (1) Oasis Nightclub and Lounge, (2) Varsity Theater parking lot, and (3) commercial property at the University/King intersection. It should be noted, however, that the University area park-and-ride lots are not part of the amended LPA.*

The alternatives are briefly described in the following paragraphs and in greater detail in Chapter 2.0 of the AA/DEIS, the SDEIS, and this FEIS.

### **S.2.1 Alternative 1: No-Build**

The No-Build Alternative provides a baseline for establishing the transportation and environmental impacts of the other alternatives being considered. Table S.4 provides a summary description of the No-Build Alternative. This alternative is physically and fiscally constrained to the existing bus fleet but assumes

Table S.4  
SUMMARY DESCRIPTION OF AA/DEIS ALTERNATIVES

Alternatives	Alignment Description	System Description
1	No-Build	<ul style="list-style-type: none"> <li>• Current Bus Service (FY1992) constrained by existing bus fleet (495 buses)</li> <li>• Planned and Budgeted Highway Improvements and HOV/Bus Facilities</li> <li>• Total No. of Park &amp; Ride Lots: 4</li> <li>• Maintenance Facilities: 2</li> </ul>
2	Transportation System Management	<ul style="list-style-type: none"> <li>• Expanded Bus Service (997 buses)</li> <li>• No New Construction of Major Capital Transit Projects</li> <li>• Planned and Budgeted Highway Improvements and HOV/Bus Facilities</li> <li>• Total No. of Park &amp; Ride Lots: 8</li> <li>• Maintenance Facilities: 4-6</li> </ul>
3-11	Fixed Guideway Technology and Integrated Bus Service	<ul style="list-style-type: none"> <li>• Fixed Guideway</li> <li>• Expanded Bus &amp; Feeder Bus Service (519-667 buses)</li> <li>• Planned and Budgeted Highway Improvements and HOV/Bus Facilities</li> <li>• Total Number of Park &amp; Ride Lots (Bus): 7</li> <li>• Bus Maintenance Facilities: Full Corridor Alternatives 3 MOS Alternatives 4</li> </ul>

**Table S.4  
SUMMARY DESCRIPTION OF AA/DEIS ALTERNATIVES  
(Continued)**

Alternatives	Alignment Description	System Description
<b>3-8 Full Corridor Alternatives</b>		
<b>3</b>	<b>Kamehameha/Hotel</b>	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, past the Honolulu International Airport, and follow Dillingham Boulevard into the CBD. The CBD segment would be a subway under Hotel Street and Kapiolani Boulevard. The alignment resurfaces at Dreier Street and proceeds in the Koko Head direction following Waimanu and Kona Streets to Ala Moana Center. Shortly thereafter, the alignment divides into two single guideway branches, one serving Waikiki and the other serving the University of Hawaii.</p>
		<ul style="list-style-type: none"> <li>• Total Length: 17.3 miles</li> <li>• Total No. of Stations: 24</li> <li>• Park &amp; Ride Lots (Guideway): 2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
<b>4</b>	<b>Salt Lake/Hotel</b>	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, Salt Lake Boulevard, and Dillingham Boulevard. The CBD segment would be a subway section under Hotel Street and Kapiolani Boulevard. Resurfacing at Dreier Street, the alignment would proceed in the Koko Head direction and follow Waimanu and Kona Streets to Ala Moana Center on standard aerial structures. Shortly thereafter, the alignment would divide into two single guideway branch lines, one serving Waikiki and the other serving the University of Hawaii.</p>
		<ul style="list-style-type: none"> <li>• Total Length: 16.7 miles</li> <li>• Total No. of Stations: 23</li> <li>• Park &amp; Ride Lots (Guideway): 2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
<b>5</b>	<b>Salt Lake/Beretania</b>	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, Salt Lake Boulevard, and Dillingham Boulevard. The CBD segment would be a standard dual aerial structure along N. Beretania Street, stacked aerial structure along Alakea Street (meaning one set of tracks above the other instead of standard side-by-side); and transition back to a dual aerial structure along Nimitz Highway, Pohukaina Street, Ward Avenue, Waimanu Street, and Kona Street to Ala Moana Center. Shortly thereafter, the alignment would divide into two single guideway branch lines, one serving Waikiki and the other serving the University of Hawaii.</p>
		<ul style="list-style-type: none"> <li>• Total Length: 17.5 miles</li> <li>• Total No. of Stations: 27</li> <li>• Park &amp; Ride Lots (Guideway): 2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>

CBD = Central Business District

H:\T0502\0020.rpt

**Table S.4**  
**SUMMARY DESCRIPTION OF AA/DEIS ALTERNATIVES**  
**(Continued)**

Alternatives	Alignment Description	System Description
6	<b>Salt Lake/Nimitz</b>	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, Salt Lake Boulevard, and Dillingham Boulevard. The CBD segment would be a standard aerial structure along Nimitz Highway, then follow Pohukaina Street, Ward Avenue, Waimanu Street, and Kona Street to Ala Moana Center. Shortly thereafter, the alignment would divide into two single guideway branch lines, one serving Waikiki and the other serving the University of Hawaii.</p> <ul style="list-style-type: none"> <li>• Total Length: 17.0 miles</li> <li>• Total No. of Stations: 25</li> <li>• Park &amp; Ride Lots (Guideway): 2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
7	<b>Kamehameha/Beretania</b>	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, past the Honolulu International Airport and follow Dillingham Boulevard into the CBD. The CBD segment would be a standard aerial structure along N. Beretania Street, stacked aerial structure along Alakea Street, and transition back to a standard dual aerial structure along Nimitz Highway, Pohukaina Street, Ward Avenue, Waimanu Street, and Kona Street to Ala Moana Center. Shortly thereafter, the alignment would divide into two single guideway branch lines, one serving Waikiki and the other serving the University of Hawaii.</p> <ul style="list-style-type: none"> <li>• Total Length: 18.0 miles</li> <li>• Total No. of Stations: 29</li> <li>• Park &amp; Ride Lots (Guideway): 2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
8	<b>Kamehameha/Nimitz</b>	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, past the Honolulu International Airport and follow Dillingham Boulevard into the CBD. The CBD segment would be a standard aerial structure along Nimitz Highway, then follow Pohukaina Street, Ward Avenue, Waimanu Street, and Kona Street to Ala Moana Center. Shortly thereafter, the alignment would divide into two single guideway branch lines, one serving Waikiki and the other serving the University of Hawaii.</p> <ul style="list-style-type: none"> <li>• Total Length: 17.6 miles</li> <li>• Total No. of Stations: 26</li> <li>• Park &amp; Ride Lots (Guideway): 2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>

CBD = Central Business District



Table S.4  
SUMMARY DESCRIPTION OF AA/DEIS ALTERNATIVES  
(Continued)

Alternatives	Alignment Description	System Description
<b>9-11 "Minimum Operable Segment" (MOS) Alternatives</b>		
<b>9 Aloha Stadium/Hotel/Waikiki</b>	From Aloha Stadium, the alignment would follow Salt Lake Boulevard and Dillingham Boulevard to the CBD. The CBD segment would be a subway under Hotel Street and Kapiolani Boulevard. Resurfacing at Dreier Street, the alignment would proceed in the Koko Head direction and follow Waimanu and Kona Streets to Ala Moana Center. From this point it would proceed to Kapahulu Avenue along Atkinson Drive, Kapiolani Boulevard, Kalakaua Avenue, and Kuhio Avenue. The entire alignment would be dual tracks with operations in both directions.	<ul style="list-style-type: none"> <li>• Total Length: 10.9 miles</li> <li>• Total No. of Stations: 18</li> <li>• Park &amp; Ride Lots (Guideway): 1</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
<b>10 Middle Street/Hotel/Waikiki</b>	The alignment would follow Dillingham Boulevard from Middle Street to Iwilei Road, include a subway segment under Hotel Street and Kapiolani Boulevard, then resurface at Dreier Street and proceed in the Koko Head direction, following Waimanu and Kona Streets to Ala Moana Center. From this point it would proceed to Kapahulu Avenue along Atkinson Drive, Kapiolani Boulevard, Kalakaua Avenue, and Kuhio Avenue. The entire alignment would consist of a dual track system with operations in both directions.	<ul style="list-style-type: none"> <li>• Total Length: 6.3 miles</li> <li>• Total No. of Stations: 14</li> <li>• Park &amp; Ride Lots (Guideway): 0</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
<b>11 Middle Street/Nimitz/Waikiki</b>	The alignment would follow Dillingham Boulevard from Middle Street into the CBD. The CBD segment would be a standard, aerial structure along Nimitz Highway then would proceed in the Koko Head direction following Pohukaina Street, Ward Avenue, Waimanu Street, and Kona Street to Ala Moana Center. From this point it would proceed to Kapahulu Avenue along Atkinson Drive, Kapiolani Boulevard, Kalakaua Avenue, and Kuhio Avenue. The entire alignment would consist of dual tracks with operations in both directions.	<ul style="list-style-type: none"> <li>• Total Length: 6.7 miles</li> <li>• Total No. of Stations: 16</li> <li>• Park &amp; Ride Lots (Guideway): 0</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>

CBD = Central Business District

Source: Parsons Brinckerhoff Quade & Douglas, Inc., November 1989 and February 1992.

construction of the adopted long-range highway plan, including incorporation of existing and planned high-occupancy-vehicle lanes (HOV/bus lanes) (see Figure S.4). The No-Build Alternative represents the best utilization of the bus fleet purchased through FY 1992, with a total fleet of 495 vehicles and a peak pull-out of 412 buses, to meet the year 2005 demands.

*Given the restricted fleet size, the number of passengers per vehicle would grow beyond the design standards on the majority of peak period bus routes. For purposes of this analysis, bus loads are allowed to reach an average of 97 passengers per vehicle, a level that has been observed during the 1991 On-Board Bus Survey. Such crush loading allows standing passengers only 1.2 square feet of standing room compared to the design standard of 2.7 square feet per standing passenger. If the No-Build Alternative were designed to accommodate the peak load-point demand with the design standards used for the other alternatives, the vehicle requirements would be a total fleet of 694 buses and a peak pull-out of 578 buses.*

Existing and under-construction park-and-ride facilities at Hawaii Kai, Mililani Mauka, West Loch, and the Wahiawa Armory are assumed. Two existing maintenance facilities are assumed: Halawa and Kalihi/Palama.

### **S.2.2 Alternative 2: Transportation System Management (TSM)**

The TSM Alternative represents the best transit service that can be provided using buses without the construction of a fixed guideway transit system and assumes construction of the adopted long-range highway plan, including the incorporation of existing and planned HOV/bus lanes (see Figure S.4). This alternative calls for a bus fleet of 997 vehicles, with 831 vehicles operating during peak periods. New express service would be added from a series of park-and-ride lots to the activity centers of Downtown/Kakaako, University of Hawaii, Pearl Harbor, and Waikiki.

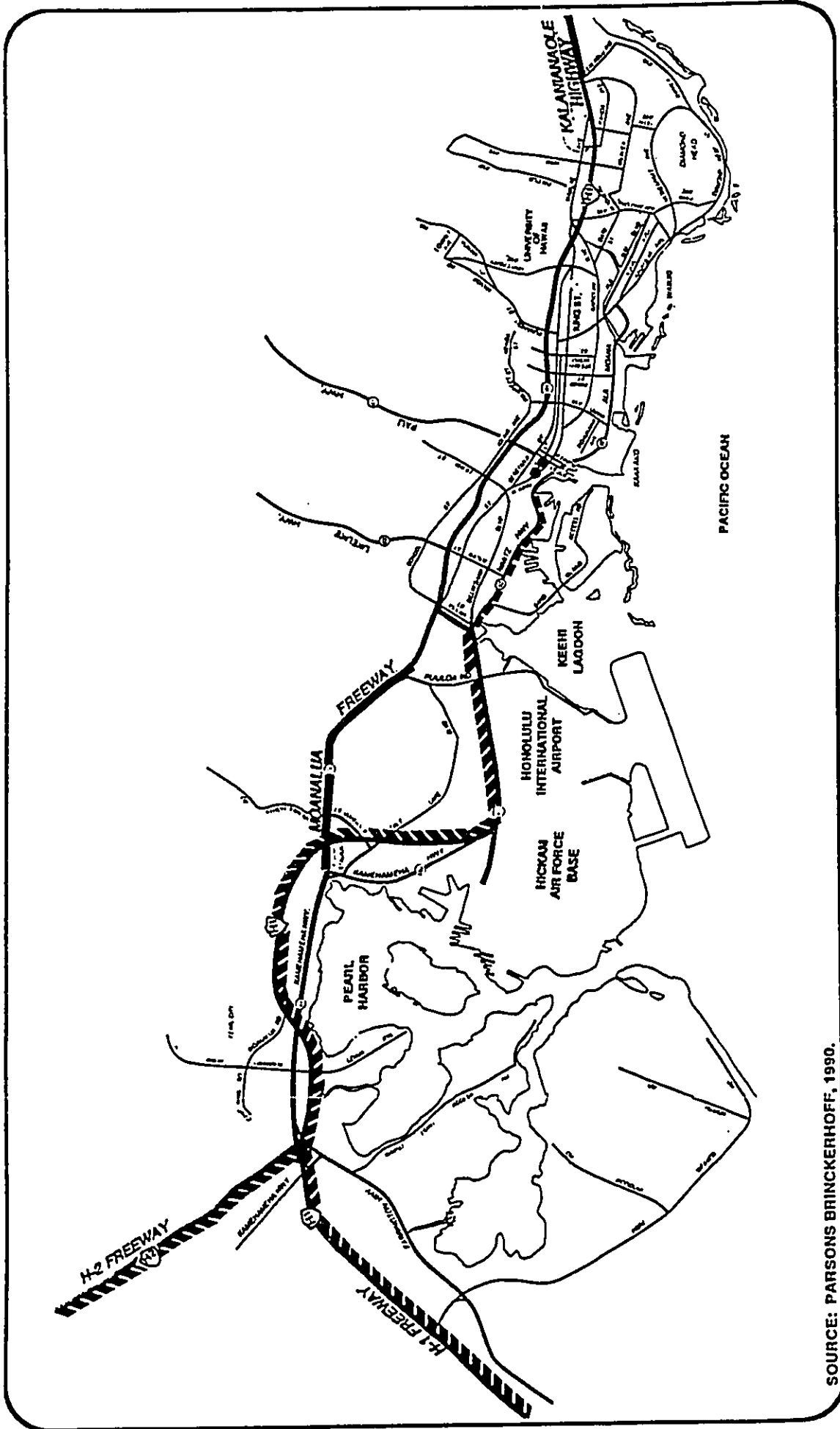
Eight park-and-ride lots (250 parking stalls each) are assumed to operate under this alternative; their locations are shown on Figure S.5. These include Hawaii Kai (expanded), Wahiawa Armory, Mililani Mauka, West Loch, Royal Kunia (previously referred to as Village Park), Kapolei, Navy Ewa Drum Storage Site, and a Windward site. A second Windward site, at Kawainui Marsh, was previously considered but has been dropped because of environmental concerns.

A total of four to six bus maintenance and/or storage facilities would be needed: the four included in the Short-Range Transit Plan (Halawa, Kalihi/Palama, Leeward/Campbell, and Windward) and two others at undetermined sites, or possibly at expanded sites incorporating the satellite service garages at Leeward/Campbell and Windward sites.

### **S.2.3 Alternatives 3 to 11: Fixed Guideway Alternatives**

The analysis in the AA/DEIS examined six full-corridor fixed guideway alternatives (Alternatives 3 to 8), each having a different physical alignment. Three MOS alternatives (Alternatives 9 to 11) also were included; these alternatives represent feasible shorter and lower-cost portions of the full-corridor alternatives. Table S.4 provides a summary description for each fixed guideway alternative considered.

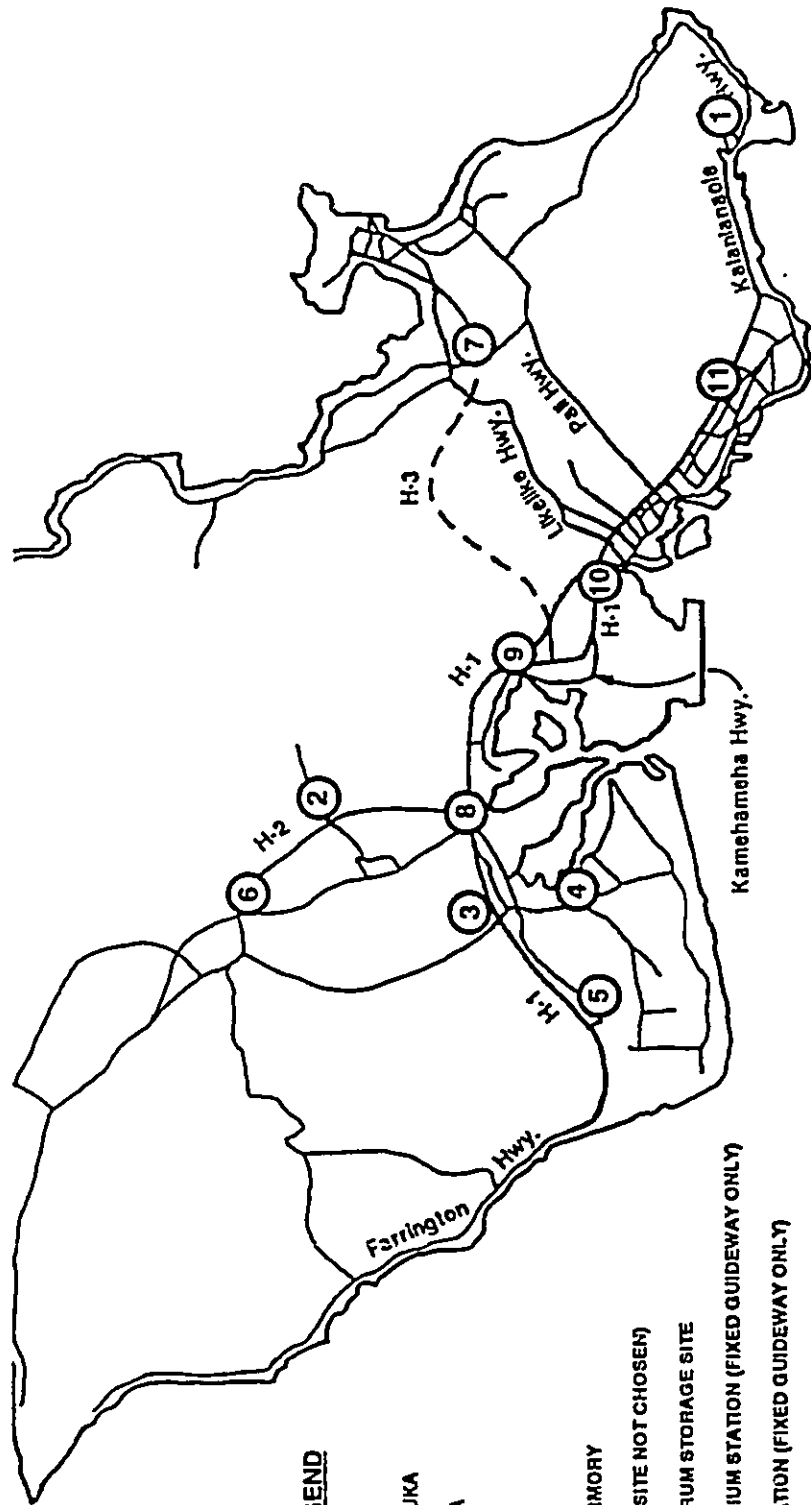
The full-corridor fixed guideway alternatives include the TSM Alternative's park-and-ride lots plus expansion of the Navy Ewa Drum Storage Site adjacent to the Waiawa Station facility and an additional park-and-ride lot at the Aloha Stadium. Each fixed guideway alternative would operate on its own right-of-way, separate from existing bus and automobile traffic. Each fixed guideway alternative consists primarily of elevated dual tracks providing service in both directions, complemented by an extensive, islandwide feeder bus network of local and express buses. Construction of the adopted long-range highway plan also is assumed.



SOURCE: PARSONS BRINCKERHOFF, 1990.

FIGURE S.4

REGIONAL TRANSPORTATION PLAN-  
HIGH OCCUPANCY VEHICLE NETWORK  
HONOLULU RAPID TRANSIT PROGRAM



**LEGEND**

- ① HAWAII KAI
- ② MILILANI MAUKA
- ③ ROYAL KUNIA
- ④ WEST LOCH
- ⑤ KAPOLEI
- ⑥ WAHIAWA ARMORY
- ⑦ WINDWARD (SITE NOT CHOSEN)
- ⑧ NAVY EWA DRUM STORAGE SITE
- ⑨ ALOHA STADIUM STATION (FIXED GUIDEWAY ONLY)
- ⑩ LAGOON STATION (FIXED GUIDEWAY ONLY)
- ⑪ UNIVERSITY AREA (FIXED GUIDEWAY ONLY)\*

--- UNDER CONSTRUCTION

\*NOT PART OF AMENDED LPA

SOURCE: PARSONS BRINCKERHOFF, 1992.



**FIGURE S.5**  
**LOCATION OF**  
**PARK-AND-RIDE LOTS**  
**HONOLULU RAPID TRANSIT PROGRAM**

#### **S.2.4 The Amended Locally Preferred Alternative**

The City's amended LPA for the Honolulu Rapid Transit Program, selected as a result of the AA/DEIS process and further engineering studies, is approximately AA/DEIS Alternative 8 (Kamehameha/Nimitz) without the Waikiki segment. *The Halekauwila Option, discussed in the SDEIS, was selected by the City to replace the Pohukaina portion of the alignment. The Halekauwila Option has less adverse environmental impacts and will provide a more efficient system at less cost.* The University Quarry option, requested for study by the City Council, has also been selected as the Koko Head terminus.

The technology that the City has selected for the system consists of a rubber dampened, steel-wheel articulated vehicle that will operate on continuously-welded steel rail. The vehicle would be 95 feet in length and propelled by AC-drive technology. Figure S.6 provides an example of how this system might look in Honolulu.

The alignment selected by the City will serve the Central Business District (CBD) from the Ewa direction via Kamehameha Highway, past the Honolulu International Airport along the makai side of the H-1 viaduct, and follow Dillingham Boulevard into the CBD. The CBD segment will be a standard aerial structure along Nimitz Highway, following *Halekauwila* Street, Ward Avenue, Waimanu Street, and Kona Street to the Ala Moana Center. The alignment will then continue Koko Head to the University of Hawaii along Kona Street and Atkinson Drive, Kapiolani Boulevard, and University Avenue. The entire alignment will consist of dual tracks operating in both directions. Table S.5 provides a summary description for the amended LPA. Figure S.7 shows the amended LPA.

*The City Administration has also pursued the possibility of adding park-and-ride lots at the Lagoon Station and in the University area (see Figure S.5). The park-and-ride lot (450 spaces) for the Lagoon Station will be located in a structure adjacent to the station. The following three alternative locations for the University area park-and-ride lot (100-200 spaces) are under consideration: (1) Oasis Nightclub and Lounge, (2) Varsity Theater parking lot, and (3) commercial property at the University/King intersection. However, the University area park-and-ride lot is not part of the amended LPA. In summary, the alignment will be 15.9 miles long and have 22 stations, three park-and-ride lots associated directly with the alignment, and one maintenance yard.*

#### **S.2.5 Capital Costs**

Capital cost estimates have been developed as described in Chapter 2.0 (see Table S.6). Differences among the cost estimates of the alternatives also reflect changes in the bus transit service designed for the alternatives. The bus-related capital costs for the amended LPA will be \$259 million compared to the TSM Alternative cost of \$406 million. The TSM Alternative would include new bus facilities beyond those required for the No-Build Alternative. This level of new bus facilities would not be required for the fixed guideway alternatives. The HOV/bus lane improvements proposed by the State of Hawaii are included in all alternatives. The cost of the HOV/bus lane improvements, funded by the State of Hawaii, is not included in the alternatives' capital costs.



SOURCE: OAHU TRANSIT GROUP, 1992

**FIGURE S.6**  
**EXAMPLE OF FIXED**  
**GUIDEWAY AERIAL STRUCTURE**  
**HONOLULU RAPID TRANSIT PROGRAM**

Table S.5  
**SUMMARY DESCRIPTION  
 OF THE AMENDED LOCALLY PREFERRED ALTERNATIVE**

Alternatives	Alignment Description	System Description
<b>Amended Locally Preferred Alternative</b>	<i>The Ewa (west) end of the project is in the vicinity of Waiawa, from which it will follow Kamehameha Highway, past the Honolulu International Airport along the makai side of the H-1 viaduct and follow Dillingham Boulevard into the CBD. The CBD segment will be a standard aerial structure along Nimitz Highway, then follow Halekauwila Street, Ward Avenue, Waimanu Street, and Kona Street to the Ala Moana Center. The alignment will continue on Kona Street, Atkinson Drive, and Kapiolani Boulevard to University Avenue, terminating at the University Quarry.</i>	<ul style="list-style-type: none"> <li>• Total Length: 15.9 miles</li> <li>• Total No. of Stations: 22</li> <li>• Park &amp; Ride Lots (Guideway): 3</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>

CBD = Central Business District

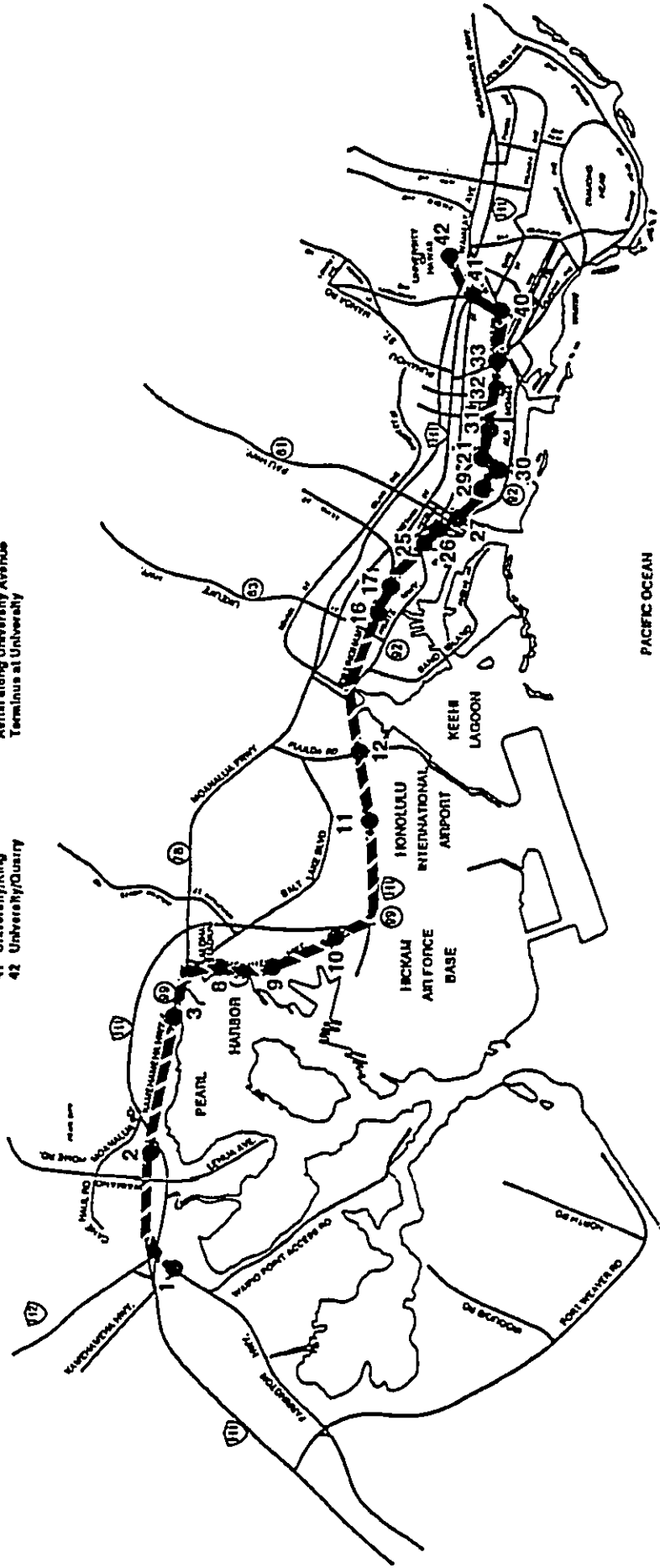
Source: Parsons Brinckerhoff Quade & Douglas, Inc., June 1992.

**STATION**  
 1 Waiawa  
 2 Pearl City  
 3 Peahi Ridge  
 8 Aloha Stadium/Kam Hwy  
 9 Arzcha Memorial  
 10 Makalapa Gate  
 11 Airport  
 12 Lagoon  
 16 Dillingham Plaza

**SEGMENT DESCRIPTION**  
 Aerial across H-1, along Farrington and Kamehameha Highway  
 Aerial along Kamehameha Highway  
 Aerial along Kamehameha Highway  
 Aerial along Kamehameha Highway  
 Aerial along Kamehameha Highway  
 Aerial along Kamehameha Highway  
 Aerial along Nimitz Highway  
 Aerial along Dillingham Boulevard  
 Aerial along Dillingham Boulevard

**STATION**  
 17 Honolulu Community College  
 25 Keanu  
 26 Nimitz/9th  
 27 Nimitz/Fort  
 29 Halekuanui/South  
 30 Halekuanui/Abad  
 31 Hea'i Blaisdell Center  
 32 Ala Moana Center  
 33 Keolu/Kapiolani  
 40 Iseberg  
 41 University/King  
 42 University/Quarry

**SEGMENT DESCRIPTION**  
 Aerial along Dillingham Boulevard  
 Aerial along Nimitz Highway  
 Aerial along Nimitz Highway  
 Aerial along Nimitz Highway  
 Aerial along Halekuanui  
 Aerial along Waimanua/Kona  
 Aerial along Kona Street  
 Aerial along Kona/Kapiolani  
 Aerial along Kapiolani Boulevard  
 Aerial along University Avenue  
 Aerial along University Avenue  
 Terminal at University



SOURCE: PARSONS BRINCKERHOFF, 1992.



0 3000 6000  
 SCALE FEET

**LEGEND**  
 ● STATIONS  
 — ALIGNMENT

**FIGURE S.7**  
**AMENDED LOCALLY PREFERRED ALTERNATIVE**  
**HONOLULU RAPID TRANSIT PROGRAM**



Table S.6 CAPITAL COST ESTIMATES AND ANNUAL OPERATING AND MAINTENANCE COSTS (1991 \$ millions)				
Alternative	Bus <sup>1</sup> Related Costs	Fixed Guideway Costs	Total Project <sup>1</sup> Capital Costs	2005 O & M Costs
No-Build	\$165.48	\$0	\$165.48 <sup>2</sup>	\$104.6 <sup>2</sup>
TSM	\$406.07	\$0	\$406.07	\$154.3
Amended LPA	\$258.82	\$1,763.70	\$2,022.52	\$149.2

Source: Parsons Brinckerhoff Quade & Douglas, Inc., April 1992.

Notes: <sup>1</sup> Additional HOV/bus facilities costs would be funded by the State of Hawaii and are not included in the capital costs.

<sup>2</sup> If the No-Build Alternative were designed to accommodate peak-load-point demand with the same vehicle load standards as the other alternatives, the total capital cost estimate would be \$256.73 million and O&M costs would be \$122.2 million.

### S.2.6 Operating and Maintenance (O&M) Costs

As described in the Operations and Maintenance Cost Results Report (December 1989), two formulae were used to calculate the O&M costs for the alternatives: one for bus transit and one for fixed guideway transit. The bus transit costs are based on a model of the current local system costs. The formula for bus operating costs has been updated to reflect 1991 dollars. The fixed guideway costs are based on the proposal by the System Contractor.

Table S.6 presents the annual O&M costs in 1991 dollars, assuming full development of the alternative by 2005.

As indicated in Table S.6, annual O&M costs for the No-Build Alternative in 2005 would be about \$105 million (in 1991 dollars). This compares to current operating costs for the existing bus system of about \$86 million annually. This increase is due to an increase in the constant dollar-per-unit cost of providing bus service, primarily due to increasing claims costs and an increase in off-peak service assumed for the No-Build Alternative. The No-Build Alternative, by definition for the study, is constrained to today's bus fleet size. By 2005, transit demand will have grown for both peak and off-peak periods. The No-Build Alternative service would not be expanded to accommodate 2005 peak-period demands because of the fleet size constraint. However, in the off-peak period, more service would be provided than today to satisfy the future demand.

Comparing the TSM Alternative with the No-Build Alternative shows that O&M costs would increase significantly, to about \$154 million, as would be expected for an increase in the bus fleet from 495 to 997. The O&M costs for the fixed guideway alternative include two components: the cost of bus service and the cost of the fixed guideway service. The total annual O&M cost for the amended LPA will be less than that for the TSM Alternative by about \$5 million in 2005.

### S.3 IMPACTS AND MITIGATION

This section presents a summary of the significant transportation and environmental impacts associated with each of the alternatives. The high points from the AA/DEIS, the SDEIS, and Chapter 4.0 (Transportation Impacts) and Chapter 5.0 (Environmental Consequences) of this FEIS are presented here.

#### S.3.1 Transportation Impacts

##### S.3.1.1 Transit

Travel forecasts or estimates of future transit service levels and ridership for the alternatives used techniques documented in the Service and Patronage Forecasting Methodology (March 1992). The travel forecasting methodology is generally compatible with that used in the AA/DEIS, *although it takes advantage of the on-board bus survey conducted in April 1991, which improves the ability to identify the trip purpose and mode of access for each transit trip. The model also has an updated approach to forecasting non-home-based trips and a revised approach to forecasting visitor trips.* However, the 2005 population and employment forecasts, both islandwide totals and the geographic distribution, have been substantially revised from those used in the AA/DEIS as a result of more current data available from the 1990 census.

*Also, the land use projections have been updated since publication of the SDEIS (March 1992). The most recent revision to the population and employment projections results from completion of the Waikiki Master Plan. As a result, the patronage forecasts for all the alternatives are different from those shown in both the AA/DEIS and the SDEIS. In the aggregate, these changes in population and employment forecasts result in 2005 patronage levels being approximately 13% higher than those in the AA/DEIS, independent of the effects of changes in transit service levels. Also, this chapter presents, as "existing" information, transit ridership and service data from 1991. This differs from the AA/DEIS, which presented ridership and service data from 1986 as "existing" conditions. Detailed discussion of transportation impacts and forecasting results is presented in the Transportation Impacts Results Report (July 1992).*

Table S.7 shows the differences in actual, unweighted transit travel times, by alternative, for the peak period for the 1991 existing bus system and forecasts for 2005 by alternative. *In comparing the amended LPA and TSM Alternatives, it can be seen for all trips displayed that the amended LPA travel times are shorter. The most pronounced decreases are for trips to destinations served by rapid transit other than in the Downtown area. For example, amended LPA travel times are more than 15 minutes shorter than TSM travel times for trips from West Loch to Waikiki, Waikiki to Kapolei, Waianae to Ala Moana Center, Palolo Valley to Downtown, and Hawaii Kai to Ala Moana Center. Amended LPA travel times are more than 30 minutes shorter for trips from Waipahu to University of Hawaii, Pearl City to Ala Moana Center, and Mililani to University of Hawaii.*

Transit ridership refers to the number of linked trips (i.e., number of trips not counting transfers) on the transit routes within the City. Because a major objective of improving the transit system is to increase the number of people using transit and thus decrease the number using individually driven automobiles, the number of transit riders is an important measure of each alternative's effectiveness. Increased transit ridership is also a good indicator of other potential benefits such as reduced energy consumption, enhanced air quality, increased mobility, higher level of transit service and convenience, and support for community development.

Table S.8 presents the forecast (2005) total daily transit trips for each alternative. With the TSM Alternative, daily 2005 transit ridership would increase by an estimated 23,200 trips over the No-Build Alternative. The amended LPA will increase daily transit trips by 72,100 compared to the No-Build Alternative.

<i>Table S.7</i>					
<i>YEAR 2005 — PEAK PERIOD TRANSIT TRAVEL TIMES</i>					
<i>(Minutes — Door to Door, Including Walk and Wait)</i>					
<i>Origin</i>	<i>Destination</i>	<i>Alternative</i>			
		<i>Existing</i>	<i>No-Build</i>	<i>TSM</i>	<i>Amended LPA</i>
<i>West Loch</i>	<i>Downtown (Fort &amp; Merchant)</i>	63	63	59	54
<i>West Loch</i>	<i>Civic Center</i>	68	69	67	62
<i>West Loch</i>	<i>Waikiki (Kuhio &amp; Olohana)</i>	86	91	89	68
<i>Waipahu</i>	<i>UH</i>	80	103	93	62
<i>Waikiki (Kuhio &amp; Olohana)</i>	<i>Downtown (Fort &amp; Merchant)</i>	27	31	32	20
<i>Waikiki (Kuhio &amp; Olohana)</i>	<i>Kapolei</i>	103	114	83	65
<i>Waianae</i>	<i>Ala Moana Center</i>	91	101	100	82
<i>Pearl City</i>	<i>Civic Center</i>	59	64	63	54
<i>Pearl City</i>	<i>Ala Moana Center</i>	72	86	83	52
<i>Palolo Valley</i>	<i>Downtown (Fort &amp; Merchant)</i>	58	71	66	50
<i>Mililani</i>	<i>Civic Center</i>	69	83	69	57
<i>Mililani</i>	<i>UH</i>	91	100	100	62
<i>Kaneohe</i>	<i>Downtown (Fort &amp; Merchant)</i>	47	58	57	53
<i>Hawaii Kai</i>	<i>Downtown (Fort &amp; Merchant)</i>	53	60	58	57
<i>Hawaii Kai</i>	<i>Ala Moana Center</i>	65	74	75	51

Source: Barton-Aschman Associates, 1992.

Table S.8 DAILY TRANSIT TRIPS AND TRAVEL TIME SAVED BY TSM RIDERS (2005)				
Alternative	Daily Transit Trips (Thousands)	Annual Dollars Saved	Daily Total Hours Saved	Annual Total Hours Saved
No-Build	249,200	N/A	N/A	N/A
TSM	272,400	N/A	N/A	N/A
Amended LPA	321,300	\$28,030,000	33,150	10,170,000

Source: Barton-Aschman Associates, May 1992.

Note: Dollar savings are calculated on the basis of \$4 per hour saved for work trips and \$2 per hour saved for non-work trips, as specified by FTA guidelines.

The build alternatives and the No-Build Alternative are significantly different in their capacity to handle the expected demand. The No-Build Alternative, constrained to today's bus fleet size, could provide seats for only about 52% of the peak-hour demand. The remaining 48% would be accommodated in "crush" load conditions on buses, with an average load of 97 passengers compared to the design standard of 69 passengers per bus. The best chance of getting a seat would be with the TSM Alternative, with about 75% of peak-hour passengers seated at peak-load points. With the amended LPA, this percentage will decline to about 61%, reflecting the proportionately larger standing area in fixed guideway vehicles compared with buses.

In addition to increases in transit ridership, transit patrons will enjoy the benefits of travel time savings. Table S.8 shows that those who would use transit in the TSM Alternative will save 33,150 hours of travel time each day if the amended LPA were implemented. These riders could save 10.2 million hours of travel time each year. Translating these hours of travel savings into dollars, it is estimated that \$28 million per year will be saved by implementation of the amended LPA.

### S.3.1.2 Highway and Parking

The existing highway network in the region and study corridor will change with the implementation of The Oahu Regional Transportation Plan (June 1991). The implementation of the transit improvements will have an additional influence on corridor vehicular travel by diverting some people out of their private automobiles onto transit. The TSM Alternative would reduce auto vehicle trips by 16,500 per day. The amended LPA will reduce vehicle trips by 38,600 per day, compared to the No-Build Alternative. Daily traffic volumes in the center to the corridor, from Kalauao Stream to Nuuanu Stream, will be reduced by more than 6%, up to 7.5%, compared to the No-Build Alternative. Peak hour reductions will be more than 14%.

Table S.9 shows the projected changes in annual vehicle miles traveled (VMT) on Oahu for 2005. Compared to the No-Build Alternative, the TSM Alternative would reduce annual auto VMT by 33 million miles but would increase annual bus VMT by 9 million miles, while the amended LPA will reduce annual auto VMT by 90 million miles and increase bus VMT by less than one million miles.

Table S.9 CHANGE IN PROJECTED ANNUAL VEHICLE MILES TRAVELED (VMT) COMPARED TO THE NO-BUILD ALTERNATIVE (2005)		
Alternative	Auto VMT	Bus VMT
TSM	- 33 million miles (- 0.4%)	+ 9.1 million miles (+ 43%)
Amended LPA	- 90 million miles (- 1.1%)	+ 0.2 million miles (+ 1%)

Source: Parsons Brinckerhoff Quade & Douglas, Inc. May 1992.

In some cases, the forecast reduction in auto traffic would be countered by an increase in bus traffic. This effect will be most pronounced with the TSM Alternative. At key locations, King and Beretania Streets Downtown and around Ala Moana Center, the increases in bus volumes would be of a sufficient magnitude to cause a reduction in speeds.

The fixed guideway structures will have some impacts on traffic flow within the corridor. The elevated profile of the guideway and its median location along existing busy roadways will not interfere with major traffic movements. Average span lengths of 180 feet will minimize impacts on intersections. Driveway access to properties along roadways with concentrations of businesses (i.e., Kamehameha Highway, Ward Avenue, Kapiolani Boulevard, Kona Street, Nimitz Highway, and Dillingham Boulevard) will be maintained. New medians will be installed along Dillingham Boulevard and University Avenue, and left-turn movements will be channelized. Direct access to some properties will be affected.

### S.3.2 Environmental Impacts

The following section highlights the significant benefits and likely adverse environmental impacts associated with each alternative, along with a discussion of mitigation commitments. Table S.10 summarizes this information.

#### S.3.2.1 No-Build Alternative

The No-Build Alternative would not require any business displacements or place extra demands on community facilities. However, this alternative neither supports the local and state goals and policies for increased travel options by non-highway modes nor provides additional mobility and does not support local or state goals regarding reducing air pollution, energy conservation, and other environmental concerns.

#### S.3.2.2 TSM Alternative

With an emphasis on bus service, the TSM Alternative would provide moderate support to local and state goals and policies to increase travel mode options but is less consistent with planning and land use goals than the fixed guideway alternative. The increase in bus service and decreased auto use would reduce most air pollutants (up to 1.3%) compared to the No-Build Alternative. However, the TSM Alternative would increase sulfur dioxide by about 2.5% and particulates by 0.7%.

Table S.10 SUMMARY OF KEY EVALUATION MEASURES			
	No-Build	TSM	Amended LPA
<b>I. COSTS</b>			
Capital Cost (Millions of 1991 \$)	165.48	406.07	2,022.52
Operating and Maintenance Cost at Full System Operation (Millions of 1991 \$)	104.6	154.3	149.2
<b>II. TRANSPORTATION</b>			
Daily Transit Trips (2005)	249,200	272,400	321,300
Daily Transit Mode Share (2005)	8.0%	8.7%	10.3%
Daily Transit Trips to Downtown (2005)	62,500	65,000	75,800
Average Minutes Saved Per Transit Trip for TSM Transit Riders (2005)	--	--	7.3
Change in Projected Annual Auto VMT (compared to the No-Build Alternative)	--	-33 million miles (- 0.4%)	-90 million miles (- 1.1%)
<b>III. ENVIRONMENTAL</b>			
Number of Buildings Requiring Noise Mitigation	0	0	0 <sup>3</sup>
Number of Businesses Displaced	0	0	55 <sup>1</sup>
Historic, Archaeological, and Cultural Sites Adversely Affected	0	0	4
Section 4(f) Sites	0	0	4
<b>IV. COST-EFFECTIVENESS</b>			
Cost Per New Rider (compared to TSM Alternative)	N/A	N/A	\$7.45 <sup>2</sup>
<b>V. EQUITY</b>			
Service to Low Income Areas (% improvement compared to No-Build)	--	2.9% - 21.7%	7.9% - 43.3%

Source: ICF Kaiser Engineers, Inc./Parsons Brinckerhoff Quade & Douglas, Inc., May 1992.

- Notes:
- <sup>1</sup> The alternatives for the University area park-and-ride lot would result in from 1 to 22 additional business displacements. It should be noted that the University area park-and-ride lot is not part of the amended LPA.
  - <sup>2</sup> Costs expressed in 1988 dollars (\$8.94 with costs expressed in 1991 dollars).
  - <sup>3</sup> Crossovers and turnouts would be located in three noise-sensitive areas. The special trackwork will be relocated to less noise-sensitive areas, if technically possible. If this is not possible, then mitigation will be provided in these areas so that the noise criteria are not exceeded.

### S.3.2.3 Amended Locally Preferred Alternative

Land Use and Economic Development. As an already highly urbanized area, the region in which the study corridor falls has market and established development characteristics that indicate land use impacts from either the TSM or the amended LPA will be unlikely to result in changes in the amount or overall trend of existing or planned development at the regional level.

The amended LPA is generally compatible with land use plans and policies. *It is consistent with the Hawaii State Plan, the Development Plans for the Primary Urban Center, Ewa, and Central Oahu, and the General Plan of the City and County of Honolulu.* Land use and development will be enhanced at Kalihi-Palama, Kakaako, Iwilei, Chinatown, and Ala Moana/Kapiolani. The fixed guideway alternative is expected to encourage development at five station sites (Waiawa, Lagoon, Piikoi/Kona, Isenberg, and University/King). At other station sites, the fixed guideway alternatives will reinforce existing development trends but are not to be expected to induce new development.

Additional construction jobs will be created by the amended LPA.

There are presently no joint development commitments within the study area. Potential new policies for joint development and value capture options and their implications for future revenues of the project are being examined by the City.

Relocations. An estimated 55 businesses will be displaced by the amended LPA. In addition, three alternative locations are being considered for the University area park-and-ride. *These lots are not part of the amended LPA.* Two of the alternatives would displace a single business. The third location would displace 20 businesses. No residential displacement will be required for the amended LPA.

Community Cohesion. The fixed guideway alternative will not present new barriers to social interaction within neighborhoods. The alternative may be perceived as a visual intrusion in the neighborhoods of Kalihi-Palama and McCully/Moiliili.

Pedestrian and Bicycle Travel. Because the fixed guideway alternative will be fully grade-separated, pedestrian movement within or between area neighborhoods and business communities will not be deterred. Where the stations are proposed to be located along highways, new pedestrian grade-separated crossings will be provided. *Existing bicycle routes will be maintained.*

Community Facilities and Services. Access will be enhanced to Leeward Community College, Honolulu Community College, University of Hawaii, government buildings, Aloha Stadium, Neal Blaisdell Center, Honolulu International Airport, Pearl Harbor, Arizona Memorial, and major shopping centers.

Visual. The fixed guideway alternative will have adverse visual impacts *in some designated view corridors in the Chinatown and Hawaii Capital Special Districts* due to the presence of the aerial structures. Construction of these aerial structures will also require removal or trimming of trees on Dillingham Boulevard, Kona Street, and Kapiolani Boulevard. Some removal or trimming is also likely along Halekauwila Street.

*The amended LPA will have an adverse effect on the following historic resources due to changes in their visual setting: Chinatown Historic District, Aloha Tower, Dillingham Transportation Building, and Mother Waldron Park.*

Air Quality. The National Ambient Air Quality Standards for carbon monoxide will not be exceeded at any of the locations with the amended LPA. The state ambient air quality standards for carbon monoxide (one-hour) will be exceeded within 5 to 10 meters of the intersections at 9 of the 11 intersections modeled, assuming worst-case conditions. The state's eight-hour standard for carbon monoxide will be exceeded

at five intersections. Overall the amended LPA will result in a slight (1% to 3%) reduction of air pollutants compared with the No-Build and TSM Alternatives.

Noise. Given the selected technology and its guideway structure, *no adverse vibration impacts are anticipated. The guideway columns will be isolated from buildings in close proximity to mitigate potential impacts. Exceedances of the airborne noise criteria are possible at three locations due to the installation of crossovers and turnouts. The three areas include Kamehameha Highway near Kaahumanu Street, Kona Street near the Ala Moana Hotel, and an area just Koko Head of Aloha Stadium. The special trackwork will be rerouted to less noise-sensitive areas, if technically possible. If this is not possible, then the necessary mitigation will be provided so that the noise criteria are not exceeded.*

No significant impact is expected from the fixed guideway maintenance facility or traction power substations (TPSS). The analysis of potential vehicular traffic noise indicates no significant difference in roadway-generated noise levels among the No-Build, TSM, or fixed guideway alternatives. No significant adverse noise impacts will occur at the park-and-ride lots.

Ecosystems. The maintenance facility at the Navy Ewa Drum Storage Site will require removal of approximately 25 acres of natural vegetation for the amended LPA because of the cut and fill operations to occur at this site. Once the required site grades have been established, the site will be landscaped.

Landscaping will be incorporated into the project to mitigate loss of streetscape trees.

Water. There will be no long-term direct induced impacts to the quality of surface or ground water resources. The project will not have any navigational impacts. Site-specific sediment and erosion control plans will be developed during final design.

The proposed maintenance facility at the Navy Ewa Drum Storage Site is within an area underlain by unconfined Southern Oahu Basal Aquifer (SOBA), an Environmental Protection Agency (EPA) designated sole-source aquifer. Detailed mitigation analysis will be required during final design, including coordination with responsible agencies, to ensure against potential impact. Specific stormwater control measures for the permanent facility will also be developed during final design.

The amended LPA will cross the designated 100-year floodplain in the areas of Waiawa, Kalauao, Aiea, Moanalua, Kahauiki, and Kalihi Streams and Ala Moana Center. Construction of the amended LPA alternative will not constitute a significant floodplain encroachment.

The amended LPA will have no significant impact on wetlands, coastal zones, or navigable waterways.

Historic Resources. The Chinatown Historic District, Dillingham Transportation Building, Aloha Tower, and Mother Waldron Park will be adversely affected by the fixed guideway alternative due to visual impacts. The amended LPA will require an easement of 0.40 acre from the Pearl Harbor Naval Base for station access at Arizona Memorial and at Makalapa Gate. However, the State Historic Preservation Officer has concurred that the project will not affect the historic significance of the base. The OR&L Station property will require 0.23 acre for the guideway alignment. The OR&L Station building will not be adversely affected.

Parklands. The amended LPA will require 0.12 acre of Keehi Lagoon Beach Park. The Aloha Stadium Station park-and-ride lot will use approximately 320,000 square feet, of which 181,000 square feet will be dedicated for transit use only.

Section 4(f) Involvements. Section 4(f) involvements for the amended LPA include easements of approximately 10,000 square feet from the Arizona Memorial Station bus parking lot and approximately 7,500 square feet at the Makalapa Gate Station, both at the Pearl Harbor Naval Base, and use of approximately 5,250 square feet of Keehi Lagoon Beach Park for the column and guideway. The



amended LPA also will require the acquisition of approximately 9,800 square feet of the OR&L Station property for the placement of guideway columns. *The Aloha Stadium Station touchdown and park-and-ride lot will use approximately 320,000 square feet, of which 181,000 square feet will be dedicated for transit use only.*

**Construction Impacts.** Adverse construction impacts include temporary access difficulties for businesses along the Nimitz Highway frontage road makai of the H-1 Freeway and mauka of Honolulu International Airport and for businesses along Dillingham Boulevard, Halekauwila, Kona, and Waimanu Streets. Construction of a fixed guideway along Kona Street through the Ala Moana Center will create *temporary* access problems for the shopping center and for bus activity along Kona Street.

Erosion and sedimentation impacts will require extensive mitigation. Activities to be addressed include the placement of piers within waterways.

The selection of the Navy Ewa Drum Storage Site for the location of the maintenance facility will increase the risk of impact to the Southern Oahu Basal Aquifer, an EPA-designated sole-source aquifer. Detailed mitigation analysis to ensure against possible impact will be required in the final design phase.

*Additional hazardous material investigations followed by appropriate remediation must be conducted to mitigate potential impacts during construction.*

### **S.3.3 Mitigation Commitments**

This section summarizes the mitigation measures being considered and the City's commitment to minimize any adverse impacts. The areas are briefly summarized in the following paragraph. For detailed discussions of environmental impacts for all alternatives and mitigation measures, the reader is referred to Chapter 5.0 of the AA/DEIS, the SDEIS, and this FEIS.

#### **Land Use and Development**

A commitment has been made for coordination with various agencies and groups listed here to continue throughout the design and implementation process to mitigate land use and development impact:

<u>Agencies and Groups</u>	<u>Location of Concern</u>
Hawaii Community Development Authority (HCDA) . . . . .	Kakaako
Office of State Planning . . . . .	Aloha Tower and other waterfront development
City and County of Honolulu . . . . .	Special Districts
Community Representatives . . . . .	Special Districts
U.S. Department of the Navy . . . . .	Navy Ewa Drum Storage Site, Pearl Harbor Naval Base
U.S. General Services Administration . . . . .	Prince Kuhio Federal Building
University of Hawaii . . . . .	Buildings at the Quarry site, <i>Leeward and Honolulu Community Colleges</i>
Department of Transportation . . . . .	Honolulu International Airport
<i>Aloha Tower Development Corporation . . . . .</i>	<i>Aloha Tower</i>
<i>Department of Accounting and General Services . . . . .</i>	<i>Aloha Stadium, Pearl City, and Liliha Civic Center</i>
<i>Department of Natural Resources . . . . .</i>	<i>Keehi Lagoon</i>

In addition, similar coordination will continue with specific developers, shopping centers, utility providers, and other interested entities to ensure project compatibility with plans.

### Relocations

Because the project is proposed to use federal funds, at least partially, it will be subject to 49 CFR, Part 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs. Within the City, the Department of Housing and Community Development administers the relocation program. Under the federal rules and regulations, probable relocation benefits for the businesses displaced are summarized below and reflected in the capital cost estimates.

Businesses and Non-Profit Organizations. Moving expenses will be reimbursed for all actual and reasonable moving expenses incurred in moving, whether by professional mover or by the displaced. Proof of expense will be required. Alternatively, in lieu of this reimbursement, businesses that meet certain qualifications could elect an optional payment that would be equal to the average annual net earnings, before taxes, of the business for the last two tax years, not less than \$1,000 nor more than \$20,000. Non-profit organizations may elect for a fixed payment, equal to the average net income after expenses for 2 years, not to exceed \$20,000, but at a minimum of \$1,000.

Residential Relocations. Although no required residential displacements have been identified for the fixed guideway alternative, federal and municipal residential relocation assistance programs are available and would be applicable should any residential use of the affected buildings be identified during subsequent project phases.

### Safety and Security

Stations and facilities for bus interface will be well lit to minimize areas of low visibility and to discourage loitering. The transit system operations plan will include *roving* full time attendants to patrol stations and trains, to perform system-wide CCTV camera surveillance, and other measures as needed to ensure the security of the transit patron.

*The City is working in cooperation with the Navy to develop station designs for the Arizona Memorial and Makalapa Gate Station that will assure compliance with physical security requirements. The design drawings for the Arizona Memorial and Makalapa Gate Stations will be subject to Navy approval.*

### Visual and Aesthetic Resources

*To minimize visual intrusion and proximity effects, urban design elements reflecting the adjacent neighborhood's character will be incorporated into the station design. Community Advisory Committees are meeting with the station architects and the City to give input into the design. The guideway, although visible, has been designed by the System Contractor to minimize visual impacts through the following: the support columns will typically be four by six feet; the curved shape, 25 feet in width, will be characterized by a uniform color and texture; typical guideway units are designed to span lengths of 180 feet; and maximizing span lengths reduces intrusion of support piers along the alignment.*

*Landscaping is required by the System Contractor and will be incorporated into the design of the amended LPA. The median will be landscaped and the guideway will have planter boxes within 200 feet of the station.*

### Noise

Noise impacts will be mitigated through the use of noise barriers as an integral component of the guideway. *Additional mitigation may also be required in three noise-sensitive areas due to the locations of crossovers and turnouts. The special trackwork will be relocated to less sensitive areas, if technically*

*possible. If not possible, then mitigation will be provided to ensure that these areas are not exposed to noise levels exceeding criteria.*

#### Vegetation and Wildlife

The removal of mature trees will be avoided where possible. Landscaping will be incorporated into the guideway within 200 feet of the station and along portions of the right-of-way, such as roadway medians, to mitigate loss of vegetation. *No areas supporting unique or biologically significant vegetation or wildlife will be affected. No "Exceptional Trees" will be affected.*

#### Water Resources

The City is committed to mitigating all potential construction-related and long-term impacts through implementation of state-of-the-art techniques and appropriate agency coordination/review through the permitting processes. *A plan of action which describes specific measures to be incorporated into the design of large paved areas, such as parking lots, will be formulated during final design and will be implemented during construction. An erosion and sediment control plan will be developed specifying measures to minimize impacts during construction. A plan to mitigate potential impacts to the Southern Oahu Basal Aquifer will be formulated during final design and will be coordinated with US EPA, HDOH, and HDLNR. The final design will incorporate site-specific sediment and erosion control measures, assure cofferdams will have no adverse flood impacts, incorporate stormwater retention and control measures in permanent facilities, develop effluent segregation and treatment measures at the maintenance facility, and protect groundwater resources.*

#### Historic/Archaeological Resources and Parklands

Through continued coordination with the State Historic Preservation Officer and the agencies having jurisdiction over the parklands, acceptable site-specific mitigation measures will be developed in the future stages of project development. *For the historic properties, a Memorandum of Agreement (MOA) has been executed detailing conditions for mitigation (see Appendix A). Additional investigations will be undertaken for archaeological resources, as outlined in the MOA.*

#### Hazardous Materials

*More detailed hazardous waste studies will be performed prior to construction to clarify on a site-specific basis potential impacts during construction. Any required remediation plans will be implemented prior to construction. An Emergency Response Plan will also be developed should unanticipated hazardous waste conditions be encountered in the field.*

### **S.4 FINANCIAL AND COST EFFECTIVENESS ANALYSIS**

This section focuses on the financial and cost-effectiveness analysis of the amended LPA.

#### **S.4.1 Rapid Transit Capital Financial Plan**

The financial plan assumes that 30% of the amended LPA capital cost is financed through FTA Section 3 Discretionary New Starts program grants and that 70% is financed by the General Excise and Use Tax (GET) surcharge.

The status of each funding source is briefly summarized below.

FTA Section 3 Discretionary New Starts Program. The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 authorized \$618 million in Federal Section 3 Discretionary New Starts program

*funds* to the Honolulu Rapid Transit Program. This is approximately 30% of the projected implementation cost of the project (in year-of-expenditure dollars). The obligation of federal funds would be subject to the City completing the FEIS, a Record of Decision by the FTA, and the City and FTA mutually executing a Full Funding Grant Agreement. Federal funding is also subject to future appropriations by Congress.

General Excise and Use Tax (GET) Surcharge. The State of Hawaii has enacted legislation that enables the City Council to enact a one-half percent increase in the current 4% General Excise and Use Tax (GET) for a period of 10 years to fund the local share of capital costs of the project. The City and the State of Hawaii have mutually executed a development agreement which specifies the financial plan for the capital costs of the project. The Finance Director of the State of Hawaii has opined positively on the reasonableness of this financial plan. The City Council must vote to enact the one-half percent GET increase no later than October 1, 1992, in order for the GET increase to take effect on January 1, 1993, for a period of *ten* years.

The City considers the rapid transit capital financial plan to be financially feasible. Further, it is a generally conservative and robust plan in several respects:

- Nearly 65% of the capital costs of the project are covered by the System Contractor's contract, which contains fixed prices (in 1991 dollars) for a fixed scope, *subject only to an inflation adjustment according to specified indices.*
- The historical GET compounded growth rate over the decade from 1980 to 1990 has been 8.5% per year and the historical GET compounded growth rate from 1985 to 1990 has been 10.5% per year.
- Because GET surcharge revenues are projected to increase more rapidly than construction costs, any unforeseen delay in the construction schedule would not be detrimental to the feasibility of the financial plan, *insofar as the escalation effect is concerned. Depending on the cause of the delay, other delay costs, beyond escalation, might also accrue.*
- *The interest rate assumptions for the bonds and rates used in the financial plan are 0.25% to 1% higher than current interest rates.*

These financial projections have been prepared on the basis of the information and assumptions set forth in this section. The achievement of any financial projection may be affected by fluctuating economic conditions and is dependent on the occurrence of future events. Therefore, the actual results achieved may vary from the projections and such variations could be material. The major risk factors with regard to the *financial* plans for the Honolulu Rapid Transit Program are:

- Sources of funding for operating deficit: The Operations and Maintenance Financial Plan reflects a 49% increase (in constant dollars) in the annual locally funded operating deficit by FY 1998. As a general purpose local government, the City has the authority to raise the additional revenues required to pay for the incremental locally funded operating deficit *from a variety of sources.*
- Availability of federal funds: While \$618 million has been authorized by the ISTEA, these funds still must be appropriated by Congress. *Also, Section 9 formula funds must be appropriated on a yearly basis.* There is uncertainty in the amount and timing of the appropriation of the discretionary funds for this project. *The Rapid Transit Capital Financial Plan assumes that the apportionment will be appropriated within the five-year authorization period of ISTEA.*
- Source of local share of project funding: *The State Legislature has enabled the City Council to levy a 0.5% surcharge on the local General Excise and Use Tax. The City Council must enact this GET surcharge*

by October 1, 1992, to ensure the local share of funding for the project. City Council actions to this point have been favorable to implementation of the project.

- **Magnitude of capital cost:** *Much* uncertainty and unconsidered factors in the capital cost estimates have been *lessened* by the City's turnkey approach to procurement. Unlike most FTA funded transit projects that must rely on an engineer's estimate for the cost estimate on which the Full Funding Grant Agreement is based, nearly 65% of the capital costs for the Honolulu program are included in the System Contractor's fixed price (in 1991 dollars) for *the currently defined scope of the project*, which is only subject to an inflation adjustment based on already defined indices.
- **Yield of dedicated excise tax:** *The economic factors which underlay the strong growth in GET revenue yields during the 1980s (particularly foreign investment in Hawaiian real estate and growth in both eastbound and westbound tourism) are projected to moderate during the early 1990s, and thus the rate of growth in GET collections may also moderate. The projected GET surcharge revenue stream assumes slow economic growth in FY 1992 and FY 1993, limited economic growth in FY 1994 and FY 1995, and a return to the baseline rate of 2% to 3% real growth (i.e., 7% to 8% growth in GET revenues assuming an annual 5% rate of inflation) in the late 1990s. The GET surcharge revenue forecast reflects the current economic cycle and is generally consistent with the projections of most forecasters of the Hawaii economy.*
- **Magnitude of operating deficit:** The fare revenue projections result in no change in the historical recovery ratio (i.e., fare revenue divided by operating costs) for the transit system. If actual costs, in fact, are higher than the projections, or if actual fare revenues are lower, there still remain substantial opportunities for the overall subsidy level to be moderated. Changes in the fare structure could be made that would minimize impacts on transit dependents yet maintain or increase revenues. *Further, the anticipated increase in the "cap" within which employers may fund employee transit expenses without these being considered "income" for Internal Revenue Service reporting purposes will also enhance transit's ability to earn operating revenue from the farebox.* Thus, significant opportunities exist to "manage" the operating deficit at the levels assumed in this analysis.
- **Financing costs:** Financing costs are subject to market conditions. The financing cost assumptions used in this analysis are prudent relative to current market conditions.

#### **S.4.2 Bus Capital Financial Plan**

In most years, the bus capital program will be funded from FTA Section 9 Formula capital grants matched by City General Fund appropriations. In FY 1995 and 1996 the plan assumes that the City will also request a relatively small grant from the FTA Section 3 Discretionary Bus Program. If Section 3 Discretionary funds are not available for Honolulu, schedule modifications or leasing options may be utilized to tap the estimated excess of Section 9 grant monies, as compared to estimated expenditure requirements, in years beyond FY 1997. Bus capital expenditures are heaviest through FY 1999 because of the need to replace significant numbers of buses that will have reached their 12-year retirement age, and also to bring into service fully accessible buses to serve the mobility-impaired community.

#### **S.4.3 Operations and Maintenance Financial Plan**

Implementation of the Honolulu Rapid Transit Program and the related bus system improvements will lead to a 49% increase (in constant dollars) in the annual locally funded operating deficit of Honolulu's transit program by FY 1998. This locally funded operating deficit in FY 1992 was paid by appropriations *from the City's General and Highway Funds*. As a general purpose local government, the City has the authority to raise the additional revenues required to pay for the incremental locally funded operating deficit by various means. In the O&M financial plan, which the City Administration presented in connection with City Council hearings on the development agreement with the state, the City Administration proposed three additional sources of O&M funds: 1) parking reduction fees; 2) tax increment financing; and 3) revenues

from development of City properties. The City Council has not yet begun to implement these supplemental revenue sources for the locally funded portion of the operating deficit.

#### **S.4.4 Effectiveness**

The alternatives were evaluated in terms of their ability to attain the area's transportation-related goals and objectives. The measures used included total daily transit trips, mode split, daily trips to Downtown, transit travel times, the need to transfer, service reliability, and reduced auto trips and vehicle miles traveled.

In nearly all of these measures, the amended LPA outperformed the TSM Alternative and the TSM Alternative proved more effective than the No-Build Alternative. The one exception is transfers. The amended LPA will result in more transfers than the other two alternatives because a significant percent of riders will access the fixed guideway system on feeder buses.

In addition, the alternatives were evaluated in terms of their ability to minimize adverse environmental impacts. The amended LPA will result in slight improvements to traffic congestion and air quality and will better support local and regional plans as compared to the other two alternatives. The amended LPA, however, will have more displacements and greater adverse impacts on cultural resources and displacements. The elevated guideway will have adverse visual impacts in some locations.

#### **S.4.5 Cost-Effectiveness**

Cost-effectiveness analysis provides a means of comparing the benefits of each alternative with its costs. The cost-effectiveness analysis has also become an important part of the FTA procedures for review of major transit projects. The FTA has established a cost-effectiveness index (CEI) for evaluating the relative merits of fixed guideway alternatives within a corridor. FTA also uses the index as an input into its rating system, which compares projects from throughout the nation and identifies those most worthy of federal funding.

The CEI for the amended LPA is \$7.45 per new transit trip, with costs expressed in 1988 dollars, or \$8.94 with costs expressed in 1991 dollars.

### **S.5 EQUITY**

Equity can be defined as the fairness of the distribution of costs, benefits, and impacts across various population subgroups. Fairness can be determined by the extent to which the costs and impacts are distributed in a way that is consistent with the area's goals.

#### **S.5.1 Impact on Low Income Areas**

The primary indicator for the distribution of transit service is reflected in the increase in trip origins from areas generally considered low income areas. The low income areas include the following neighborhoods in the study corridor: Waikiki, Downtown, Kalihi, Iwilei, and Waianae. Based on the number of transit trips originating from each identified low income area, the amended LPA will provide better transit service to these areas than the No-Build or TSM Alternatives.

### **S.5.2 Environmental/Socioeconomic Equity and Benefit**

The analysis of equity and benefit from an environmental and socioeconomic perspective was based on a relative balance between the extent or severity of environmental and/or socioeconomic impact relative to change in transit accessibility. The amended LPA will result in improved transit accessibility relative to the TSM and the No-Build Alternatives. When compared to the No-Build Alternative, the amended LPA and TSM Alternatives will result in an increase of daily transit trips by 29% and 9%, respectively. The amended LPA will result in a 18% increase of daily transit trips over the TSM Alternative.

However, the environmental impacts of the amended LPA will be greater than the TSM or No-Build Alternatives. This is mainly due to the visual displacement and construction of the amended LPA. However, if a fixed guideway is not built, this could result in the provision of poorer transit service at increased costs in the future and fewer mobility options for all persons, especially the mobility-impaired.

### **S.5.3 Local Financing Options Equity and Burden**

In Section 6.1, the financing plan for the capital cost of the project is discussed. The proposed principal local financing source is a 0.5% increase in the current General Excise and Use Tax (GET), from 4.0% to 4.5%. The excise tax is generally viewed as a regressive tax, with lower income groups paying a higher percentage of their income than higher income groups. The State tax credit for residents essentially eliminates the regressive nature of the GET surcharge and is clearly progressive through the middle and upper family income ranges (i.e., above \$20,000 per year).

*The City has performed an assessment of the burden of the GET surcharge revenue which will be collected in FY 1994 and concluded that visitors and non-residents will bear 35.9 percent of the burden. The remaining 64.1 percent will be borne by Hawaii residents in their role as consumers and/or taxpayers. With the state providing a tax credit through the income tax, the incremental share of the GET surcharge borne directly by Honolulu residents declines to 26.1 percent of the surcharge (the tax credit would be funded by the state utilizing existing state tax sources). With the tax credit, the average incremental burden of the GET surcharge, by itself, on Honolulu residents is about \$36 per person. While the average per capita incremental burden of the surcharge is \$36 per person per year, the incremental annual burden for residents with family incomes from \$10,000 to \$50,000 per year is substantially less —about \$20 per person per year.*

## **S.6 SIGNIFICANT TRADE-OFFS BETWEEN ALTERNATIVES**

Selection of an alternative by local decision makers involves balancing the advantages associated with each of the alternatives under consideration and applying individual priorities and value judgments. Highlighted below are the factors which were considered to be of particular importance in making a comparative assessment of the alternatives presented in this FEIS. What is particularly important are the relative trade-offs between the costs of the alternatives and the benefits received for those costs or investments.

The key comparison is to distinguish between the merits of an expanded bus system (TSM Alternative) compared with investment in the amended LPA. The TSM Alternative would improve transit travel times compared with the No-Build Alternative in areas where HOV/bus lane facilities are available to increase the bus operating speed. However, in the intense built-up area between Downtown, Ala Moana Center, and Waikiki, the TSM Alternative provides no improved travel times over the No-Build Alternative. The amended LPA will provide improvements in all cases. From the perspective of the annual operating cost, the TSM Alternative when compared to the amended LPA would cost approximately \$5 million more per year while providing a lower level of service. Initial capital costs for the TSM Alternative would be far less, putting less demand on local resources. The TSM Alternative would avoid some adverse impacts of the fixed guideway alternative, such as the visual impact of the aerial structures, but would add to the

congestion, noise, and pollution of a substantially expanded bus fleet. The TSM Alternative also would have lower transit ridership and less travel-time benefits.

## **S.7 ISSUES TO BE RESOLVED**

*Publication and circulation of this FEIS completes one phase of the Honolulu Rapid Transit Program. There are several phases yet to be completed and many issues that must be resolved prior to full implementation of the program. The purpose of this section is to present some of the more important immediate steps that must be taken to make the program a reality.*

### **S.7.1 Implementation of the Financing Plan**

*To construct the rapid transit system, the financing plan must be implemented. The plan requires specific actions by the City, State, and Federal governments. The City's share of the capital cost of the system will be provided by a 0.5% surcharge on the General Excise and Use Tax for a period of ten years. The State Legislature has authorized the surcharge. The City Council must implement the tax by October 1, 1992.*

*The remaining 30% of the funding for the capital cost of the system is proposed to come from FTA Section 3 New Start Funds. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) authorized \$618 million for the program. The authorized funds still must be appropriated by the U.S. Congress. The City and FTA also must enter into a Full Funding Grant Agreement.*

### **S.7.2 Signing the Phase II Notice to Proceed (NTP) with the System Contractor**

*After the completion of preliminary engineering, the City will execute a Notice To Proceed for Phase II work with the System Contractor.*

### **S.7.3 Finalization of Trade of Land With the U.S. Navy**

*The proposed maintenance facility is located at the Navy Ewa Drum Storage Site. The U.S. Congress has authorized a trade of City-owned land on the Waiawa Peninsula for the Navy Ewa Drum Storage Site. The City and the U.S. Navy must complete a formal Memorandum of Agreement (MOA) regarding the property transfer.*

*The MOA will include provisions to study both properties to ascertain the presence of hazardous wastes and for their clean-up, if necessary. A separate document will be prepared addressing the environmental impacts of the land swap, including the demolition of existing structures on the City site and the roadway/bridge construction across Waiawa Stream.*

### **S.7.4 Finalization of the Location of the Traction Power Substation at the Makalapa Gate Station in Cooperation with the U.S. Navy**

*The City and the U.S. Navy must come to an agreement on the location of the substation.*

### **S.7.5 Adoption of a Policy on Bicycles on the Rapid Transit System**

*The City must adopt a policy dealing with whether or not bicycles will be allowed on the system and what, if any, restrictions will be imposed.*

### **S.7.6 Completion of Proposed Mitigation Plan and Environmental Permits**

*As a result of preliminary engineering and the preparation of this FEIS, the project and its expected environmental impacts have been identified. Many mitigation measures as identified in Section S.3.3 have already been incorporated into the preliminary design and cost estimates and committed to by the City.*



*In addition, the City has committed to studying further ways to mitigate or finalize the mitigation of certain impacts. Examples of areas or considerations requiring further study and commitment include:*

- *Final decisions regarding landscaping and architectural design treatments;*
- *Development of a traffic management plan for the construction phase;*
- *Relocation plan for displaced businesses; and*
- *Securing the necessary permits, such as those in Table S.11.*

**Table S.11  
REQUIRED PERMITS AND APPROVALS**

The following permits or approvals may be required:

**Federal**

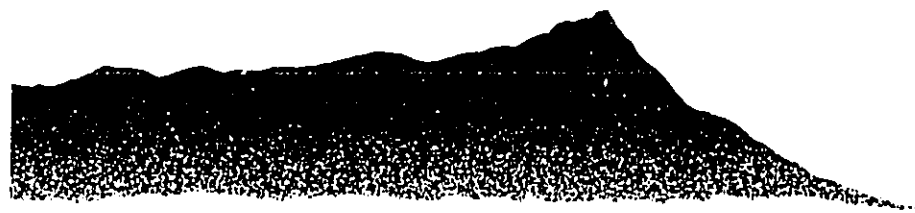
U.S. Army Corps of Engineers Permit for Activities in *Waters of the United States*  
U.S. Coast Guard Bridge *Advanced Approval*  
U.S. Environmental Protection Agency Section 1424(e) Approval (Sole Source Aquifer)  
U.S. Department of Transportation Notice of Proposed Construction Near Airports  
U.S. Department of Transportation FHWA Approval of Modifications Within Limits of Interstate Highways  
U.S. Department of the Navy, Easements on Navy Base Property

**State**

State Department of Land and Natural Resources Stream Channel Alteration Permit  
State Department of Land and Natural Resources Historic Sites Review  
Hawaii Community Development Authority - Kakaako  
State Department of Transportation Permit for Construction to Cross or Enter the State Energy Corridor  
State Department of Transportation Permit to Perform Work Upon a State Highway  
Hawaii Coastal Zone Management Program - Federal Consistency  
State Department of Health Noise Permit  
State Department of Health Storm Water Runoff Permit  
National Pollutant Discharge Elimination System (NPDES) Permit

**County**

Development Plan Public Facilities Map Amendment  
Special Design District Permit  
Zoning Waivers for Public Uses, Public Utilities and Walls  
Sewer Connection Permits  
Water and Water System Requirements for Developments  
Building Permit  
Certificate of Occupancy  
Combustible and Flammable Liquids Tank Installation  
Liquified Petroleum Gases Permit  
Areawide Clearinghouse Review  
Development Application in Flood Hazard Districts  
Special Management Area Use Permit  
Construction Dewatering Permit (Temporary)  
Grubbing, Grading, Excavation, and Stockpiling Permit  
Street Usage Permit  
Discharge of Waters Permit



**Chapter 1**  
**Purpose and Need**

## 1.0 PURPOSE AND NEED

This chapter describes the purpose of the study effort and discusses the need for transportation improvements in the study corridor. Also included are discussions of the planning and development process, the Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS), Supplemental Draft Environmental Impact Statement (SDEIS), and Final Environmental Impact Statement (FEIS) roles in project development and decision making, a project update, and the decision at hand.

### 1.1 NEED FOR TRANSPORTATION IMPROVEMENTS

Over the past half-century Oahu has become increasingly urbanized and, as with any urban area, has had increasing requirements for high quality, high capacity transportation facilities. Initial planning efforts after World War II focused on developing an extensive freeway system to accommodate growing travel demand.

In the 1960s, as freeway construction progressed, negative public sentiment grew, culminating in deletion of the proposed elevated Makai Freeway from the planned transportation system. The Oahu Transportation Study, begun in 1963, explored non-highway options for accommodating a portion of the travel demand. Its 1967 conclusion was that a fixed guideway system, ultimately serving an urban corridor between Pearl City and Hawaii Kai, would be a cost-effective component of the overall transportation system.

Over the following 20 years, various specific transit options that might provide that component were examined. During this study period the population on Oahu grew by more than 40% and the transportation deficiencies that were identified in 1967 became increasingly evident.

This report focuses on an examination and evaluation of the amended LPA, in addition to those alternatives presented in the AA/DEIS and SDEIS, in a portion of the corridor identified in the 1967 study as appropriate for major transit improvements. This corridor, shown in Figure 1.1, has a long, narrow shape confined between the Koolau mountain range and the ocean. These same elements of the natural topography also identify geographical orientations within the study corridor.

Throughout this document, local terminology is used to identify direction. Mauka refers to a direction toward the mountains, generally north; makai refers to a direction toward the ocean, generally south; and Koko Head refers to a direction generally toward the east. The westerly direction is identified as Ewa, which is also a community on the southwest portion of the island.

*The study corridor is the focus of most of the existing travel on Oahu. Table 1.1 shows the number of person trips generated in each of eight areas of the island, displayed in Figure 1.2. In 1980 nearly 58 percent of all trips were generated in the Honolulu area, with nearly 20 percent generated in the Pearl Harbor-Central Oahu area, the two areas that encompass the study corridor. The third leading generator of trips was Koolaupoko.*

The examination of transportation needs and possible solutions in this report focuses on a horizon year of 2005. By that year, the population on Oahu is expected to exceed 930,000 persons, an increase of 11% since 1990, and employment is expected to exceed 585,600 jobs, an increase of more than 16% from 505,400 jobs in 1990.

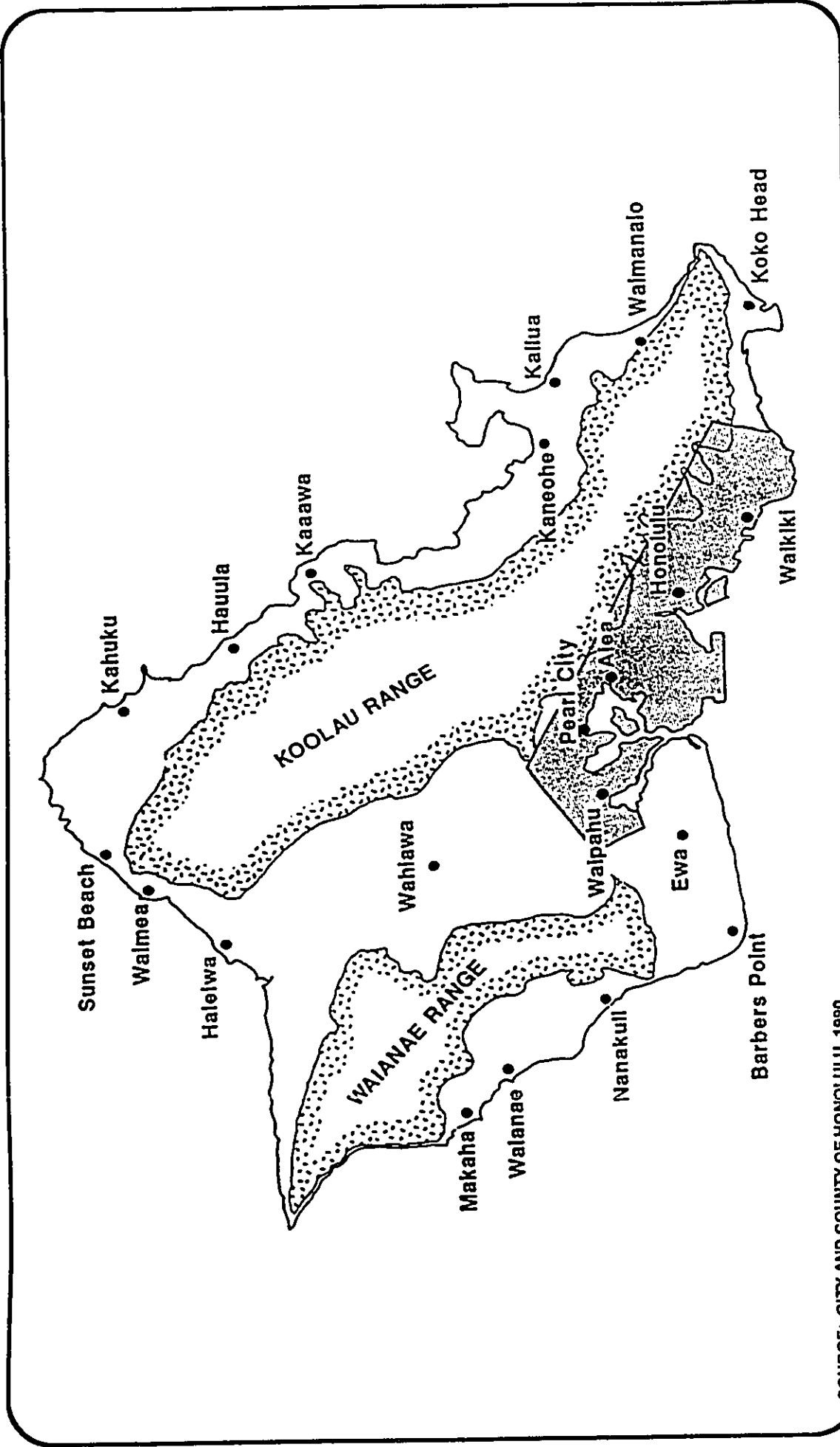
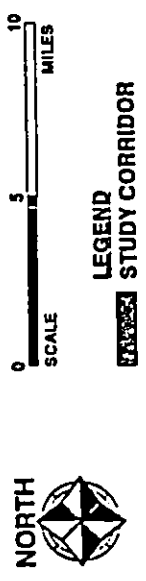
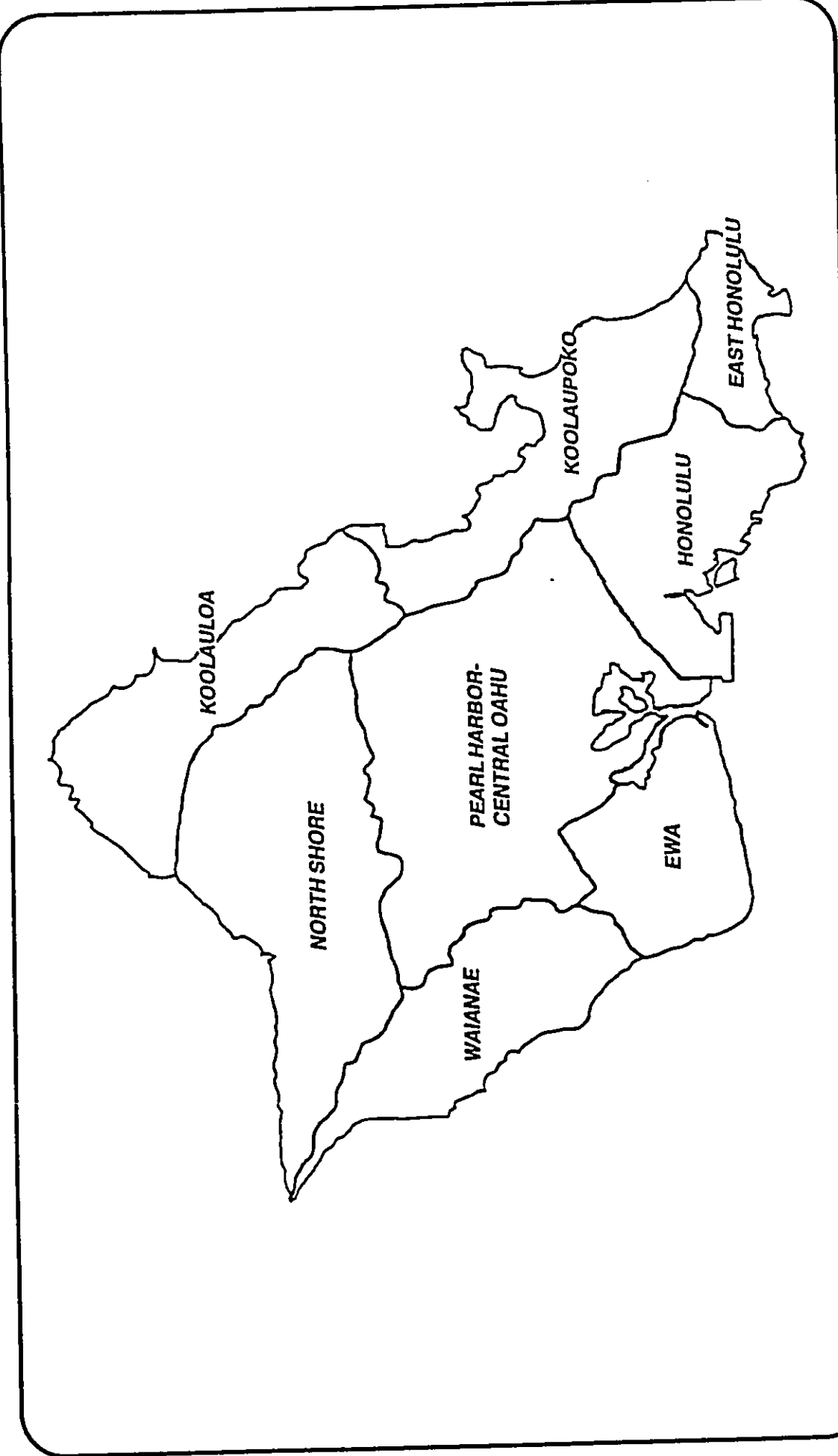


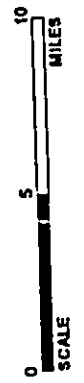
FIGURE 1.1

STUDY CORRIDOR: REGIONAL CONTEXT  
 HONOLULU RAPID TRANSIT PROGRAM





SOURCE: CITY AND COUNTY OF HONOLULU, 1992.



**FIGURE 1.2**

**ISLAND OF OAHU**

**HONOLULU RAPID TRANSIT PROGRAM**

<i>Table 1.1 PERSON TRIPS BY AREA<sup>1</sup></i>					
<i>Area</i>	<i>Person Trip Origins and Destinations</i>				<i>Percent Increase</i>
	<i>1980</i>		<i>2005<sup>2</sup></i>		
	<i>Number</i>	<i>% of Total</i>	<i>Number</i>	<i>% of Total</i>	
<i>Honolulu</i>	<i>2,507,200</i>	<i>57.7</i>	<i>3,152,100</i>	<i>51.9</i>	<i>26</i>
<i>Pearl Harbor-Central Oahu</i>	<i>857,100</i>	<i>19.7</i>	<i>1,309,500</i>	<i>21.6</i>	<i>53</i>
<i>Ewa</i>	<i>124,400</i>	<i>2.9</i>	<i>372,300</i>	<i>6.1</i>	<i>199</i>
<i>East Honolulu</i>	<i>167,900</i>	<i>3.9</i>	<i>245,000</i>	<i>4.0</i>	<i>46</i>
<i>Koolaupoko</i>	<i>459,500</i>	<i>10.6</i>	<i>598,700</i>	<i>9.9</i>	<i>30</i>
<i>Koolauloa</i>	<i>58,700</i>	<i>1.3</i>	<i>119,600</i>	<i>2.0</i>	<i>104</i>
<i>North Shore</i>	<i>42,800</i>	<i>1.0</i>	<i>66,100</i>	<i>1.1</i>	<i>55</i>
<i>Waianae</i>	<i>127,700</i>	<i>2.9</i>	<i>208,700</i>	<i>3.4</i>	<i>63</i>
<i>Total</i>	<i>4,345,300</i>	<i>100.0</i>	<i>6,072,000</i>	<i>100.0</i>	<i>40</i>

Source: Barton-Aschman Associates, 1992.

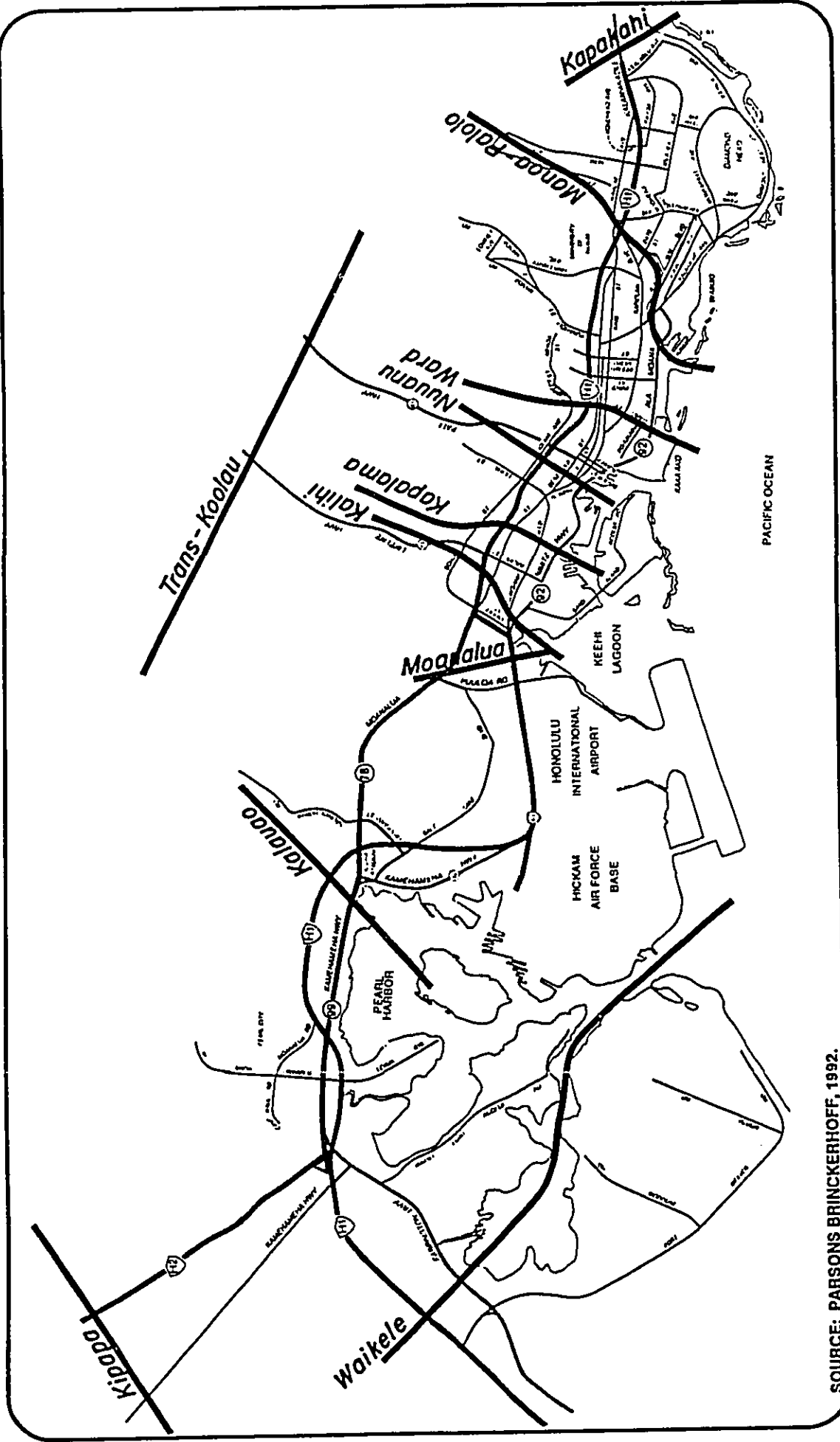
Notes: <sup>1</sup> Trips by Oahu residents only; excludes tourist trips.

<sup>2</sup> From the Hali 2005 Study, modified to reflect latest household and employment forecasts.

If recent trends continue, travel demand can be expected to increase at an even greater rate than population and employment between now and 2005. Over the 15-year period from 1975 to 1990, the number of vehicles in Honolulu increased by more than 57% while population grew by less than 17%. During the same period, annual vehicle miles of travel increased by almost 73% while the number of licensed drivers increased by less than 14%. Thus, over the 15 years, the average annual miles traveled per driver increased by more than 50%, from less than 7,300 miles per year to more than 11,000 miles per year. This likely reflects both an increased average trip distance, as the urban area has expanded geographically, and an increased number of trips made, particularly an increase in work trips by women whose labor-force participation rate has grown by nearly 40% nationwide.

As travel demand increases between now and 2005, the geographic pattern of travel will change. From Table 1.1 it can be seen that in 2005 the Honolulu area will continue to generate most of the trips on the island, followed by Pearl Harbor-Central Oahu and Koolaupoko. By 2005, Ewa will also become a significant generator of trips.

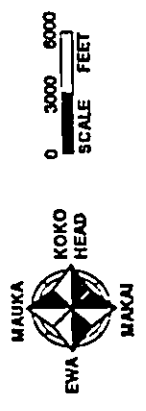
Another view of the change in travel patterns can be seen by examining travel volumes across imaginary lines called screenlines. Figure 1.3 shows the location of several screenlines in and around the study corridor. Table 1.2 shows forecast changes in daily travel volumes across some of the screenlines. As can be seen, the largest percentage increases in travel from 1980 to 2005 are expected at peripheral screenlines such as Waikele, Kipapa, Kalauao, and Kapakahi. Nevertheless, the largest volumes in 2005 will continue to be those across central screenlines from Kapalama to Manoa-Palolo. These screenlines in the heart of the study corridor will also experience the largest absolute increase in travel volumes over the 25-year period.



SOURCE: PARSONS BRINCKERHOFF, 1992.

FIGURE 1.3

TRANSPORTATION SCREENLINES  
HONOLULU RAPID TRANSIT PROGRAM





<i>Table 1.2</i> <b>CHANGE IN DAILY TRAVEL VOLUMES ACROSS KEY SCREENLINES</b>					
<i>Person Trips</i>					
<i>Screenline</i>	<i>1980</i>	<i>2005<sup>1</sup></i>	<i>Increase</i>	<i>Total Percentage Increase</i>	<i>Average Annual Increase</i>
<i>Waikale</i>	<i>145,000</i>	<i>242,100</i>	<i>97,100</i>	<i>67%</i>	<i>2.1%</i>
<i>Kipapa</i>	<i>144,000</i>	<i>188,700</i>	<i>44,700</i>	<i>31%</i>	<i>1.1%</i>
<i>Kalaauao</i>	<i>330,000</i>	<i>437,000</i>	<i>107,000</i>	<i>32%</i>	<i>1.1%</i>
<i>Moanalua</i>	<i>365,000</i>	<i>458,100</i>	<i>93,100</i>	<i>26%</i>	<i>0.9%</i>
<i>Kapalama</i>	<i>417,000</i>	<i>524,100</i>	<i>107,100</i>	<i>26%</i>	<i>0.9%</i>
<i>Nuuanu</i>	<i>497,000</i>	<i>607,100</i>	<i>110,100</i>	<i>22%</i>	<i>0.8%</i>
<i>Ward</i>	<i>520,000</i>	<i>628,100</i>	<i>108,100</i>	<i>21%</i>	<i>0.8%</i>
<i>Manoa-Palolo</i>	<i>496,000</i>	<i>625,600</i>	<i>129,600</i>	<i>26%</i>	<i>0.9%</i>
<i>Kapakahi</i>	<i>100,000</i>	<i>150,700</i>	<i>50,700</i>	<i>51%</i>	<i>1.7%</i>
<i>Trans-Koolau</i>	<i>178,000</i>	<i>198,300</i>	<i>20,300</i>	<i>11%</i>	<i>0.4%</i>

Source: Barton-Aschman Associates, 1992.

Note: <sup>1</sup> From the Hali 2005 Study, adjusted to reflect latest household and employment forecasts.

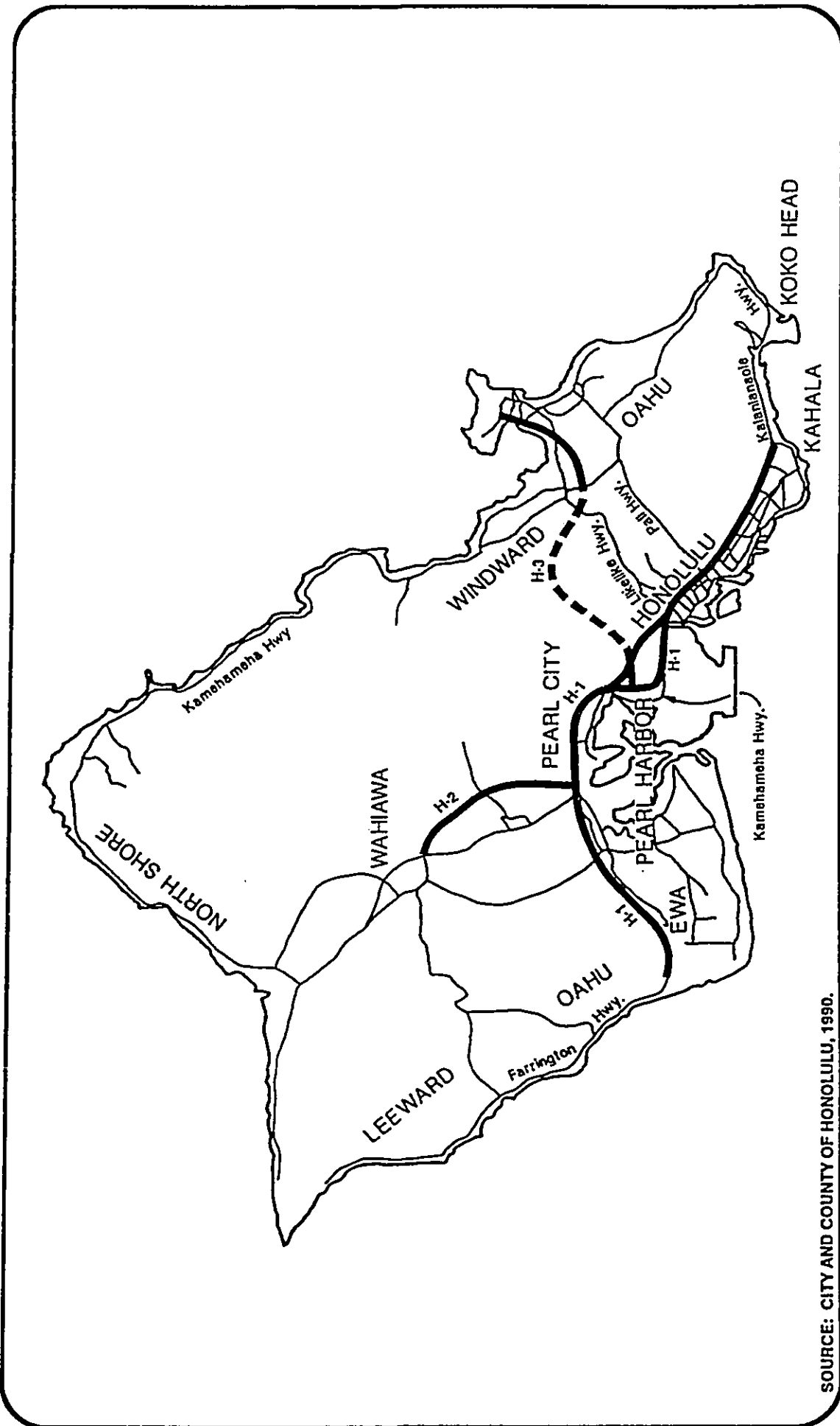
### **1.1.1 Transportation Facilities and Services in the Corridor**

#### **1.1.1.1 Highways**

The primary highway facilities serving the City and County of Honolulu center on three interstate freeways. These include the H-1 Freeway, which accommodates traffic between Ewa and Kahala, and the H-2 Freeway, which serves traffic between Wahiawa and Pearl City. The H-3 Freeway, currently under construction, will serve traffic between Windward Oahu and Pearl Harbor. Figure 1.4 shows the primary facilities serving the island.

Numerous arterial and collector streets provide connecting and supplementary service to the three interstate freeways. Mauka/makai (north/south) facilities connect the major Ewa/Koko Head (west/east) roadways and/or provide regional access to Windward Oahu. Figure 1.5 shows the major facilities in the study corridor.

Traffic growth on the street and highway system can be examined at the corridor level by looking at total volumes crossing screenlines. The State Department of Transportation maintains information on traffic traveling over four of the screenlines shown in Figure 1.3 (Kalihi Stream, Kapalama Canal, Nuuanu Stream, and Manoa-Palolo Canal). Table 1.3 shows the change in volumes for these screenlines between 1977 and 1990. As can be seen, traffic crossing the Kalihi Stream and Nuuanu Stream screenlines increased by over 45% during this 13-year period.

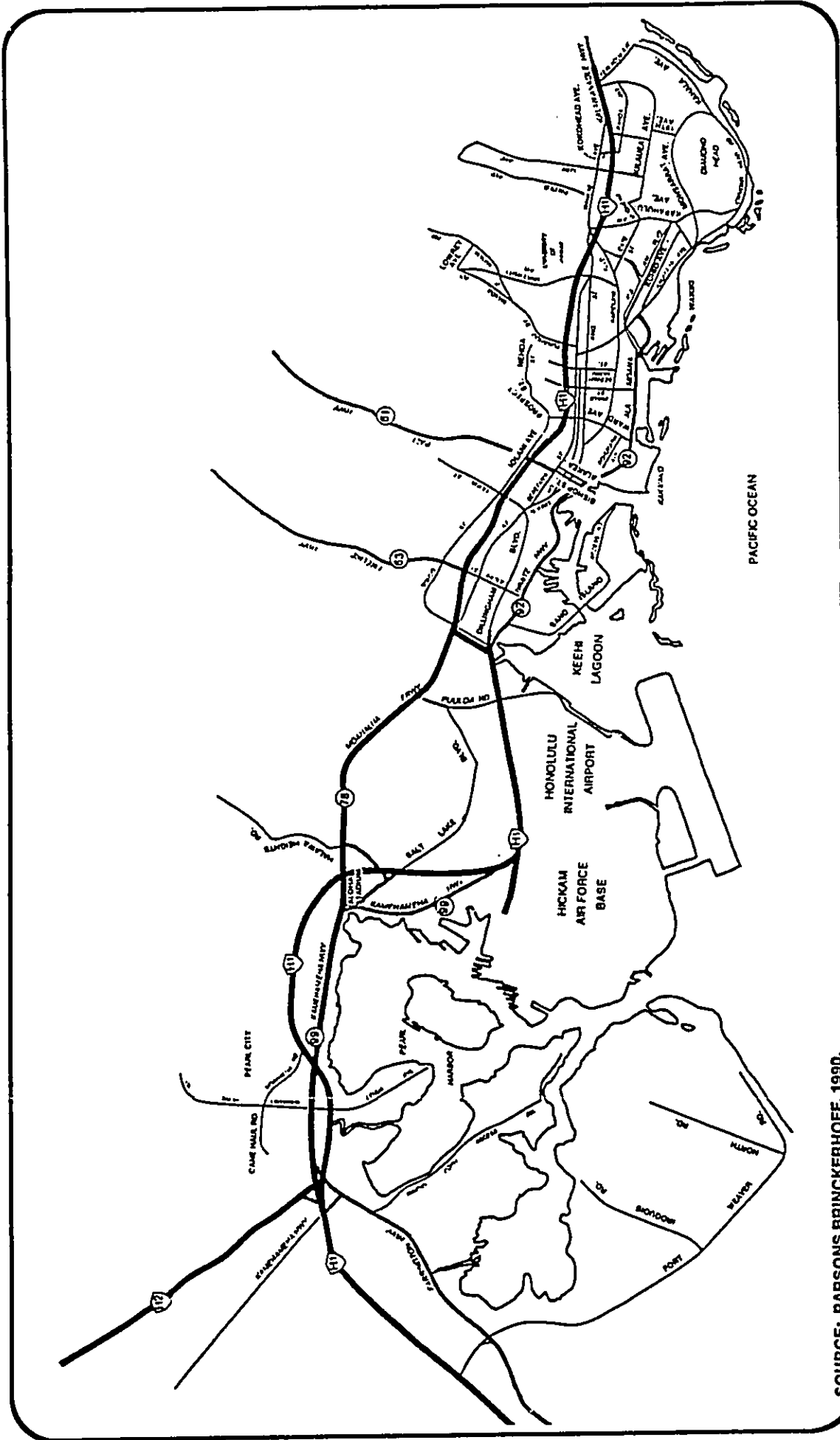


SOURCE: CITY AND COUNTY OF HONOLULU, 1990.



- LEGEND**
- FREIGHTWAYS
  - MAJOR HIGHWAYS
  - UNDER CONSTRUCTION

**FIGURE 1.4**  
**HIGHWAY SYSTEM**  
**ISLAND OF OAHU**  
**HONOLULU RAPID TRANSIT PROGRAM**



SOURCE: PARSONS BRINCKERHOFF, 1990.

**FIGURE 1.5**  
**MAJOR FACILITIES SERVING STUDY CORRIDOR**  
**HONOLULU RAPID TRANSIT PROGRAM**

MAUKA  
  
 EWA  
 KOKO  
 HEAD  
 MAKAI

0 5000 6000  
 SCALE FEET

Table 1.3 STATE DEPARTMENT OF TRANSPORTATION 24-HOUR SCREENLINE TRAFFIC VOLUMES				
Year	Screenlines			
	Kalihi Stream	Kapalama Canal	Nuuanu Stream	Manoa-Palolo Canal
1977	291,800	264,300	286,500	314,800
1978	284,600	255,200	297,100	324,100
1979	N/A	N/A	322,700	343,600
1980	312,300	325,600	345,200	320,800
1981	290,200	303,100	309,300	N/A
1982	N/A	284,100	N/A	N/A
1983	334,400	N/A	N/A	N/A
1984	N/A	302,900	340,700	336,600
1985	335,300	313,300	342,500	340,300
1986	360,400	348,600	373,000	344,700
1987	N/A	N/A	N/A	N/A
1988	400,000	345,500	378,600	N/A
1989	N/A	354,500	397,600	368,000
1990	N/A	355,400	422,400	376,700
Increase from 1977 to 1990	45.2% <sup>1</sup>	34.5%	47.4%	19.7%

Source: State of Hawaii Department of Transportation, *Traffic Summary*, Island of Oahu, 1986, Tables 12, 13, 14, and 15 and State of Hawaii Department of Transportation, *Traffic Summary*, Island of Oahu, 1990, Tables 12.0, 13.0, 14.0, and 15.0.

Note: <sup>1</sup> Extrapolated from 1977 to 1988 increase.

Current plans for transportation facility improvements were prepared in the Oahu Regional Transportation Plan (June 1991). In this study, the Oahu Metropolitan Planning Organization (OMPO) evaluated 2005 conditions to consider alternatives for updating the 1984 Hali 2000 long-range transportation plan. The plan recommends numerous arterial and highway improvements; these are especially focused on the Central Oahu, Primary Urban Center (PUC), Ewa, and East Honolulu DPAs. The list of improvements recommended in this update shows that 44% are planned for the PUC, 23% for the Central Oahu area, 12% for the Ewa area, and 4% for East Honolulu.

#### 1.1.1.2 Transit

The City and County of Honolulu provides fixed-route public transit service for the entire island of Oahu. TheBus, as this service is called, is an integral part of Honolulu's transportation system. In 1980, with an estimated 11.1% of its work force riding the bus, Honolulu ranked seventh out of 366 U.S. urban areas in terms of percentage of workers taking the bus to work, following San Francisco, New Orleans, Pittsburgh, Madison, Baltimore, and Washington D.C. The ratio of local passengers per revenue hour (65.6 in 1986) also shows the Honolulu system to rank very high nationally when compared to other systems. Only New York City, San Francisco, Chicago, Philadelphia, New Orleans, and Baltimore had higher productivity levels in that year.

Over the past seven years, TheBus fleet size has increased from 415 to 475 buses, or 14%. In this same period, the number of bus routes has increased over 38%, from 47 to 65 routes. Since 1984, TheBus's operating expenses have steadily increased: from \$49.5 million to \$80 million in FY 1991. Key components of increasing operating expense are increases in labor and labor-related fringe benefit costs. Despite the increases in operating expense, TheBus offers the lowest cost per unlinked passenger trip for all U.S. transit systems operating 250 to 499 vehicles in maximum service. In 1989, the latest year for which an FTA Section 15 Annual Report is available, TheBus carried passengers for \$.90 per unlinked passenger trip compared to a national average of \$1.44. The low cost per passenger trip results from several characteristics of the service, including the high density, linear development patterns; high ridership; lean administrative and management structure; and improvements in operating efficiencies.

TheBus system is designed to provide reasonably high speeds to offer riders travel times that are competitive with the private automobile. However, the major factors influencing speeds are the traffic conditions under which the service operates, passenger loading conditions, and bus stop spacing. Honolulu has significant traffic congestion, high ridership and load factors, and closely spaced bus stops. Combined, these factors result in bus operating speeds that have declined systemwide from 14.6 mph in FY 1983 to 13.6 mph in FY 1992, as can be seen in Table 1.4.

*Table 1.4*  
**AVERAGE BUS OPERATING SPEEDS**

<i>Service Type</i>	<i>FY 83</i>	<i>FY 84</i>	<i>FY 85</i>	<i>FY 86</i>	<i>FY 87</i>	<i>FY 88</i>	<i>FY 89</i>	<i>FY 90</i>	<i>FY 91</i>	<i>FY 92</i>
<i>Urban</i>	11.30	11.03	10.76	10.63	10.50	10.30	10.11	10.03	9.95	9.87
<i>Suburban</i>	19.41	19.32	19.23	19.10	18.76	18.71	18.66	18.68	18.71	18.69
<i>Freder</i>	18.24	16.81	15.50	15.07	15.20	15.03	14.77	14.91	15.03	15.06
<i>Local Total</i>	14.42	14.18	13.95	13.85	13.61	13.49	13.32	13.27	13.22	13.16
<i>Express</i>	22.21	22.31	22.39	21.83	22.35	22.29	22.25	22.25	22.25	22.06
<i>System Total</i>	14.61	14.40	14.19	14.11	14.00	13.86	13.72	13.71	13.70	13.64

Source: City and County of Honolulu, Department of Transportation Services, Short-Range Transit Plan and Updates, Fiscal Years 1985 to 1993.

Notes: Speeds are in miles per hour, calculated by dividing average weekday revenue vehicle miles by average weekday revenue vehicle hours. FY 1984, FY 1988, and FY 1990 speeds are calculated by interpolation.

These reduced speeds diminish the attractiveness of transit as an alternative to the private automobile, and the resulting congestion reduces transit schedule reliability. As the number of transit passengers increases and the total volumes of traffic approach the capacity of the streets, the benefits of transit will be further diminished.

The declines in average operating speeds have been most pronounced for local buses. An aggressive bus priority treatment program has kept express bus speeds relatively constant from FY 1983 to FY 1992. These priority elements include the priority lane operations on the Hawaii Kai Drive/Kawaihae Street bus lane, the Kalaniana'ole Highway high-occupancy-vehicle (HOV) lane, the Moanalua Freeway HOV lane, and the H-1 Freeway HOV lane. Additional priority facilities will be developed through 2005.

### 1.1.1.3 Paratransit

In addition to the regular fixed-route bus service, the City and County of Honolulu offers a paratransit service, called TheHandi-Van, for the semi- and non-ambulatory people who are disabled and cannot ride TheBus. A demand-responsive curb-to-curb service provided by 87 vans and minibuses, TheHandi-Van,

provides service throughout the island seven days a week. Since 1978, ridership on this system has increased from 106,000 to 583,300 in 1990, *declining to 528,900 in 1991.*

Despite the decline in 1991, the outlook for TheHandi-Van system is one of increasing demand and service expansion. Currently, it represents one of the largest demand-responsive transit systems in the country contracted to a sole operator.

#### 1.1.1.4 Parking

Parking is an essential element of the transportation system, especially in Downtown. A 1981 study of Downtown parking needs identified deficiencies of both short-term and long-term parking spaces, particularly in the Financial District, where long-term demand exceeds supply by more than 60% and short-term demand exceeds supply by nearly 90%. This imbalance has led to increased parking rates with monthly rates averaging \$135 for an unassigned stall and \$200 for a reserved stall. This has resulted in the overflow of demand into adjacent areas. *Aside from zoning regulations (Land Use Ordinance) for private development*, no official City policy governs parking; however, the City's trend is to encourage increased short-term supply but not an increase in long-term spaces. As noted in the 1981 study:

The most important 'parking management action' which could be implemented in the next several years would be the expansion of transit service. This would provide additional capacity to carry a large proportion of the existing long-term parking demand, as well as future demand. Much of the current parking problem is due to large numbers of work trips which are made by autos since they are unable to use the crowded bus service. The excess long-term parking demand also aggravates the short-term parking problem as long-term parkers misuse short-term use spaces. The improved transit program as well as a stricter enforcement program would reduce the amount of misused spaces. (Honolulu Parking Management Study, May 1981, p. viii.)

#### 1.1.2 Transportation Related Goals and Objectives

Transportation planning in Honolulu involves several local, state, and federal agencies. The primary ones are the City and County of Honolulu Department of Transportation Services, the State of Hawaii Department of Transportation, the Oahu Metropolitan Planning Organization, and the U.S. Department of Transportation, Federal Transit Administration and Federal Highway Administration. The successful undertaking of major capital transportation investments requires that the primary goals and objectives of the area be considered in structuring and evaluating alternatives. Relevant local, state, and federal goals and objectives relating to public transit and highway investments were reviewed, and a complete list is presented in the Evaluation Methodology Report (May 1989). The following sections present those goals and objectives specifically related to transportation.

##### 1.1.2.1 City and County of Honolulu

The General Plan for the City and County of Honolulu (1991) sets forth the local long-range objectives and policies. This document was first adopted in 1977 and subsequently amended in 1979, 1982, 1985, 1987, 1989, 1990, and 1991. The general plan includes 11 subject areas which provide the framework of the City's desired public policy. The key objectives applicable to this project follow:

##### Transportation and Utilities

Objective A. To create a transportation system which will enable people and goods to move safely, efficiently, and at a reasonable cost; serve all people, including the poor, the elderly, and the physically handicapped; and offer a variety of attractive and convenient modes of travel.

Objective D. To maintain transportation and utility systems which will help Oahu continue to be a desirable place to live and visit.

Natural Environment

Objective B. To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.

Energy

Objective B. To conserve energy through the more efficient management of its use.

Physical Development and Urban Design

Objective B. To develop Honolulu (Waialae-Kahala to Halawa), Aiea, and Pearl City as the Island's primary urban center.

**1.1.2.2 State of Hawaii**

On January 30, 1989, the Director of the Office of State Planning distributed the updated and amended Hawaii State Plan (Chapter 226, Hawaii Revised Statutes (HRS), as amended, May 1986). The plan consists of the goals, objectives, policies, and priorities to be pursued statewide. Based on a review of the document, the relevant major statements from the plan are these:

Sec. 226-14 Objective and Policies for Facility Systems - In General.

- (a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and communication systems that support statewide social, economic, and physical objectives.
- (b) To achieve the general facility systems objective, it shall be the policy of this State to:
  - (1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.
  - (2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.
  - (3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.
  - (4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.

Sec. 226-17 Objectives and Policies for Facility Systems - Transportation.

- (a) Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:
  - (1) An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods.

(2) A statewide transportation system consistent with planned growth objectives throughout the State.

(b) To achieve the transportation objectives, it shall be the policy of this State to (only relevant policies are listed):

- Design, program, and develop a multi-modal system in conformance with desired growth and physical development as stated in Chapter 226, HRS.
- Coordinate State, County, Federal, and private transportation activities and programs toward the achievement of statewide objectives.
- Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties.
- Promote a reasonable level and variety of mass transportation services that adequately meet statewide and community needs.
- Encourage transportation systems that serve to accommodate present and future development needs of communities.
- Promote programs to reduce dependence on the use of automobiles.
- Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawaii's natural environment.
- Encourage safe and convenient uses of low-cost, energy-efficient, non-polluting means of transportation.

### 1.1.2.3 Oahu Metropolitan Planning Organization

The Oahu Metropolitan Planning Organization (OMPO) is the federal- and state-designated regional planning organization, with participation from the City and County of Honolulu and the State of Hawaii. Through its respective policy and advisory committees, a set of transportation goals and objectives related to the Hali 2005 Plan were adopted. Some of the most important goals related to the evaluation of the proposed public transportation alternatives follow:

#### Transportation Service

System Goal. Develop and maintain Oahu's island-wide transportation system to ensure safe, convenient, and economical movement of people and goods.

#### Quality of Life

System Goal. Develop and maintain Oahu's transportation system in a manner which maintains environmental quality and community cohesiveness.

#### Community Responsibility

System Goal. Develop and maintain Oahu's transportation system in a manner that is sensitive to community needs and desires.



### Demand Management

System Goal. Develop a travel demand management system for Oahu which optimizes use of existing transportation resources.

#### 1.1.2.4 Federal Transit Administration

The objectives of the Federal Transit Administration (FTA) program are derived from the findings and purposes contained in the Urban Mass Transportation Act. Two primary purposes of the program, according to the act, are to:

"Assist in the development of improved mass transportation facilities, equipment, techniques, and methods," and to

"Encourage the planning and establishment of areawide urban mass transportation systems needed for economical and desirable urban development."

Congress and FTA have identified several criteria that reflect the extent to which a major investment proposal attains these objectives within the limited resources of the FTA capital program. To be eligible for discretionary capital funding, a major investment proposal must be:

- Based upon the results of an alternatives analysis and preliminary engineering;
- Justified based upon a comprehensive review of the project's mobility improvements, environmental benefits, cost effectiveness, and operating efficiencies; and
- Supported by an acceptable degree of local financial commitment, including stable and dependable sources of funds to construct, maintain, and operate the system.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) also requires that the Secretary of Transportation consider at least the following in making decisions on which projects should be funded:

- The direct and indirect costs of the project alternatives;
- The costs related to such factors as congestion relief, improved mobility, air pollution, noise pollution, energy consumption, and all of the costs to implement each alternative including the cost of mitigation;
- Existing land use policies and future developments that are supportive of transit;
- Increases in the mobility of transit dependents; and
- Promotion of economic development.

#### 1.1.2.5 Other Goals Important in the Selection of an Alternative

In addition to the formal goals listed above, the review of the city, county, regional, state, and federal goals underscores several general goals and directions demanding consideration when evaluating the alternatives. Not all of them apply to transportation improvements by name; however, the relationship between the transportation alternatives and the development policy is clear.

Both the state and local goals state that publicly undertaken improvements be aligned, designed, and constructed to enhance the natural and cultural richness of the state and local area. Such transportation improvements should also provide access to the myriad of cultural, historic, aesthetic, and natural areas.

Other local and state goals support the policy of using transportation improvements to reinforce and direct desirable development patterns. Thus, the related goals of balancing and enhancing Downtown development, reinforcing the leeward side of the island and the urban center, and supporting a mix of Downtown residences and businesses are three general themes that merit consideration in evaluating the improvements.

The final goals mentioned in the local and state plans relate to the natural environment. Specific goals focus on conserving energy, improving air quality, and minimizing undesirable noise levels. Thus, the evaluation of the proposed alternative transportation improvements should consider these related impacts.

### **1.1.3 Specific Transportation Problems in the Region**

Transit has been included as a key component in plans to meet transportation demands in urban Honolulu since the 1960s and the continued viability of transit as a mobility option is a State and City objective, as noted in the previous sections. To date, an efficient and productive bus system has met this objective. The Oahu Regional Transportation Plan (June 1991) found that in the year 2005 capacity problems would exist, even with implementation of 2005 plan roadway improvements.

Further, while this analysis assumes numerous improvements, the implementation of these improvements by 2005 is far from certain. Costs exceed available revenues, and some of the projects may face opposition because of their impacts.

With increasing traffic congestion, a mobility option other than the highway system becomes even more necessary. However, this increasing congestion on the highway and street system frustrates the ability of the bus system to provide this mobility option. As noted in Table 1.4, a downward trend in bus operating speed has occurred, which has resulted in a continuing decline in productivity measured in passengers per vehicle hour (10% over the period 1983 to 1991) and a 50% increase in operating expense per passenger over the same period. If this trend in speeds continues to 2005, average systemwide speeds would decline to 12.4 mph and speeds for local buses would decline to 11.5 mph.

Without the development of facilities and operational strategies to maintain and improve transit operating speed and conditions, further declines in transit productivity can be expected by 2005. Thus, a No-Build option for transit results in a future with no greater percentage of trips on transit than today, but with an increased cost to the community to provide this service. It would offer fewer mobility options for all persons, especially the mobility-impaired. This is in direct conflict with City and State of Hawaii objectives to offer attractive and convenient, multi-modal transportation options.

## **1.2 PLANNING CONTEXT**

### **1.2.1 Planning and Development Process**

The U.S. Department of Transportation (USDOT), FTA has established a number of planning prerequisites for its program of providing capital assistance to metropolitan areas considering the development of fixed guideway transit systems. The process involves a technically sound planning procedure that can be conducted in a reasonable amount of time and will produce sound and objective information on which to make decisions on development of transit solutions to transportation problems. The process has five phases that lead from project conception to completion. These phases are:

1. System Planning (and Transition Studies). System planning refers to the ongoing 3-C (see below) urban transportation planning process conducted in each urbanized area by its metropolitan planning organization. During system planning, local officials develop or update regional goals and objectives, collect data on regional travel patterns, and project future land use and travel. This leads to the

identification of current and anticipated transportation problems and priorities and to selection of the travel corridor for further study.

2. Alternatives Analysis and Draft Environmental Impact Statement (AA/DEIS). Upon receiving approval to initiate an alternatives analysis, the designated local lead agency studies the priority corridor in detail, looking at alternative solutions to the transportation problems identified in system planning. The evaluation of alternatives is documented in a DEIS and circulated for comments. This leads to selection of a preferred mode and alignment, and the adoption of a financing plan.
3. Preliminary Engineering and Final Environmental Impact Statement (PE/FEIS). During the preliminary engineering phase, local project sponsors refine the design of the locally preferred alternative, taking into consideration all reasonable design alternatives. The EIS process is completed and funding sources secured.
4. Final Design. Local agencies may proceed with right-of-way acquisition and the preparation of final construction drawings, construction management plans, project specifications, engineer's costs estimates, and bid documents.
5. Construction. The grantee undertakes physical construction, procurement of vehicles, and pre-service testing.

Since the 1960s, the USDOT has required that each urban area establish a 3-C (cooperative, comprehensive, and continuing) planning process for transportation. The Oahu Transportation Study (1967), the first regional 3-C study, defined a transit corridor based on travel demand. This viable transit corridor lies between Pearl City and Hawaii Kai, and its existence has been retained with slight modifications in all subsequent transit development reports. Subsequent studies in 1972 (PEEP I) and in 1976 (PEEP II) explored various transit technologies and alignments or routes alternatives, including fixed guideway alternatives. More recently, system planning for fixed guideway and other transit in Honolulu has occurred under the auspices OMPO, which is responsible for developing and updating the region's comprehensive transportation plan. The latest plan is The Oahu Regional Transportation Plan, adopted in June 1991, which includes a rapid transit line.

In the 1970s Honolulu proceeded beyond systems planning into planning, environmental, and engineering studies for the Honolulu Area Rail Rapid Transit (HART) project. The City and County of Honolulu, which is authorized by State statute to plan and operate public mass transit on Oahu, served as the lead agency for these studies, which culminated in 1982 with the acceptance of the HART Final Environmental Impact Statement by the Secretary of the USDOT. However, at this time there was change in the City Administration and the decision was made not to proceed with the HART project.

A re-examination of fixed guideway options began in 1985. As noted above, the HART project had completed the PE/FEIS phase and was at the point of entering final design. However, in the re-examination of fixed guideway options, it was decided to explore new technologies that had been developed, to examine alignment variations that would take advantage of the new technologies, and to evaluate alternative public-private financial/implementation options. The alternatives analysis built on previous planning and engineering studies and recognized many key decisions that had already been made. These decisions, such as definition of the corridor, the need for full grade separation and the specification of a fixed guideway technology, were not re-examined in the alternatives analysis.

### **1.2.2 The Environmental Impact Statement Role in Project Development and Decision Making**

The AA/DEIS was prepared for two purposes. The first was to meet the requirements established by the National Environmental Policy Act of 1969 (NEPA), as amended, guidelines of the USDOT, FTA, and

Chapter 343 Hawaii Revised Statutes. The second purpose was to provide sufficient information for decision makers to make an informed selection of a Locally Preferred Alternative (LPA) and financing plan.

The AA/DEIS addressed the social, economic, and environmental impacts of mode and alignment alternatives for the preferred study corridor. Current FTA guidance for alternatives analysis presents a structure for organizing evaluation measures into four key areas — effectiveness, cost-effectiveness, financial feasibility, and equity. The AA/DEIS document, within this evaluation framework, described the likely environmental consequences of each alternative, outlined mitigation measures, and identified those probable impacts that cannot be mitigated.

The AA/DEIS was approved by FTA for circulation on March 19, 1990. Formal public hearings to receive comments on the AA/DEIS were held. On July 25, 1990, the City Council voted to select Alternative 3 (Kamehameha/Hotel) in the AA/DEIS as the LPA. The City Council in making its decision also directed the City Administration to study, during the PE/FEIS stage, the feasibility of relocating the University of Hawaii branch terminus to the Lower Campus (Quarry) area.

On November 14, 1991, the City Council adopted a resolution amending the LPA. The amended LPA is similar to the Kamehameha/Nimitz Alternative (Alternative 8) in the AA/DEIS except the Waikiki segment is eliminated and the Metcalf terminus is changed to the Quarry area at the University.

*The SDEIS supplemented the information in the March 19, 1990 Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS). The changes studied in the SDEIS were as follows: (1) Shifting of the University terminus from Metcalf Street to the Quarry area; (2) Elimination of the Waikiki segment; (3) Relocation of the alignment from Pohukaina Street to Halekauwila Street; and (4) Addition of a park-and-ride lot at the Lagoon Station and three alternatives for a University area park-and-ride lot.*

*The SDEIS was circulated for public review and comment in March 1992. During the formal review period, interested citizens and government agencies were invited to comment on the SDEIS. A public hearing was held on April 23, 1992 to receive testimony. The analyses documented in the SDEIS and the related public input were used by the City Council to amend the LPA to reflect the selection of the Halekauwila Street Option.*

*The following three alternative locations for the University area park-and-ride lot (100-200 spaces) are still under consideration: (1) Oasis Nightclub and Lounge, (2) Varsity Theater parking lot, and (3) commercial property at University/King intersection. These are not part of the amended LPA.*

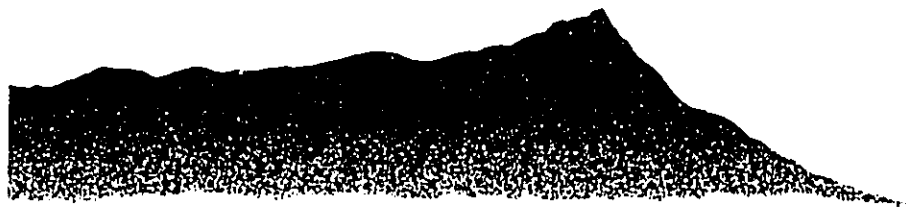
### **1.2.3 Preliminary Engineering and Turnkey Procurement**

On October 23, 1990, FTA authorized the City to proceed with preliminary engineering on the LPA. Work on refining the project began shortly after that date. *The turnkey procurement allowed for various technologies evaluated in the AA/DEIS to be advanced by bidders for the system contract and evaluated by the City.* The primary focus of the early work had been to continue the "turnkey" procurement process to select a System Contractor. The System Contractor, under the direction of the City and its General Engineering Consultant, would be responsible for the design and construction of the rapid transit system. The System Contractor is also responsible for the operation of the system for the initial five years.

Towards this end, the City prepared a Request for Proposals. Five proposals were received from potential System Contractors. The proposals were rigorously evaluated and Oahu Transit Group (OTG) was selected as the System Contractor. The rapid transit system as proposed by OTG, the System Contractor, and adopted by the City is described in Chapter 2.0 of this document. *The System Contractor provided technology-specific information for this FEIS.*

#### **1.2.4 Final Environmental Impact Statement**

*The purpose of this FEIS is to evaluate the impacts of the amended LPA and to address the comments received on the two previously circulated documents. This FEIS also contains commitments to mitigate adverse impacts. No action can be taken on the project for 30 days following the announcement of the FEIS availability in the Federal Register to allow federal agencies the opportunity to refer interagency disagreements to the Council on Environmental Quality. Federal funds for final design and construction cannot be committed to the project until the EIS process has been completed and a Record of Decision issued. Pursuant to Chapter 343, HRS, the Governor of the State of Hawaii is the accepting authority for this FEIS. Therefore, this completed FEIS has been submitted as required for this acceptance.*



**Chapter 2**  
**Alternatives Considered**

## 2.0 ALTERNATIVES CONSIDERED

This chapter reviews the screening and selection process that determined which alternatives *were* considered in the Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) and in the Supplemental Draft Environmental Impact Statement (SDEIS) and the process that led to the selection of the amended Locally Preferred Alternative (LPA). The amended LPA, as well as other alternatives and options considered for the Honolulu Rapid Transit Program (H RTP), are defined in this chapter in terms of physical and operating characteristics, capital costs, and operating and maintenance costs.

More detailed descriptions of the alternatives considered in the earlier AA/DEIS process are included in the Final Definition of Alternatives (December 1989) and the AA/DEIS. The SDEIS provides a more detailed description of the amended LPA and the options considered. In addition, further discussion of the operating characteristics of the alternatives is contained in the Operations and Maintenance Cost Results Report (December 1989). Further discussion of the engineering design concepts of the alternatives is contained in the Capital Cost Results Report (December 1989), including its separately bound Appendix B. Discussion of the selection of the original LPA can be found in the Locally Preferred Alternative Report (August 1990). Plan and profile drawings of the fixed guideway alternative alignments considered in the AA/DEIS and SDEIS are included in Appendix B of each of those documents. Plan and profile drawings of the amended LPA alignment are included as an Appendix to this FEIS.

### 2.1 SCREENING AND SELECTION PROCESS

#### 2.1.1 Summary of Relevant System Planning Activities

Preliminary engineering for the H RTP represents the culmination of over two decades of transit planning. In the 1960s, the State of Hawaii and the City and County of Honolulu, with federal financial support, embarked upon a series of comprehensive transportation studies exploring alternative solutions to satisfying transportation demands. These studies included:

- Oahu Transportation Study (1967);
- Preliminary Engineering and Evaluation Program, Phase I (PEEP I) (1972);
- Evaluation of Alternative Transportation Systems Study (1973);
- Preliminary Engineering and Evaluation Program, Phase II (PEEP II) (1976);
- Hali 2000 Alternatives Analysis Study (1984);
- Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) (1990);
- Oahu Regional Transportation Plan (1991); and
- Supplemental Draft Environmental Impact Statement (SDEIS) (1992).

For a discussion of these referenced studies relative to the screening and selection process, refer to Section 1.2.1 and to the AA/DEIS (March 1990) (page 2-1).

Building on previous studies and public input, the City and County of Honolulu conducted a series of three public scoping meetings during 1987. Community workshops also were held during 1987 and 1988 in six neighborhoods that potentially would be affected by a fixed guideway system. The input received from these meetings and subsequent discussions with special interest groups and agencies helped to identify a range of potential alternatives. For a discussion of the modifications to the set of alternatives in the scoping process, refer to the AA/DEIS (page 2-2).

The screening process for the AA/DEIS resulted in a No-Build Alternative, a Transportation System Management (TSM) Alternative, and six fixed guideway transit system alternatives, plus three Minimum

Operable segments (MOS) being selected and developed for consideration. The AA/DEIS, approved for circulation by FTA on March 19, 1990, provided a comparative analysis of these alternatives.

### **2.1.2 Selection of the Amended Locally Preferred Alternative**

Subsequent to the public review process of the AA/DEIS, the City Council selected a LPA from those options presented in the AA/DEIS. The process began with the circulation of the AA/DEIS on March 19, 1990. After the close of the public review period for the AA/DEIS on May 23, 1990, the City Council and its Economic Development and Transportation Committee held their own public hearings to solicit comments and to select a preferred alternative based on the input received. This process was concluded on July 25, 1990, with the adoption of the original LPA by the City Council (Resolution No. 90-284, CD-1).

The initial task in selecting the LPA was to decide between the No-Build Alternative, an expanded bus solution (TSM Alternative), and a fixed guideway solution as presented in the AA/DEIS. In the technical evaluation of alternatives, a fixed guideway alternative with feeder buses was found to best meet Honolulu's transportation needs. Evaluation criteria included environmental concerns such as impacts on air quality; visual and aesthetic resources; noise; soils; water; and historic, recreation, and parkland areas. In addition to public comments, other important decision making criteria were travel-time savings, ridership, capital and operating costs, opportunities for joint development, relocations, financial feasibility, and a favorable cost-effectiveness index for portions of the alternative that will qualify for federal assistance. The fixed guideway alignment adopted by the City Council, was Alternative 3 (Kamehameha/Hotel) as defined in the AA/DEIS.

The resolution adopted by the City Council further authorized the City Administration to "examine a relocation of the University terminus to the Lower Campus . . . If it (is) determined that the relocation of the University terminus to the Lower Campus is feasible, then the City Administration is authorized to proceed with preliminary engineering (PE) on this revised University segment of the LPA . . ."

The resolution also authorized the City Administration to commence with the Preliminary Engineering/Final Environmental Impact Statement (PE/FEIS) phase of project development. The City Administration proceeded to issue two "Requests for Proposals" (RFP), one for a Hotel Street Subway Contractor and the other for a System Contractor for the development of a fixed guideway system and engineering studies to provide for the further definition of the proposed system.

During this phase further detailed and comprehensive hydrological and geotechnical studies were performed by the City and its General Engineering Consultant. The results of the studies, confirmed by the proposals received in response to the RFP for the Hotel Street Subway Contractor, showed that the construction cost of the subway segment through downtown Honolulu would be much greater than originally estimated. Based on these findings, it was determined that the Hotel Street subway segment in Alternative 3 was financially infeasible.

Therefore, based on the results of the AA/DEIS, preliminary engineering studies conducted to-date, comments received during the public review process, and determinations made in the RFP processes, the City Council amended the LPA by Resolution No. 91-241, CD-1, which replaced the Hotel Street subway with an aerial alignment that generally follows Nimitz Highway, Pohukaina Street, and Ward Avenue and replaced the University terminus at Metcalf Street with a Lower Campus (Quarry) terminus. Due to budgetary and environmental reasons, the Waikiki segment was dropped from further consideration and eliminated by the City Council from the amended LPA. There was considerable community concern that the visual impact of the aerial guideway structure would present negative visual impacts on the resort atmosphere of Waikiki, and an underground alignment was suggested as an alternative. A feasibility assessment of a Waikiki subway indicated highly complex subsurface conditions along the proposed subway alignment that would require expensive, disruptive, and time-consuming non-standard construction techniques. For these reasons, a Waikiki subway alignment was not pursued.



Therefore, in order to satisfy the environmental and budget concerns, fixed guideway service in Waikiki will be replaced by shuttle bus service, as discussed in Section 2.2.2.1. In addition, the City also decided to explore the possibility of shifting the portion of the fixed guideway that will traverse Pohukaina Street one block mauka to Halekauwila Street between Nimitz Highway and Ward Avenue. *This option, as well as the other changes to Alternative 8 (Kamehameha/Nimitz) were analyzed, and a Supplemental Draft Environmental Impact Statement (SDEIS) was issued on March 20, 1992. In a subsequent action by the City Council on July 8, 1992, the Halekauwila Option replaced the guideway alignment on Pohukaina Street. Therefore, the Halekauwila Option is now part of the amended LPA.*

Even though the City Council adopted the amended LPA with an aerial guideway along Nimitz Highway, they were concerned about not providing direct rapid transit service to the heart of the downtown area. As a result of that concern, the City Council directed the City Administration to re-evaluate the feasibility of a downtown subway along a King Street alignment. The study had two primary objectives. The first objective was to determine if a King Street subway alignment would cost significantly less to build than the previously studied Hotel Street alignment, primarily due to better geologic conditions. The second objective was to determine whether additional local financial resources could be found to pay for any increase in cost over and above the cost of the adopted amended LPA. *The additional studies showed that the King Street Subway alignment would be similar in cost to the Hotel Street Subway segment and additional local financial resources were not available. Therefore the King Street Subway alignment was dropped from further consideration.*

Subsequent to the adoption of the amended LPA in 1991 by the City Council, City Administration pursued the possibility of adding park-and-ride lots at the Lagoon Station and in the University area. The park-and-ride lot (450 spaces) for the Lagoon Station will be located in a structure adjacent to the station. *The following three alternative locations for the University area park-and-ride lot also remain under consideration: (1) Oasis Nightclub and Lounge, (2) Varsity Theater parking lot, and (3) commercial property at the University Avenue/King Street intersection. It should be noted that the University area park-and-ride lot is not part of the amended LPA.*

## 2.2 DEFINITION OF ALTERNATIVES

As discussed in Section 2.1.1, the screening analysis presented in the AA/DEIS resulted in eleven system alternatives, of which three were MOS alternatives, being developed for consideration in the AA/DEIS. *This FEIS focuses on the amended LPA, which is approximately Alternative 8 (Kamehameha/Nimitz) presented in the AA/DEIS without the Waikiki segment and including the Halekauwila option. In addition, the FEIS includes the University/Quarry Station as the Koko Head terminus and an additional park-and-ride lot at the Lagoon Station. Three possible sites for a University area park-and-ride lot are also presented in this FEIS; however, the University area park-and-ride lot is not part of the amended LPA.* The alternatives are briefly described in this section. Chapter 2.0 of the AA/DEIS and SDEIS provides greater detail for each alternative not selected as part of the amended LPA.

Consistent loading standards have been assumed for all of the build alternatives. These are based on the seating capacity of the vehicle plus the number of standees that can be accommodated on the vehicle floor, allowing one standee per 2.7 square feet. For fixed guideway vehicles, this amounts to 52 seated passengers plus 156 standing passengers for a design load of 208. For buses, this amounts to 47 seated passengers plus 22 standing passengers, for a design load of 69. For the No-Build Alternative only, today's bus peak loads were allowed; 47 seated passengers plus 36 to 53 standing passengers, for a load of 83 to 100. This loading is well beyond industry design standards and constitutes a noticeably poorer level of comfort than is assumed under the other alternatives.

The fare structure used for all alternatives was based on today's fares (in 1991 dollars assumed to increase by inflation):

Adults:	\$0.60 cash or \$15 monthly pass
Students:	\$0.25 cash or \$7.50 monthly pass
Senior Citizens and Handicapped:	Free with a \$15 pass good for four years or \$0.30 cash with \$6 pass good for four years

Transfers between transit routes, as well as between mass transit modes, will be free. Free parking will be provided at park-and-ride lots.

An honor-system fare-collection procedure has been assumed for use in the fixed guideway alternatives. Fare inspectors will be used to *randomly* check that the passengers have paid a fare. Fare machines will be available at stations, and standard fare boxes will be used on buses.

The highway system, assumed to be in place for all alternatives in the year 2005, consists of the network developed jointly by the City and County of Honolulu and the State of Hawaii as part of the Oahu Metropolitan Planning Organization (OMPO) Oahu Regional Transportation Plan (1991). The guidelines used to develop the highway network continue existing City and State of Hawaii policies to expand into areas of new development, and where feasible, provide capacity to allow peak-period operation at Level of Service D. The plan includes a series of highway improvements for general highway traffic and for high occupancy vehicles (HOV/bus lanes).

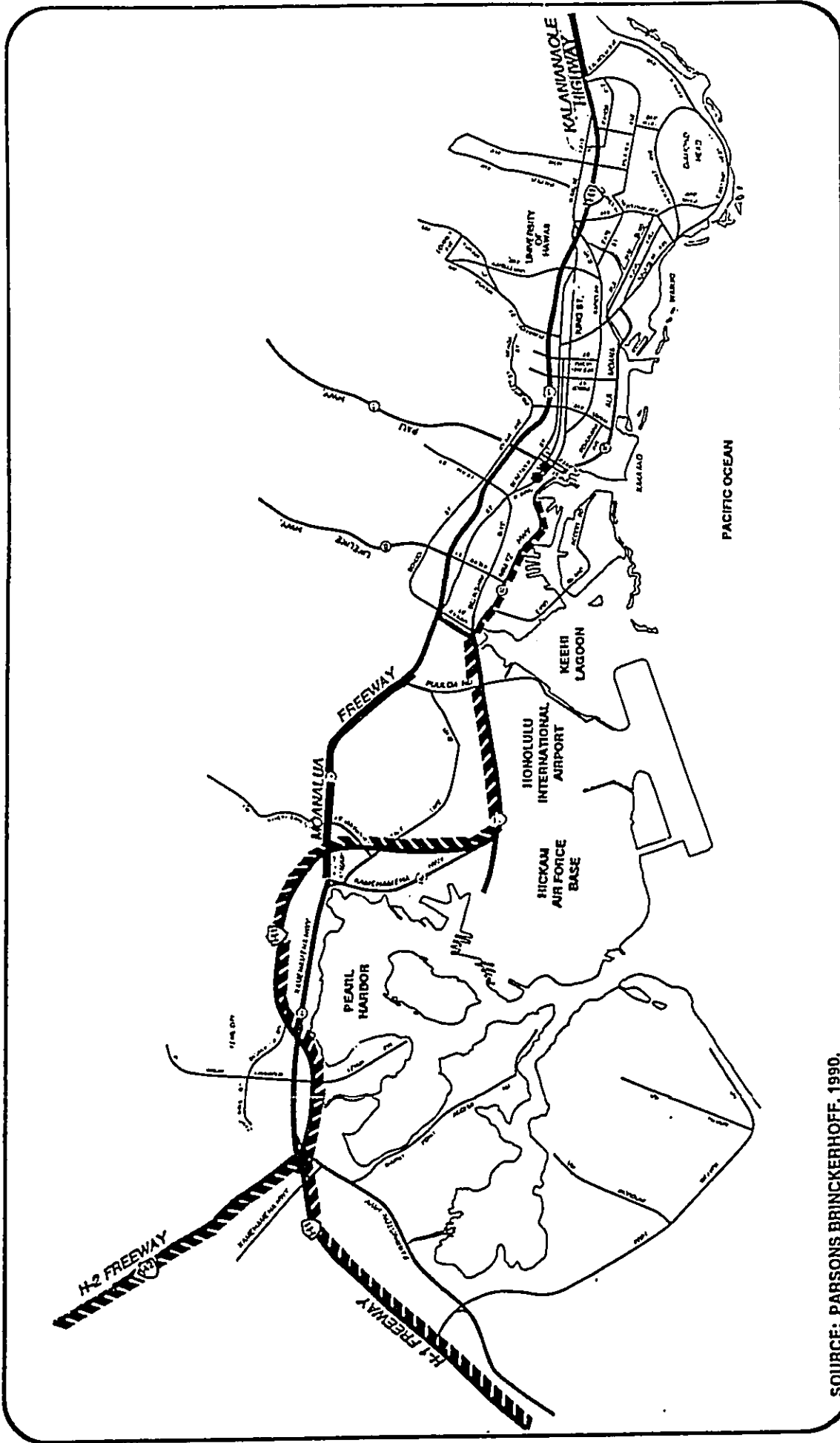
The HOV/bus lanes network is shown on Figure 2.1. In the highway network, use of the HOV/bus lanes is restricted to buses and other vehicles with two or more occupants. For 2005, the following operating speeds are assumed for buses in HOV lanes:

H-1 -- Ewa of Waiawa Interchange	50 mph
H-2 -- Mauka of Waiawa Interchange	40 mph
H-1 -- Waiawa Interchange to Keehi Interchange	40 mph
Moanalua Freeway -- Aiea Interchange to Ft. Shafter	40 mph
Makai Viaduct -- Keehi Interchange to Pacific St.	40 mph

At present, buses in the existing H-1 HOV lanes from the Waiawa Interchange to the Keehi Interchange do not have significant speed advantage over traffic in general purpose lanes. Surveys of a.m. peak hour bus speeds taken in October 1989 observed average bus speeds in the HOV lanes from the Waiawa Interchange (H-1/H-2) to the Halawa Interchange (H-1/Moanalua Freeway) of 25.1 mph and from the Halawa Interchange to the Keehi Interchange (H-1/Nimitz/Dillingham) of 37.1 mph which are lower than what would be expected for an HOV lane. Therefore, as noted above, for 2005 bus speeds in HOV lanes on H-1 from the Waiawa Interchange to the Keehi Interchange, and also on the Makai Viaduct from the Keehi Interchange to Pacific Street, are assumed to be 40 mph. This higher speed could result from some minor operational improvements, better enforcement of HOV regulations, and, perhaps, a tightening of the HOV definition from vehicles with two or more occupants to vehicles with three or more occupants.

### **2.2.1 Alternatives Considered in the AA/DEIS and SDEIS**

The alternatives considered in the AA/DEIS and SDEIS are summarized in this section.



SOURCE: PARSONS BRINCKERHOFF, 1990.

FIGURE 2.1

REGIONAL TRANSPORTATION PLAN-  
HIGH OCCUPANCY VEHICLE NETWORK  
HONOLULU RAPID TRANSIT PROGRAM

0 3000 6000  
SCALE FEET

- LEGEND
- HOV/BUS LANES INBOUND
  - - - HOV/BUS LANES REVERSIBLE
  - ▨ HOV/BUS LANES BI-DIRECTIONAL
  - TRANSIT MALL



### 2.2.1.1 Alternative 1: No-Build

The No-Build Alternative provides a baseline for establishing the transportation and environmental impacts of the other alternatives being considered. This alternative is physically and fiscally constrained by the existing bus fleet size but assumes construction of the adopted long-range highway plan, including incorporation of existing and planned HOV/bus lanes (see Figure 2.1). The No-Build Alternative represents the best utilization of the bus fleet purchased through FY 92, with a total fleet of 495 vehicles and a peak pull-out of 412 buses, to meet the Year 2005 demands. *For the No-Build Alternative, the existing route structure is modified so that all of the Year 2005 baseline demand can be accommodated.*

*Given the restricted fleet size, the number of passengers per vehicle would grow beyond the design standards on the majority of peak period bus routes. For the purposes of this analysis, bus loads are allowed to reach an average of 97 passengers per vehicle, a level that had been observed during the 1991 On-Board Bus Survey. Such crush loading allows standing passengers only 1.2 square feet of standing room, compared to the design standard of 2.7 square feet per standing passenger. If the No-Build Alternative were designed to accommodate the peak-load-point demand with the design standards used for the other alternatives, the vehicle requirements would be a total fleet of 694 buses and a peak pull-out of 578 buses.*

Existing and under-construction park-and-ride facilities at Hawaii Kai, Mililani Mauka, West Loch, and the Wahiawa Armory are assumed. Two existing maintenance facilities are assumed: Halawa and Kalihi/Palama.

### 2.2.1.2 Alternative 2: Transportation System Management

The Transportation System Management (TSM) Alternative represents the best transit service using buses without constructing a fixed guideway transit system. This alternative assumes construction of the adopted long-range highway plan, including the incorporation of existing and planned HOV/bus lanes (see Figure 2.1). The alternative would have required a bus fleet of 997 vehicles, with 831 vehicles operating during peak periods. New express service would be added from a series of park-and-ride lots to the activity centers of Downtown/Kakaako, University of Hawaii, Pearl Harbor, and Waikiki.

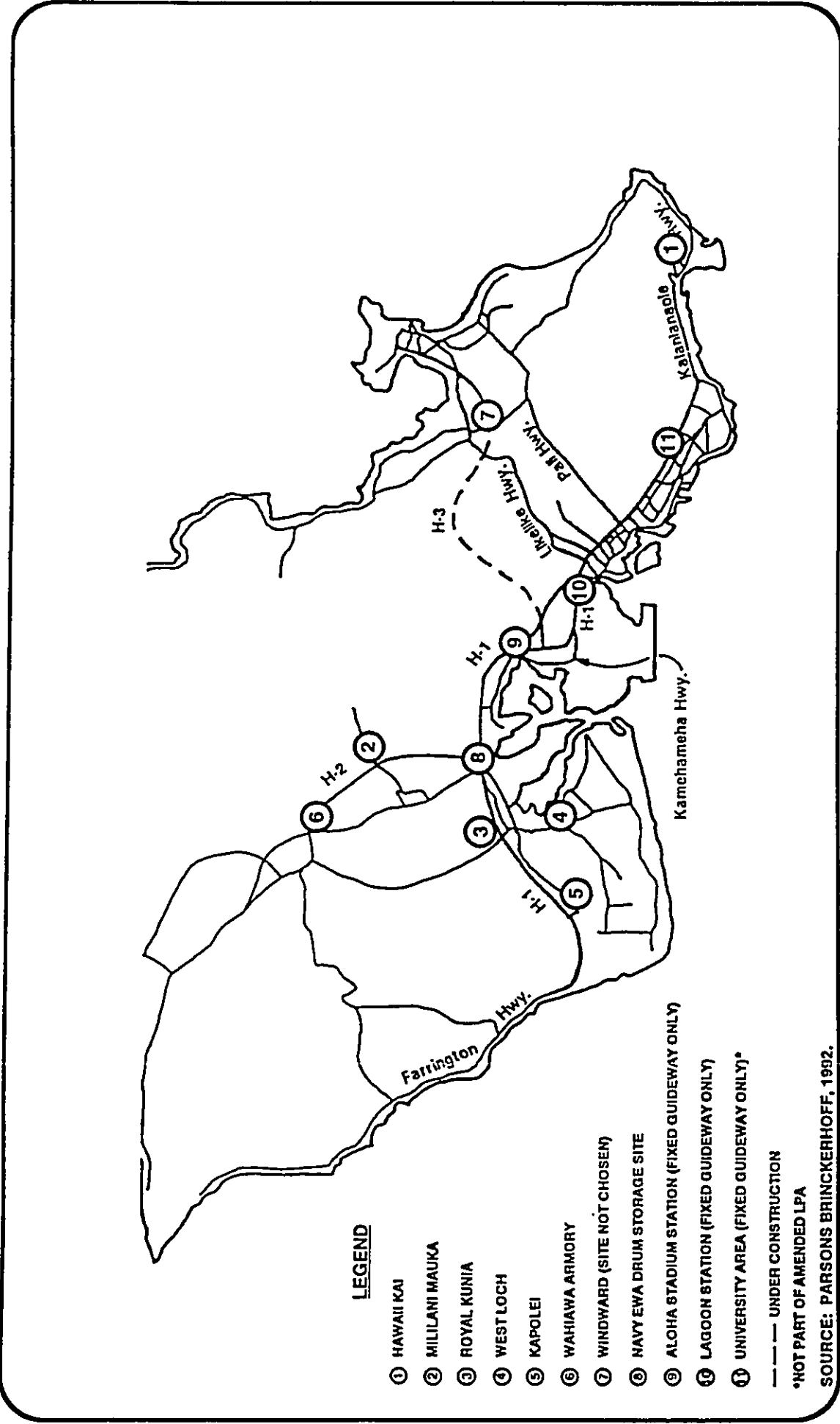
Eight park-and-ride lots (about 250 parking stalls each) were assumed to operate under this alternative; their locations are shown on Figure 2.2, and include Hawaii Kai, Wahiawa Armory, Mililani Mauka, West Loch, Royal Kunia (previously referred to as Village Park), Kapolei, Navy Ewa Drum Storage Site, and a Windward site. A second Windward site, at Kawainui Marsh, was previously considered, but has since been dropped because of environmental concerns.

A total of four to six bus maintenance and/or storage facilities would be needed; the four included in the Short-Range Transit Plan (Halawa, Kalihi/Palama, Leeward/Campbell, and Windward) and two others at undetermined sites, or possibly at expanded sites incorporating the satellite service garages at the Leeward/Campbell and Windward sites.

### 2.2.1.3 Alternatives 3 to 11: Fixed Guideway Alternatives

The analysis in the AA/DEIS examined six full-corridor fixed guideway alternatives (Alternatives 3 to 8), each having a different physical alignment. Three MOS alternatives (Alternatives 9 to 11) also were included. The MOS alternatives represent feasible shorter and lower-cost portions of the full-corridor alternatives. Table 2.1 provides a summary description for each fixed guideway alternative considered.

The full-corridor fixed guideway alternatives included the TSM Alternative's park-and-ride lots plus an expansion of the Waiawa Station facility and an additional park-and-ride lot at the Aloha Stadium Station. Each fixed guideway alternative would have operated on its own right-of-way, separate from existing bus



**FIGURE 2.2**  
**LOCATION OF**  
**PARK-AND-RIDE LOTS**  
**HONOLULU RAPID TRANSIT PROGRAM**

**Table 2.1**  
**SUMMARY DESCRIPTION OF THE AA/DEIS FIXED GUIDEWAY ALTERNATIVES**

Alternatives	Alignment Description	System Description
3    Kamehameha/Hotel	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, past the Honolulu International Airport, and follow Dillingham Boulevard into the CBD. The CBD segment would be a subway under Hotel Street and Kapiolani Boulevard. The alignment resurfaces at Dreier Street and proceeds in the Koko Head direction following Waimanu and Kona Streets to Ala Moana Center. Shortly thereafter, the alignment divides into two single guideway branches, one serving Waikiki and the other serving the University of Hawaii.</p>	<ul style="list-style-type: none"> <li>• Total Length:                    17.3 miles</li> <li>• Total No. of Stations:        24</li> <li>• Park &amp; Ride Lots (Guideway):    2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
4    Salt Lake/Hotel	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, Salt Lake Boulevard, and Dillingham Boulevard. The CBD segment would be a subway section under Hotel Street and Kapiolani Boulevard. Resurfacing at Dreier Street, the alignment would proceed in the Koko Head direction and follow Waimanu and Kona Streets to Ala Moana Center on standard aerial structures. Shortly thereafter, the alignment would divide into two single guideway branch lines, one serving Waikiki and the other serving the University of Hawaii.</p>	<ul style="list-style-type: none"> <li>• Total Length:                    16.7 miles</li> <li>• Total No. of Stations:        23</li> <li>• Park &amp; Ride Lots (Guideway):    2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
5    Salt Lake/Beretania	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, Salt Lake Boulevard, and Dillingham Boulevard. The CBD segment would be a standard dual aerial structure along N. Beretania Street, stacked aerial structure along Alakea Street (meaning one set of tracks above the other instead of standard side-by-side); and transition back to a dual aerial structure along Nimitz Highway, Pohukaina Street, Ward Avenue, Waimanu Street, and Kona Street to Ala Moana Center. Shortly thereafter, the alignment would divide into two single guideway branch lines, one serving Waikiki and the other serving the University of Hawaii.</p>	<ul style="list-style-type: none"> <li>• Total Length:                    17.5 miles</li> <li>• Total No. of Stations:        27</li> <li>• Park &amp; Ride Lots (Guideway):    2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>

CBD = Central Business District

**Table 2.1**  
**SUMMARY DESCRIPTION OF THE AA/DEIS FIXED GUIDEWAY ALTERNATIVES**  
**(Continued)**

Alternatives	Alignment Description	System Description
6	<b>Salt Lake/Nimitz</b>	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, Salt Lake Boulevard, and Dillingham Boulevard. The CBD segment would be a standard aerial structure along Nimitz Highway, then follow Pohukaina Street, Ward Avenue, Waimanu Street, and Kona Street to Ala Moana Center. Shortly thereafter, the alignment would divide into two single guideway branch lines, one serving Waikiki and the other serving the University of Hawaii.</p> <ul style="list-style-type: none"> <li>• Total Length: 17.0 miles</li> <li>• Total No. of Stations: 25</li> <li>• Park &amp; Ride Lots (Guideway): 2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
7	<b>Kamehameha/Beretania</b>	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, past the Honolulu International Airport and follow Dillingham Boulevard into the CBD. The CBD segment would be a standard aerial structure along N. Beretania Street, stacked aerial structure along Alakea Street, and transition back to a standard dual aerial structure along Nimitz Highway, Pohukaina Street, Ward Avenue, Waimanu Street, and Kona Street to Ala Moana Center. Shortly thereafter, the alignment would divide into two single guideway branch lines, one serving Waikiki and the other serving the University of Hawaii.</p> <ul style="list-style-type: none"> <li>• Total Length: 18.0 miles</li> <li>• Total No. of Stations: 28</li> <li>• Park &amp; Ride Lots (Guideway): 2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
8	<b>Kamehameha/Nimitz</b>	<p>The alignment would serve the CBD from the Ewa direction via Kamehameha Highway, past the Honolulu International Airport and follow Dillingham Boulevard into the CBD. The CBD segment would be a standard aerial structure along Nimitz Highway, then follow Pohukaina Street, Ward Avenue, Waimanu Street, and Kona Street to Ala Moana Center. Shortly thereafter, the alignment would divide into two single guideway branch lines, one serving Waikiki and the other serving the University of Hawaii.</p> <ul style="list-style-type: none"> <li>• Total Length: 17.6 miles</li> <li>• Total No. of Stations: 26</li> <li>• Park &amp; Ride Lots (Guideway): 2</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>

CBD = Central Business District

**Table 2.1**  
**SUMMARY DESCRIPTION OF THE AA/DEIS FIXED GUIDEWAY ALTERNATIVES**  
**(Continued)**

Alternatives	Alignment Description	System Description
9 Aloha Stadium/Hotel/ Waikiki	From Aloha Stadium, the alignment would follow Salt Lake Boulevard and Dillingham Boulevard to the CBD. The CBD segment would be a subway under Hotel Street and Kapiolani Boulevard. Resurfacing at Dreier Street, the alignment would proceed in the Koko Head direction and follow Waimanu and Kona streets to Ala Moana Center. From this point it would proceed to Kapahulu Avenue along Atkinson Drive, Kapiolani Boulevard, Kalakaua Avenue, and Kuhio Avenue. The entire alignment would be dual tracks with operations in both directions.	<ul style="list-style-type: none"> <li>• Total Length: 10.9 miles</li> <li>• Total No. of Stations: 18</li> <li>• Park &amp; Ride Lots (Guideway): 1</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
10 Middle Street/Hotel/ Waikiki	The alignment would follow Dillingham Boulevard from Middle Street to Iwilei Road, include a subway segment under Hotel Street and Kapiolani Boulevard, then resurface at Dreier Street and proceed in the Koko Head direction, following Waimanu and Kona Streets to the Ala Moana Center. From this point it would proceed to Kapahulu Avenue along Atkinson Drive, Kapiolani Boulevard, Kalakaua Avenue, and Kuhio Avenue. The entire alignment would consist of a dual track system with operations in both directions.	<ul style="list-style-type: none"> <li>• Total Length: 6.3 miles</li> <li>• Total No. of Stations: 14</li> <li>• Park &amp; Ride Lots (Guideway): 0</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>
11 Middle Street/Nimitz/ Waikiki	The alignment would follow Dillingham Boulevard from Middle Street into the CBD. The CBD segment would be a standard, aerial structure along Nimitz Highway then would proceed in the Koko Head direction following Pohukaina Street, Ward Avenue, Waimanu Street, and Kona Street to Ala Moana Center. From this point it would proceed to Kapahulu Avenue along Atkinson Drive, Kapiolani Boulevard, Kalakaua Avenue, and Kuhio Avenue. The entire alignment would consist of dual tracks with operations in both directions.	<ul style="list-style-type: none"> <li>• Total Length: 6.7 miles</li> <li>• Total No. of Stations: 16</li> <li>• Park &amp; Ride Lots (Guideway): 0</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>

CBD = Central Business District

Source: Parsons Brinckerhoff Quade & Douglas, Inc., November 1989.



and automobile traffic. Each fixed guideway alternative primarily consisted of elevated dual tracks providing service in both directions, complemented by an extensive feeder network of local and express buses. The construction of the adopted long-range highway plan also was assumed.

*The original LPA was Alternative 3 (Kamehameha/Hotel) as discussed in the AA/DEIS. The rationale for the selection of the original LPA is detailed in the Locally Preferred Alternative Report (August 1990).*

*The No-Build Alternative was rejected as being unresponsive to the future transportation needs of the corridor. The existing bus fleet would not be able to accommodate the expected future growth in demand.*

*Ultimately a fixed guideway alternative was chosen over the TSM Alternative on the basis of travel time savings, system capacity, and total transit ridership. Alternative 3 was the preferred fixed guideway alignment because it would provide better service to Honolulu International Airport and Pearl Harbor, and more direct service to Downtown. It also was judged to have the fewest displacements and relocations, the least visual impact, the least impact on the Salt Lake community, and the lowest operating and maintenance cost.*

*The LPA was subsequently amended by:*

- *Replacing the Hotel Street subway with an aerial alignment along Nimitz Highway because of the unexpected high cost of subway construction Downtown;*
- *Dropping the Waikiki section of the alignment due to community opposition;*
- *Moving from Pohukaina Street to Halekauwila Street to reduce impacts and cost; and*
- *Changing the University of Hawaii terminus to the Quarry to better serve the University and eliminate branching of the line.*

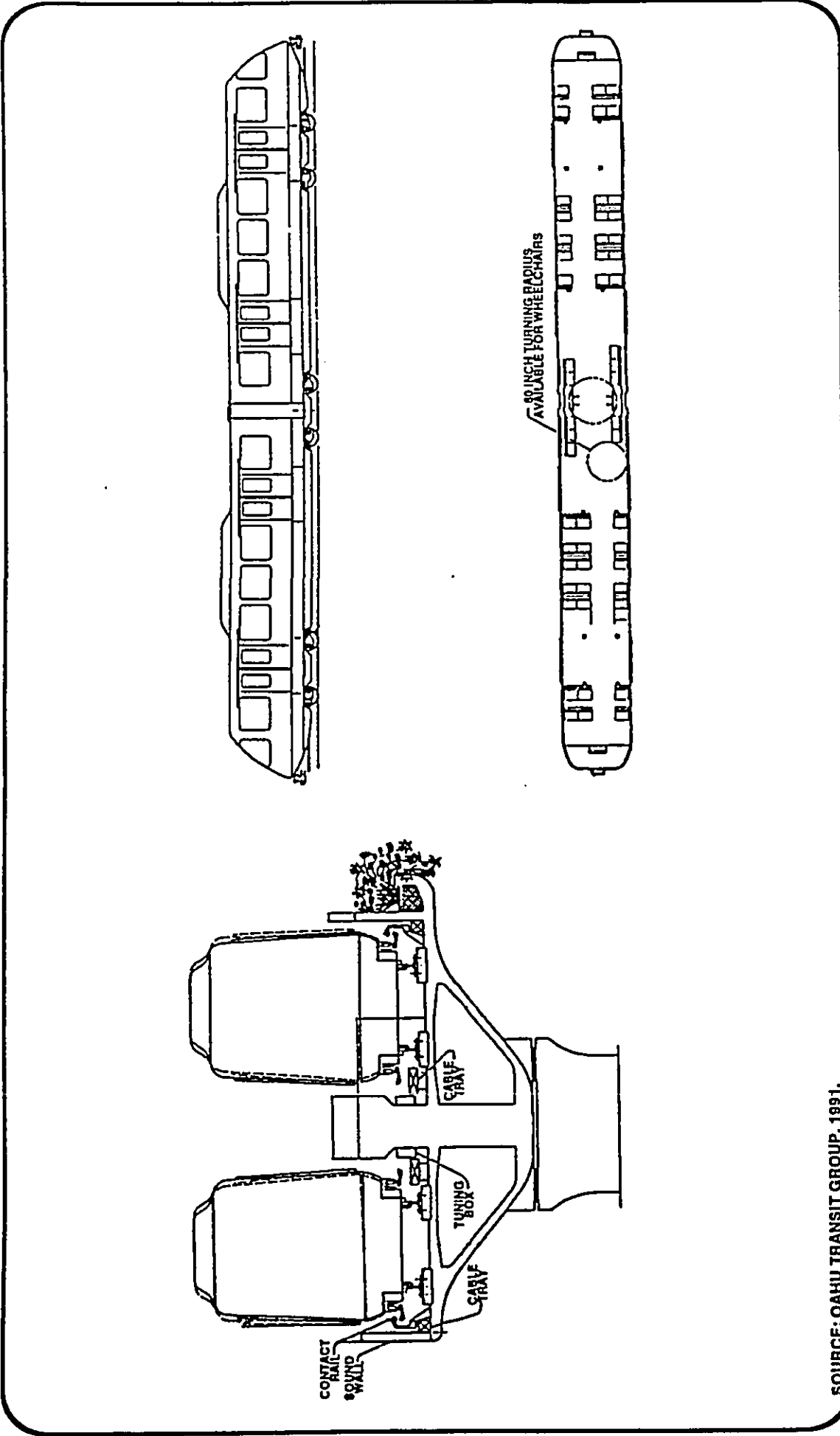
### **2.2.2 The Amended Locally Preferred Alternative**

The amended LPA for the Honolulu Rapid Transit Program, selected as a result of the AA/DEIS process and further engineering studies, is approximately Alternative 8 (Kamehameha/Nimitz) without the Waikiki segment. *The Halekauwila Option, discussed in the SDEIS, has been selected to replace the Pohukaina portion of the alignment. This option has been selected for several reasons. The alignment avoids impacts to the Prince Kuhio Federal Building and Ala Moana Mini-Park. It will also consist of a shorter and straighter track segment than the Pohukaina Street Option, resulting in an improvement in system speed and a reduction in construction costs. The Halekauwila Option also requires less right-of-way and fewer business relocations, and does not result in any change in anticipated ridership when compared to the alignment proposed for Pohukaina Street.*

*The amended LPA also differs from Alternative 8 because the University/Quarry option, requested for study by the City Council, has been selected as the Koko Head terminus and includes double tracking to the terminus (see Section 2.1.2). It also includes a park-and-ride lot at the Lagoon Station.*

The selected system technology consists of a rubber-dampened, steel-wheel articulated vehicle that will operate on continuously-welded steel rail. The vehicle will be 95 feet in length and propelled by AC-drive technology. Figure 2.3 illustrates the guideway/vehicle combination that has been selected.

The City's selected alignment will serve the Central Business District (CBD) from the Ewa direction via Kamehameha Highway until past the Honolulu International Airport and will follow Dillingham Boulevard into the CBD. The CBD segment will be a standard aerial structure along Nimitz Highway, then will follow Halekauwila Street, Ward Avenue, Waimanu Street, and Kona Street to the Ala Moana Center. The alignment will then continue to the University of Hawaii along Atkinson Drive, Kapiolani Boulevard, and University Avenue. The entire alignment will consist of dual tracks operating in both directions. Table 2.2



**FIGURE 2.3**  
**SELECTED GUIDEWAY/VEHICLE**  
**COMBINATION**  
**HONOLULU RAPID TRANSIT PROGRAM**

Table 2.2  
**SUMMARY DESCRIPTION OF THE AMENDED LOCALLY PREFERRED ALTERNATIVE**

Alternatives	Alignment Description	System Description
<b>Amended Locally Preferred Alternative</b>	<i>The Ewa (west) end of the project is in the vicinity of Waiawa, from which it will follow Kamehameha Highway until past the Honolulu International Airport and will follow Dillingham Boulevard into the CBD. The CBD segment will be a standard aerial structure along Nimitz Highway, then it will follow Halekauwila Street, Ward Avenue, Waimanu Street, and Kona Street to the Ala Moana Center. The alignment will continue on Kona Street, Atkinson Drive, and Kapiolani Boulevard to University Avenue, terminating at the University Quarry.</i>	<ul style="list-style-type: none"> <li>• Total Length: 15.9 miles</li> <li>• Total No. of Stations: 22</li> <li>• Park &amp; Ride Lots (Guideway): 3</li> <li>• Maintenance Facilities (Guideway): 1</li> </ul>

CBD = Central Business District

Source: Parsons Brinckerhoff Quade & Douglas, Inc., June 1992.

provides a summary description for the amended LPA. Figure 2.4 shows the amended LPA. Also refer to the Plan and Profile Drawings in Appendix B of this FEIS. In summary, the amended LPA will be 15.9 miles long, have 22 stations, three park-and-ride lots associated directly with the alignment, and one maintenance yard.

### 2.2.2.1 Operating Characteristics

#### Bus System

The general framework of the bus service for all the alternatives, with the exception of the No-Build Alternative, was developed using the following guidelines:

- Continue to provide service to all areas currently receiving transit service;
- Expand service into new neighborhoods consistent with the City's policy of servicing new demand;
- Maintain existing service standards, providing more frequent service only to the extent that is warranted by increased ridership; and
- Follow the recommendations made in the FY 1992 Short-Range Transit Plan to the extent practical.

In addition, bus service for the fixed guideway alternatives, including the amended LPA, was developed considering the following:

- Terminate all Leeward corridor and East Honolulu express routes at the first convenient fixed guideway station;
- Provide direct access at frequent intervals to the fixed guideway system from local routes; and
- Minimize the need for transferring to the fixed guideway for short trips by maintaining parallel local bus routes.

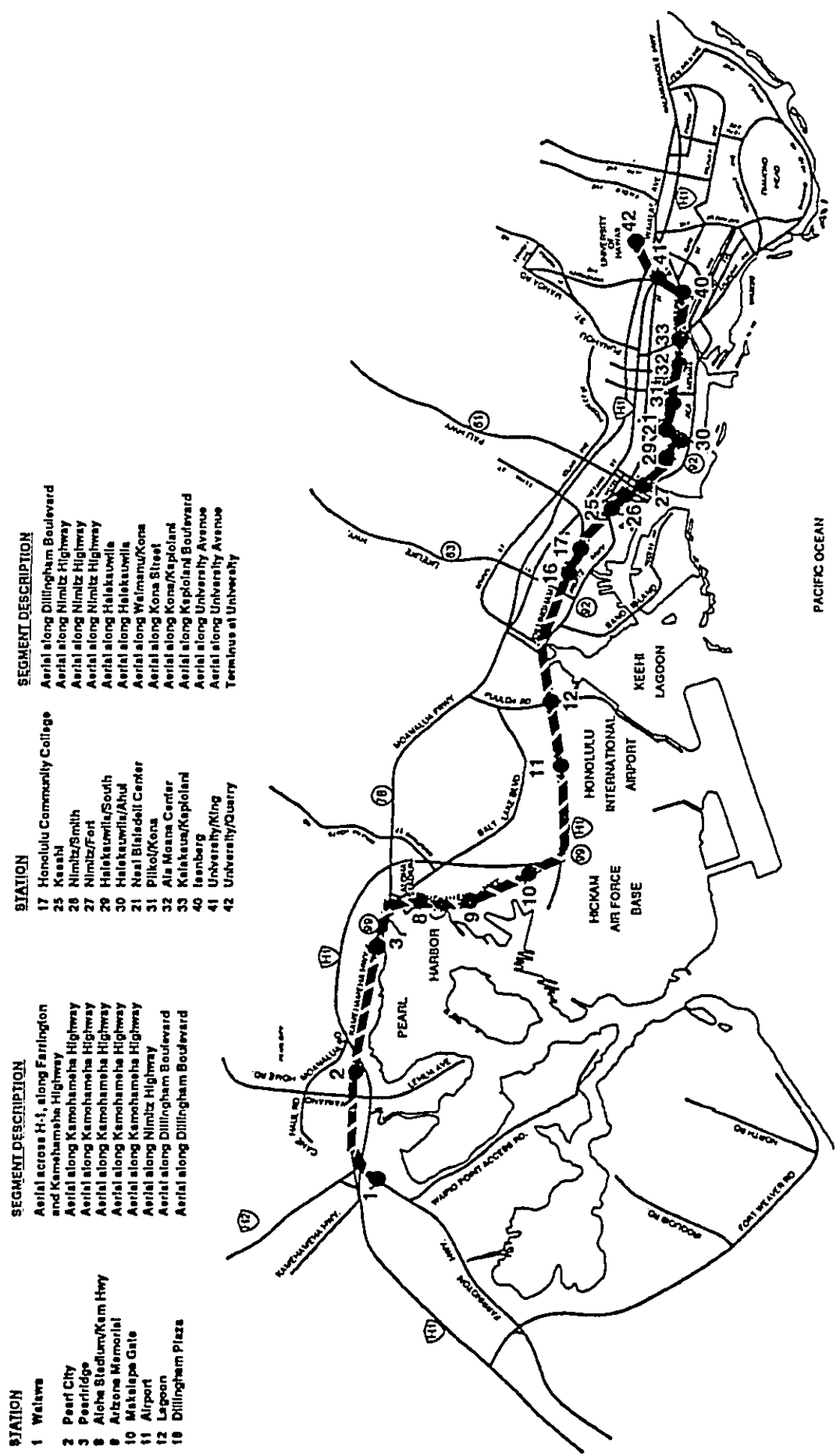
On the Ewa side, express buses will utilize the H-1 Freeway and H-2 Freeway HOV/bus lanes to Waiawa Station where they will connect to the fixed guideway system. On the Koko Head side, express buses from East Honolulu will connect to the fixed guideway system at University/King Station. Table 2.3 shows the number of weekday buses required for each alternative.

The two existing bus maintenance facilities, Halawa and Kalihi/Palama, and two additional bus storage facilities (Leeward/Campbell and Windward) will be needed.

Table 2.3 WEEKDAY TRANSIT VEHICLE REQUIREMENTS - YEAR 2005				
Alternative	Buses		Fixed Guideway	
	Peak	Fleet	Peak	Fleet
No-Build <sup>1</sup>	412	495	0	0
TSM	831	997	0	0
Amended LPA	558	670	44	52

Source: Parsons Brinckerhoff Quade & Douglas, Inc., April 1992.

Note: <sup>1</sup> If the No-Build Alternative were designed to accommodate peak-load-point demand with the same vehicle-load standards as the other alternatives, the bus requirements would be 578-peak and 694-fleet.



STATION	SEGMENT DESCRIPTION
1	Waiawa
2	Pearl City
3	Pearlridge
4	Aloha Stadium/Kem Hwy
5	Arizona Memorial
6	Makalepa Gate
7	Airport
8	Lagoon
9	Dillingham Plaza
10	Aerial across H-1, along Farrington and Kamehameha Highway
11	Aerial along Kamehameha Highway
12	Aerial along Kamehameha Highway
13	Aerial along Kamehameha Highway
14	Aerial along Kamehameha Highway
15	Aerial along Kamehameha Highway
16	Aerial along Kamehameha Highway
17	Aerial along Dillingham Boulevard

STATION	SEGMENT DESCRIPTION
17	Honolulu Community College
25	Kesah
26	Nimitz/Smith
27	Nimitz/Fort
28	Halekaunui/South
29	Halekaunui/Alud
30	Halekaunui
31	Pilikoi/Kona
32	Ala Moana Center
33	Kilauea/Kapiolani
40	Iserberg
41	University/King
42	University/Quarry

SEGMENT DESCRIPTION
Aerial along Dillingham Boulevard
Aerial along Nimitz Highway
Aerial along Nimitz Highway
Aerial along Nimitz Highway
Aerial along Halekaunui
Aerial along Halekaunui
Aerial along Waimanu/Kona
Aerial along Kona Street
Aerial along Kona/Kapiolani
Aerial along Kapiolani Boulevard
Aerial along University Avenue
Aerial along University Avenue
Terminus at University

SOURCE: PARSONS BRINCKERHOFF, 1992.

**FIGURE 2.4**  
**AMENDED LOCALLY PREFERRED ALTERNATIVE**  
**HONOLULU RAPID TRANSIT PROGRAM**

0 3000 6000  
SCALE FEET

MAUKA  
EWA  
KOKO HEAD  
MAKAU

LEGEND  
 ● STATIONS  
 - - - ALIGNMENT

#### Downtown Shuttle/Fixed Guideway Interface

The center of Downtown is generally along King Street. The central Downtown station in the original LPA, Hotel/Alakea, would have been located approximately 600 feet mauka of King Street. The central Downtown station in the amended LPA, Nimitz/Fort, will be located approximately 850 feet makai of King Street. Because the amended LPA will less centrally serve the Downtown, a series of shuttle bus routes will be provided to facilitate access between Downtown and Kakaako locations and the fixed guideway stations at Nimitz/Smith, Nimitz/Fort, *Halekauwila/South*, and *Halekauwila/Ahui*. As shown on Figure 2.5, three shuttle loops, each offering a bus every three minutes during the peak period and a bus every ten minutes during the base period, will serve Downtown and Kakaako, in addition to continuing regular bus service. All transfers between the fixed guideway and the shuttle buses or regular buses will be free.

Figures 2.6a and 2.6b show the shuttle bus interfaces at the Nimitz/Smith, Nimitz/Fort, and *Halekauwila/South Stations*. In each case, the curbside shuttle bus stop will be located to be convenient for pedestrian access to the station and away from heavy vehicular traffic (on Nimitz Highway). For the two Nimitz stations, the shuttle bus stop will be located across a minor street (Smith Street and Queen Street, respectively) from the station entrance. For the *Halekauwila/South Station*, the shuttle bus stop will be located immediately adjacent to the station entrance.

While the shuttle buses will provide frequent service between the fixed guideway stations and Downtown and Kakaako locations, total bus volumes in the Downtown area will decline with the amended LPA relative to existing conditions and to the TSM Alternative. As can be seen from Table 2.4, bus traffic in the vicinity of the Nimitz/Smith and Nimitz/Fort Stations will be much less than existing or with the TSM Alternative. Bus traffic in the vicinity of the *Halekauwila/South Station* will increase with the amended LPA, but not to a level that will create street capacity problems.

Station	Existing	TSM	Amended LPA
Nimitz/Smith	90	120	20
Nimitz/Fort	118	135	64
Halekauwila/South	9	18	40

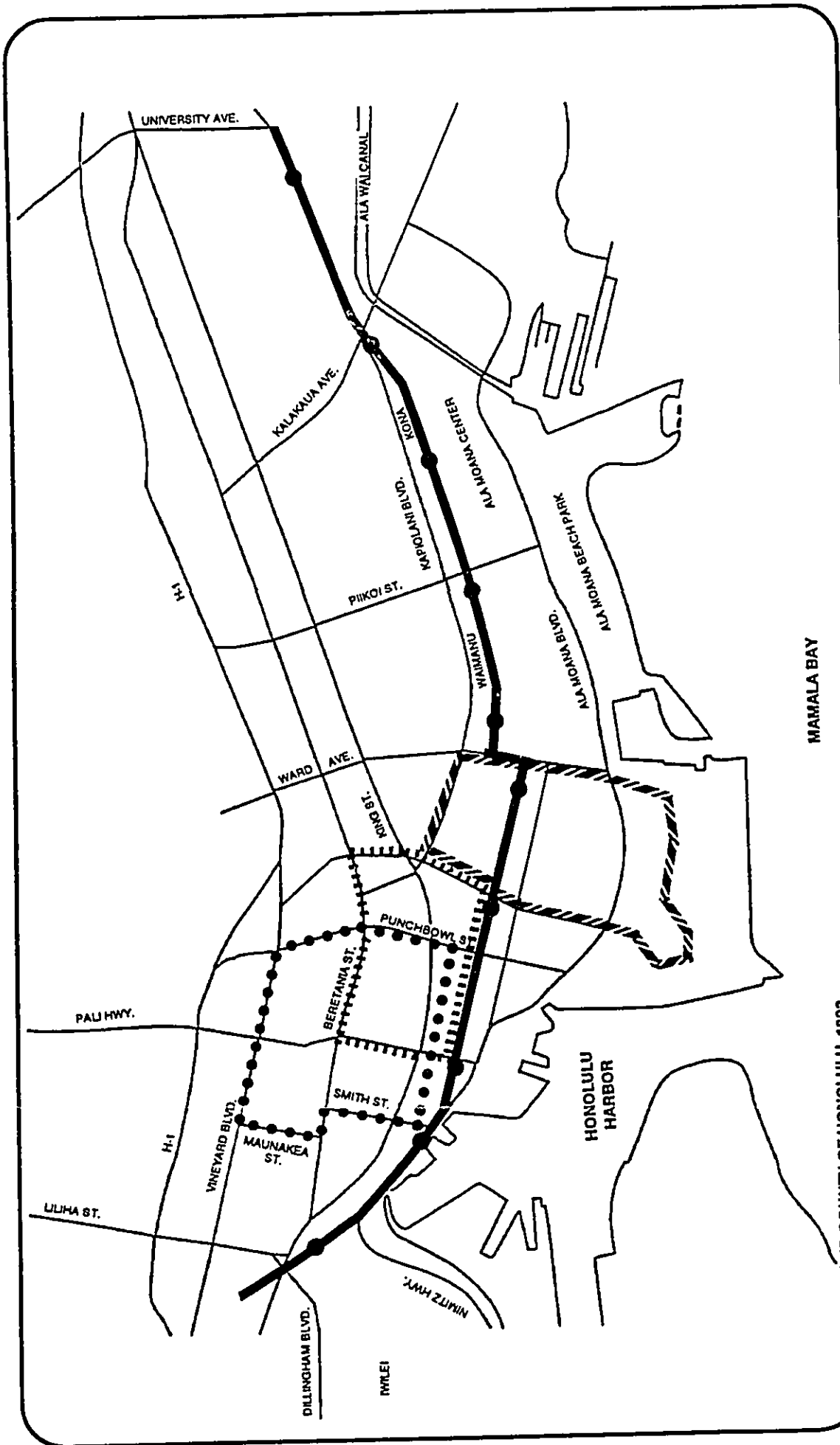
Source: City and County of Honolulu, 1992.

#### Waikiki Shuttle/Fixed Guideway Interface

Waikiki will be served with buses rather than a fixed guideway transit alignment, as presented in the AA/DEIS. Bus service will be provided using shuttle routes from within Waikiki interfacing with one of the nearby fixed guideway stations, Ala Moana Center or Kalakaua/Kapiolani.

Figure 2.7 shows the Waikiki shuttle bus service. The shuttle service will not impact Kuhio Avenue traffic as the number of buses on Kuhio will be reduced from the existing 106 buses per hour in two directions to 98 per hour for the amended LPA.

The bus interface plan for the Kalakaua/Kapiolani Station is shown on Figure 2.8.

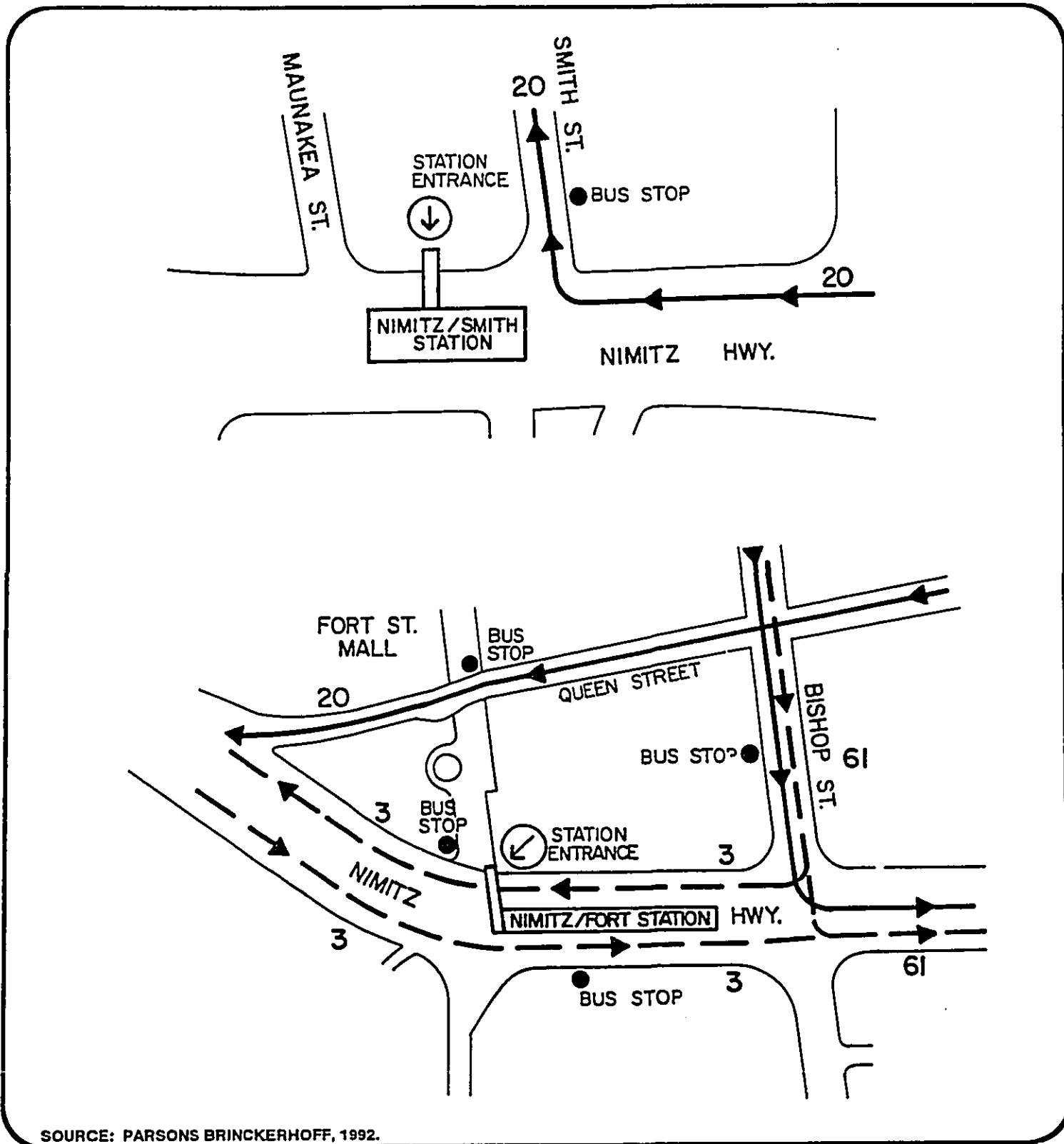


SOURCE: CITY AND COUNTY OF HONOLULU, 1992.

**FIGURE 2.5**  
**DOWNTOWN SHUTTLE SERVICE**  
**HONOLULU RAPID TRANSIT PROGRAM**

**LEGEND**

		GUIDEWAY ALIGNMENT
		SHUTTLE BUS ROUTES



SOURCE: PARSONS BRINCKERHOFF, 1992.

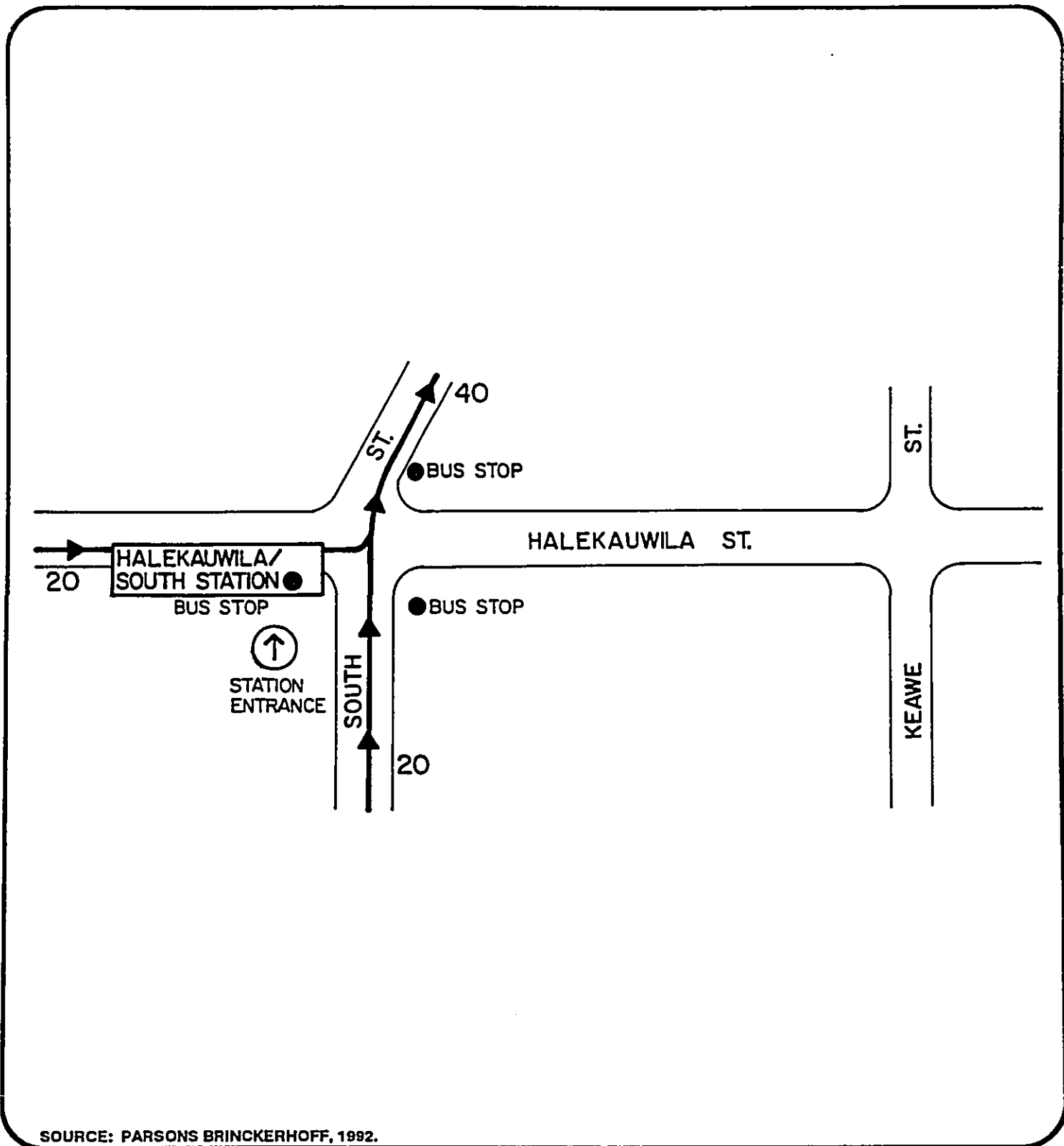


**LEGEND**  
 ——— DOWNTOWN SHUTTLE  
 - - - BUS  
 (NUMBERS INDICATE THE NUMBER OF BUSES PER HOUR)

**FIGURE 2.6a**

**HOURLY BUS VOLUMES AROUND DOWNTOWN AND KAKAAKO STATIONS  
 HONOLULU RAPID TRANSIT PROGRAM**





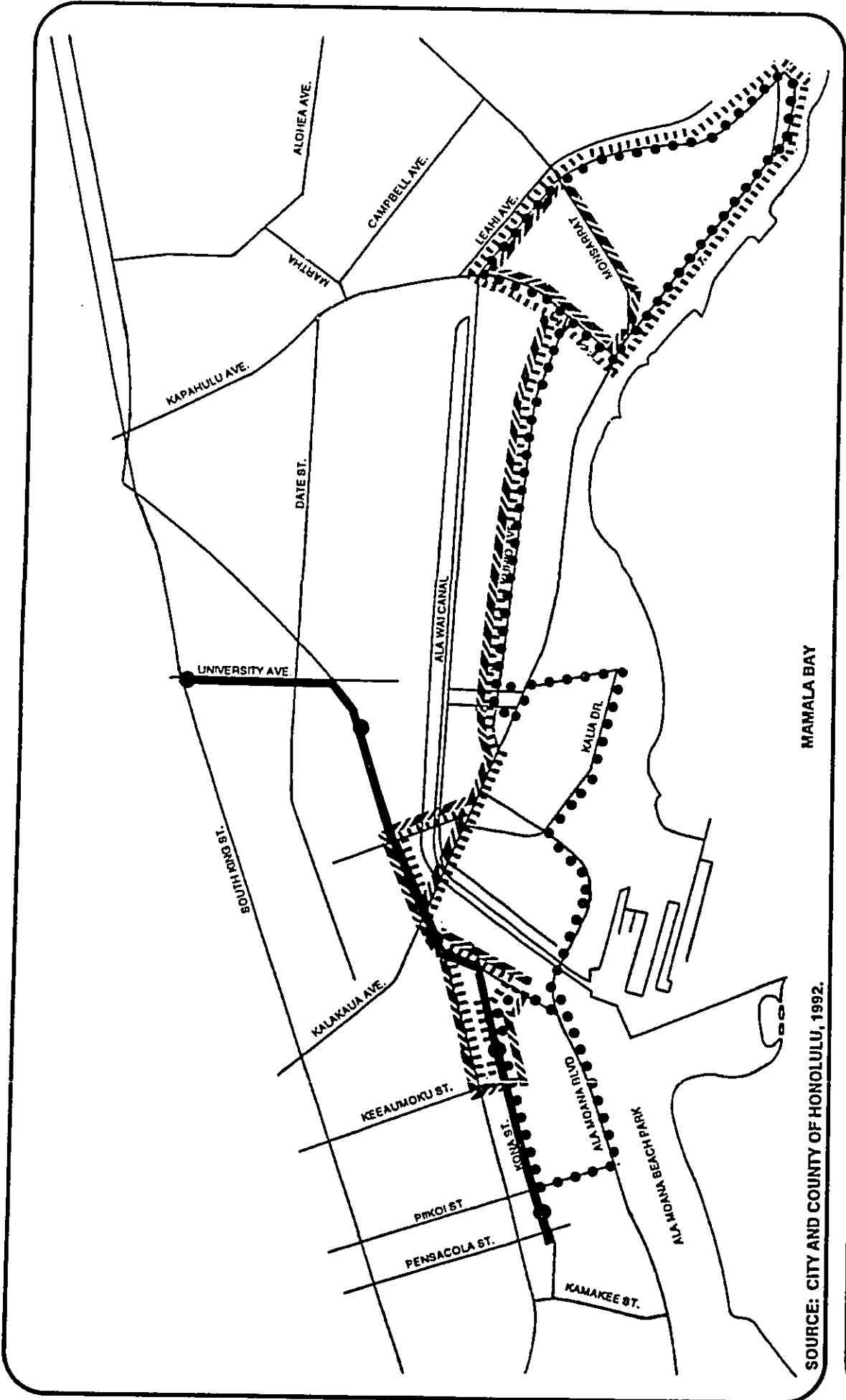
SOURCE: PARSONS BRINCKERHOFF, 1992.



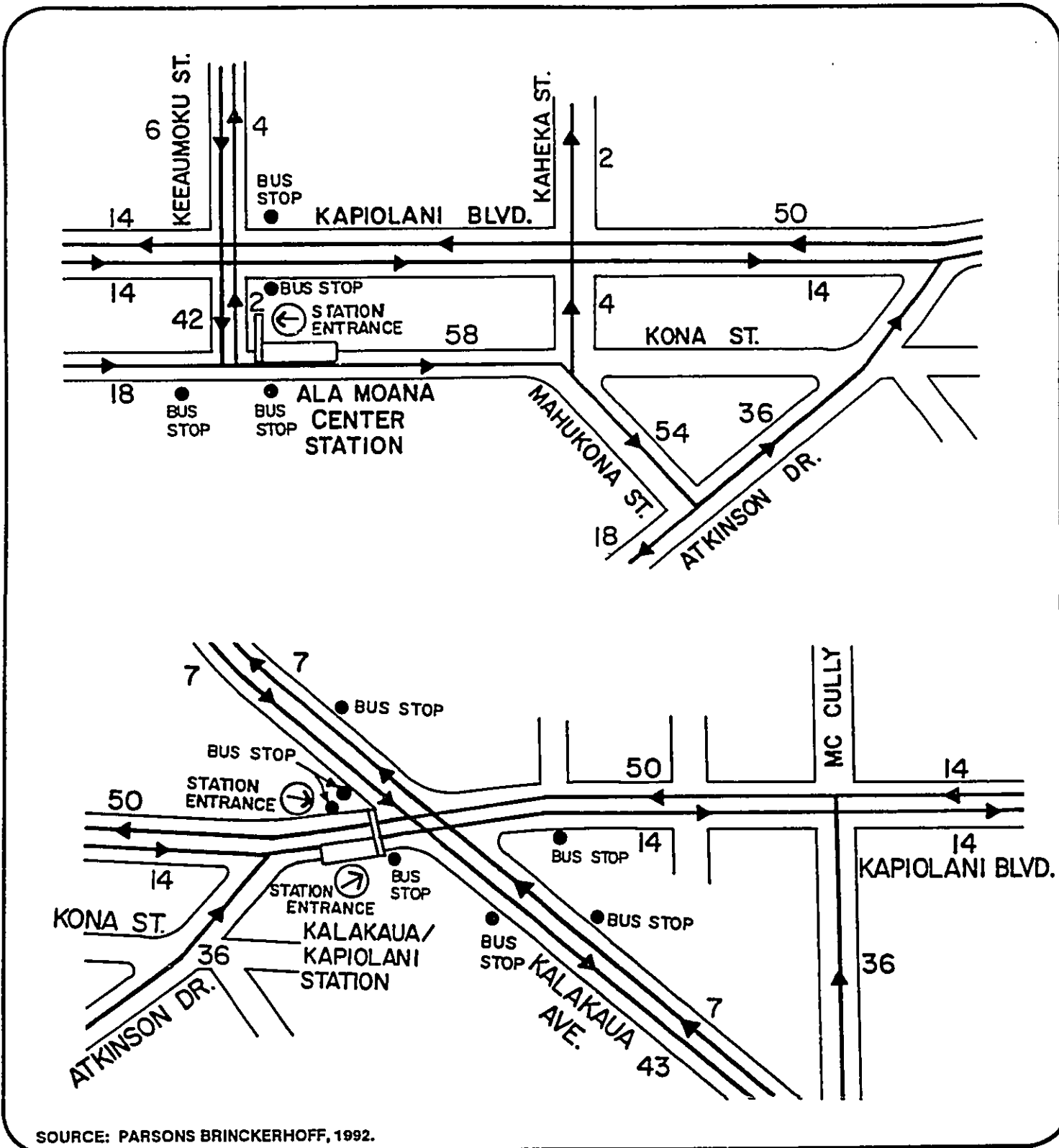
**LEGEND**  
 DOWNTOWN SHUTTLE  
 (NUMBERS INDICATE THE  
 NUMBER OF BUSES PER HOUR)

**FIGURE 2.6b**

**HOURLY BUS VOLUMES AROUND  
 DOWNTOWN AND KAKAOKO STATIONS  
 HONOLULU RAPID TRANSIT PROGRAM**



**FIGURE 2.7**  
**WAIKIKI SHUTTLE SERVICE**  
**HONOLULU RAPID TRANSIT PROGRAM**



**LEGEND**  
 WAIKIKI SHUTTLE  
 (INDICATES THE  
 NUMBER OF BUSES PER HOUR)

**FIGURE 2.8**  
**HOURLY BUS VOLUMES AROUND**  
**ALA MOANA AND KALAKAUA/**  
**KAPIOLANI STATIONS**  
**HONOLULU RAPID TRANSIT PROGRAM**

At the Kalakaua Avenue/Kapiolani Boulevard intersection, the greatest number of buses approaching the intersection will be from the Koko Head and Ewa directions. A total of 50 buses from each direction will be on Kapiolani Boulevard. The Koko Head-bound buses will stop at the bus stop on *Kapiolani Boulevard* near the station where the street is to be widened to accommodate the traffic into a new driveway to the convention center.

The Ewa bound buses will continue to utilize the existing stop on Kapiolani Boulevard at Kalakaua Avenue.

Figure 2.8 also shows the bus interface at the Ala Moana Station site. This interface serves the Waikiki shuttle bus service as well as a number of other bus routes.

The heaviest bus volume will occur on Kona Street near Keeaumoku Street. A total of 58 buses will travel this section during a peak hour. However, no major impacts as a result of these buses are anticipated since this will be a decrease in the bus volume as compared to today.

Table 2.5 shows the number of peak hour buses approaching the station sites for the TSM Alternative and the amended LPA in comparison to the existing service. For the amended LPA, 58 buses serve the Ala Moana Center Station and 114 buses serve the Kalakaua/Kapiolani Station during peak hour. This is in comparison to the existing 85 buses serving Ala Moana Center and 68 buses at the Kalakaua Avenue/Kapiolani Boulevard intersection or the 140 and 74 buses, respectively, needed in the TSM Alternative.

Table 2.5 NUMBER OF PEAK HOUR BUSES			
Station	Existing	TSM	Amended LPA
Ala Moana Center	85	140	58
Kalakaua/Kapiolani	68	74	114

Source: City and County of Honolulu, 1992.

#### Fixed Guideway System

For the amended LPA, the same park-and-ride lots for express bus service will be provided as in the TSM Alternative (see Section 2.2.1.2). Three park-and-ride lots will provide additional spaces at fixed guideway stations: the Waiawa Station facility will be expanded beyond the size proposed for the TSM Alternative to a total of 1,600 spaces (800 spaces initially); the Aloha Stadium *park-and-ride lot* will have a total of 830 spaces (750 parking stalls for transit riders during the work week and for stadium patrons during non-work hours and weekends, and 80 parking stalls reserved at all times for transit riders); the Lagoon Station will have a 450-space lot. The three options for the University area which are not part of the amended LPA could provide between 100 and 200 spaces each. The locations of the park-and-ride lots are shown on Figure 2.2.

Free parking will be provided at the park-and-ride lots. However, some parking restrictions will be considered. Parking will be limited to transit users; at some locations, such as the University area park-and-ride lots, this restriction might be enforced by limiting access to the lot to those carrying transit passes.

The fixed guideway service will be provided by computer-controlled, automated (driverless) 95-foot, articulated vehicles. Single vehicle trains (expandable to two and three articulated-vehicle trains in the future) will operate over the route in a pinched loop fashion. The automatically controlled trains will be dispatched from the maintenance and storage yard at the end of the line. Vehicles will be added and subtracted from the revenue fleet depending on the required flow rates. The time between peak-period trains will be approximately 100 seconds. During peak periods, all trains will serve Waiawa, Lagoon, Dillingham Plaza, Nimitz/Smith, Nimitz/Fort, *Halekauwila/South*, *Halekauwila/Ahui*, Ala Moana Center, Kalakaua/Kapiolani, University/King, and University/Quarry Stations. The other stations will be served, alternately, by one-half the trains in service. During non-peak periods, all trains will stop at all stations. The one-way travel time from the Waiawa Station to the University/Quarry Station will be about 34 minutes for the amended LPA.

The articulated vehicles will employ state-of-the-art steel wheel/steel rail technology, based upon proven light rail vehicle design, including AC propulsion and rubber-cushioned resilient wheels. Electric power at 750 VDC will be provided to the vehicles by a third-rail mounted along the track. Each vehicle will be designed to carry 208 passengers in air-conditioned comfort. *The vehicle will be designed for a cruise speed of 65 miles per hour; however, the 15.9 mile system from Waiawa to the University/Quarry Stations will be designed for a cruise speed of 55 miles per hour.* The track will be continuously welded standard gauge attached to the guideway structure resiliently by direct fixation.

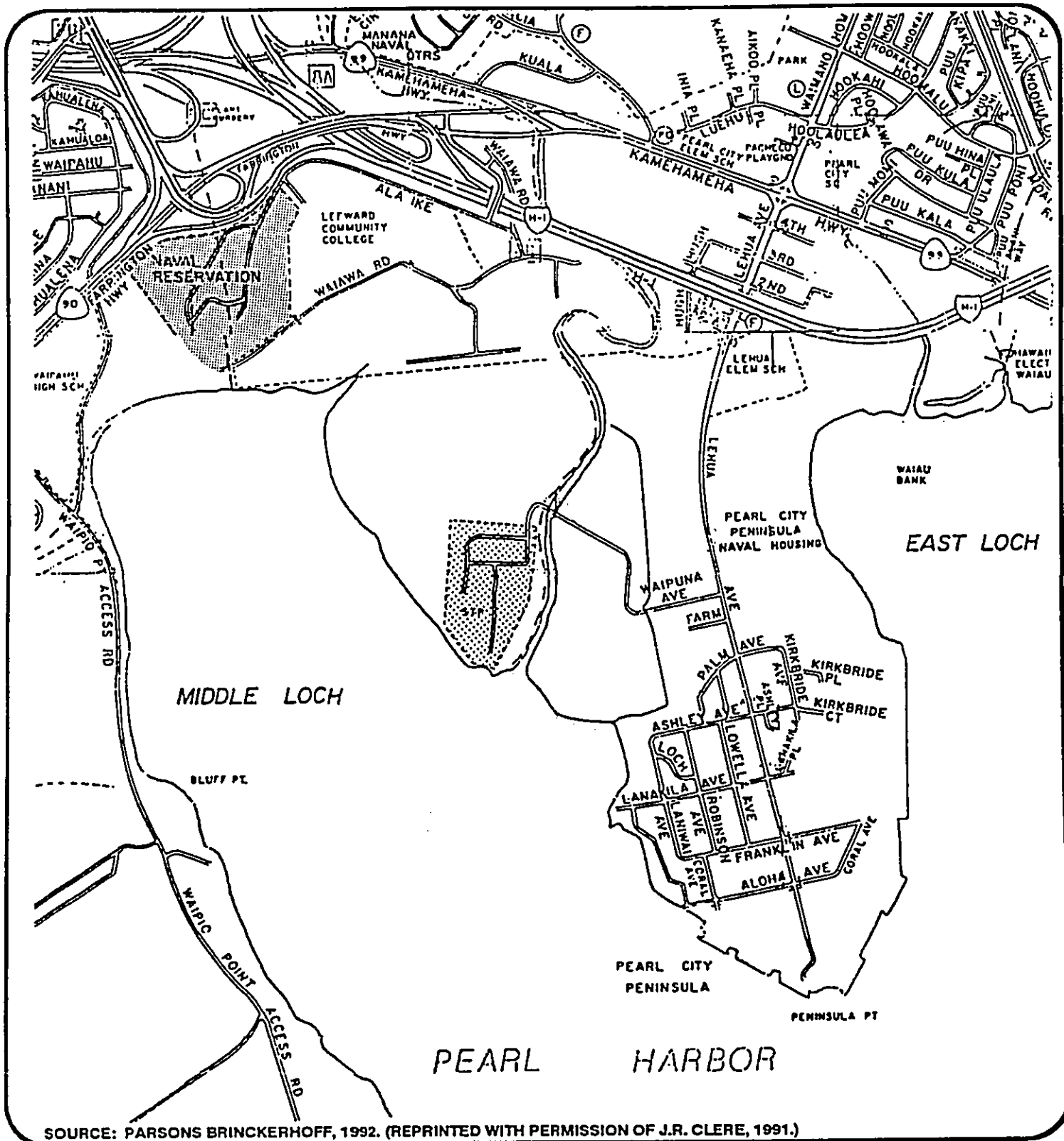
The fixed guideway maintenance facility and storage yard for the amended LPA will be located at the Navy Ewa Drum Storage Site, as shown in Figure 2.9. This property is proposed to be obtained from the U.S. Navy in exchange for City-owned property on the Waiawa Peninsula (that was a former sewage treatment plant, as shown in Figure 2.9). A discussion of the land exchange is contained in Section 5.2.1.

#### 2.2.2.2 Physical Characteristics

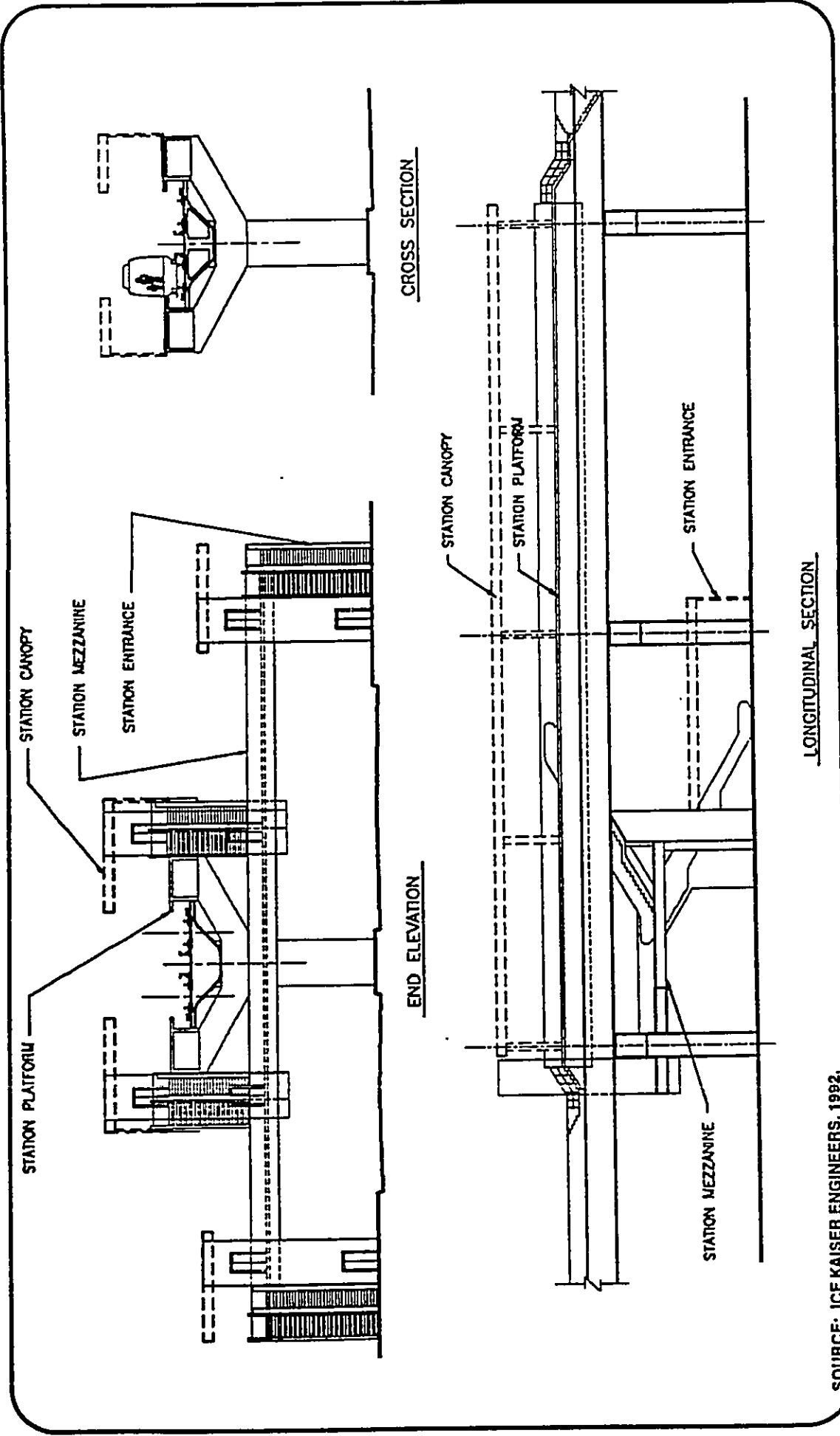
The following paragraphs describe the characteristics of each of the geographical sections comprising the amended LPA. Specifically discussed are the alignment characteristics and station descriptions for each section. The alignment discussions focus on the proposed location of the guideway with respect to existing natural and man-made features such as streets, buildings, and streams. Because the guideway will be on an elevated structure in all locations except at the Waiawa Station, existing facilities primarily will be affected by the placement of guideway columns, as noted in the following discussions. The pre-cast, segmental concrete structure uses typical 180-foot spans that will be erected from traveling trusses launched from atop the previously built structure. *The pre-cast yard to be used during construction is located east of the H-3 Freeway off Kapaa Quarry Road in Windward Oahu. The site is currently used as the pre-cast yard for the construction of the H-3 Freeway project.*

The stations will have several standard design elements. Each station consists of two 90-foot spans supporting 190-foot platforms, which will provide sufficient capacity for the project beyond 2005. The ultimate system would require three-vehicle platforms 280 feet long. The future expansion of the system would be subject to additional environmental review. Structural modifications would be necessary to accommodate the additional platform length. All platforms will be high level; i.e., at the same level as the vehicle floor, thus eliminating the need to step up or down when entering or exiting the vehicle. In all cases, the station design will satisfy the Americans with Disabilities Act (ADA). Figures 2.10 and 2.11, respectively, show a cross section of a side-platform station and a stacked-platform station. Figure 2.12 illustrates a conceptual station. Stations will be unattended and will utilize automatic ticket equipment. Roving system personnel will perform security, monitoring, and fare inspection duties.

*The rapid transit system will require 17 traction power substations (TPSS) for vehicle propulsion and auxiliary power. Each substation will contain transformers, rectifiers, batteries, and ventilation equipment. The TPSS building structure will be of a size approximately 35 feet by 50 feet. To provide for the maintenance of the TPSS*



**FIGURE 2.9**  
**NAVY EWA DRUM STORAGE SITE**  
**AND SEWAGE TREATMENT PLANT SITE**  
**HONOLULU RAPID TRANSIT PROGRAM**



SOURCE: ICF KAISER ENGINEERS, 1992.



**FIGURE 2.10**  
**SIDE-PLATFORM STATION**  
 HONOLULU RAPID TRANSIT PROGRAM

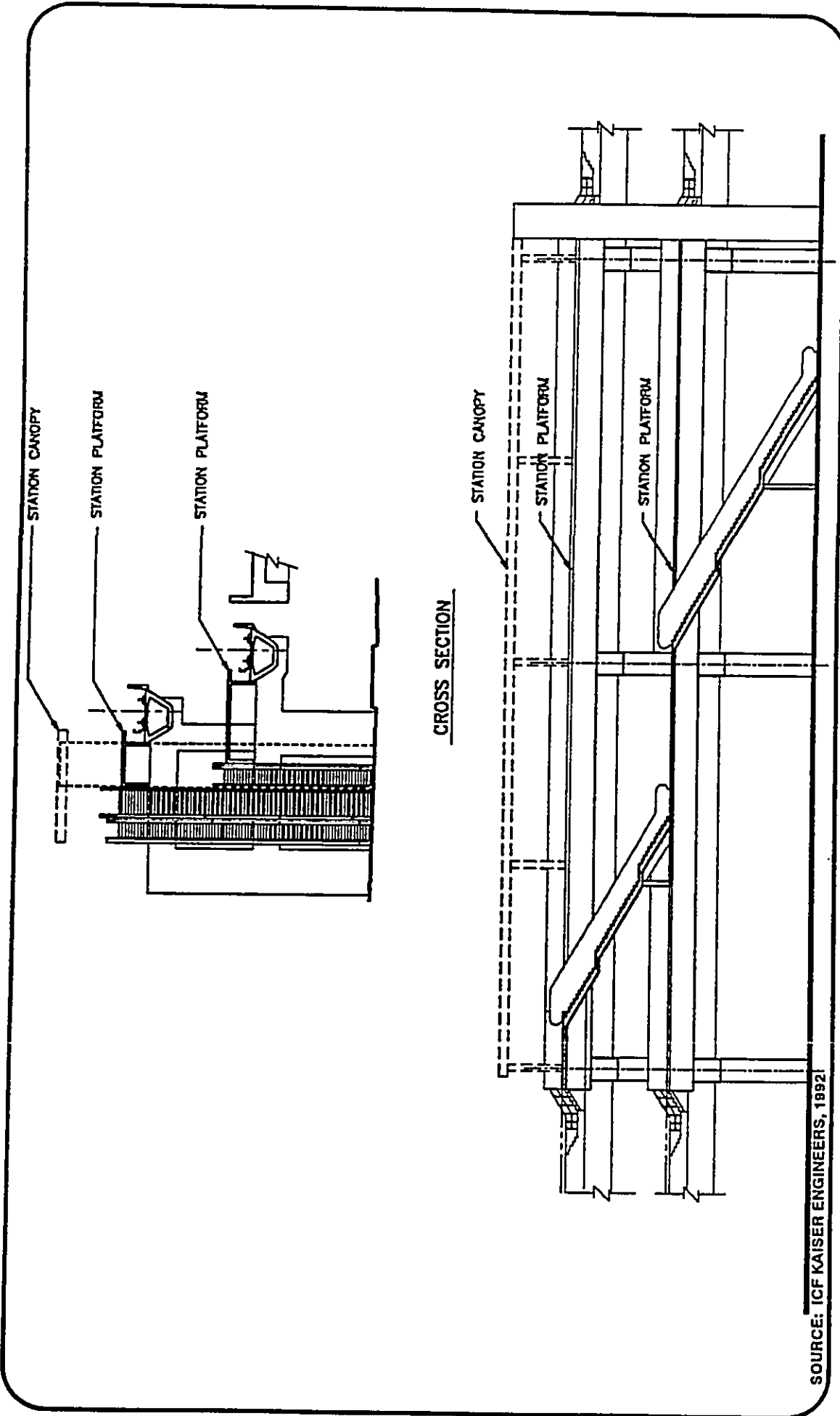
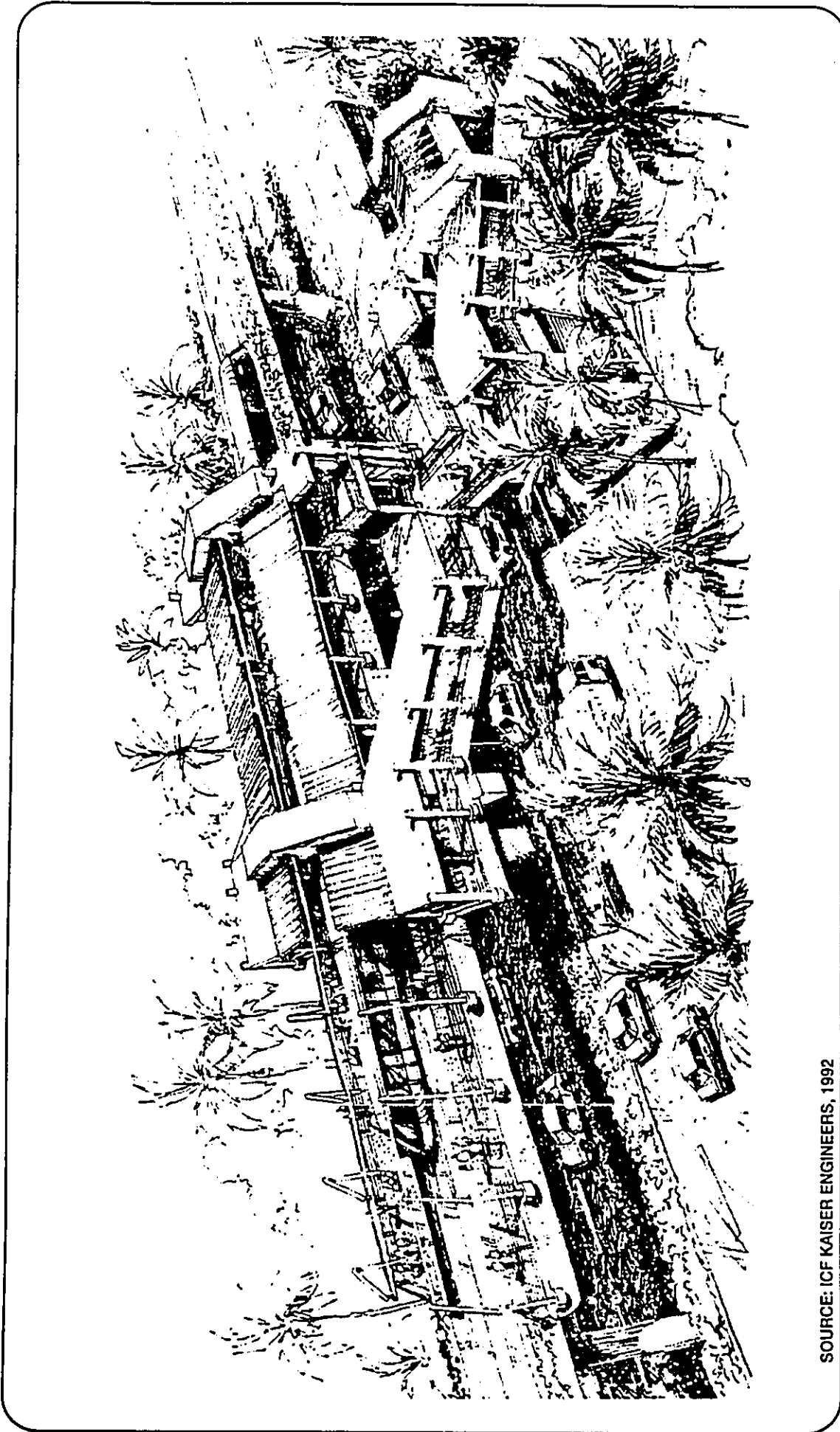


FIGURE 2.11

STACKED-PLATFORM STATION  
 HONOLULU RAPID TRANSIT PROGRAM







SOURCE: ICF KAISER ENGINEERS, 1992

FIGURE 2.12

CONCEPTUAL STATION

HONOLULU RAPID TRANSIT PROGRAM

equipment, the facility will have to be situated on a site approximately 55 feet by 75 feet. A majority of the substations will be located adjacent to stations as indicated in the following discussion. In addition to those substations associated with stations, two additional substations will be required; one in the Kalihi area near the Keehi Interchange and Dillingham Boulevard, and the other near Kaluamoi Street and Kamehameha Highway, Koko Head of the Pearl City Station.

#### Section I - Waiawa to Aloha Stadium

##### Alignment/Profile

The guideway for the amended LPA in Section I begins in Waiawa at the Navy Ewa Drum Storage Site. The alignment will cross the H-1 Freeway, follow Farrington Highway, then transition to Kamehameha Highway and follow Kamehameha Highway to the Aiea Interchange Ewa of Aloha Stadium. Three stations will be located in this section: Waiawa, Pearl City, and Pearlridge.

From the Navy Ewa Drum Storage Site, the side-by-side, dual-track guideway will be located within the State's right-of-way along the mauka side of the Leeward Community College access road, Ala Ike Street. The alignment will cross over Ala Ike Street and the H-1 Freeway, to the mauka side of Farrington Highway.

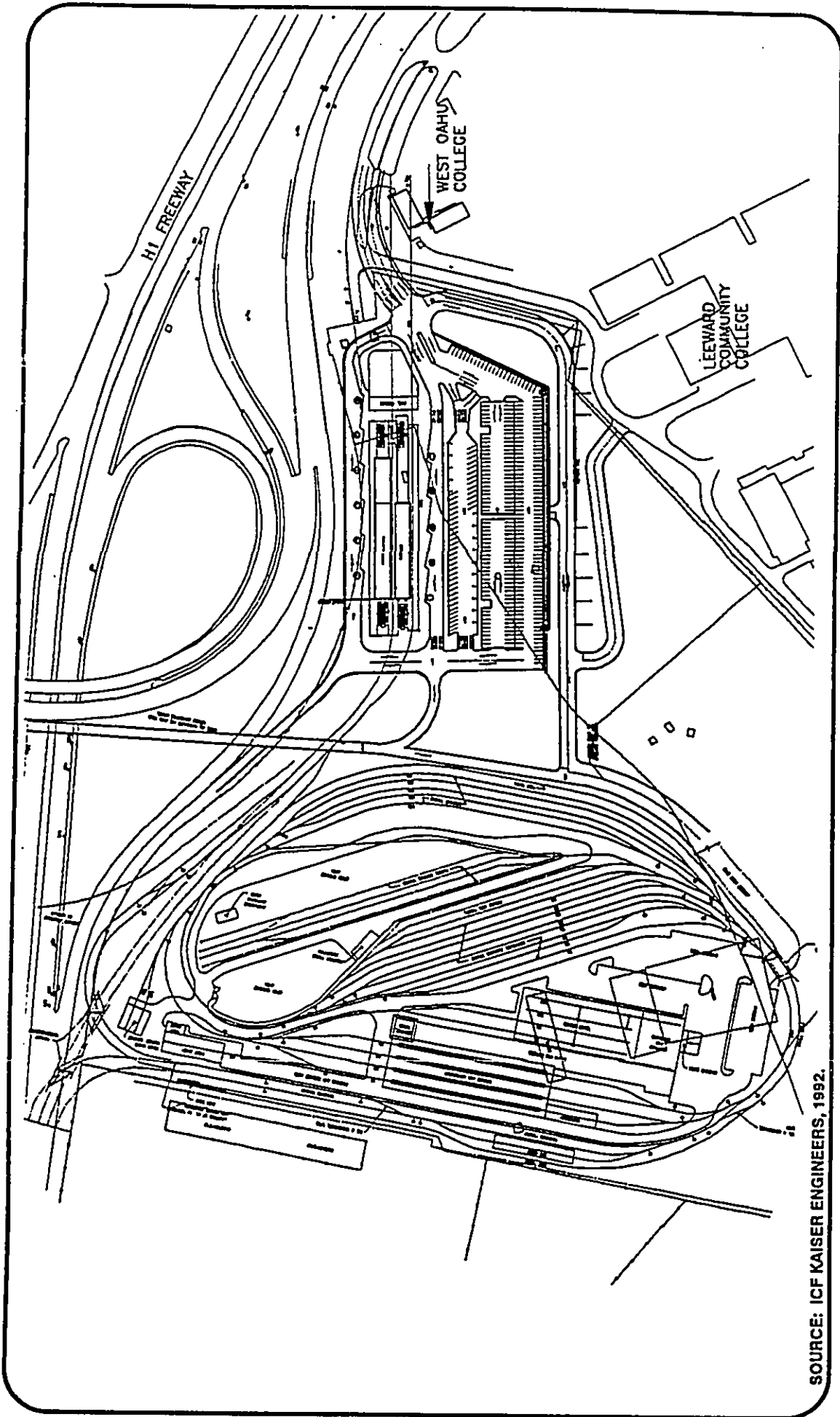
Ewa of Kipaipai Street, the guideway will transition into the median of Kamehameha Highway, where it will remain throughout this section in a side-by-side track configuration. The guideway will go over H-1 Koko Head of Puu Poni Street and will cross four streams (Waiawa, Waimalu, Kalauao, and Aiea) plus a drainage canal Ewa of Pearlridge. All streams, except Waiawa and the drainage canal Ewa of Pearlridge Center, are contained within open, artificial channels. Kamehameha Highway is a six-lane arterial with a median width of approximately 30 feet in the section of the highway from Farrington Highway to Lehua Avenue. There it narrows to six lanes with a 10- to 12-foot median, which contains left-turn lanes at principal intersections. Near the end of this section, in the area of the Aiea interchange with Moanalua Road, Kamehameha Highway narrows once more to four lanes with a 2-foot median.

Modifications to Kamehameha Highway to accommodate the transit guideway columns in the median will include re-striping the traffic lanes, and reconstruction of various left-turn lanes for placement of columns within the existing right-of-way. None of these modifications will decrease the total number of through travel lanes.

##### Stations/Park-and-Ride Lots

Waiawa Station and Park-and-Ride Lot. The Waiawa Station will be a "retained cut" station located within the 43-acre Navy Ewa Drum Storage Site adjacent to the Waiawa Maintenance and Storage Yard, Ewa of Leeward Community College (see Figure 2.13). The "retained cut" reduces the amount of the parcel required for the transit facilities. The Waiawa Station will have a center-platform (see Figure 2.14).

As shown in Figure 2.14, the station will include a bus loop, and a layover area. This station will serve as a major feeder/express bus and park-and-ride interface point for the transit guideway. An 800-stall park-and-ride structure, with expansion potential to 1,600 stalls, will be makai of the station platform. The park-and-ride structure will also include a kiss-and-ride area and a short-term parking area. Improvements to the street access to the station may include direct access ramps to and from Farrington Highway and a ramp from Kamehameha Highway. Ala Ike Street will be extended into the Waiawa Station area. *The substation associated with this portion of the alignment will be located inside the parking structure.*



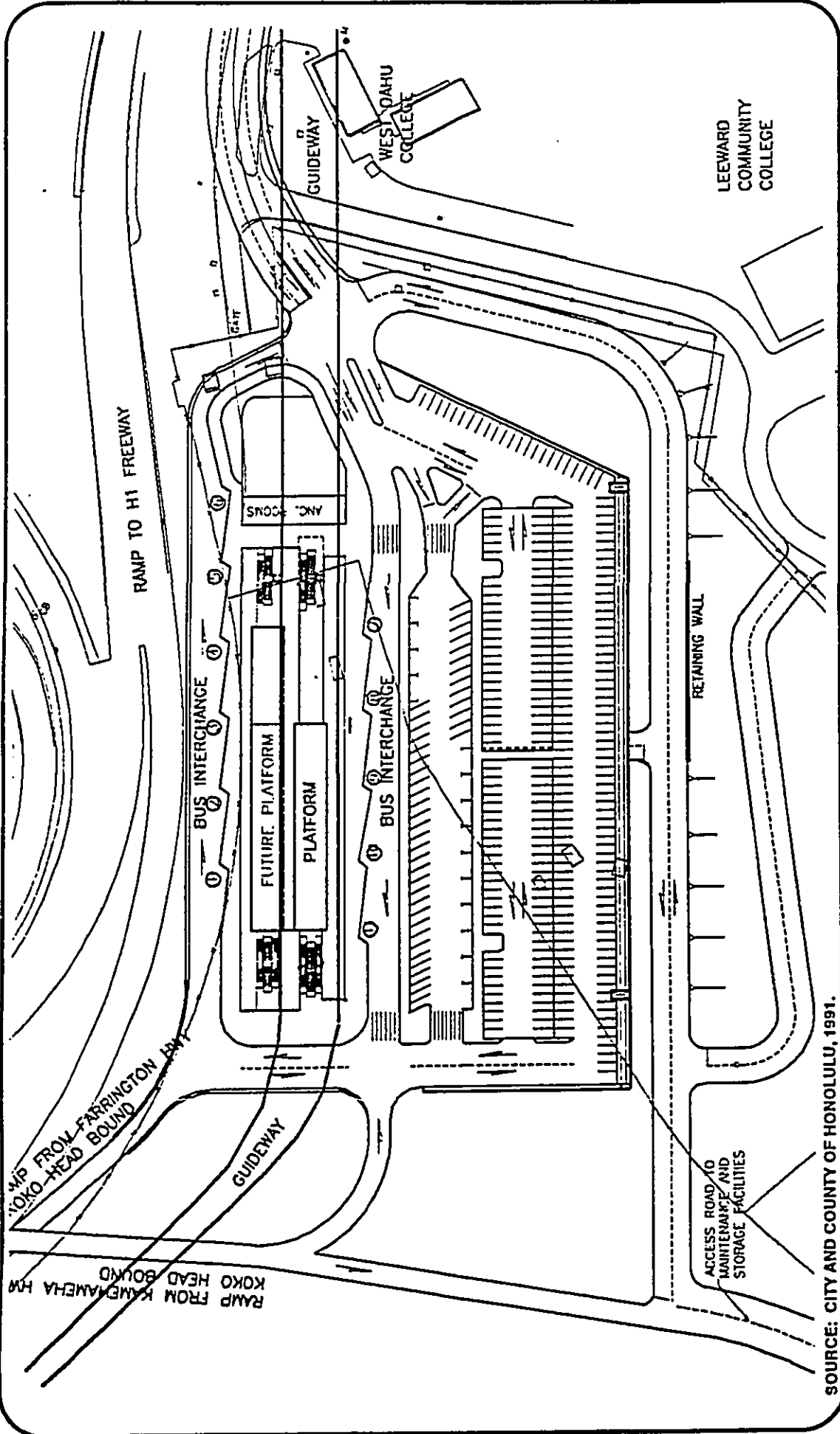
SOURCE: ICF KAISER ENGINEERS, 1992.



FIGURE 2.13

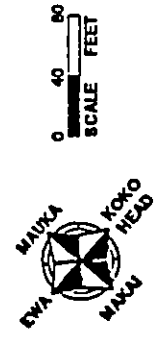
WAIAWA TRANSIT FACILITIES

HONOLULU RAPID TRANSIT PROGRAM



**FIGURE 2.14**

**WAIAWA STATION  
AND PARK-AND-RIDE LOT  
HONOLULU RAPID TRANSIT PROGRAM**



Pearl City Station. The Pearl City Station will be located adjacent to the Pearl City Shopping Center on Kamehameha Highway between Waimano Home Road/Lehua Avenue and Puu Momi Street. The side-platform station will include separate platforms for inbound and outbound guideway riders. These platforms will be accessed from a connecting mezzanine passing under the guideway above the roadway. The tracks of the guideway will pass over the median of Kamehameha Highway. *The substation at the Pearl City Station will be located in the parking area behind the adjacent health center.*

Pearlridge Station. The Pearlridge Station will be adjacent to Pearlridge Center over the median of Kamehameha Highway between Kaonohi and Pali Momi Streets. The station design will be basically the same as proposed for the Pearl City Station; i.e., a side-platform station with a pedestrian bridge over the traffic lanes of Kamehameha Highway. *The substation will be located adjacent to the mauka station entrance.*

#### Waiawa Maintenance and Storage Yard.

The maintenance and storage yard will be located at the Ewa terminus of the project at the Navy Ewa Drum Storage Site. Figure 2.15 shows the conceptual layout, which responds to the operational and maintenance functions of the system. The maintenance shop will consist of three primary areas: service and inspection, heavy repair, and support areas such as the car wash and paint shop. The facility can accommodate a fleet of 70 vehicles, which will be sufficient for the projected 2005 demand; and can be expanded to serve an ultimate fleet of approximately 115 vehicles. The central control facility and two substations will also be located at this site.

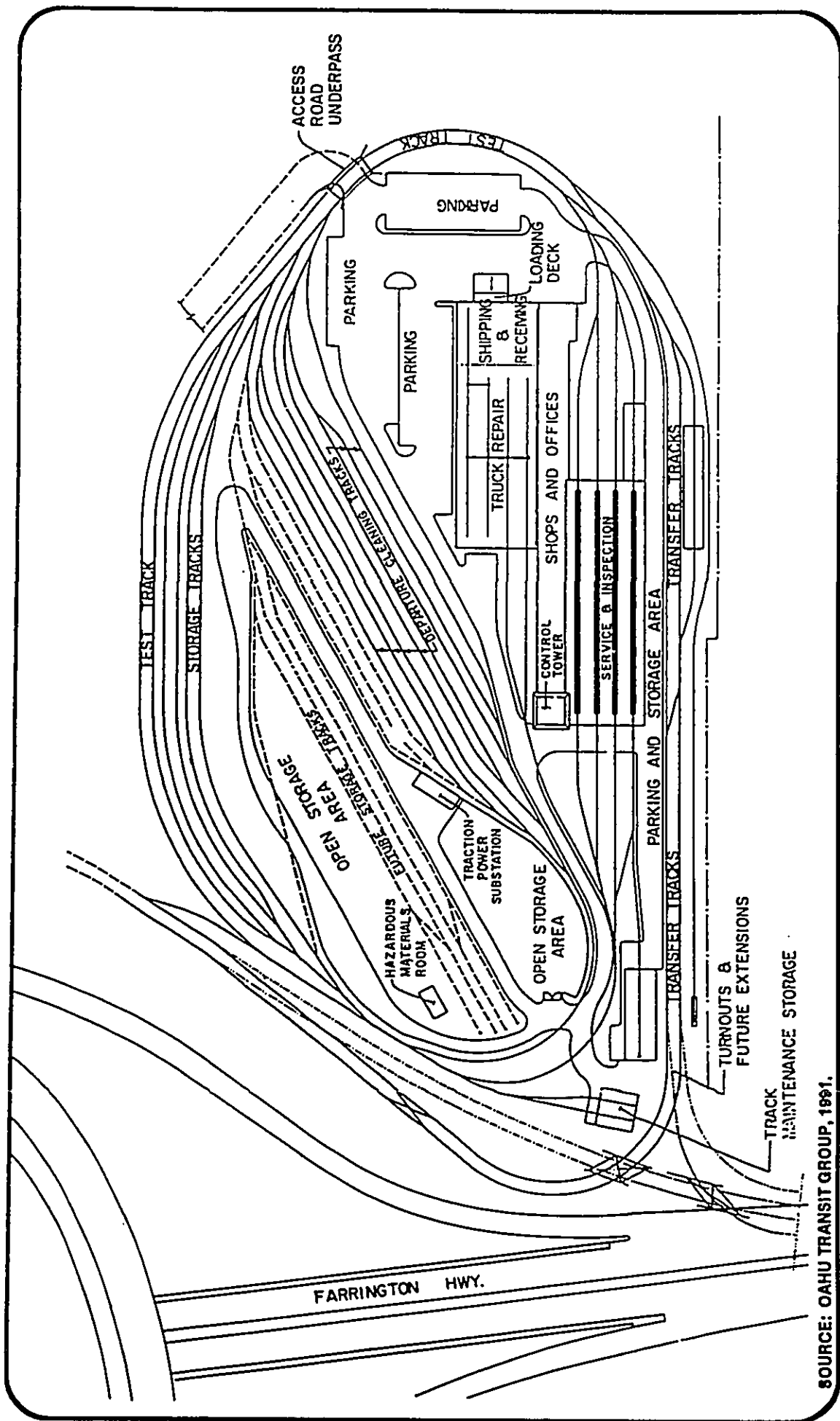
#### Section II - Aloha Stadium to Keehi Interchange

##### Alignment/Profile

From the Aiea Interchange, the alignment will pass over two freeway ramps through the Ewa edge of the Aloha Stadium parking area (*moved in the Ewa direction closer to Kamehameha Highway than shown in the SDEIS*), transition into the median of Kamehameha Highway at the inbound lanes of Salt Lake Boulevard, and then transition to the makai side of the Pearl Harbor Interchange and the elevated H-1 Freeway where it will remain until the Keehi Interchange. Five stations will be included in this section: Aloha Stadium, Arizona Memorial, Makalapa Gate, Airport, and Lagoon. A pocket track will be included at the Aloha Stadium site.

Within the Aiea Interchange, just Ewa of Aloha Stadium, Kamehameha Highway passes under both Moanalua and Aiea Access Roads. The guideway, however, will pass over both roadways, until it reaches 45 feet above grade at Kamehameha Highway. The guideway also will pass over ramps of the Pearl Harbor Interchange reaching an elevation of approximately 60 feet above grade. As the guideway crosses over the ramps from H-1 to the airport, it will reach a height of 85 feet above Nimitz Highway.

From the H-1/Pearl Harbor Interchange to the Keehi Interchange, Nimitz Highway is beneath the elevated H-1 Freeway. The guideway alignment will follow the makai side of the highway, at an elevation just slightly higher than the H-1 Freeway. A small portion of Keehi Lagoon Beach Park will be required for columns and aerial guideway. Approaching Keehi Interchange, the guideway will cross Moanalua Stream adjacent to the existing pedestrian bridge. The guideway will pass over the Keehi Interchange structures. This section of guideway will cross three major streams: Halawa, Moanalua, and Kalihi. Halawa Stream is contained within an open, artificial channel crossing under Kamehameha Highway.



**FIGURE 2.15**

**WAIAWA MAINTENANCE AND STORAGE FACILITY**  
**HONOLULU RAPID TRANSIT PROGRAM**



### Stations/Park-and-Ride Lots

Aloha Stadium Station and Park-and-Ride Lot. The Aloha Stadium Station and Park-and-Ride Lot will be located in the Aloha Stadium overflow parking lot makai of the stadium at the Salt Lake Boulevard/Kamehameha Highway intersection (see Figure 2.16). *The station will be located approximately 850 feet from Aloha Stadium.* The guideway and special events station, including a pocket track, will be approximately 30 feet above the paved surface. Stairs, elevators, and escalators will provide separate accesses to both station platforms. *The overflow parking area at Aloha Stadium presently contains approximately 1,000 parking stalls. After construction of the Aloha Stadium Station and park-and-ride lot, the parking area will provide 750 parking stalls to be used by transit riders during the work week and for stadium patrons during non-work hours and weekends (see Figure 2.15). An additional 80 parking stalls will be reserved at all times for rapid transit patrons. The substation in this area will be incorporated into the station.*

Arizona Memorial Station. This station will be located between Arizona Memorial Place and Arizona Street over the median of Kamehameha Highway above Halawa Stream. Platforms on both sides of the tracks will be included in the design at an elevation of approximately 35 feet above grade. A mezzanine level underneath the guideway will connect the platforms. The station access will be makai of Kamehameha Highway and require an easement on Navy property. There will not be a touchdown on the mauka side of the highway. *A substation is not required at this station.*

Makalapa Gate Station. The Makalapa Gate Station will be located Ewa of Radford Drive over the median of Kamehameha Highway (see Figure 2.17). The station design will include side platforms with a connecting mezzanine and a station entrance on the makai side of Kamehameha Highway. An easement on Navy property will be required for the station access. *As shown on Figure 2.17, the substation is proposed to be located on the mauka side of Kamehameha Highway. The site of this substation is being discussed with the U.S. Navy. The design drawings for the substation will be subject to Navy approval.*

Airport Station. *The Airport Station, a side-platform with mezzanine station, will be Ewa of Aolele Street on the makai side of Nimitz Highway adjacent to the parking lot of the Inter-island Terminal. This station will provide primary access to Honolulu International Airport and will serve as an interface between the fixed guideway system and an intra-airport automated people mover system. The substation will be located under the station.*

Lagoon Station and Park-and-Ride Lot. The Lagoon Station and its park-and-ride lot will be located Ewa of Lagoon Drive on the makai side of Nimitz Highway (see Figure 2.18). A stacked-platform station will be built with platforms approximately 25 and 50 feet over the existing ground. The multi-leveled park-and-ride structure will accommodate 450 parking spaces. *The substation required for this portion of the alignment will be incorporated into the site.*

### Section III - Keehi Interchange to Iwilei

#### Alignment/Profile

Continuing along the alignment, Section III extends along Dillingham Boulevard from the Keehi Interchange to Akepo Lane. Two stations will be included in Section III: Dillingham Plaza and Honolulu Community College.

Dillingham Boulevard is one of Honolulu's major east-west arteries. It is heavily used by vehicles traveling to and from Downtown Honolulu as well as by local traffic within the Kalihi-Palama area. Kalihi Street is a continuation of Likelike Highway, a major corridor serving the windward side of the island. It intersects Dillingham Boulevard Ewa of Dillingham Plaza.

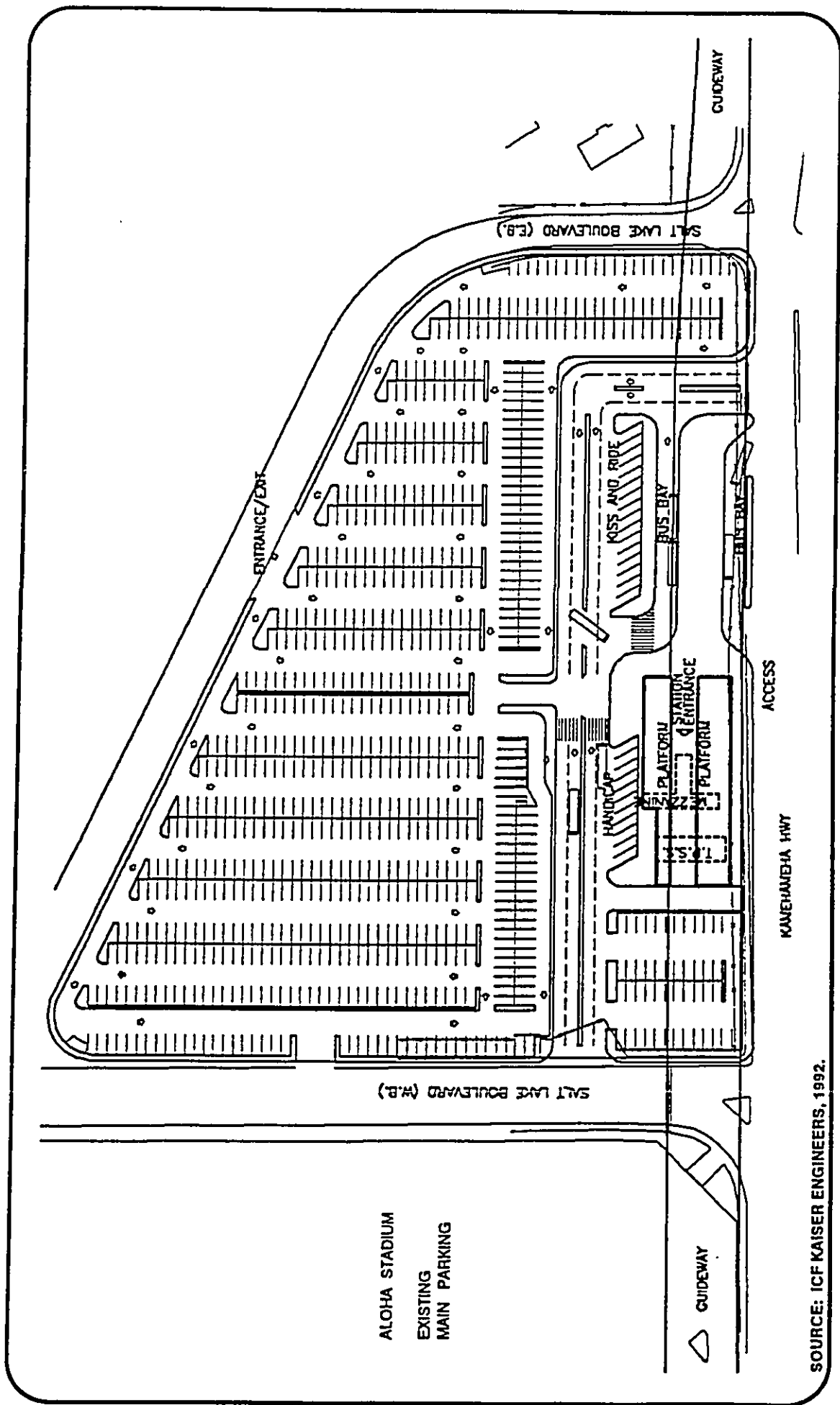
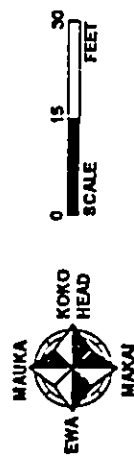
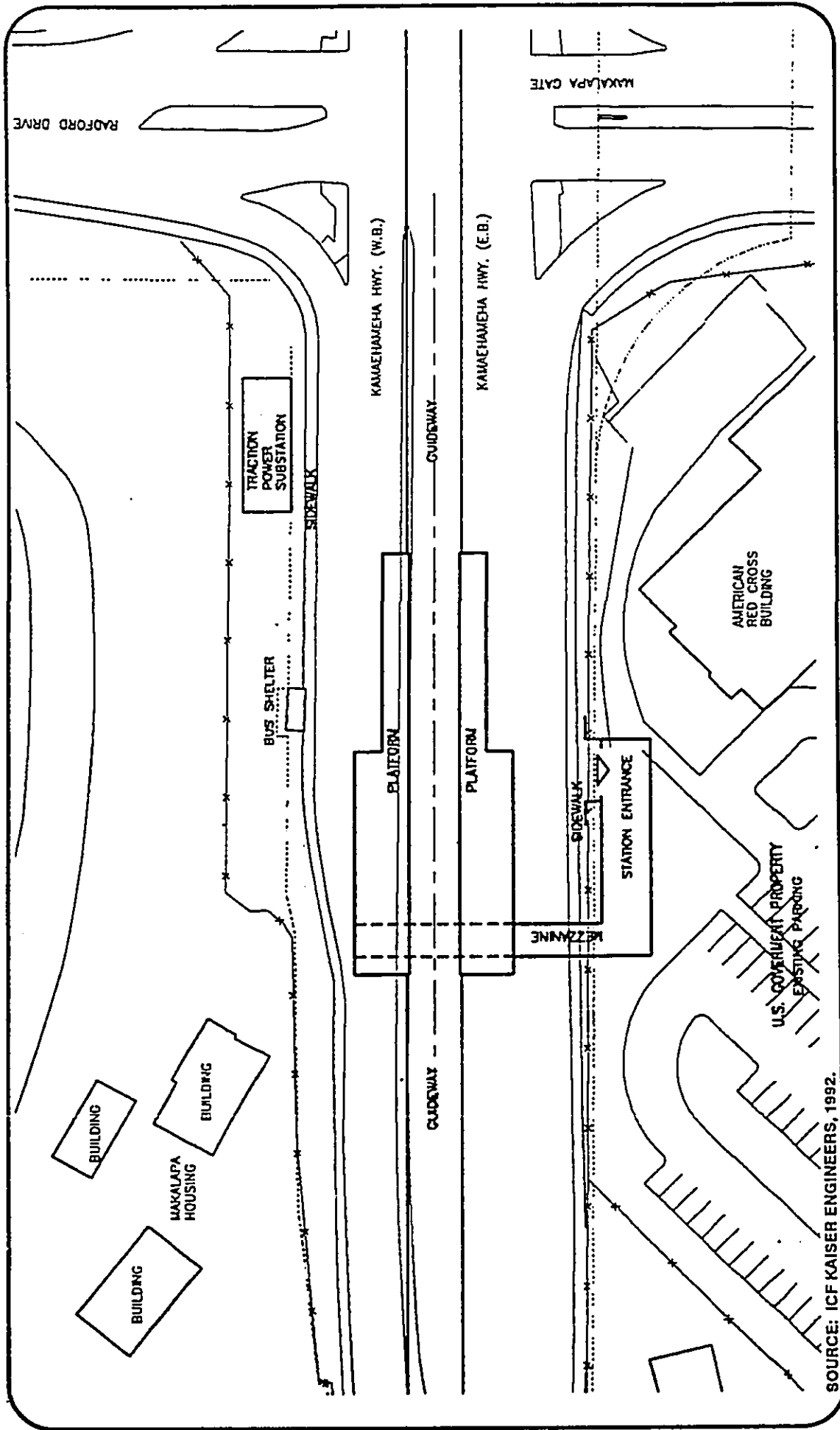


FIGURE 2.16

ALOHA STADIUM STATION  
AND PARK-AND-RIDE-LOT  
HONOLULU RAPID TRANSIT PROGRAM

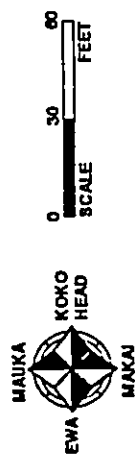


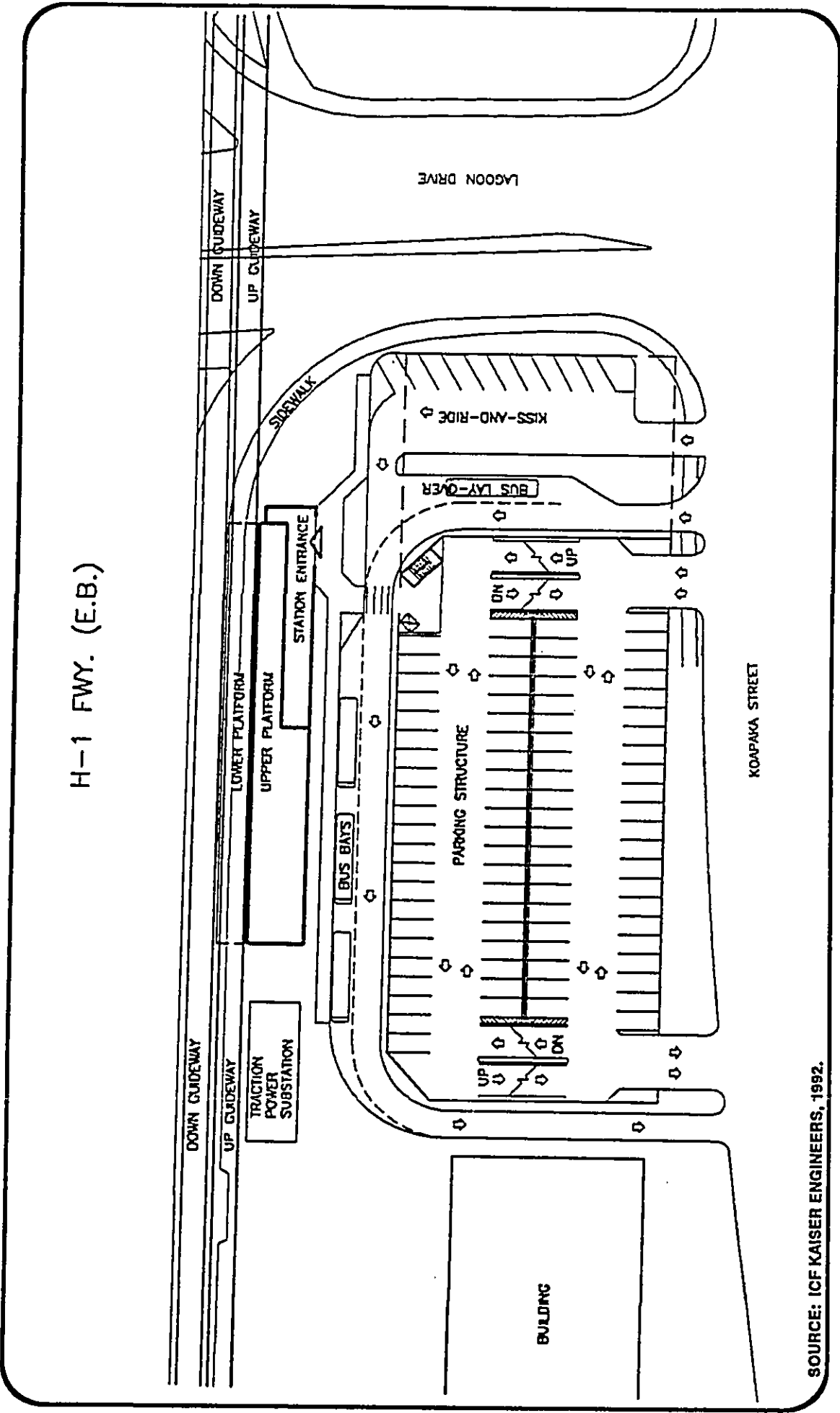




**FIGURE 2.17**

**MAKALAPA GATE STATION  
(PEARL HARBOR NAVAL BASE)  
HONOLULU RAPID TRANSIT PROGRAM**





**FIGURE 2.18**  
**LAGOON STATION**  
**AND PARK-AND-RIDE LOT**  
**HONOLULU RAPID TRANSIT PROGRAM**

The existing right-of-way on Dillingham Boulevard is approximately 100 feet wide between Middle Street and Oahu Community Correctional Center (OCCC); it then narrows to 78 feet between OCCC and Waiakamilo Road; and is 86 feet wide in the section from Waiakamilo Road to Liliha Street. The width of the paved roadway varies within the right-of-way from a maximum of 70 feet to a minimum of 56 feet.

The existing roadway has two travel lanes in each direction and a continuous left-turn lane in the median. The roadway is freely accessed from numerous residential and commercial driveways. On-street parking is not permitted on either side of the street.

The guideway columns will be located within a new raised median along Dillingham Boulevard. Left turn access will be accommodated at most of the existing major intersections. The same number of travel lanes will be maintained.

#### Stations

Dillingham Plaza Station. The Dillingham Plaza Station will be a side-platform station with mezzanine over the Dillingham Boulevard (approximately 42 feet above the roadway) right-of-way between McNeill Street and Waiakamilo Road. Figure 2.19 shows the guideway connections that will be made on either side of Dillingham Boulevard. *The substation will be located on Dillingham Plaza property adjacent to the station (see Figure 2.19).*

Honolulu Community College Station. This station will be located just Ewa of Ala Kawa Street and will provide access to Honolulu Community College (see Figure 2.20). The Honolulu Community College Station will be a side-platform station with mezzanine, also 42 feet above the roadway. *No substation will be required at this station.*

#### Section IV - Downtown/West Kakaako

##### Alignment/Profile

The Nimitz Highway portion of the alignment will continue as an elevated, dual guideway throughout its entire length. From Dillingham Boulevard, the alignment will cross private property to the intersection of Iwilei Road and Nimitz Highway, and cross Nuuanu Stream to the makai side of Nimitz Highway between Iwilei Road and River Street. The alignment adjacent to the OR&L Station has been coordinated with the Liliha Civic Center project. Between River Street and Alakea Street, the alignment will follow the center median of Nimitz Highway. The guideway will transition to Halekauwila Street near the intersection of Richards Street. The guideway will be located on the makai side of Halekauwila Street from Nimitz Highway to Ward Avenue. *Columns will be located in the makai parking lane.* From this point, the guideway will turn mauka onto Ward Avenue and be over the parking lane on the Koko Head side of Ward Avenue to Waimanu Street. On-street parking in the vicinity of the stations on Halekauwila Street will be eliminated, but other parking will remain except at column locations. Similarly, along Ward Avenue, parking will be maintained except at column locations.

This section will contain five stations: Kaaahi, Nimitz/Smith, Nimitz/Fort, *Halekauwila/South, and Halekauwila/Ahui.*

The alignment will be designed to maximize the use of single columns without straddle bents. However, straddle bents could be necessary at the Nimitz/Smith, *Halekauwila/South, and Halekauwila/Ahui Stations* and where the guideway turns onto Ward Avenue.

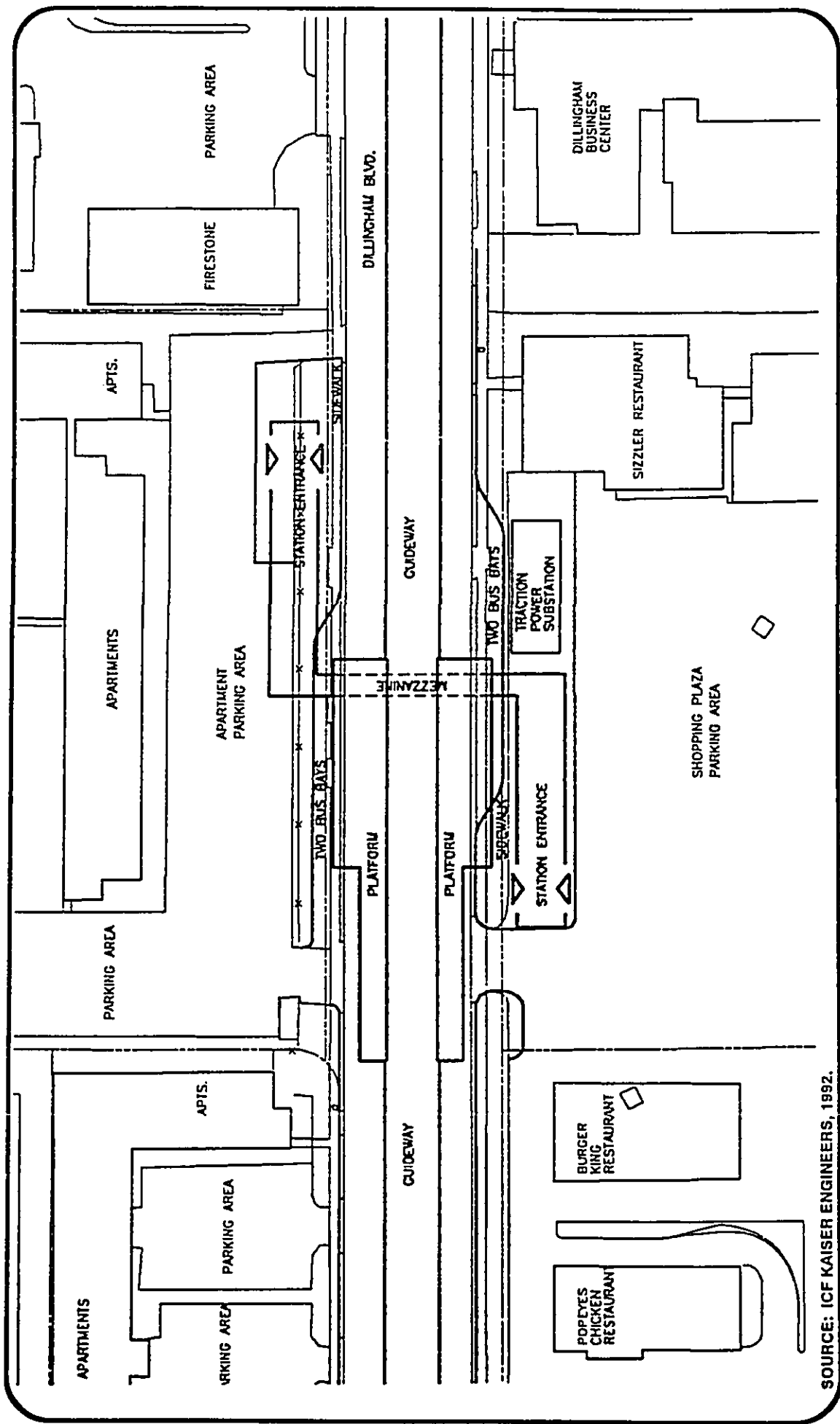
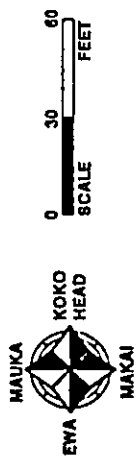
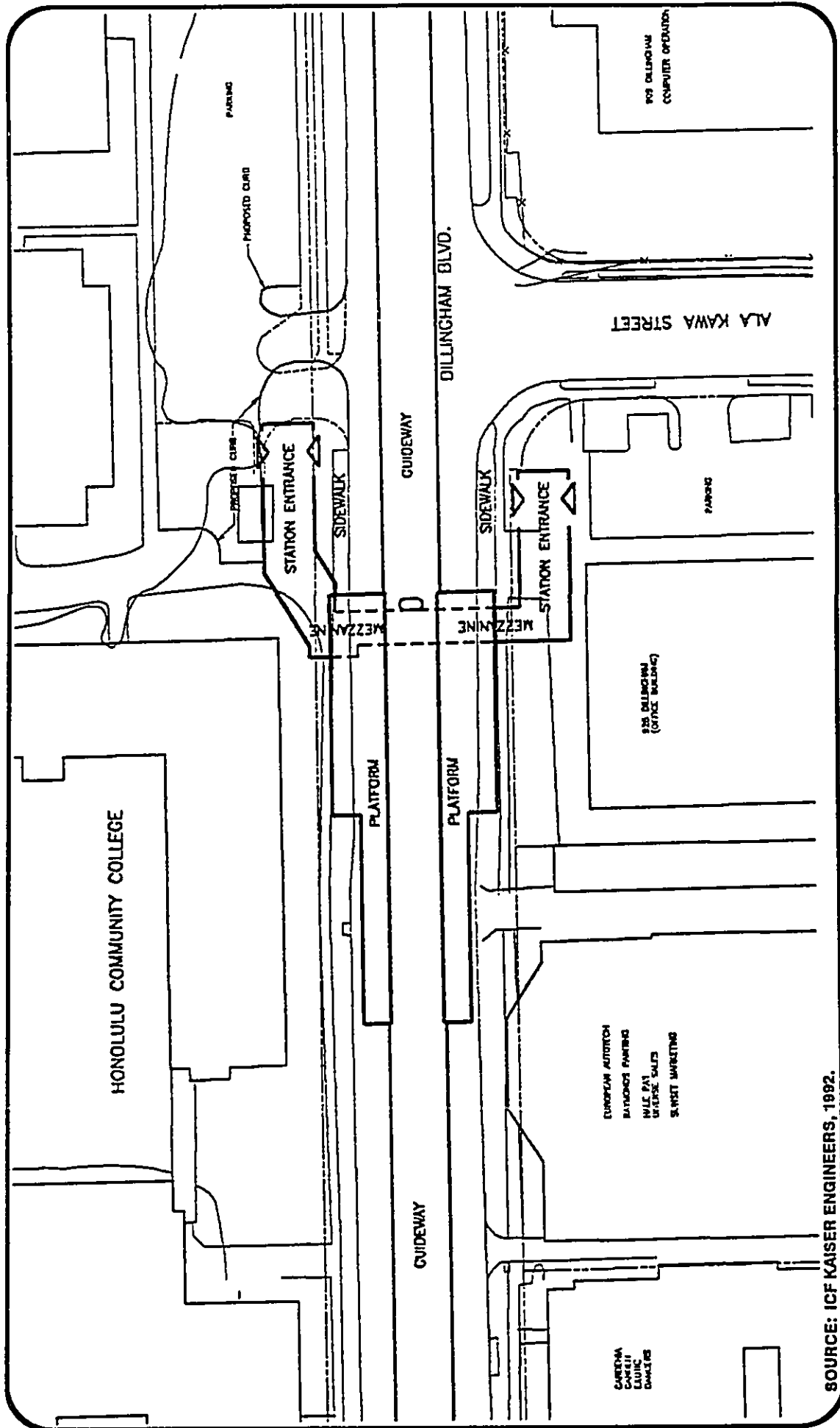


FIGURE 2.19

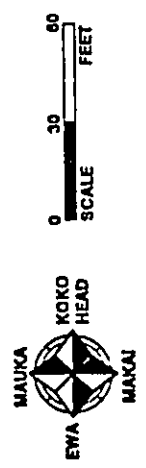
DILLINGHAM PLAZA STATION

HONOLULU RAPID TRANSIT PROGRAM





**FIGURE 2.20**  
**HONOLULU COMMUNITY COLLEGE STATION**  
 HONOLULU RAPID TRANSIT PROGRAM



## Stations

Kaaahi Station. The Kaaahi Station (see Figure 2.21) will be located makai of Kaaahi Street and Ewa of the OR&L Station. The Liliha Civic Center project is proposed for the area Koko Head of the Kaaahi Station and makai of the OR & L Station building. The station will be a side-platform station with mezzanine. *A pocket track will be located makai of the station. A substation will be located within the property required for the station if it cannot be located at the Nimitz/Smith Station.*

Nimitz/Smith Station. The Nimitz/Smith Station (see Figure 2.22) will be located over Nimitz Highway between Maunakea and Smith Streets and will require use of a City-owned parcel (site of the Smith/Maunakea housing project) to accommodate the station entrance on the mauka side of the highway. *No displacements will occur. The station will be a side-platform station with mezzanine. A substation will be located at this site.*

Nimitz/Fort Station. The side-platform station with mezzanine (see Figure 2.23) will be located over Nimitz Highway. The station access will be on the mauka side of Nimitz Highway. *A substation will not be constructed at this station location.*

Halekauwila/South. The Halekauwila/South Station will be located over the makai parking lane of Halekauwila Street just Ewa of South Street (see Figure 2.24). The station will be a side-platform station with mezzanine. *The station access will be on the makai side. A substation will not be required at this site.*

Halekauwila/Ahui. The side-platform station with mezzanine will be located over the makai parking lane of Halekauwila Street just over Ahui Street (see Figure 2.25). *It has been relocated 180 feet Ewa of its location in the SDEIS. In addition, a substation will be located adjacent to the makai station access, if a substation cannot be located at the Nimitz/Smith Station.*

## Section V - East Kakaako to Kalakaua/Kapiolani

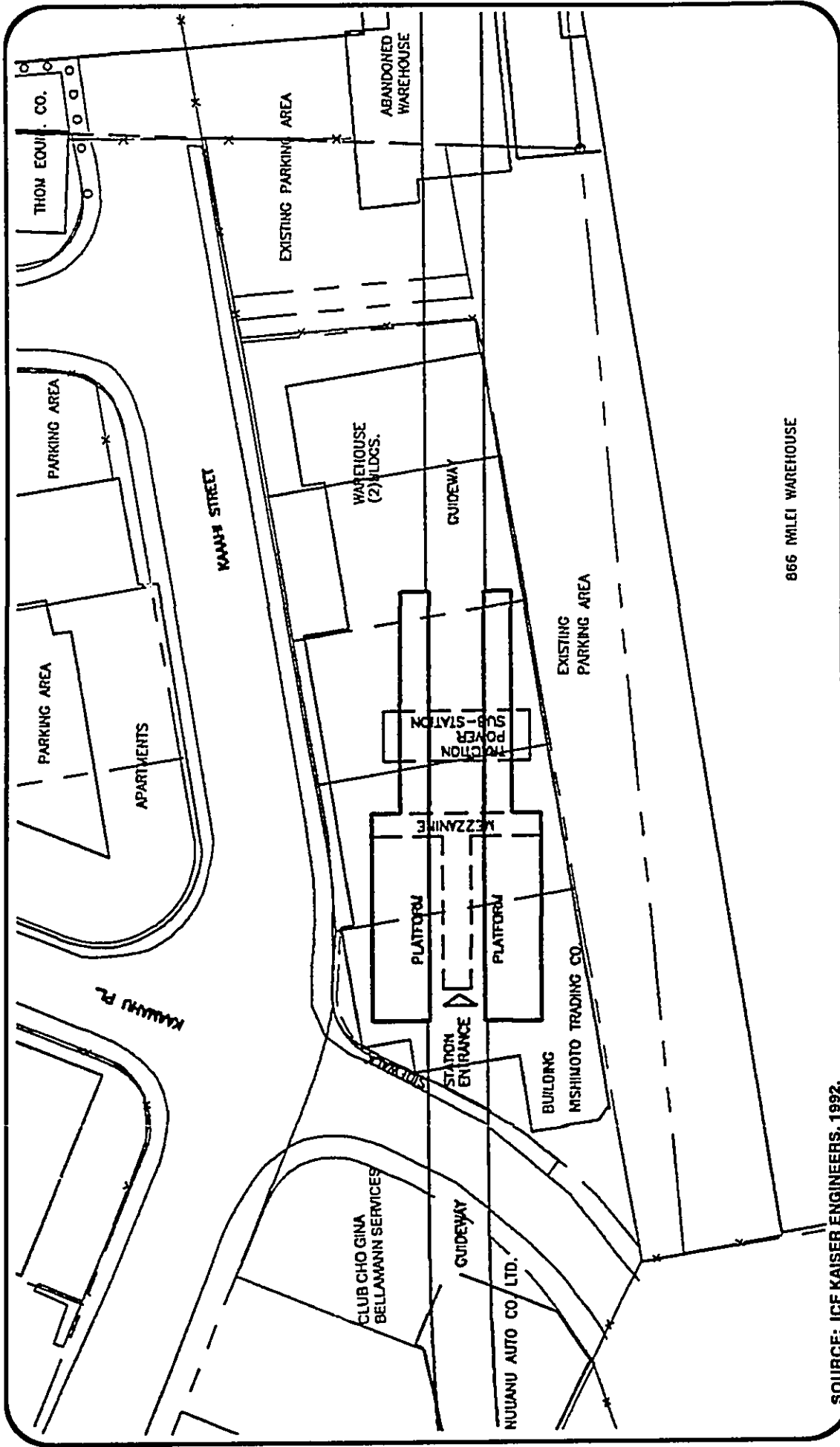
### Alignment/Profile

Starting from the intersection of Ward Avenue and Kawaiahao Street, the alignment turns Koko Head onto the makai side of Waimanu Street. *The guideway will be located on the makai side of Waimanu Street from Ward Avenue to Kamakee Street. Columns will be located in the makai parking lane. This section then proceeds Koko Head and transitions from Waimanu Street to the mauka side of Kona Street crossing the Honolulu Gas Company property at Kamakee Street. Between Kamakee Street and Piikoi Street, the guideway will be located on the mauka side of Kona Street. Columns will be located in the mauka parking lane. The alignment then proceeds Koko Head into the median of Kona Street from Piikoi Street to Keeaumoku Street, then swings to the mauka side of Kona Street from Keeaumoku Street to Atkinson Drive. The alignment follows Atkinson Drive in the mauka direction and ends near the intersection of Kapiolani Boulevard and Kalakaua Avenue on the 10-acre former Aloha Motors lot. This section will include four stations: Neal Blaisdell Center, Piikoi/Kona, Ala Moana Center, and Kalakaua/Kapiolani.*

Consistent with the Kakaako Community Development District Plan, Waimanu and Kona Streets will be developed with two travel lanes, one in each direction and a center turn-lane.

### Stations

Neal Blaisdell Center Station. The location of the station will be at the Cummins Street/Waimanu Street intersection. This location will provide convenient access to the Neal Blaisdell Center complex of arena, exhibition hall, and concert hall. The elevation of the side-platform station with mezzanine above the existing roadway will be approximately 42 feet. *If during final design the location of substations at the Halekauwila/Ahui and Kaahi Stations is moved, they will be relocated adjacent to the Neal Blaisdell Center Station.*

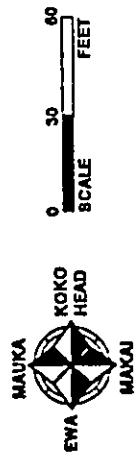


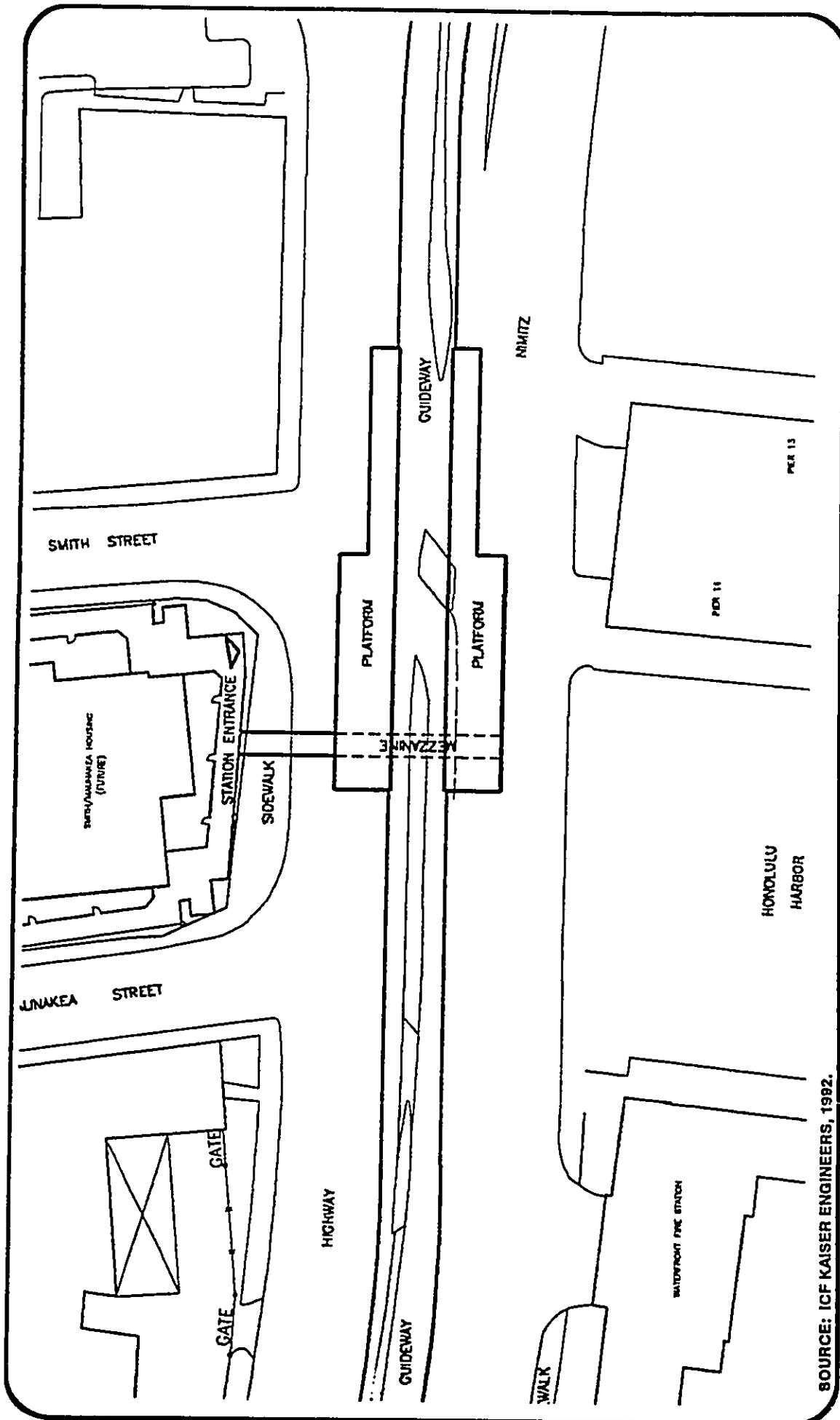
SOURCE: ICF KAISER ENGINEERS, 1992.

FIGURE 2.21

KAAHAI STATION

HONOLULU RAPID TRANSIT PROGRAM



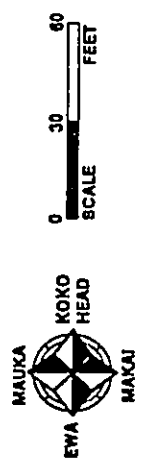


SOURCE: ICF KAISER ENGINEERS, 1992.

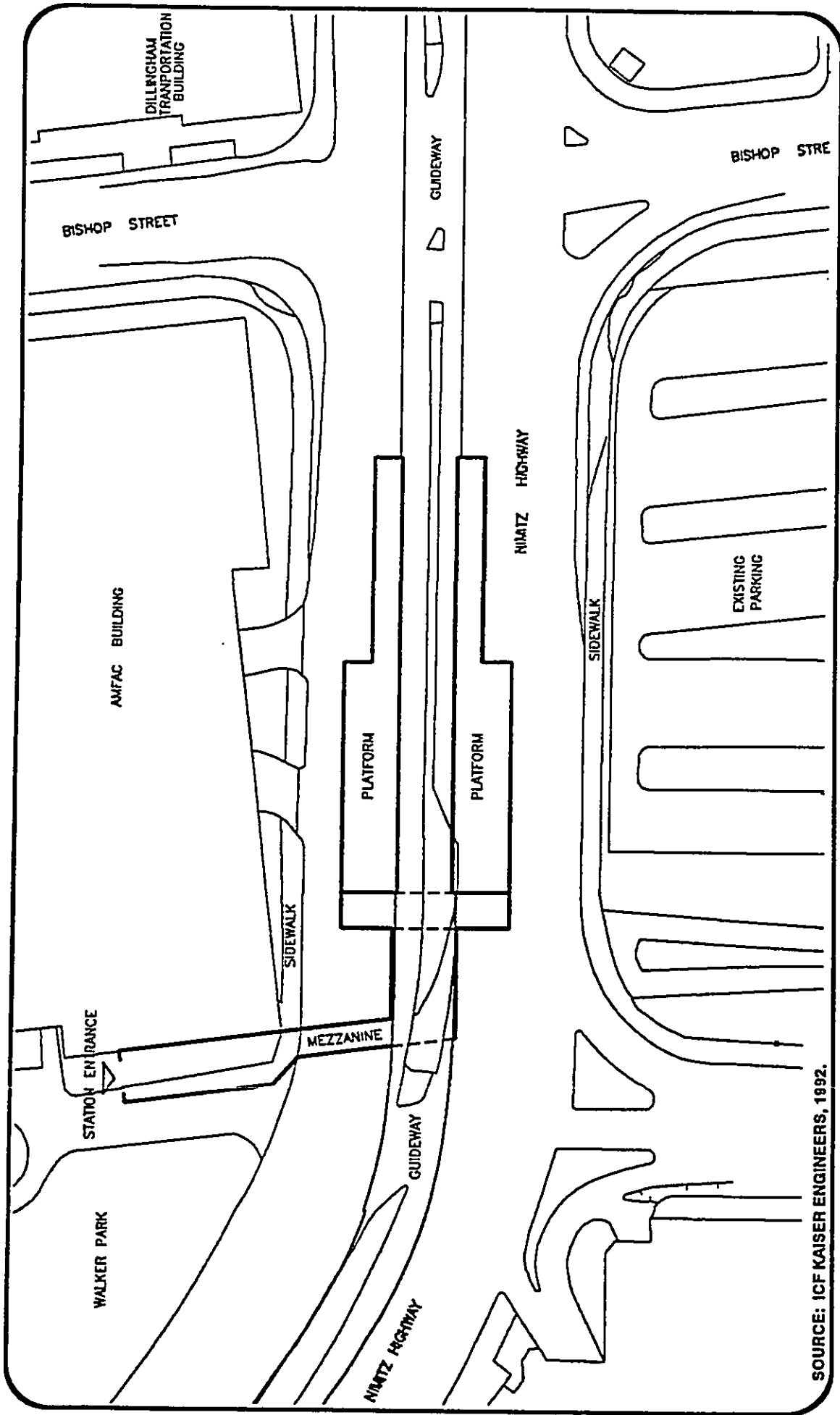
FIGURE 2.22

NIMITZ/SMITH STATION

HONOLULU RAPID TRANSIT PROGRAM







SOURCE: ICF KAISER ENGINEERS, 1992.

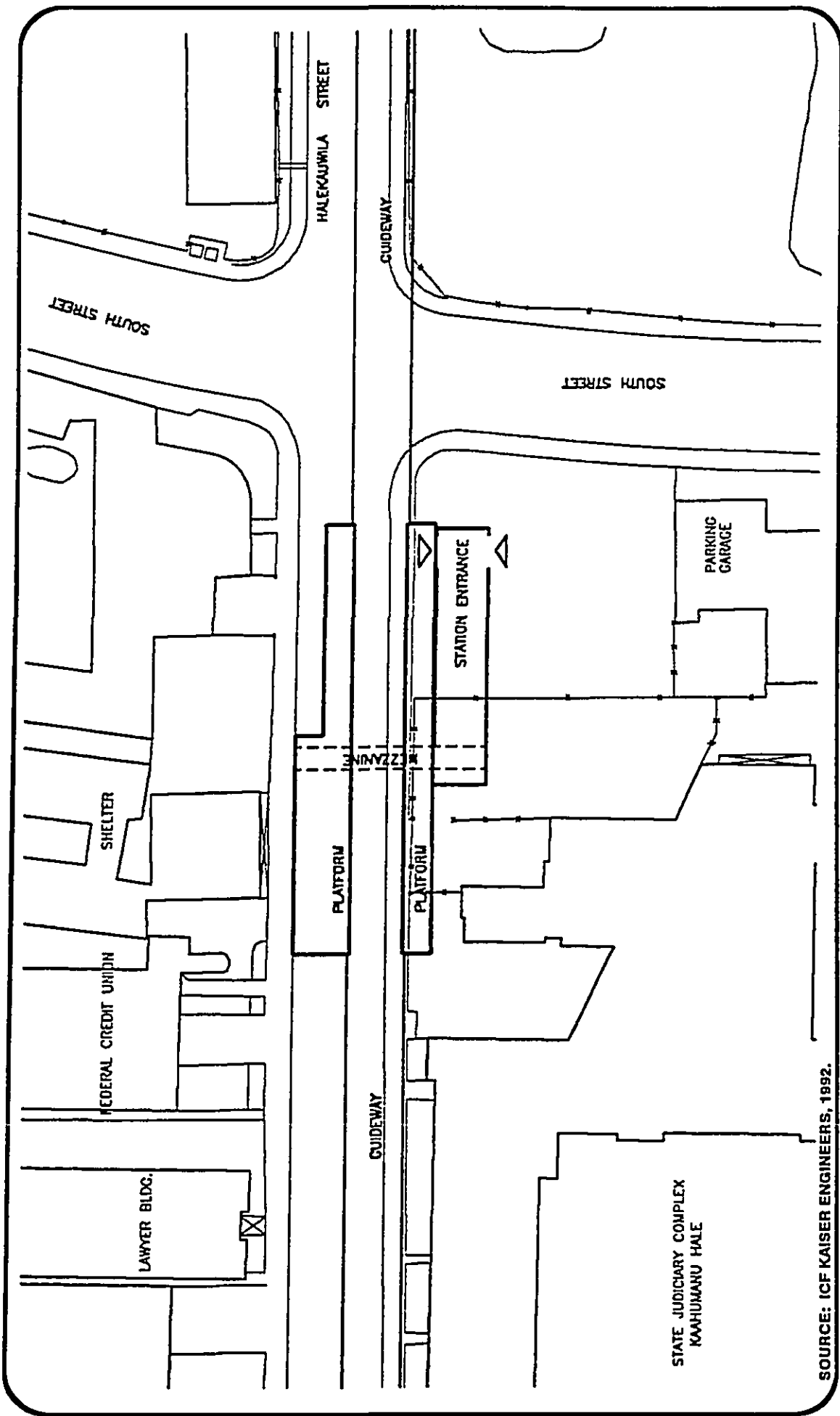


0 30 60  
SCALE  
FEET

FIGURE 2.23

NIMITZ/FORT STATION

HONOLULU RAPID TRANSIT PROGRAM



SOURCE: ICF KAISER ENGINEERS, 1992.



**FIGURE 2.24**  
**HALEKAUWILA/SOUTH STATION**  
**HONOLULU RAPID TRANSIT PROGRAM**

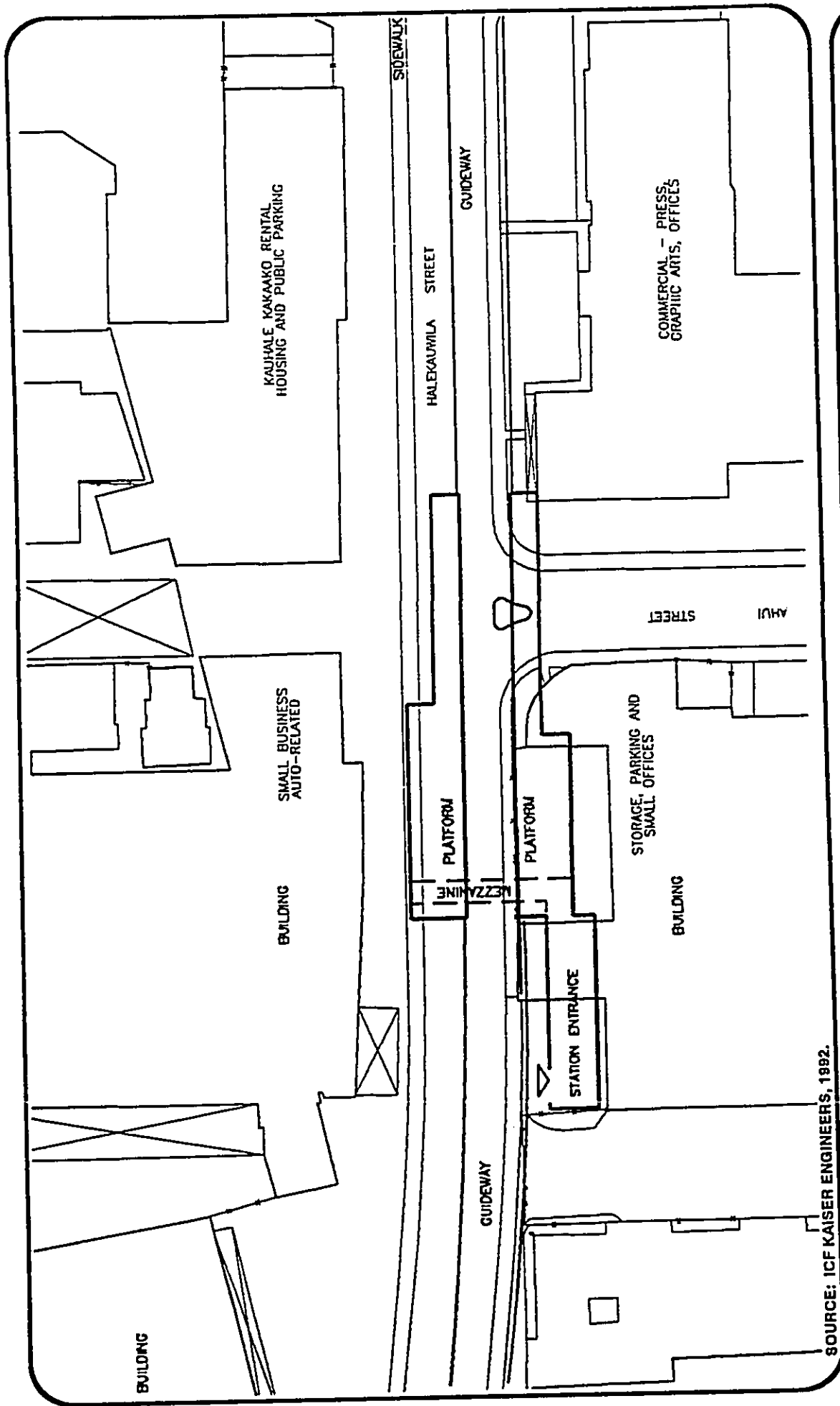
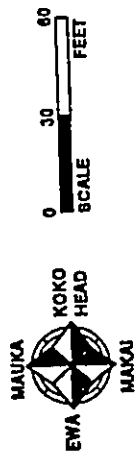


FIGURE 2.25

HALEKAUWILA/AHUI STATION

HONOLULU RAPID TRANSIT PROGRAM



Piikoi/Kona Station. A side-platform station with mezzanine will be built on the mauka side of Kona Street near its intersection with Piikoi Street (see Figure 2.26). *The station is located approximately 46 feet Koko Head of its location in the SDEIS. No substation will be required at this location.*

Ala Moana Center Station. The station will be a side-platform station with mezzanine (see Figure 2.27). It will be located on Kona Street between Keeaumoku and Kaheka Streets at an elevation of approximately 60 feet above the existing roadway. *No substation will be built at this site.*

Kalakaua/Kapiolani Station. The Kalakaua/Kapiolani Station will be on the mauka side of the former Aloha Motors site adjacent to Kapiolani Boulevard. It will be a side-platform station with mezzanine. The platform level will be approximately 42 feet above grade. *A substation will be built in the vicinity of the station; however, three options for the substation are under consideration for final design. These include the side of the mauka access, underground or above ground on the convention center site, or at the corner of Atkinson Drive and Kona Street.*

#### Section VII - University

##### Alignment/Profile

The amended LPA will continue the double tracking along Kapiolani Boulevard from the Kalakaua/Kapiolani Station to University Avenue. The guideway for the amended LPA will then proceed mauka on University Avenue ending at the University of Hawaii lower campus Quarry area of the Manoa Campus. Several university buildings will be relocated within the Quarry area. This section will contain three stations: Isenberg, University/King, and University/Quarry Stations.

From the Kalakaua/Kapiolani Station, the guideway will proceed Koko Head from this point on Kapiolani Boulevard, crossing a drainage channel at Hauoli Street, and transitioning to above the roadway median.

From the Isenberg Station, the aerial dual-track guideway will turn mauka onto University Avenue. The fixed guideway on University Avenue will travel above the median of University Avenue to just mauka of Varsity Place. The alignment will then proceed Koko Head over the H-1 Freeway (elevation approximately 70 feet), then parallel Lower Campus Road on the University of Hawaii campus. The alignment will terminate immediately Ewa of Kalele Road.

A median will be provided on Kapiolani Boulevard from Kalakaua Avenue to McCully Street to accommodate the guideway columns and left turn lanes. To maintain the existing six travel lanes, three in each direction, the lanes will be narrowed and re-stripped.

One through-lane on University Avenue makai-bound at its intersection with Kapiolani Boulevard will be eliminated to accommodate a center median for guideway piers. A property take is required on the makai side of Kapiolani Boulevard to provide a left turn onto University Avenue.

On-street parking on University Avenue will be eliminated on one side of the King Street intersection to accommodate the wider median and to allow continued use of two lanes in each direction for vehicular traffic flow. This elimination is important to vehicular circulation in the area since University Avenue is a major makai-mauka street within the area that runs continuously from Kapiolani Boulevard past the freeway to Manoa.

The median along University Avenue between King Street and Varsity Place will be widened to accommodate the support columns. Two travel lanes in each direction and the existing bike lanes will remain.

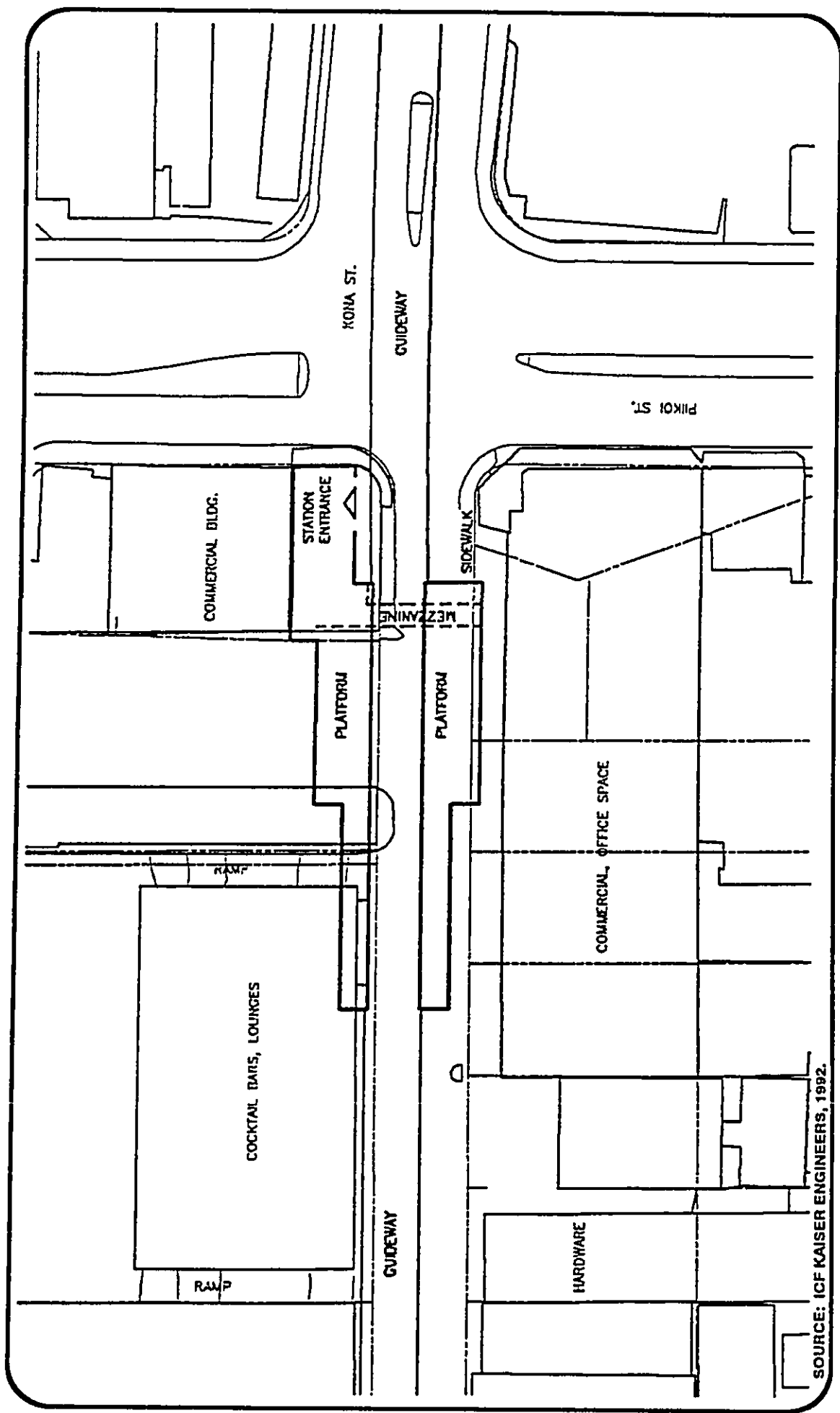
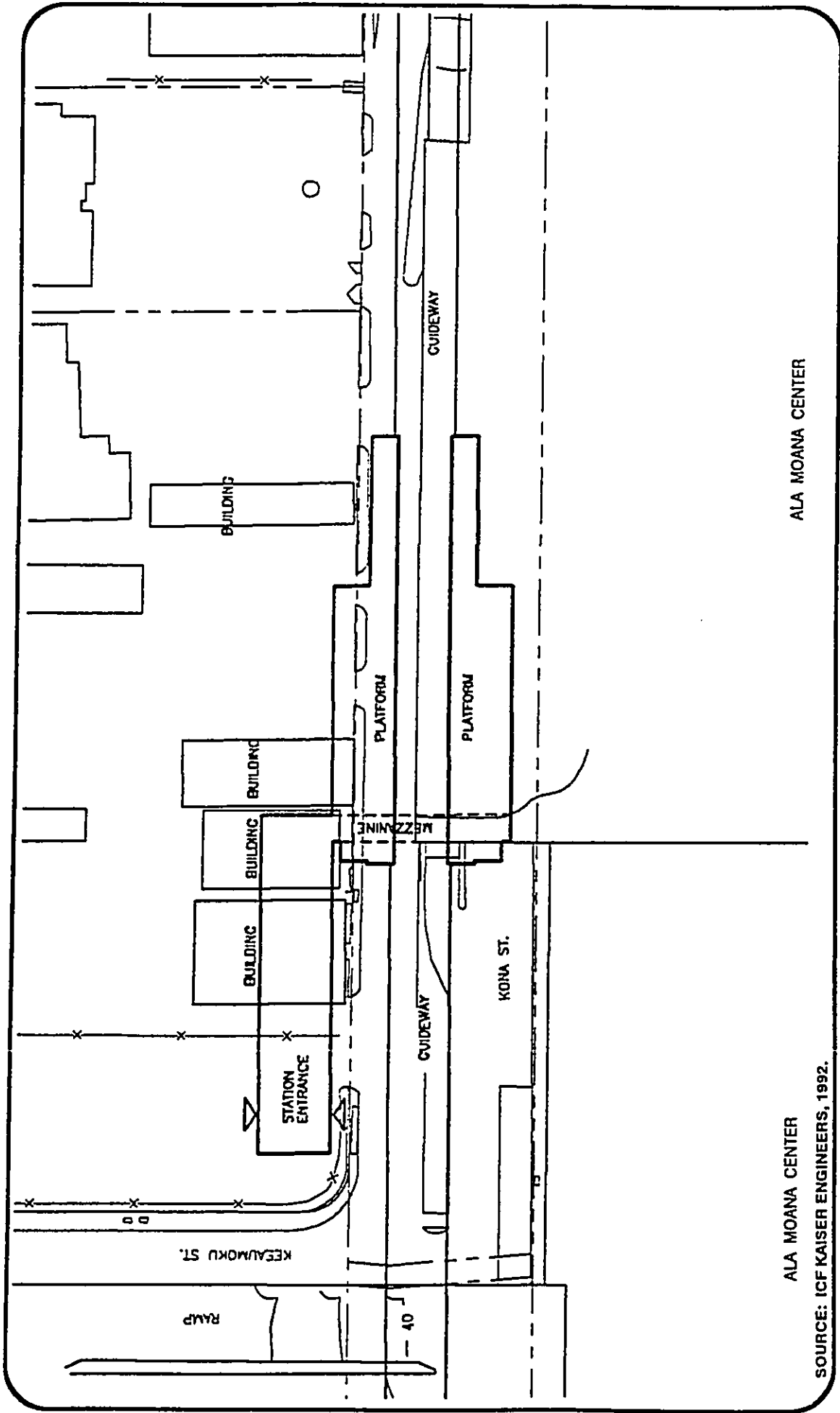


FIGURE 2.26

PIIKOI/KONA STATION

HONOLULU RAPID TRANSIT PROGRAM



ALA MOANA CENTER

ALA MOANA CENTER

SOURCE: ICF KAISER ENGINEERS, 1992.



FIGURE 2.27

ALA MOANA CENTER STATION

HONOLULU RAPID TRANSIT PROGRAM

### Stations/Park-and-Ride Lots

Isenberg Station. The Isenberg Station, located at Kapiolani Boulevard and Isenberg Street *approximately 30 feet Ewa of the location in the SDEIS*, will be a side-platform station with mezzanine above the median of Kapiolani Boulevard (see Figure 2.28). *The station shift will eliminate three straddle bents previously proposed for this section.* The station site will be Koko Head of the Marco Polo tower, adjacent to the large parking structures for the Marco Polo and the Ala Wai Plaza condominiums. The landscaped open space between the parking structures and Kapiolani Boulevard will be utilized for the station's makai entrance that will include stairs, an elevator, and an escalator. A second entrance, on the mauka side of Kapiolani Boulevard, will consist of stairs only. *A substation will not be located at the station.*

University/King Station. The University/King Station (see Figure 2.29) will be constructed as a side-platform station with mezzanine makai of the King Street intersection on University Avenue at Kullei Street. *The station has been moved approximately 40 feet mauka as compared to the SDEIS. A substation will be located adjacent to the Koko Head touchdown (see Figure 2.29).*

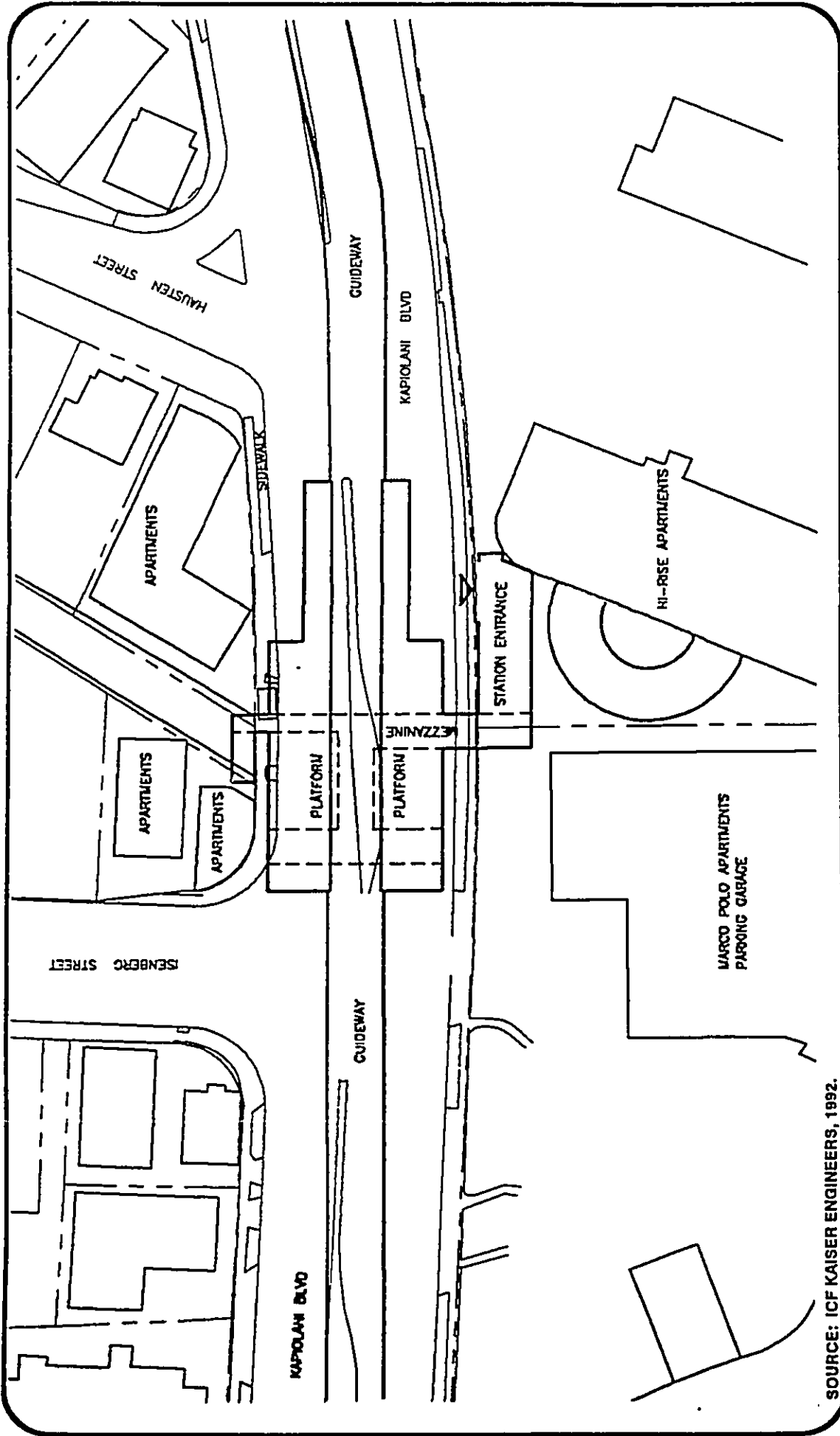
University/Quarry Station. The University/Quarry Station will serve the University of Hawaii campus and surrounding area. The station will be located makai of Lower Campus Road Ewa of Kalo Place (see Figure 2.30). A side-platform, end-of-the-line station incorporating a tail track will be built. *There will be a substation associated with the station in the vicinity of the station access.*

University Area Park-and-Ride Lots. Three sites are under consideration as park-and-ride lots in the University area. *It should be noted that these are not part of the amended LPA.* The three sites, as shown on Figure 2.31, include the Varsity Theater property, commercial property at University Avenue/King Street, and the Oasis Nightclub and Lounge property.

The Varsity Theater property is located on the mauka side of Coyne Street, Ewa of the Varsity Theater on University Avenue, approximately an 800-foot walk from the University/King Station entrance. The site currently serves as a private parking lot. The lot would have 100 spaces with access off Coyne Street (see Figure 2.32). This would have the same access as used for the existing lot today.

The University/King park-and-ride lot would be located on commercial property, at the corner of University Avenue (Koko Head) and King Street (makai) (see Figure 2.32) immediately adjacent to the University/King Station entrance. The site contains the University Square commercial complex. A multi-level parking structure with 205 spaces would be developed on the site.

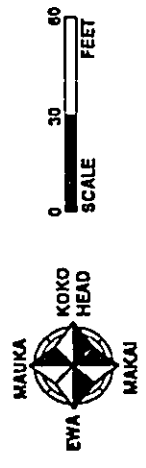
The Oasis Nightclub and Lounge property is located on the mauka side of Waiialae Avenue, approximately 3,700 feet from the University/King Station and 3,100 feet from the University/Quarry Station. Shuttle bus service would be provided between the park-and-ride lot and the University/Quarry Station, with a bus every five minutes during the peak period and a bus every nine minutes during the base period. In addition, regular bus service would be available from the park-and-ride lot to the University/King Station, with a bus every four minutes during the peak period and a bus every eleven minutes during the base period. However, even with the bus service, this park-and-ride location would be less attractive for transit patrons than the other two sites, which are within walking distance of a station. The site would be developed to have 191 parking spaces with access from Waiialae Avenue (see Figure 2.32).



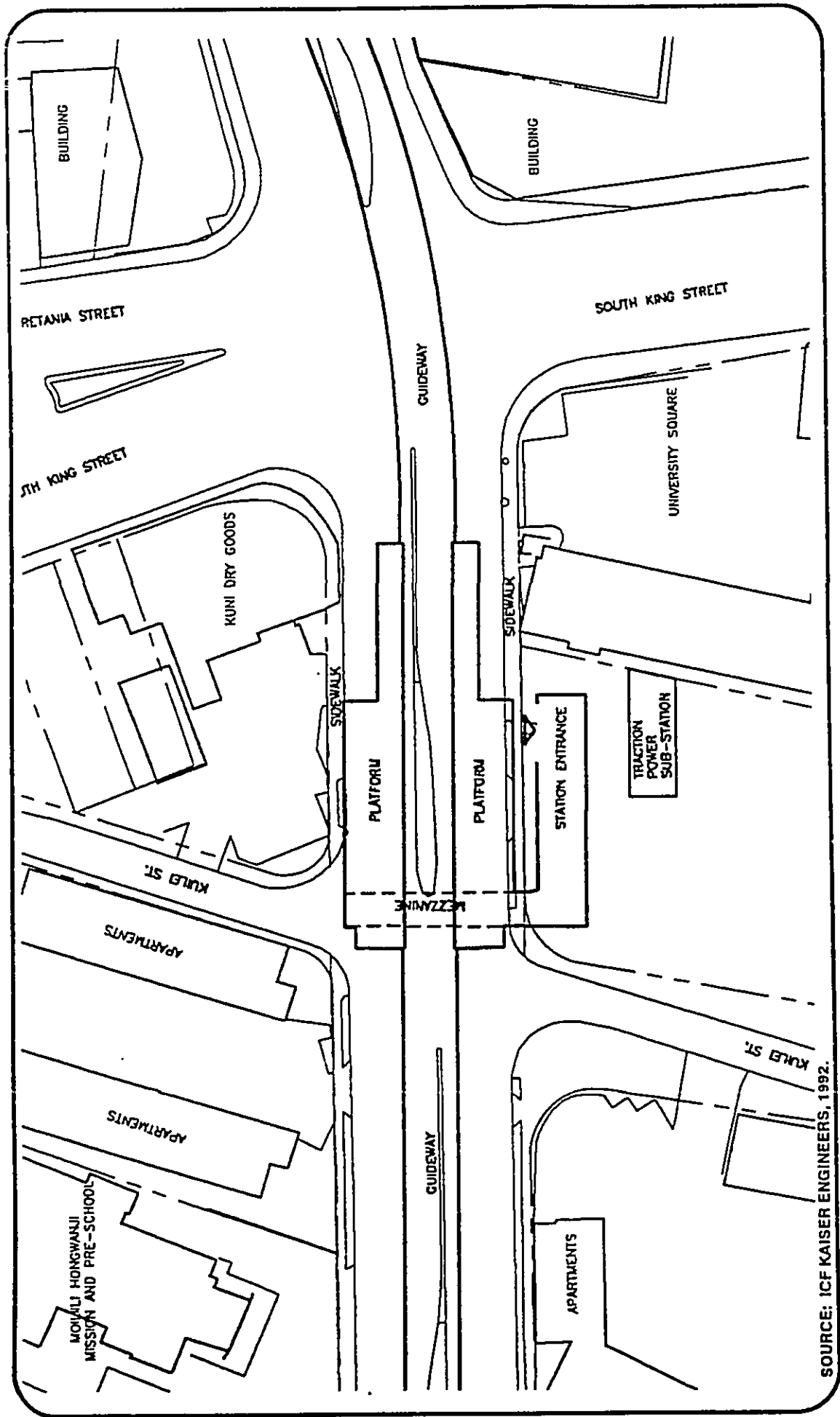
SOURCE: ICF KAISER ENGINEERS, 1992.

FIGURE 2.28

ISENBERG STATION  
HONOLULU RAPID TRANSIT PROGRAM





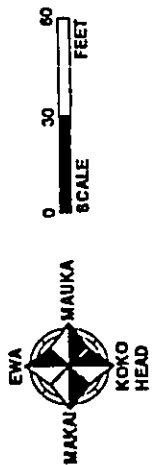


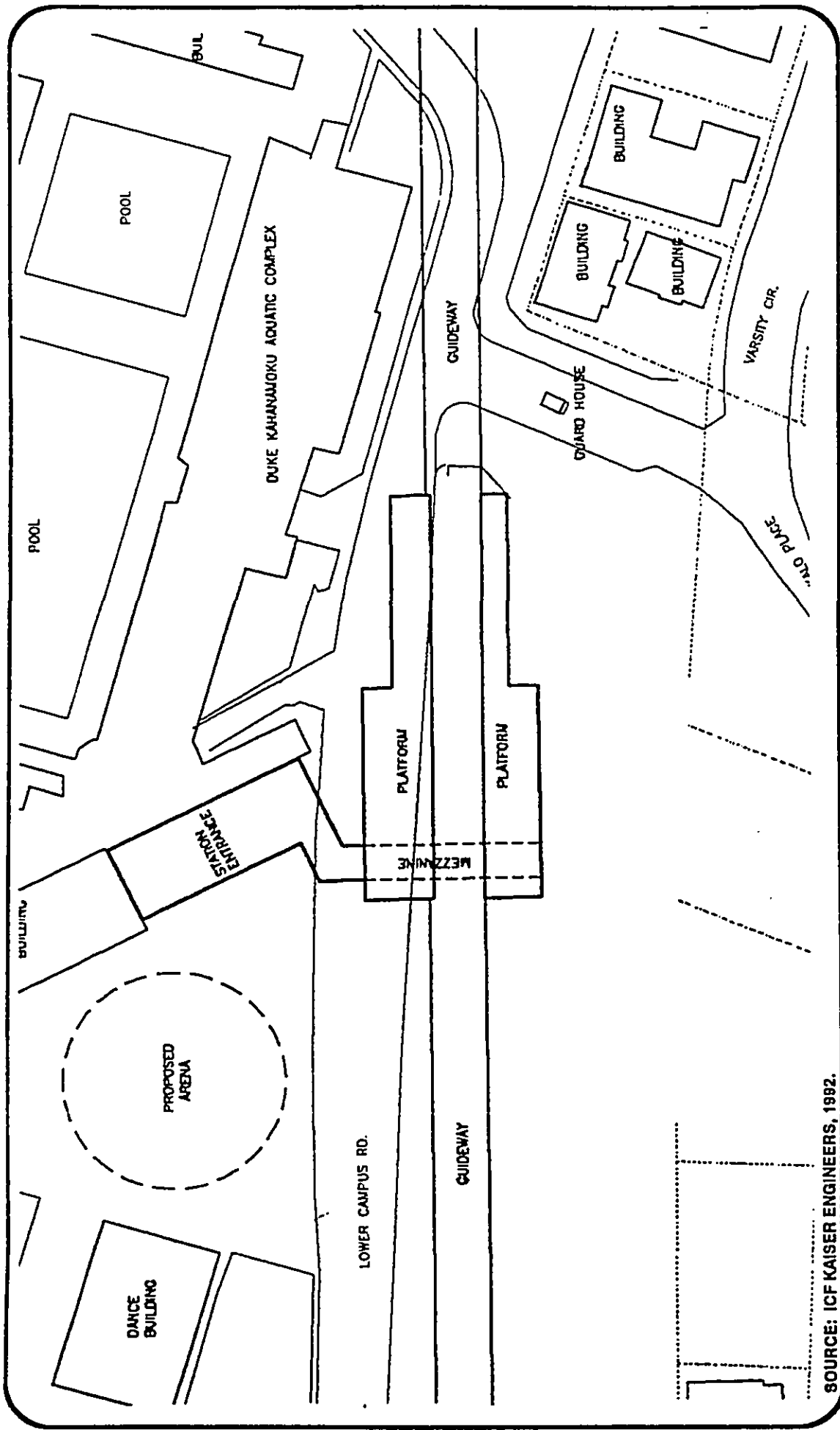
SOURCE: ICF KAISER ENGINEERS, 1992.

FIGURE 2.29

UNIVERSITY/KING STATION

HONOLULU RAPID TRANSIT PROGRAM



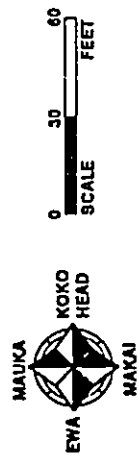


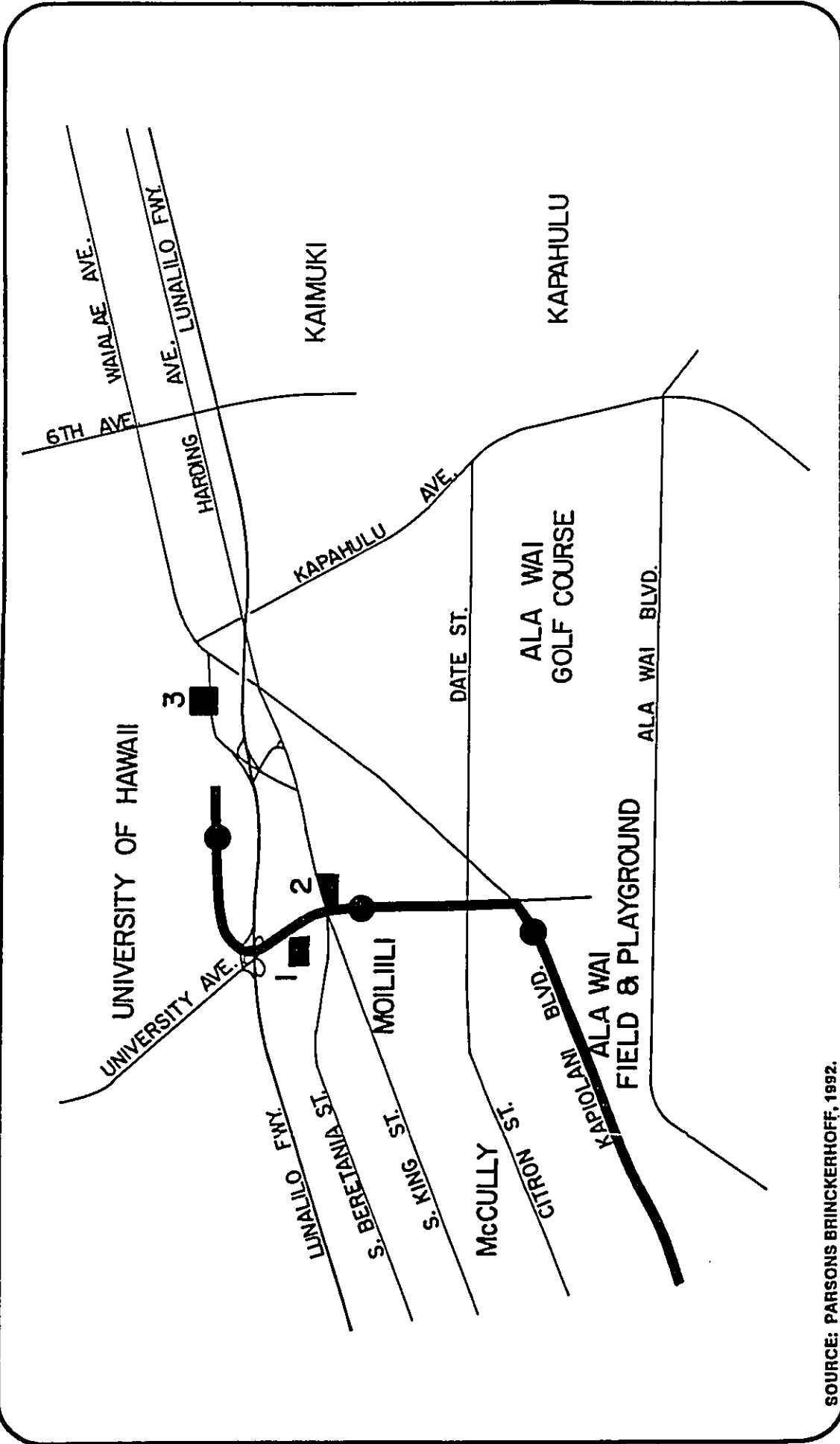
SOURCE: ICF KAISER ENGINEERS, 1992.

FIGURE 2.30

UNIVERSITY/QUARRY STATION

HONOLULU RAPID TRANSIT PROGRAM





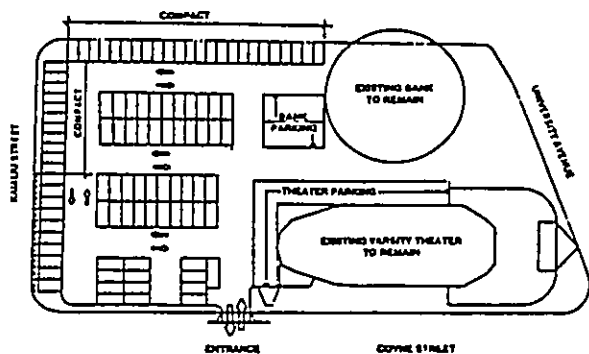
SOURCE: PARSONS BRINCKERHOFF, 1992.

**FIGURE 2.31**  
**UNIVERSITY AREA**  
**PARK-AND-RIDE LOCATIONS**  
**HONOLULU RAPID TRANSIT PROGRAM**

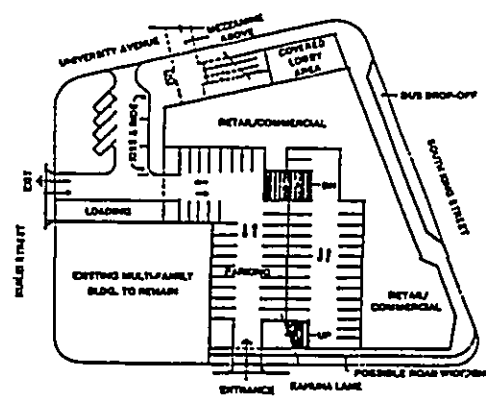
MAUIKA  
 EWA  
 KOKO HEAD  
 MANA

0 1600 3200  
 SCALE  
 FEET

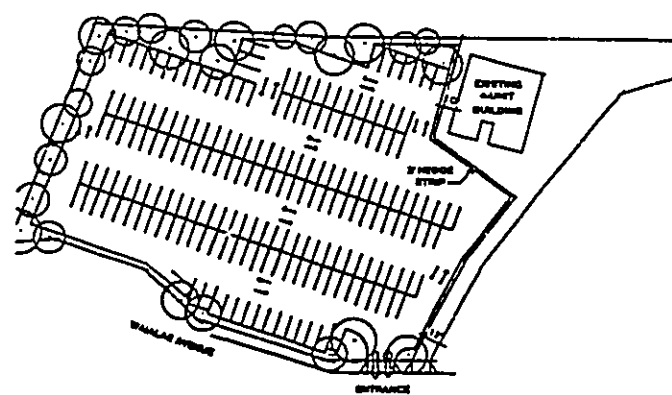
LEGEND  
 1 - VARSITY THEATER  
 2 - UNIVERSITY PLAZA  
 3 - OASIS NIGHTCLUB AND LOUNGE  
 ● STATIONS



Varsity Theater



University/King



Oasis Nightclub and Lounge

SOURCE: CITY AND COUNTY OF HONOLULU, 1992.



FIGURE 2.32

UNIVERSITY AREA PARK-AND-RIDE LOTS

HONOLULU RAPID TRANSIT PROGRAM

## 2.3 CAPITAL COSTS

This section describes estimates of the capital costs for the various alternatives. Development of the capital costs for the No-Build and TSM Alternatives followed the methodology developed early in the study, incorporating additional analyses and review comments made during the course of the study, and documented in the Capital Cost Methodology Report (March 21, 1988) and the Technical Support to the Capital Cost Methodology Report (May 1989). Costs for the fixed guideway alternatives are based on bid prices from the successful System Contractor and estimates and allowances for other costs. Costs associated with the completion of transit stations, access roads and parking facilities and right-of-way acquisition have been estimated using quantity take-offs and applying unit costs. Program insurance coverage, management and budget reserve are calculated as percentages of the other fixed guideway capital costs. Also included are allowances for hazardous material removal and treatment and for payment of General Excise and Use Taxes.

The cost of the fixed guideway component of the Honolulu Rapid Transit Program is summarized in Table 2.6. *The costs shown are those included in the development agreement between the City and the State. They do not include the cost impacts of changes being examined in preliminary engineering, such as the estimated cost increase for including mezzanines at Dillingham Plaza and Honolulu Community College Stations or the estimated cost decrease due to locating the alignment on Halekauwila Street rather than on Pohukaina Street.* This total consists of the following components:

- System Contract Price. This price is the Phase 2 Best and Final Offer (BAFO) price of the Oahu Transit Group (OTG) less any allowances for General Excise and Use Taxes that had been included in the BAFO price (these taxes are included below as an allowance). Unlike most FTA funded transit projects that must rely on an engineer's estimate for the cost estimate on which the Full Funding Grant Agreement is based, nearly 65% of the capital costs for the Honolulu program are included in the System Contractor's fixed price (in 1991 dollars) for a fixed scope, which is subject to an inflation adjustment based on already defined indices.
- Station Contracts. These costs are the engineer's estimate of the construction costs required to finish the stations over and above the work performed by the System Contractor.
- Other Project Costs. These costs are the engineer's estimate of the other costs to the City of completing the program, other than the system contract and the station contracts.
- Contingency Reserve. A contingency reserve has been established as 7-1/2% of the sum of the system contract price, the station contracts, and the other project costs.
- Allowance for General Excise and Use Taxes on Program Activities.

Differences among the cost estimates of the current alternatives also reflect changes in the bus transit service designed for the alternatives. Table 2.7 shows the differences among the bus-related costs by alternative. The bus-related capital cost for the amended LPA is \$259 million compared with the TSM cost of \$406 million. HOV/bus lanes-lane improvements as proposed by the State of Hawaii are included in all of the alternatives. However, the cost of the improvements, funded by the State of Hawaii, is not included in the alternative capital costs.

Table 2.6 AMENDED LOCALLY PREFERRED ALTERNATIVE FIXED GUIDEWAY CAPITAL COSTS	
	Millions of 1991 Dollars
System Contract	\$1,099.38
Station Contracts	165.00
Other Costs	300.00
Contingency Reserve	120.00
Subtotal	\$1,684.38
Allowance for GET on Program Activities (4.5%)	75.00
<b>TOTAL</b>	<b>\$1,759.38</b>

Source: City and County of Honolulu, 1992.

Table 2.7 CAPITAL COST ESTIMATES (Millions of 1991 Dollars)								
Alternative	Fixed Guideway	Bus Capital						Total <sup>1</sup> Capital
		Replacement Buses	New Buses	Maintenance Facilities	Park-and-Ride Facilities	Other Capital	Bus <sup>1</sup> Total	
No-Build <sup>2</sup>	\$0.00	\$133.96	\$0.00	\$ 0.46	\$0.00	\$31.06	\$165.48	\$165.48
TSM	\$0.00	\$133.96	\$139.27	\$89.47	\$12.31	\$31.06	\$406.07	\$406.07
Amended LPA	\$1,759.38 <sup>3</sup>	\$133.96	\$48.64	\$36.07	\$9.09	\$31.06	\$258.82	\$2,018.20

Source: Parsons Brinckerhoff Quade & Douglas, Inc., April 1992.

Notes: <sup>1</sup> Additional HOV/bus lanes facilities will be funded by the State of Hawaii.

<sup>2</sup> If the No-Build Alternative were designed to accommodate peak-load-point demand with the same vehicle load standards as the other alternatives, the No-Build total capital cost estimate would be \$256.73 million.

## 2.4 OPERATING AND MAINTENANCE COSTS

Annual operating and maintenance (O&M) cost estimates have been prepared for each of the alternatives. The costs are for the forecast year 2005, assuming full development of each alternative, and are expressed in 1991 dollars.

### 2.4.1 Cost Estimation Methods

Bus O&M costs have been estimated and described in the Operations and Maintenance Cost Methodology Report, (May 4, 1988); Technical Supplement, (April 1989); and the Operations and Maintenance Cost Results Report, (December 1989); with costs updated to 1991 dollars.

The bus operating cost model, which was derived principally using Section 15 data for the existing bus system, closely follows FTA's recommended approach to disaggregating and classifying individual

expense categories using Section 15 expense object "function codes." The bus cost model also included a model validation process, in which the estimated cost model was applied to the existing bus operating statistics from prior years; the resulting O&M cost estimates were then compared to actual expenditures in those years.

Fixed guideway O&M costs include the System Contractor's fixed price and an estimate of City management and insurance and claims costs based on the experience of other systems.

#### 2.4.2 Comparative Discussion

Table 2.8 presents the annual O&M costs in 1991 dollars, assuming full development of the alternative by the year 2005. The costs are based on the methodology reports (updated), the engineering and travel demand forecasting results, and the cost from the System Contractor.

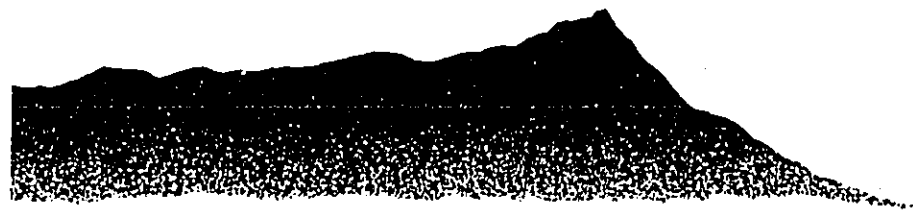
As indicated in Table 2.8, O&M costs for the No-Build Alternative in 2005 would be about \$105 million (in 1991 dollars). This compares to current operating costs for the existing bus system of about \$86 million. This increase is due to an increase in the constant dollar, per unit cost of providing bus service, primarily due to increasing claims costs, and to an increase in off-peak service assumed for the No-Build Alternative. The No-Build Alternative, by definition for the study, is constrained to today's bus fleet size. By the year 2005, transit demand will have grown for both peak and off-peak periods. The No-Build Alternative service would accommodate year 2005 peak-period demand *at heavily loaded conditions* because of the fleet size constraint. However, in the off-peak period, more service could be provided than today to satisfy the future demand at reasonable load standards.

Comparing the TSM Alternative to the No-Build Alternative, it can be seen in Table 2.8 that O&M costs would increase significantly, to about \$154 million, as is expected for an increase in the bus fleet. The O&M costs for the fixed guideway alternatives include two components, the cost of bus service and the cost of the fixed guideway service. The amended LPA will cost about \$5 million per year less to operate than the TSM Alternative.

Alternative	Bus Cost	Fixed Guideway Cost	Total Cost
No-Build	\$104.6 <sup>1</sup>	\$0	\$104.6 <sup>1</sup>
TSM	\$154.3	\$0	\$154.3
Amended LPA	\$106.5	\$42.7	\$149.2

Source: Parson Brinckerhoff Quade & Douglas, Inc., April 1992.

Note: <sup>1</sup> If the No-Build Alternative were designed to accommodate peak-load-point demand with the same vehicle load standards as the other alternatives, the annual operating and maintenance cost would be \$122.2 million.



**Chapter 3**  
**Affected Environment**



## 3.0 AFFECTED ENVIRONMENT

This chapter summarizes existing study area characteristics. It covers land use and economic activity, transportation, neighborhoods, visual and aesthetic resources, air quality, and noise and vibration. Other existing characteristics discussed include ecosystems, water, historic and archaeological resources, and parklands. Additional detailed information and mapping is contained in the Updated Environmental Baseline Report (December 1989), the Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) (March 1990), the specific technical studies supporting the AA/DEIS, and the Supplemental Draft Environmental Impact Statement (SDEIS) (March 1992).

### 3.1 LAND USE AND ECONOMIC ACTIVITY

#### 3.1.1 Regional Summary

The island of Oahu is 44 miles long and 30 miles wide. It contains almost 380,000 acres of land, surrounded by a coastline of 112 statute miles. Much of the land area is mountainous; almost 50% of the land has a slope equal to or greater than 20%; about 40% of the land area has slopes less than 10%. As a result, about 54% of the total land area is developable.

Oahu is Hawaii's most heavily populated island. The island of Oahu generally comprises the boundaries of the City and County of Honolulu. Based on designated land use classifications used by the City and County of Honolulu, Figure 3.1 illustrates that 70% of the City and County of Honolulu is classified as either agricultural or preservation, with another 14% in military and other use, and another 9% designated as residential. Industrial, commercial, public, and hotel and resort land use classes comprise the remaining 7%.

The City and County of Honolulu has divided Oahu into eight Development Plan Areas (DPA), each with specific land use objectives and development constraints. Figure 3.2 illustrates these areas. The project study area falls in the Primary Urban Center (PUC) and the Central Oahu DPAs and is bordered by a portion of the Ewa DPA.

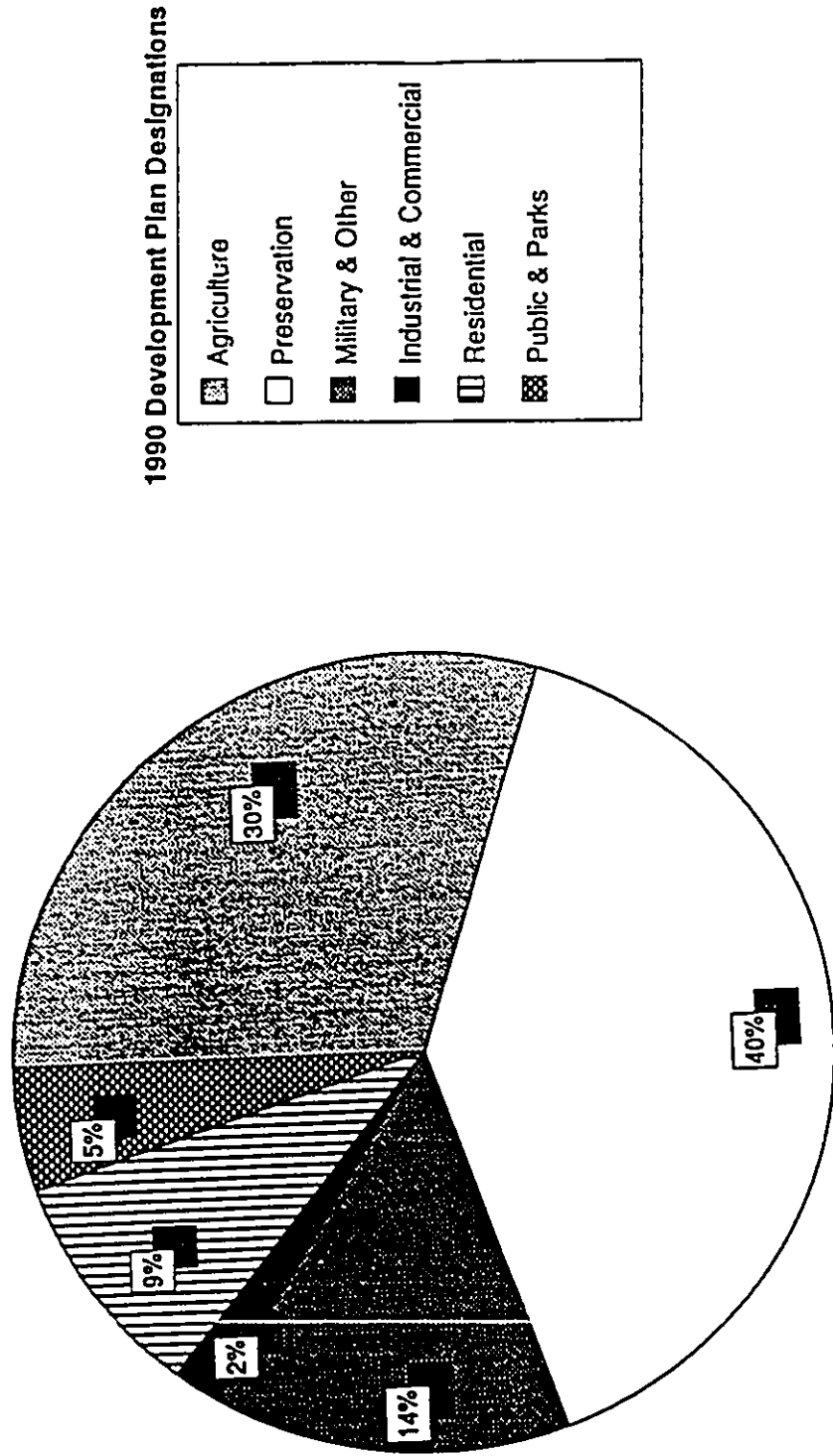
#### 3.1.2 General Study Area

This FEIS focuses on an area extending from the H-1/H-2 Freeway interchange on the Ewa side to the University of Hawaii on the Koko Head side. Figure 1.1 shows the study corridor.

Figures 3.3a, b, and c show the 1987 Development Plan Land Use Map in generalized form for the study area. Both the Ewa and Central Oahu DPAs have experienced significant designation of land for residential development since 1987.

##### 3.1.2.1 The Primary Urban Center

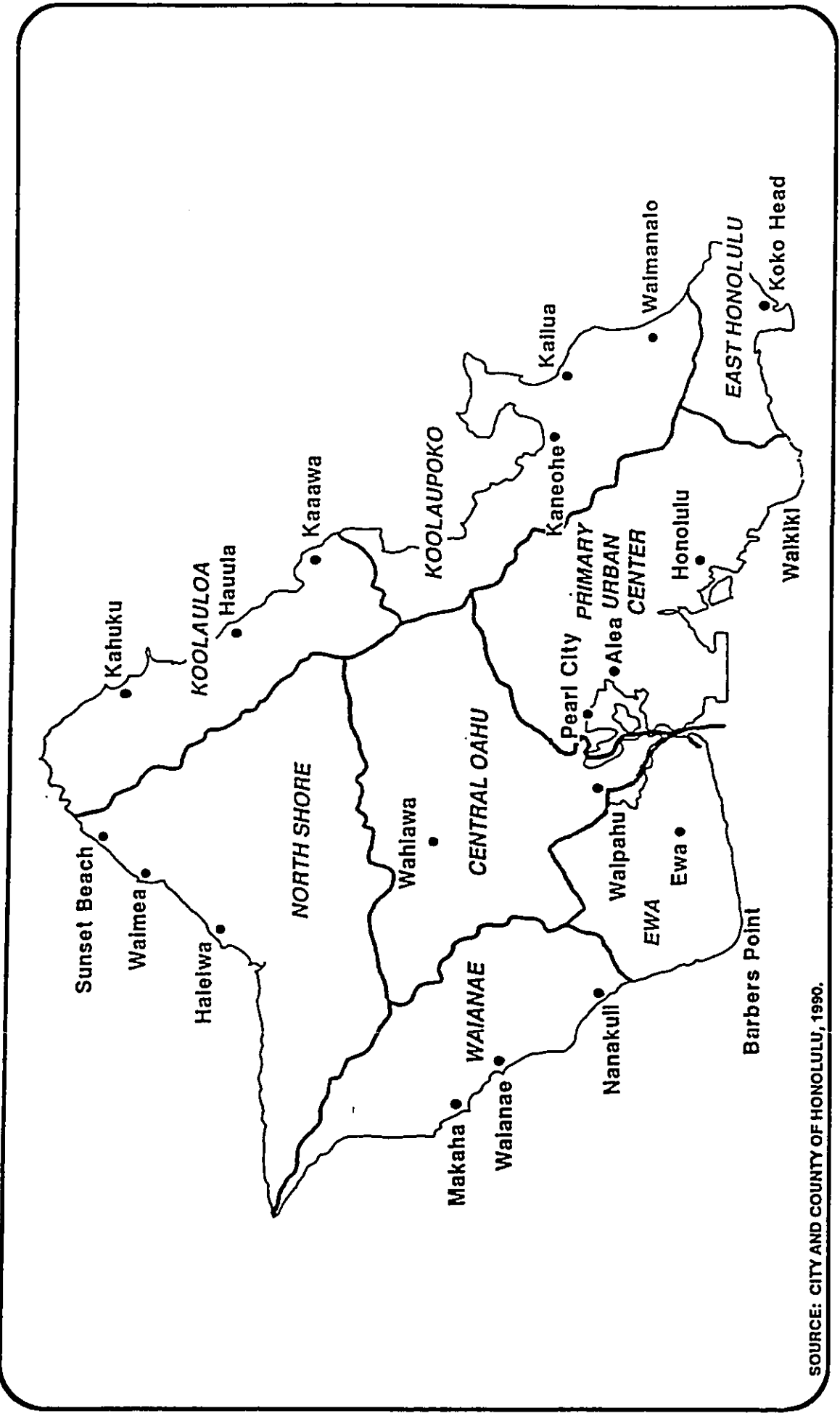
The PUC DPA includes the communities from Waialae-Kahala to Pearl City. According to the City and County of Honolulu Department of General Planning's Fiscal Year 1990 Development Plan Status Review (1990), Volume One, the PUC is the most populated part of Oahu. Between 1980 and 1989, 35% of all population growth and 45% of all new housing occurred in the PUC. It is also Oahu's center for government, economic, and cultural activities, and contains about 75% of the total civilian employment.



SOURCE: CITY AND COUNTY OF HONOLULU, 1991.

FIGURE 3.1

DISTRIBUTION OF DESIGNATED LAND USES  
HONOLULU RAPID TRANSIT PROGRAM



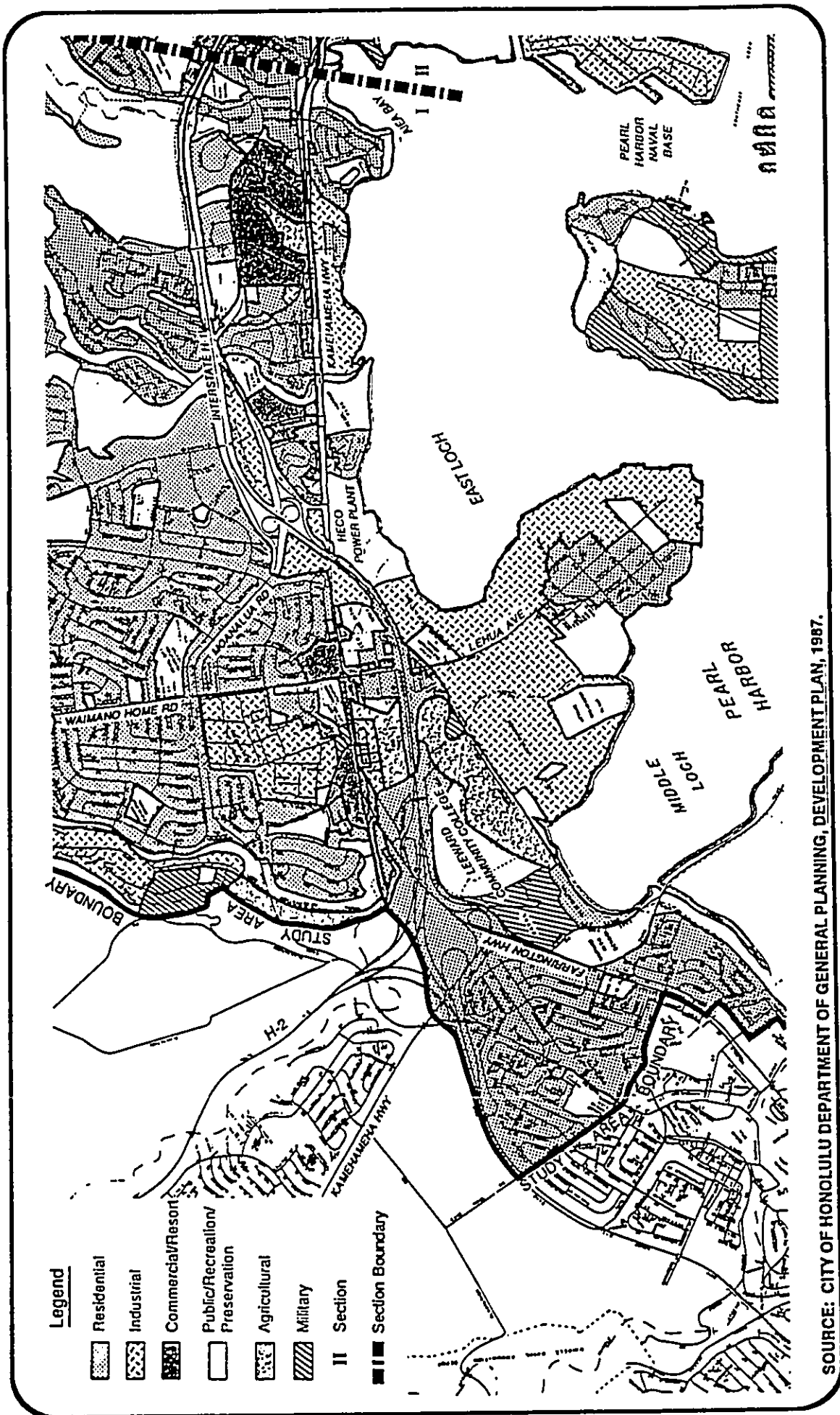
SOURCE: CITY AND COUNTY OF HONOLULU, 1990.



**FIGURE 3.2**

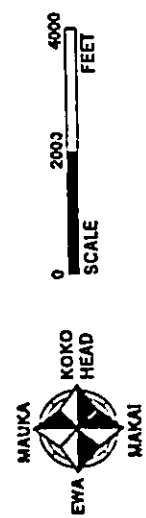
**DEVELOPMENT PLAN AREAS**

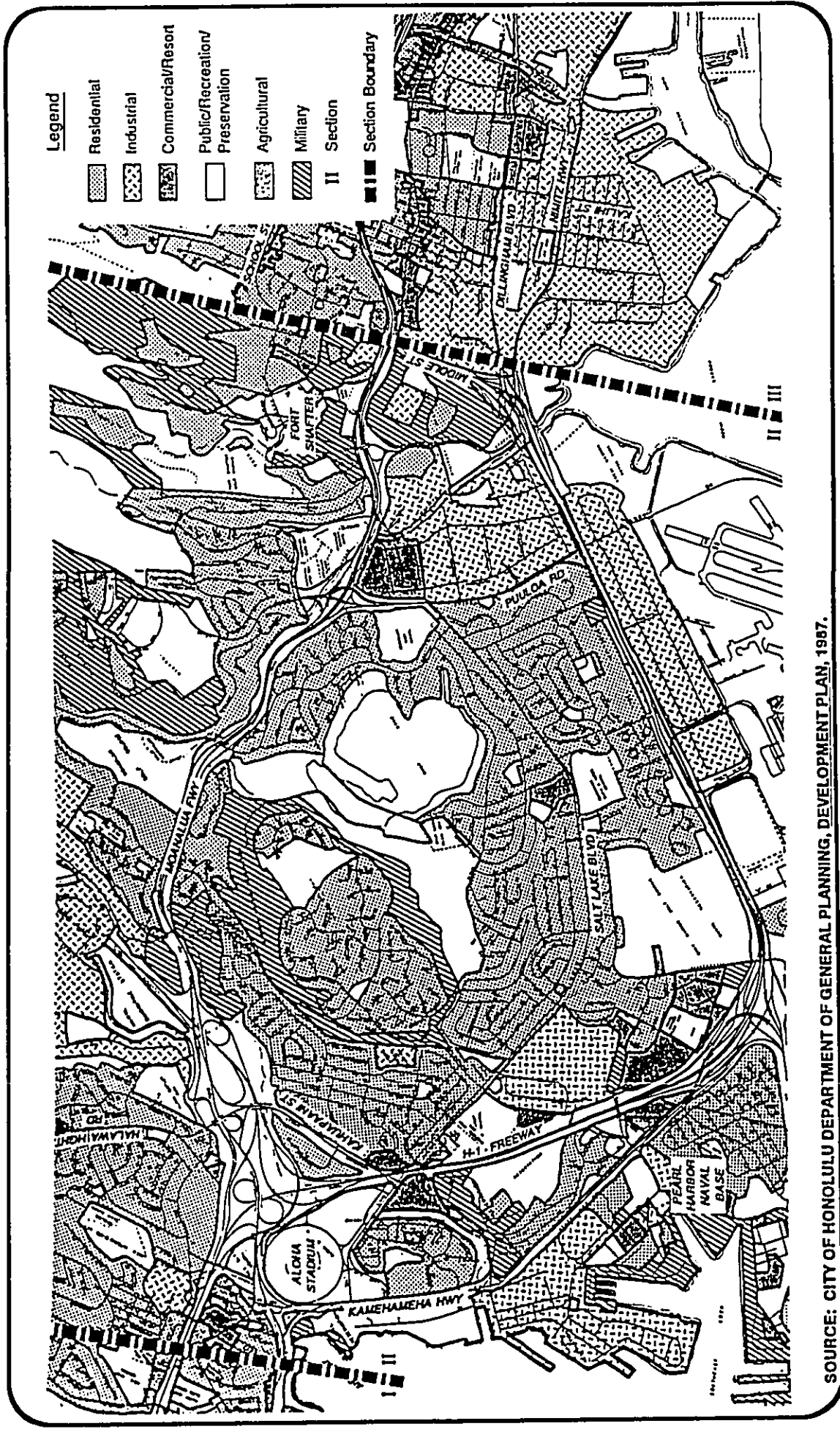
**HONOLULU RAPID TRANSIT PROGRAM**



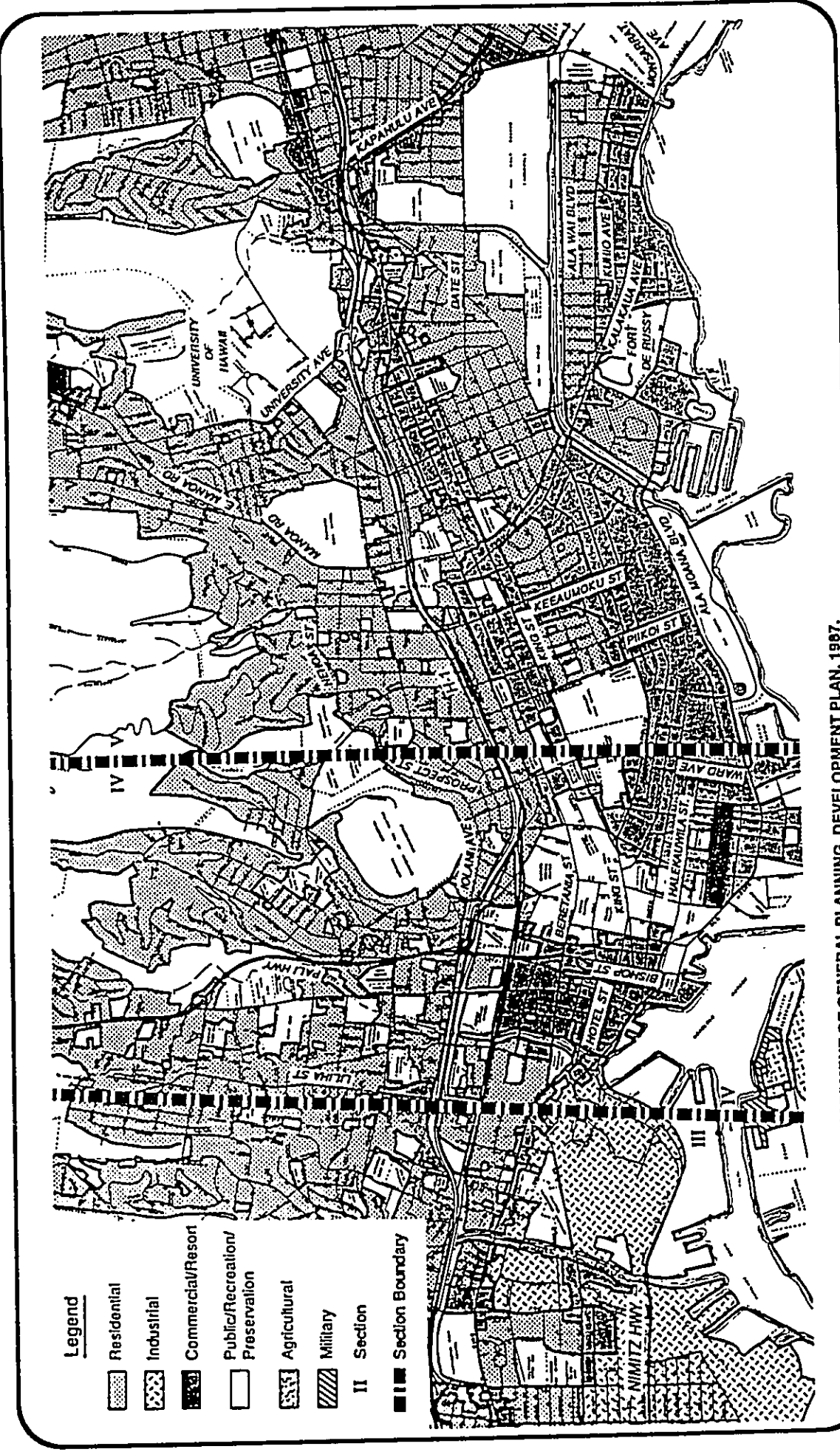
**FIGURE 3.3a**

**GENERALIZED DEVELOPMENT PLAN  
LAND USE MAP  
HONOLULU RAPID TRANSIT PROGRAM**



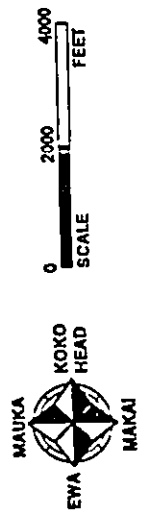


**FIGURE 3.3b**  
**GENERALIZED DEVELOPMENT PLAN**  
**LAND USE MAP**  
**HONOLULU RAPID TRANSIT PROGRAM**



SOURCE: CITY OF HONOLULU DEPARTMENT OF GENERAL PLANNING, DEVELOPMENT PLAN, 1987.

**FIGURE 3.3C**  
**GENERALIZED DEVELOPMENT PLAN**  
**LAND USE MAP**  
**HONOLULU RAPID TRANSIT PROGRAM**



About 30,000 military personnel work at military installations within the PUC. The Fiscal Year 1991 Development Plan Status Review (1991) shows that of the roughly 65,000 acres within the PUC, 16% of the land area is designated residential; 5% is commercial/industrial; 12% is public facilities, including parks; 53% is preservation; 12% is military and other; 1% is agricultural; and less than 1% is resort. The 1990 population and housing data by DPAs are currently unavailable.

Within the PUC, considerable diversity in land uses exists, and specific subareas serve as focal points for particular activities. The valleys and heights in the mauka portions are developed primarily in single-family residential uses. Multi-family concentrations lie in Waikiki, McCully/Moiliili, Kaheka Street, Makiki/Punchbowl, Kukui, Kalihi/Palama, Salt Lake, and Pearlridge. Office, retail, service, and government centers are located primarily in the makai areas between Chinatown and Kalakaua Avenue. Industrial uses are concentrated in Kakaako, Kalihi-Iwilei, and the Pearl Harbor/Sand Island areas, with lesser concentrations within the Halawa to Pearl City areas. Waikiki is the center for resort activities.

Military land uses predominate in the western portion; Pearl Harbor Naval Complex, Hickam Air Force Base, Tripler Army Medical Center, and Fort Shafter are the main military installations. Major redevelopment opportunities exist in the underutilized areas of Kalihi/Palama and Kakaako. McCully/Moiliili and Makiki/Punchbowl are areas transitioning from single-family to multi-family residential. The Aiea to Pearl City area has now achieved nearly full urban development with residential and commercial mixed uses.

Development priorities have been outlined by the City as: (1) mixed use in Downtown; (2) infrastructure and urban design improvements in Waikiki; (3) mixed use in Kakaako; (4) low-density apartment, industrial and mixed use areas in Kalihi/Palama; (5) medium-density apartment use in McCully-Moiliili; and (6) single-family/low-density apartment uses in Aiea-Pearl City.

### **3.1.2.2 Ewa and Central Oahu Development Plan Areas**

The General Plan for the City and County of Honolulu (1991) envisions the Ewa area (in particular the West Beach-Makakilo portion) as a secondary urban center, with substantial future economic and residential growth. The area contains some of Hawaii's best agricultural lands as well as Campbell Industrial Park; the existing residential developments of Makakilo, Ewa Beach, and Ewa Villages; and the new deep draft harbor at Barbers Point. Two major residential and one major resort (Ko Olina) developments are under construction.

Central Oahu contains the wide fertile plateau between the Waianae and Koolau mountain ranges. It includes prime agricultural lands, military reservations, and several major residential communities. Although a major high technology park has been started near the town of Mililani, the major focus of Central Oahu continues to be expanding residential communities. Waipahu is a growing residential community where most new development will occur in areas mauka of the H-1 Freeway.

### **3.1.3 Corridor Land Uses**

The amended LPA corridor contains many neighborhoods and mixed land uses. The study corridor is divided into six sections, as listed below, for ease of description and analysis. (Section boundaries are shown on Figures 3.3a, b, and c) The Waikiki segment described as Section VI in the AA/DEIS is not included as part of the amended LPA; therefore, Section VI is omitted here.

Section I	Waiawa to Aloha Stadium
Section II	Aloha Stadium to Keehi Interchange
Section III	Keehi Interchange to Iwilei
Section IV	Downtown/West Kakaako
Section V	East Kakaako to Kalakaua/Kapiolani
Section VII	University

For a description of the existing land use for each section, refer to the AA/DEIS.

#### **3.1.4 Proposed Development Projects**

The study corridor contains many projects under construction or in varying stages of planning or approval, as listed in Table 3.1 on the following page. When implemented, these projects will influence adjacent land use characteristics.

#### **3.1.5 General Plans and Zoning**

Historically, Oahu has had and continues to have a strong agricultural base; however, the physical and climatic attributes have made it a very desirable location for tourism and for residential and commercial development. The State of Hawaii and the City and County of Honolulu have sought to guide development and obtain a healthy compromise among agriculture, land conservation, and urbanization resulting from a strong economy and significant tourism growth.

##### **3.1.5.1 State of Hawaii Plans**

The Hawaii State Plan (1989) is an adopted comprehensive plan that establishes broad goals, objectives, and policies to guide long-range growth and development. It includes twelve functional plans translating broad goals and objectives into detailed courses of action for such areas as agriculture, conservation, recreation, transportation, and water resources.

Consistent with the plan, the State of Hawaii Administrative Rules establish four land classification districts: urban, agricultural, conservation, and rural. No Oahu lands are classified as rural. Within the urban district, land use control is delegated to the counties. The entire study area is contained within the State's urban land use classification, subject to the City and County of Honolulu controls. Exceptions, where the State has established special controls over land use, follow:

The State's Aloha Tower Development Corporation (ATDC) is responsible for the redevelopment of the 22.4-acre Aloha Tower parcel makai of Nimitz Highway at the foot of Bishop Street in Section IV. The proposed plan includes maritime facilities, hotel, office, retail, residential condominiums, and open space uses. It retains the historic Aloha Tower and proposes to extend the Fort Street Mall to the tower via a pedestrian overpass across Nimitz Highway.

On June 19, 1990, a development agreement was executed by ATDC and Aloha Tower Associates, the designated developer for the Aloha Tower area.

The Honolulu Waterfront Master Plan Final Report (1989), prepared for the Office of State Planning, encompasses land areas through which the fixed guideway alignments either pass or will benefit and/or affect. The master plan supports a feasible rapid transit plan providing a high level of waterfront access. It also has the long-range goal of developing a people-mover system to tie to the fixed guideway system.



**Table 3.1  
PROPOSED DEVELOPMENT PROJECTS<sup>1</sup>  
WITHIN THE AMENDED LOCALLY PREFERRED ALTERNATIVE CORRIDOR**

- Section I**
- o *Hawaii Power Center (UC)*
  - o Pearl City Shopping Center expansion
  - o Park and Elderly housing on Hale Mohalu site
  - o Retail expansion of Pearlridge Center
  - o Office building at Pearlridge Center
- Section II**
- o Pearl Plantation Center (178,000 sq. ft.) at Castle Park
  - o Camp Catlin military housing
  - o Honolulu International Airport terminal complex expansions (UC)
  - o Airport Industrial Park (UC)
  - o Ford Island Navy Family Housing/Shore Support Facilities
  - o Airport Hotel
- Section III**
- o Keehi Lagoon recreational/industrial developments (UC)
  - o Industrial park at Middle Street and Dillingham Boulevard (UC)
  - o Dillingham Plaza Shopping Center expansion
- Section IV**
- o Liliha Civic Center (Iwilei Road and Nimitz Highway)
  - o Park Place housing/commercial
  - o Kekaulike-Maunakea Parking Site Housing Project
  - o Foster Garden Housing
  - o Smith/Maunakea parking site residential project (*Marin Tower*)(UC)
  - o Kaahumanu Garage site commercial office building (*Harbor Court*)(UC)
  - o *First Hawaiian Tower (UC)*
  - o Pacific Nations Center at Block J
  - o Merchandise Mart commercial office building (*1100 Alakea*)(UC)
  - o HECO Power Plant site redevelopment
  - o Aloha Tower complex
  - o Pier 6 parking lot redevelopment
  - o *Imperial Plaza (UC)*
  - o Waterpark Towers (UC)
  - o *Pohulani Elderly* housing project (UC)
  - o HECO Substation Expansion, Kakaako
  - o Kauhale/Kakaako Development (*Ilaniwai Mixed-use Project*)(UC)
  - o Na Lei Hulu Kupuna (UC)
  - o Servco Commercial Development
  - o Majestic Plaza
  - o *Queen Emma* (UC)
  - o *Symphony Park and King Street Project*
- Section V**
- o Neal Blaisdell Center Improvements (UC)
  - o Queen/Kamakee housing project (UC)
  - o 404 Piikoi Street residential towers (UC)
  - o Former Aloha Motors site redevelopment (Honolulu Convention Center)
  - o *1230 Kapiolani*
  - o *KCC parcel housing - Hale Kewalo*
- Section VII**
- o Second University of Hawaii parking structure
  - o 10,000-seat arena at University of Hawaii

Source: City and County of Honolulu Department of General Planning, 1992.

Note: <sup>1</sup> Includes both committed, under construction (UC), and anticipated developments as indicated by the City and County of Honolulu Department of General Planning. Developments completed since the AA/DEIS have been deleted.

The Kakaako area in Sections IV and V is the subject of a major redevelopment plan coordinated by the Hawaii Community Development Authority (HCDA), a State agency established as a public corporation for the purpose of long-range community planning and development. The total area under HCDA's jurisdiction is 660 acres. Development is guided by a plan that identifies three major land uses: a Mixed-Use Zone-Residential, a Mixed-Use Zone-Commercial, and a Single-Use Waterfront Industrial Zone. Development that can be implemented with the HCDA plan will make Kakaako a major activity node for various uses, including residential, industrial, office, and those related to the harbor. The HCDA plan recognizes a future regional fixed guideway system serving Kakaako.

### **3.1.5.2 City and County of Honolulu Plans**

The specific goals and objectives guiding development within the City and County of Honolulu are enunciated within the General Plan from the City and County of Honolulu (1987). Included are goals and objectives relating to the fixed guideway system program.

The City and County of Honolulu's Land Use Ordinance recognizes several special districts. The amended LPA will be within Chinatown and the Hawaii Capital Special Districts. The Special District Ordinance outlines specific objectives and design controls to further those objectives. Guidelines for building heights, architectural controls, landscaping, and preservation of visual resources and historic structures are enunciated in the Special District design controls.

### **3.1.5.3 Military Installation Planning**

The Department of the Navy prepared the draft Pearl Harbor Naval Complex Master Plan (October 1991), a comprehensive planning document, to guide the development and redevelopment of the Pearl Harbor Naval Base and surrounding auxiliary facilities shown on Figures 3.3a and 3.3b. The Pearl Harbor Naval Base facilities are located on both sides of Kamehameha Highway from Aloha Stadium to Honolulu International Airport, integrating housing, office, supply, recreational, shipyard, and naval support uses. The plan recommends continued development of the Makalapa area makai of Aloha Stadium between Kamehameha Highway and H-1 Freeway (see Figure 3.3b) as a consolidation area for headquarters and administration functions. New uses would include a library, Red Cross office, chapel, and bachelor enlisted quarters. It also shows a fixed guideway corridor along Kamehameha Highway. The plan calls for housing at the Moanalua area between Salt Lake Boulevard and H-1 Freeway, Ewa of the Navy Marine Golf Course, and Koko Head of Camp Catlin and the Honolulu International Airport Interchange.

The U.S. Army facility within the study corridor is Fort Shafter (see Figure 3.3b). The majority of the military housing at Fort Shafter is located toward the mauka side. The Fort Shafter Installation Master Plan (1985) and subsequent revisions indicate that, within the alignment corridor, exploration of a maintenance facility for reserve units, a tentative location for Special Compartmented Information Facility (SCIF), a tactical equipment maintenance shop, and/or athletic fields are being planned.

The Comprehensive Plan — Future Land Use Plan, Hickam Air Force Base, Oahu, Hawaii (October 1988) guides land use planning and future development of the base's lands (see Figure 3.3b). Development of new facilities is not planned for areas in proximity to Kamehameha Highway, and thus, are not included in this discussion.

### **3.1.6 Activity Centers and Growth Attractions**

Throughout the study corridor, a number of *attractions* and anticipated growth areas exist that attract and produce travel. Transit improvements can enhance the accessibility of people living, working, and/or visiting Oahu. These areas were identified based on the total transit trips generated during the patronage forecasting task for the future No-Build Alternative. Table 3.2 provides a summary of these areas.

Table 3.2 MAJOR ACTIVITY CENTER AND GROWTH AREAS	
Leeward Community College	Kakaako
West Oahu College	Ward Warehouse/Ward Centre
Pearl City Shopping Center	Neal Blaisdell Center
Pearlridge Center	Kapiolani Community College
Aloha Stadium	McKinley High School
Salt Lake Neighborhood	Kapiolani Business District
Pearl Harbor Naval Base	Ala Moana Center
Arizona Memorial	<i>Honolulu Community College</i>
Honolulu International Airport	Waikiki
Middle Street Industrial Area	Fort DeRussy
Kalihi/Palama Neighborhood	Honolulu Zoo
Iwilei Industrial District	Kapiolani Park
Chinatown	Ala Wai Park
Downtown Financial District	Tokai University
Government centers (Federal/State/City)	McCully/Moiliili Neighborhood
Queen's Medical Center	University of Hawaii

Source: Parsons Brinckerhoff Quade & Douglas, Inc., August 1989.

### 3.1.7 Population and Employment Trends

#### 3.1.7.1 Population Trends and Projections

The island of Oahu has experienced continuous growth in population since 1970. Within the PUC, population increased by 12% between 1970 and 1980 and 7% between 1980 and 1989. For the Ewa area, 44% and 11% increases for the same two time periods attest to this fast growing area.

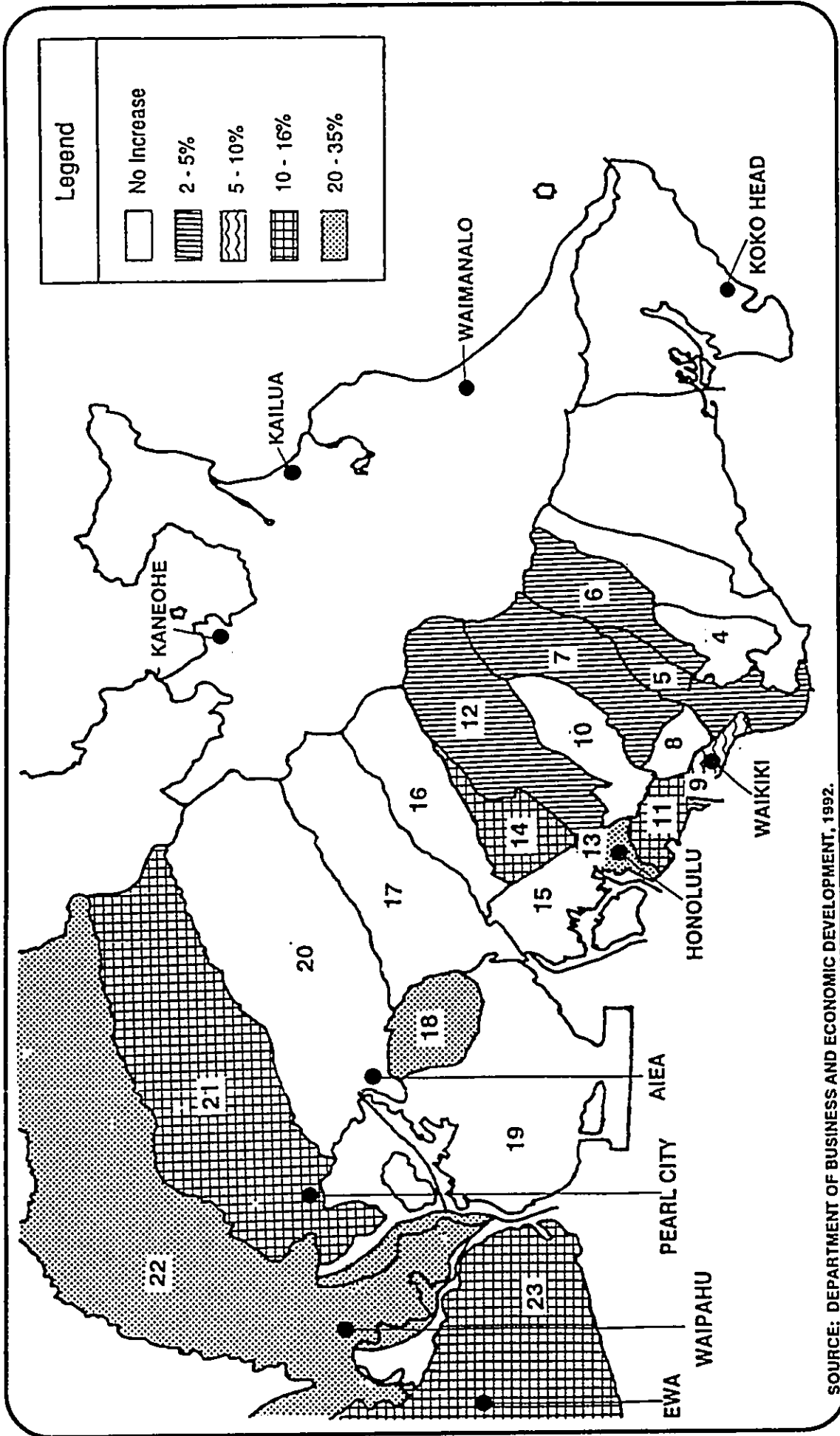
The City and County of Honolulu is organized into neighborhoods in accordance with the Revised Neighborhood Plan, (1986). The study area encompasses the 20 neighborhoods that are listed on Table 3.3 and shown on Figure 3.4. Boundaries within smaller areas, and at more detail, are shown in the Updated Environmental Baseline Report (December 1989). Within these neighborhoods, relative population growth from 1980 to 1989 is shown in Table 3.3 and graphically in Figure 3.4. Aliamanu/Salt Lake, Downtown, and Waipahu neighborhoods were clearly growth areas during this period, with population increases of 21%, 36%, and 48%, respectively. More moderate growth rates occurred in the Pearl City, Aiea, and Ala Moana/Kakaako areas.

Table 3.4 summarizes the expected population growth from 1985 to 2005, and Figure 3.5 shows the expected geographic distribution by transportation district. Districts expected to experience pronounced population increases over the 20-year period include Downtown, Kakaako, Ewa, Beretania, Iwilei, and Waipahu. This growth reflects anticipated development within the Central Oahu and Ewa DPAs and the State's Kakaako Plan Area. The areas expected to show decreases in population are areas in transition from predominantly residential land uses to more commercial, retail uses, and commercial/industrial uses.

**Table 3.3  
POPULATION GROWTH 1980-1989  
(BY NEIGHBORHOOD)**

Neighborhoods	1980 Pop.	1989 Pop.	% Increase
4 Kaimuki	19,603	19,930	1.0
5 Diamond Head/Kapahulu	21,191	21,574	1.7
6 Palolo	14,110	14,103	2.2
7 Manoa	22,605	23,961	3.2
8 McCully/Moiliili	26,664	26,471	-0.6
9 Waikiki	17,384	18,680	7.5
10 Makiki/Tantalus	28,695	28,456	0.4
11 Ala Moana/Kakaako	10,032	11,327	12.2
12 Nuuanu/Punchbowl	16,166	16,847	4.3
13 Downtown	8,674	11,653	35.5
14 Liliha/Kapalama	21,068	23,331	10.9
15 Kalihi/Palama	40,144	40,118	-0.1
16 Kalihi Valley	17,613	17,809	1.1
17 Moanalua	12,948	12,927	-0.2
18 Aliamanu/Salt Lake	31,199	37,247	21.0
19 Airport	28,436	28,514	0.3
20 Aiea	30,084	34,522	13.7
21 Pearl City	42,577	49,451	15.5
22 Waipahu	33,927	51,625	48.1
23 Ewa	35,585	39,516	10.9

Source: The State of Hawaii Data Book: A Statistical Abstract, Department of Business and Economic Development, 1991, Table 12.



SOURCE: DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT, 1992.

**FIGURE 3.4**

**POPULATION GROWTH  
BY NEIGHBORHOOD, 1980-1989  
HONOLULU RAPID TRANSIT PROGRAM**

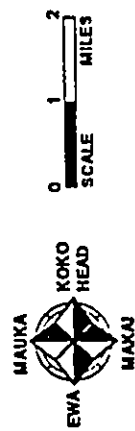
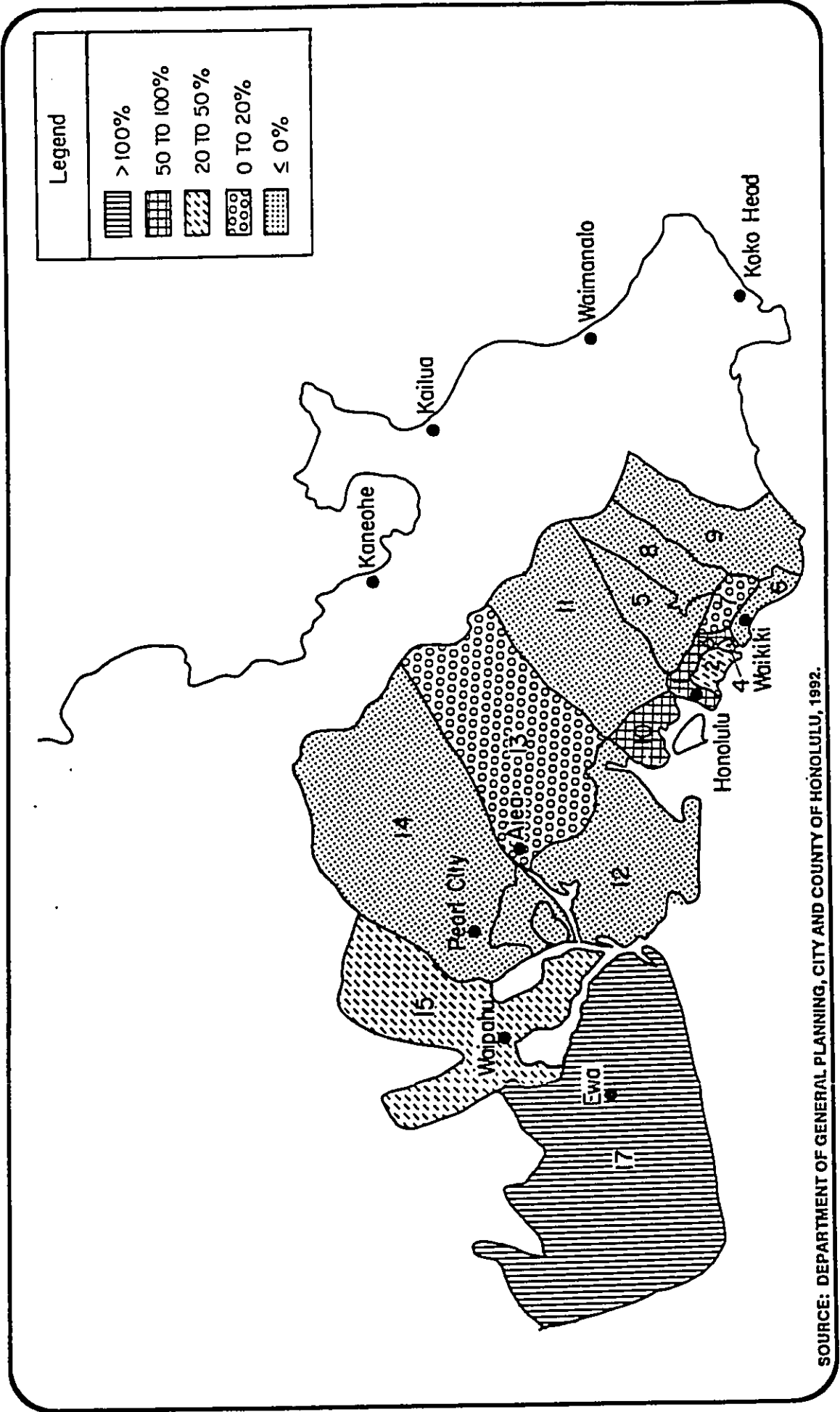


Table 3.4 POPULATION GROWTH 1985-2005 (BY TRANSPORTATION DISTRICT) <sup>1</sup>			
District	1985 Pop.	2005 Pop.	% Increase
1 Downtown	7,480	12,716	70
2 Kakaako	2,725	14,270	90
3 Beretania	17,109	25,603	50
4 Ala Moana Center	0	0	0
5 Makiki	37,816	37,016	-2
6 Waikiki	17,286	13,960	-24
7 McCully	30,542	33,926	11
8 UH/Manoa	19,516	17,332	-11
9 Kaimuki	59,730	53,932	-11
10 Iwilei	14,731	22,603	53
11 Kalihi	73,788	72,997	-1
12 Airport	28,619	24,833	-13
13 Salt Lake	58,322	63,857	9
14 Aiea	71,182	70,614	-1
15 Waipahu	44,197	64,867	47
17 Ewa	37,035	94,223	154

Source: City and County of Honolulu Department of General Planning, December 1991.

Note: <sup>1</sup> The transportation district boundaries are not the same as the neighborhood boundaries in Table 3.3.



**FIGURE 3.5**  
**POPULATION GROWTH BY**  
**TRANSPORTATION DISTRICT, 1985-2005**  
**HONOLULU RAPID TRANSIT PROGRAM**

### 3.1.7.2 Employment

Civilian employment on Oahu has increased 41% between 1980 and 1990, from 357,900 to 505,400 jobs. Although the labor force has grown about 23% over the same period, the unemployment rate has fallen since the 1980s. In 1985, the unemployment rate was 5.1%; in January 1990 it was 2.9%. The January 1991 jobless rate of 2.5% for Oahu was well below the national average of 7.0%.

Economic and employment projections indicate that the number of jobs is expected to increase from 436,400 in 1986 to 585,600 in 2005. The projections indicate that trade and service sectors will continue to be major employment categories and will increase their percentage of total jobs over time. A larger percentage will be self-employed, while the proportion of government jobs will decrease.

Employment projections for the transportation districts shown in Figure 3.5 are summarized in Table 3.5. The primary employment growth districts are expected to be Ewa, Waipahu, and Kakaako, with 1985 to 2005 employment increases of 294%, 124%, and 94%, respectively. The expected job growth within Ewa reflects the development emphasis as a secondary urban center.

Table 3.5 EMPLOYMENT GROWTH 1985 - 2005 (BY TRANSPORTATION DISTRICT)			
District	1985 Employment (Total Jobs)	2005 Employment (Total Jobs)	% Increase
1 Downtown	55,440	78,170	41
2 Kakaako	30,273	58,655	94
3 Beretania	31,930	40,117	26
4 Ala Moana Center	8,823	10,272	16
5 Makiki	5,211	6,357	22
6 Waikiki	35,709	38,359	7
7 McCully	11,412	13,491	18
8 UH/Manoa	10,132	12,569	24
9 Kaimuki	16,889	19,985	18
10 Iwilei	26,465	27,976	6
11 Kalihi	14,009	18,314	31
12 Airport	57,647	60,537	5
13 Salt Lake	10,003	11,280	13
14 Aiea	18,363	22,526	23
15 Waipahu	8,464	18,971	124
17 Ewa	10,896	42,916	294

Source: City and County of Honolulu Department of General Planning, December 1991.



### 3.1.7.3 Commercial Space

The demand for competitive commercial office space within the PUC has been increasing, while for retail space it has been variable. The vacancy rate for Downtown office space and space between Downtown and Waikiki has declined, from 16% and 9%, respectively, in 1985, to 5% and 4%, in 1988, and to 3% and 5% in 1990. This trend holds true for remaining portions of the PUC, showing a general decline from 19% in 1985, to 10% in 1988, and to 8% in 1990 with some fluctuations. Vacancy rates for retail space have been variable since 1985; no clear pattern of growth or decline in rates is evidenced in Downtown, or the corridor between Downtown and Waikiki.

The City Department of General Planning indicates that the area from Pearl City to Waikiki is absorbing about 350,000 square feet of net office space per year. About half of this growth is occurring in the Downtown Financial District. Most of the remainder is in Kakaako and Ala Moana. Waikiki and the Iwilei to Pearl City areas are experiencing slow growth in office space (about 20,000 square feet each per year), while growth outside the study corridor is limited (about 15,000 square feet annually). The absorption rate for office space has recently increased following a relatively slow period during the early 1980s. The recent low-vacancy rates suggest a strong market for office space will continue. The proposal to open a Honolulu Stock Exchange, referred to as Block J, and locate it Downtown in a new one-million-square-foot office development contributes to optimism for a decade of strong office space demand. Proposals were received for the development in 1990. After reviewing these proposals, the City redefined their needs and will distribute another request for proposals in mid-1992.

### 3.1.8 Socio-Economic Trends and Distribution

#### 3.1.8.1 Housing

Available housing of all types has increased 57% from 174,200 units in 1970 to 274,000 units in 1990. In 1986, 57% of all housing units were single-family dwellings, while the remainder were multi-family. The 1990 figures show single-family units possessing a decreasing portion of the market; according to the State Department of Business and Economic Development, 55% of all housing units were single-family. Housing vacancy rates have been decreasing and have been consistently low since 1977. Homeowner vacancy rates were 1% and 0.6% for 1980 and 1990, respectively. Although rental vacancy rates are higher, the decreasing trend is still apparent. Rental vacancy rates were 7% and 4% for 1980 and 1990, respectively. Average household size has also been decreasing: from 3.6 persons per household (pph) in 1970 to 3.02 persons per household in 1990.

#### 3.1.8.2 Resident Income

Personal income and per capita income are expected to continue to rise over the 20-year period, 1985 to 2005, as shown in Table 3.6.

Table 3.6 PERSONAL AND PER CAPITA INCOME (1985 - 2005)				
	1985	1995	2000	2005
Personal income (billions of 1982 \$)	\$10.6	\$12.4	\$15.4	\$16.5
Per capita income (thousands of 1982 \$)	\$13.0	\$15.5	\$16.5	\$17.2

Source: State Department of Business and Economic Development's Quarterly Statistical and Economic Report, 4th Quarter 1988 (Table 2-4).

Figure 3.6 shows the proportion of residents with income below the designated federal poverty level by neighborhood. The highest percentage of low-income residents are within the Downtown, Kalihi/Palama, Waikiki, Kalihi Valley, and Waipahu neighborhood areas. These areas typically contain low income and/or public housing units, have a disproportionate number of elderly residents, and tend to be areas where new immigrants settle. Neighborhoods having the lowest proportion of low-income residents include Pearl City and Manoa.

### 3.1.8.3 Statewide Age Distribution

The Hawaii population is expected to continue shifting in age distribution. Both the 45- to 64-year-old range and the over 75-year-old range will increasingly contain a greater proportion of the population. Conversely, the under 19-year-old and 20- to 44-year-old categories are predicted to have less representation in the state's population. The 1990 census shows that 24.5% of the total population of the City and County of Honolulu is under the age of 18 years, while 11% is 65 years old or over.

Statewide, the median age has been rising, from 28.3 in 1980 to 32.6 in 1990. This trend is expected to continue, with predicted median ages of 33.1 in 1995, 34.1 in 2000, and 34.9 in 2005.

### 3.1.8.4 Neighborhood Data

Socioeconomic characteristics of neighborhoods within the study corridor are further discussed in Section 3.3.1.

## 3.2 TRANSPORTATION

The following is a summary of the characteristics of the existing transportation system. Detailed information including traffic data, patronage, and trip purposes is contained in the Transportation Impacts Results Report (February 1990) supporting the AA/DEIS and in the Transportation Impacts Results Report (July 1992) supporting this FEIS.

### 3.2.1 Highway Network

The street network is heavily constrained by topography. Because of these physical constraints, roadways are primarily located in the coastal areas between the mountains and ocean. The dominant highways generally parallel the coastline and carry Ewa/Koko Head traffic. There are three state freeways: H-1 accommodates traffic between Waianae and Kahala; H-2 services traffic between Mililani/Wahiawa and Pearl City; and Route 78 (Moanalua Road) connects H-1 and Kamehameha Highway in Aiea with H-2 at the Kahauiki Interchange. In addition, the H-3 Freeway between Windward Oahu and Pearl Harbor is currently under construction. Motorists between Kahala and Hawaii Kai use Kalaniana'ole Highway. *Pali and Likelike Highways connect Honolulu with Windward Oahu across the Koolau Mountains.*

In addition to the freeways, the network of roadways carry regional and local traffic. Within the study corridor, the following streets are the principal Ewa/Koko Head arteries:

- Farrington Highway
- Kamehameha Highway
- Moanalua Road
- Salt Lake Boulevard
- Nimitz Highway
- Dillingham Boulevard
- Vineyard Boulevard
- Beretania Street
- King Street
- School Street
- Kapiolani Boulevard
- Ala Moana Boulevard
- Kuhio Avenue
- Kalakaua Avenue
- Ala Wai Boulevard

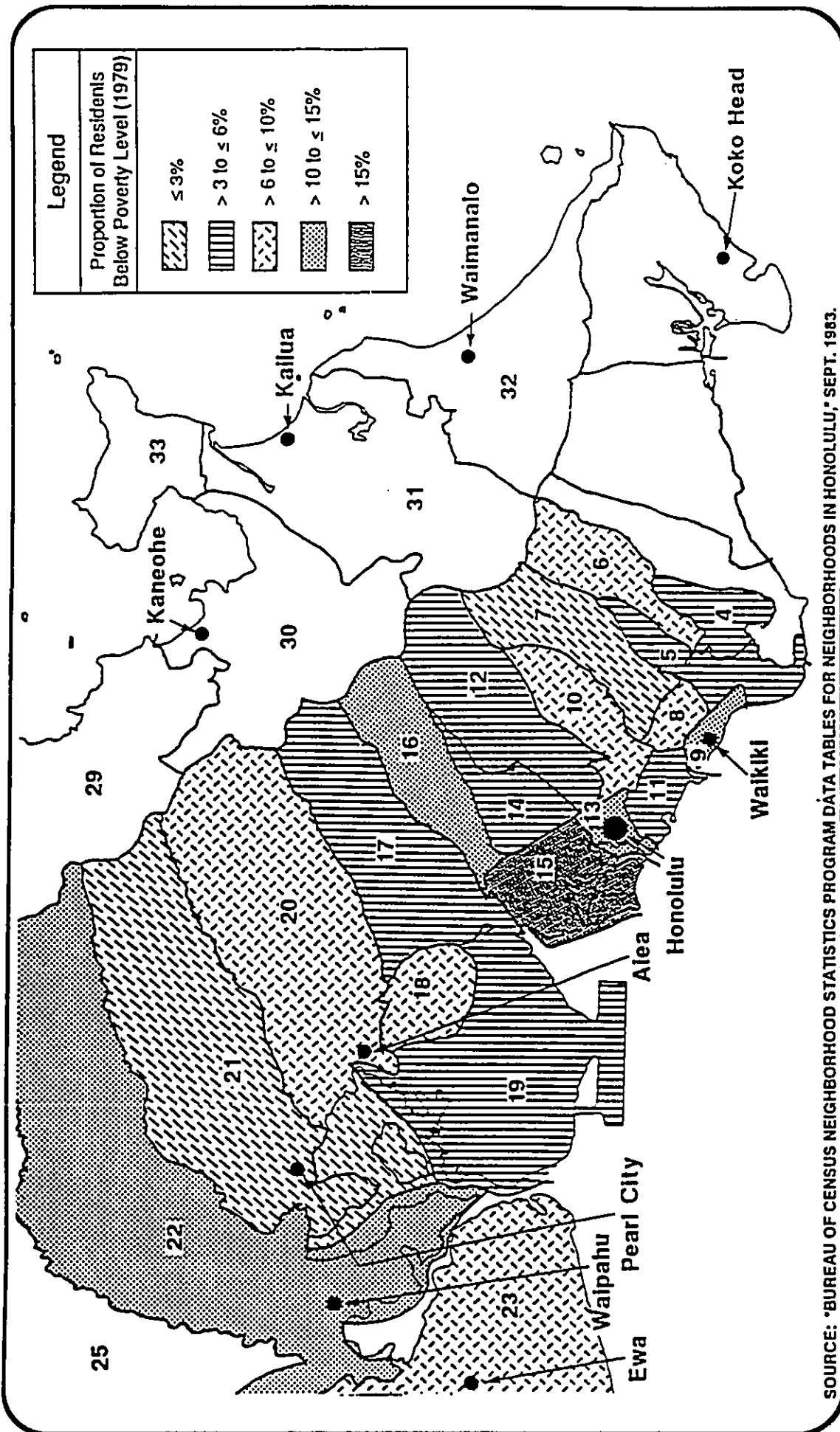
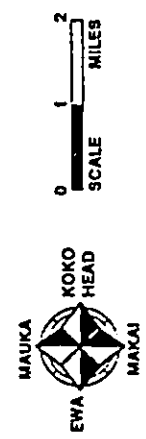


FIGURE 3.6

INCOME LEVEL BY NEIGHBORHOOD  
HONOLULU RAPID TRANSIT PROGRAM



The main mauka/makai roadways include:

- Puuloa Road
- Middle Street
- Likelike Highway/Kalihi Street
- *Waiakamilo Road/Houghtailing Street*
- Liliha Street
- Pali Highway
- South/Punchbowl Streets
- Ward Avenue
- Piikoi/Pensacola Streets
- Keeaumoku Street
- *Kalakaua Avenue*
- McCully Street
- University Avenue
- Kapahulu Avenue

Level of Service F (forced flow) is characteristic during the morning and afternoon peak hours on the major roadways, particularly on the H-1 Freeway from the Waiawa Interchange to the University area, where stop-and-go conditions are typical. Signalized routes, like Nimitz Highway, are typified by vehicles requiring more than one traffic signal cycle to clear intersections during peak periods.

To avoid peak-hour congestion, motorists have been observed to shift their time of travel, resulting in extended peak traffic conditions. Weekday morning and afternoon peak traffic conditions typically last two to three hours each. Weekend traffic during the mid-day also has been observed to resemble weekday peak period conditions.

### **3.2.2 Transit Network**

The City and County of Honolulu has an extensive fixed-route bus system (TheBus) that provides service on Oahu and is described in the following sections.

#### **3.2.2.1 Bus Routes and Operations**

TheBus system began service in March 1971 with a fleet of 67 buses. The active bus fleet for FY 1992 includes 475 vehicles, with peak-period requirements for 412 buses, that operate on over 60 routes. During the weekdays, morning service begins at 3:42 a.m. and night service ends at 1:47 a.m. On Saturdays and Sundays, TheBus system operates from 4:12 a.m. to 1:42 a.m. Routes 1 through 22, exclusive of Route 11, serve the central urban area of Honolulu. Route 11 and Routes 50 through 58 provide bus service between Central Honolulu and the outlying suburban and rural areas of Oahu. The remaining routes provide service primarily within areas elsewhere on Oahu. Routes 70 through 77 provide feeder and shuttle bus service within selected communities of suburban and rural Oahu. Routes numbered greater than 80 provide peak-period express service between suburban residential communities and major employment and activity centers (i.e., Downtown, University of Hawaii at Manoa, and Pearl Harbor).

Service frequency varies with route. In general, during the commute periods, nine routes operate at a 10-minute or less headway, and 18 other routes operate at a headway of 30 minutes or less. Actual service to patrons along major portions of the trunk routes is more frequent since several routes operate on the same street. Routes with peak-period headways of 60 minutes or longer are Routes 21, 70, 71, 72, 74, 75, and 77.

During the peak period, TheBus system is approaching capacity in two key *service* characteristics: *the volumes of riders per bus and the numbers of buses per hour*. The buses themselves are carrying peak period, peak point loads averaging 83 to 100 passengers per bus, well above normal design loads of 69 passengers per bus. In Downtown, particularly on King and Beretania Streets, peak-hour bus volumes exceed 70 buses per hour. If bus volumes grow into the 80 to 100 buses per hour range, additional declines in bus speeds into the range of 5 mph can be expected, with dramatic declines into the range of 2 to 3 mph occurring beyond 100 buses per hour.

*Average weekday* speeds systemwide have declined from 14.6 mph in 1983 to 13.6 mph in 1991. These reduced speeds diminish the attractiveness of transit as an alternative to the private automobile, and congestion reduces transit schedule reliability. The declines in average operating speeds have been most pronounced for local buses. An aggressive bus priority treatment program has kept express bus speeds unchanged from FY 1983 to FY 1989.

### 3.2.2.2 Passenger Facilities

TheBus system includes various facilities for its patrons, from bus stops to bus priority lanes. Patrons can gain access to TheBus at 3,900 bus stops throughout the service area. The first park-and-ride lot, containing 150 parking spaces, opened in 1988 in Hawaii Kai. Another lot containing *approximately 100* parking spaces opened in 1989 in Wahiawa. Other park-and-ride facilities are being planned for: Millilani, West Loch, Royal Kunia (previously referred to as Village Park), Kapolei, and Windward Oahu.

To facilitate bus service and improve the person-carrying capacity of major roadways, special lanes have been constructed and/or designated for use by buses only or buses and other high occupancy vehicles (HOV). Priority-lane operations include the Kalakaua Avenue bus lane, the H-1 Freeway HOV/bus lane, the Hawaii Kai Drive/Kawaihae Street bus lane, and the Kalaniana'ole Highway HOV/bus lane. Within Downtown, the Hotel Street Transit Mall, a one-half-mile-long transit mall, facilitates the operation of Routes 1, 2, 3, 9, and 12. The suburban trunk and express routes running Ewa and Koko Head through the Downtown use Beretania Street and King Street, respectively.

### 3.2.2.3 Current Ridership

The average annual total daily passengers on TheBus system for FY 1991 was 206,500. In 1986 it was 187,700; therefore, ridership has increased more than 9%. The proportion of adult riders has slowly increased over the last six years from 54% to 58% of the total passenger ridership. The proportion of student riders, however, has decreased steadily from 18% to 15%. These changes in ridership reflect demographic changes in the age structure documented in Section 3.1.8.3.

Fares charged for TheBus system are \$.60 for adults and \$.25 for students. Monthly passes cost \$15 for adults and \$7.50 for students. Senior citizens and handicapped passengers ride free if they have an official pass, which costs \$15 (good for four years), or they may obtain a discount card for \$6 (good for four years) and pay a \$0.30 fare. Annual revenues have increased from \$18.2 million in FY 1984 to \$18.9 million in FY 1990. These revenues have covered a declining percentage of operating cost, from about 37% in 1984 to about 25% in 1990.

Since 1984, TheBus's operating expenses have steadily increased from \$49.5 million to \$86 million in FY 1992. Key components of the increases in operating expenses are increases in labor and fringe benefit costs and risk management costs. Despite the increases in the operating expense, TheBus offers the lowest cost per unlinked passenger trip for all U.S. transit systems operating 250 to 499 vehicles in maximum service. In 1989, the latest year for which the FTA Section 15 Annual Report is available, TheBus carried passengers for \$0.90 per unlinked passenger trip. By comparison, the national average cost per unlinked passenger trip for transit systems operating 250 to 499 vehicles in maximum service was \$1.44. The low cost per trip results from the high density, linear development patterns, high ridership, a lean administrative and management structure, improvements in operating efficiencies, and shorter trips.

### 3.2.2.4 TheHandi-Van Paratransit Program

TheHandi-Van system was established in 1977 to provide transportation services to semi- and non-ambulatory disabled persons who cannot utilize the existing bus system. This service program was approved by the U.S. Department of Transportation (Section 504 Program) in June, 1986. Under FTA's

504 regulations, the City is currently providing a special paratransit service. The service is subsidized by the City and contracted out to a private carrier. Hours of operation are from 6:00 a.m. to 11:00 p.m. on weekdays and 9:00 a.m. to 11:00 p.m. on weekends and holidays. The peak periods of operation are 6:00 to 7:00 a.m. (about 22% of the daily pickups), and 2:00 to 3:00 p.m. (about 18% of the pickups). One day advance reservation is required for weekday service, although same-day calls are accommodated when possible. The City will implement its Paratransit Plan, which was prepared in accordance with the requirements of the Americans With Disabilities Act of 1990.

#### **3.2.2.5 Management**

On January 1, 1992, the Honolulu Public Transit Authority (HPTA), a special proprietary semi-autonomous agency within the City's executive branch, became operational. The HPTA administers TheHandi-Van contract for the City's paratransit program.

With regards to TheBus system, the HPTA has effectuated the formation of Oahu Transit Services, Inc. (OTS), a private non-profit organization which was formed under Chapter 415.B of the Hawaii Revised Statutes and pursuant to Ordinance No. 91-27. The OTS, which is an instrumentality of the City, operates and maintains the directly operated portion of TheBus system.

The City has adopted a Private Enterprise Participation policy conforming to the FTA policy which encourages private sector participation in public transportation. The HPTA and OTS are providing such contracting opportunities which include but are not limited to the following areas:

- Purchased transportation services for certain express routes;
- Bus maintenance services;
- Janitorial services; and
- Security services.

Pursuant to Ordinance 91-27, the Department of Transportation Services is responsible for: 1) the study, planning, supply, construction, operation, and maintenance of the automated fixed guideway rapid transit system; and 2) the study and planning of an integrated mass transit system with the City bus system as the feeder bus component. It is envisioned that future legislation will be enacted to place the operation and maintenance of the fixed guideway rapid transit system under the HPTA's jurisdiction.

#### **3.2.2.6 TheBus and TheHandi-Van Programs - Fiscal Years (FY) 1992 - 1997**

Based on the Short-Range Transit Plan Update, in FY 1992 the City intends to implement its Private Enterprise Participation (PEP) Program Phase One Project. This action will free six peak pull-out buses to the spare fleet. The recommended operating plan for FY 1993 through 1997 anticipates expanding bus service through a combination of a directly operated and contracted service. The added service will: (1) help reduce standing loads, (2) maintain service frequency while travel speeds decrease resulting from greater traffic congestion, and (3) aid schedule adherence.

The major emphases of TheBus Six-Year Capital Cost Program include: (1) the modernization and expansion of TheBus fleet, (2) the upgrading and expansion of bus maintenance facilities, and (3) the development of a series of park-and-ride facilities to serve suburban communities. The program will be dynamic as TheBus evolves into a feeder bus system with the rapid transit system.

TheHandi-Van proposed plan through FY 1997 includes a number of improvements. The following explains the highlights of the improvements:

- FY 1994: Initiate supplementary taxi or sedan service - develop plan for service.
- FY 1995: Initiate supplementary taxi or sedan service - solicit bids for service.
- FY 1996: Begin reimbursement on an hourly basis.

### 3.2.3 Travel Behavior

Travel behavior of residents and visitors within the City and County of Honolulu was examined by the OMPO in their 1982 Oahu Model Update Study and the Hali 2000 Alternatives Analysis Study for the Oahu Long-Range Transportation Plan Update. In 1991, the City conducted an on-board survey of TheBus patrons. The following sections summarize the highlights of these studies. The first summarizes travel behavior by travel time and all transit modes, the second summarizes by purpose for all modes, and the third summarizes transit key travel-behavior findings.

#### 3.2.3.1 Oahu Model Update Study - 1982

In the early 1980s, OMPO updated its 1967 model. To accomplish this update, OMPO conducted three surveys; a telephone/mail back, an on-board-bus, and a special attraction site intercept survey. The survey results indicated that the travel mode used to gain access to the bus was predominantly (86.3%) walking. Home-based work and home-based school trips accounted for over half of all bus trips. A key relationship between vehicle ownership and bus ridership was revealed; approximately 58% of the riders had one or no vehicle available.

In addition to reporting public transit ridership behavior, the 1982 study addressed overall travel behavior for all ground travel modes. Table 3.7 shows this information. For estimated 1985 trips using the 1967 land use data, the Oahu study area had 32% of trips for home-based school and work. Home-based social trips accounted for 22% and non-home-based trips were 16% of all trips generated. Home-based work trips had the longest trip lengths, followed by home-based social and home-based other.

Table 3.7 1985 ESTIMATE OF PERSON TRIPS AND TRAVEL TIME FOR ALL MODES OF TRAVEL			
Purpose	1985 Trips	% Total Trips	Mean Trip Length (minutes)
Home-based Work	668,033	22	20.0
Home-based Shopping	387,602	13	14.5
Home-based Social	668,830	22	16.8
Home-based School	288,579	10	12.9
Home-based Other	315,195	11	16.1
Non-Home-based	489,610	16	13.5
Commercial (Truck and Taxi)	166,495	6	13.5
TOTAL	2,984,344	100	--

Source: Oahu Model Update Study. Final Report Volume 1, December 1982, p. 9.

### 3.2.3.2 Hali 2000 Study

The average Oahu household generates 9.4 person trips per average weekday, while the average household resident makes 3.0 trips per day, according to a 1981 household travel survey. Table 3.8 summarizes the resident person trips by purpose, as excerpted from the OMPO Trip Generation Model of July 1983.

Table 3.8 1980 OAHU RESIDENT PERSON TRIPS BY PURPOSE FOR ALL MODES OF TRAVEL			
Trip Type	Trip Purpose	% of Total	Average Travel Distance
Home-based	Work	16.5	7.3 miles
	Shopping	7.6	4.0 miles
	Social/Rec.	10.2	6.4 miles
	School	10.5	4.6 miles
	Other	19.0	6.1 miles
Non-Home-based		36.2	4.0 miles

Source: Wilbur Smith and Associates, Hali 2000 Study Alternatives Analysis Final Report, 1984, Table 2-3, p. 2-9.

The 1981 survey data also indicated that 70% of home-based work trips in autos are taken in vehicles occupied by one person. The average persons per vehicle for home-based work trips was found to be 1.20. Transit captured 14.9% of home-based work trips. The transit share was highest (18.8%) for school trips and relatively low for other home-based and non-home-based trip categories (5%). When averaged across all trip types, transit accounted for 8.2% of all resident travel trips.

In 1979, the U.S. Census Bureau collected information on the journey-to-work for residents living in U.S. urbanized areas. The data collected for Honolulu were divided into Honolulu on the Leeward corridor and Kailua and Kaneohe on the Windward side. To provide some comparison between the Honolulu data and other urbanized area information, six U.S. cities were selected based on their similarity in size and general income characteristics: New Orleans; Portland; Salt Lake City; Sacramento; San Antonio; and San Diego. All six are major cities and contain large universities; several are state capitals and all either have advanced planning for or existing rail transit service.

The percentage of persons using bus transportation to work in Honolulu, at 11.1%, was second only to New Orleans. Trucks and vans used for work are lower in Hawaii than the six comparable cities. More employees walk to work in Honolulu (8.4%) and Kailua/Kaneohe (8.5%) than in five of the other cities, with San Diego being higher with 9.3%. The average vehicle occupancies for Honolulu and Kailua/Kaneohe are higher than for the other six cities. Two-person carpools and three-plus-person carpools are also higher in Honolulu and Kailua/Kaneohe than the other areas. At 12.6%, the study area is most similar to Portland and San Antonio for zero-car ownership rates, while it is most comparable to New Orleans for one- and two-car ownership rates.



The Honolulu area hosts numerous tourists who contribute to overall trip-making; studies made in 1983 regarding tourist travel indicate that TheBus provides the mode for 18% of all tourist vehicle trips. Over 50% of their trips are made in rental vehicles, with another 28% in tour vehicles. Compared to other major U.S. cities' demographics, Honolulu's indicate a greater propensity to use public transit and ride-sharing modes. The lower level of automobile ownership, higher development density, and present strong transit ridership are indicative of a continuing transit market.

### **3.2.3.3 1991 On-Board Ridership Survey**

An on-board transit rider survey was conducted in 1991. The following points summarize the key travel-behavior findings:

- About 34% of weekday bus riders used TheBus for their trip because they either do not drive or do not have a car available for the trip. More than 40% ride because TheBus is economical and convenient;
- Visitors account for 15% of weekday trip-making;
- Work trips comprised the largest single trip purpose (36%) of weekday bus trips; school trips accounted for 16%;
- About 85% of patrons were able to travel from their trip origin to their destination using a single route; only 15% needed to transfer; and
- The most frequently reported destinations of weekday bus riders were downtown Honolulu (26%), Waikiki (10%), and Ala Moana Center (7%).

More detail on the on-board survey can be found in the On-Board Bus Survey Final Report (March 1992).

### **3.2.4 Bicycle Travel and Pedestrian Facilities**

The State of Hawaii adopted a Statewide Bikeway System Master Plan in 1977. Its goal is to promote the efficient and safe movement of bicycles throughout the state. Three types of bicycle facilities were identified: mode-separated bike paths, shared right-of-way bike lanes, and signed designated bike routes. Within the project area, the Master Plan identifies King Street, Beretania Street, Piikoi Street, and sections of Kalakaua Avenue for designated bike routes. Bike lanes are existing or to be incorporated into the rights-of-way for additional sections of Kalakaua Avenue, University Avenue, Ala Moana Boulevard, and Nimitz Highway.

A September 1989 City and County of Honolulu Department of Transportation Services inventory of existing bikeway routes indicates that the following facilities exist within the study corridor:

#### Class I (separate pathway)

- Date Street, Kapahulu Avenue to Manoa-Palolo Canal
- Pearl Harbor bike path, Lehua Avenue to Richardson Field

Class II (signed and striped on-street bike lane)

- University Avenue, Kapiolani Boulevard to Dole Street
- Maile Way, University Avenue to Oahu Avenue
- Metcalf Street, University Avenue to Wilder Avenue
- Waiakamilo Road, School Street to Nimitz Highway

Class III (signed streets only)

- McCully Street, Kalakaua Avenue to Wilder Avenue
- Dole Street, University Avenue to St. Louis Drive
- Young Street, Isenberg Street to Victoria Street

Oahu has a developed pedestrian trail system, several components of which exist all or in part within the project area. The corridor also contains other areas of concentrated pedestrian activity, including pedestrian malls and public beach accesses.

**3.2.5 Parking**

The high cost of land and development densities, particularly in Downtown and Waikiki, and the buoyant development economy makes provision of parking a challenge to policy-makers, developers, and planners alike. The City and County of Honolulu commissioned a study to develop a coordinated Downtown parking management plan. The resultant 1981 Honolulu Parking Management Study focused on an area bounded by approximately Vineyard Boulevard, South Street, Nimitz Highway, and River/Aala Streets. As shown in Table 3.9, the study concluded that there was not a major parking problem in the overall study area at that time; however, a sizable deficiency of long-term parking stalls relative to demand was evident. The study also identified a deficiency of short-term stalls concentrated in the Financial District (bordered by Beretania Street, Richards Street, Nuuanu Avenue, and Nimitz Highway). The study found limited on-street short-term metered parking available throughout the Downtown, Civic Center, and Waikiki areas. Most parking, however, is located in various public and private parking structures associated with major office/commercial developments.

Table 3.9 1980 DOWNTOWN PARKING SUPPLY AND DEMAND COMPARISON (Number of Parking Spaces)					
Parking Type	Financial District	Chinatown	Kukui Redevelopment	Civic Center	Total for Study Area
<b>Long-Term Parking</b>					
Supply	5,400	400	3,100	6,700	15,600
Demand	8,800	1,400	1,400	6,900	18,500
Deficit	3,400	1,000	(1,700)	200	2,900
<b>Short-Term Parking</b>					
Supply	1,500	900	700	1,400	4,500
Demand	2,800	900	500	900	5,100
Deficit	1,300	0	(200)	(500)	600
<b>Total Parking</b>					
Supply	6,900	1,300	3,800	8,100	20,100
Demand	11,600	2,300	1,900	7,800	23,600
Deficit	4,700	1,000	(1,900)	(300)	3,500

Source: PRC Honolulu Parking Management Study, May 1981, p. 14 and Downtown Improvement Association of Honolulu, The Downtowner, Vol. XXX No. 7, pp. 2-3.

The Land Use Ordinance (LUO) governs the City's minimum parking requirements based on the land use type. However, key activity centers in Honolulu, including Downtown, are exempt from the LUO parking requirements since the landowners in these areas were assessed a portion of the cost to construct municipal off-street parking facilities. This City municipal parking supply is not expected to increase above the present level.

In spite of the special provisions to exempt them from the standard LUO parking requirements, many developers have made the decision to include a substantial amount of parking in major buildings for commercial use. City-sponsored residential developments in Downtown are being planned with adequate parking to support the residential use, but without increasing the supply of public parking.

The available parking is relatively expensive. A December 1991 parking bulletin compiled by the Downtown Improvement Association of Honolulu indicates that downtown parking is a significant commuter's expense, if parking is not supplied by employers. Parking rates range from \$ .50 per half hour to \$3.00 per half hour, or from \$4.50/day to \$32.00/day. Monthly tenant parking varies from \$70.00 to \$230.00 for a parking stall.

Elsewhere within the study corridor, major parking facilities are associated with major attractors. These include regional shopping centers like Ala Moana Center or Pearlridge Center, recreational areas like Ala Moana Beach Park, and major residential developments.

### 3.3 NEIGHBORHOODS

#### 3.3.1 Demographic Descriptions

Data from the 1980 Census of Population and Housing, Neighborhood Statistics Program, Hawaii, were used to define the baseline demographic description for the neighborhoods described in Section 3.1.7.1 and shown in Figure 3.4. The study corridor covers 19 identifiable neighborhoods. Since detailed information by neighborhoods will not be available until the latter portion of 1992, data from the 1990 Census of Selected Population and Housing Characteristics can only be discussed on a general basis for the City and County of Honolulu. Income and school enrollment data also will not be released until mid-1992.

##### 3.3.1.1 Population Characteristics

Age, race, or ethnic group; number of households and families; school enrollment; and education for each of the neighborhoods are summarized in Table 3.10, Parts 1 and 2 on the following pages. Generally, 65% of the population in the project area is of Asian/Pacific Islander heritage, 28% is White, and the remaining population is comprised of African-American, American Indian, and Spanish origin. The highest concentrations of school age children live in Kalihi/Palama (#15), Aliamanu/Salt Lake/Foster Village (#18), Aiea (#20), and Pearl City (#21). These neighborhoods also coincide with those showing the most families. In 1980, 61% of the total population was of Asian/Pacific Islander heritage. The 1990 data show a 2% growth of this population group over the 10-year period to 63%. All other ethnic/racial groups show a decrease in population from 1980 to 1990, except the African-American and American Indian/Eskimo/Aleut communities, which increased from 2% to 3.1% and .03% to .04%, respectively. The Caucasian community declined from 34% to 31.6% and persons of Hispanic origin declined from 7.2% to 6.8%.

##### 3.3.1.2 Economic Characteristics

The 1979 median income for Oahu was \$21,077 per household or \$23,554 per family. Those neighborhoods in which 50% of the households subsist on an income 20% less than the median income include: McCully/Moiliili (#8), Waikiki (#9), Ala Moana/Kakaako (#11), Downtown (#13), Kalihi/Palama (#15), and the Airport Area (#19). Figure 3.6 showed the distribution of residents below the poverty level. Table 3.10, Part 2, summarizes the number of households in which the income is at or below 80% the median income.

##### 3.3.1.3 Housing Characteristics

The housing supply varies in age and quality among neighborhoods. This paragraph discusses the longevity of housing units in the City and County of Honolulu based on 1980 Census data. The comparable data collected for the 1990 Census is expected to be released later in 1992. Those neighborhoods demonstrating the greatest stability in terms of tenure in housing unit, are; Kaimuki (#4), Palolo (#6), Manoa (#7), Nuuanu/Punchbowl (#12), Liliha/Kapalama (#14), and Kalihi Valley (#16). Each of these shows that more than 40% of the housing units had been occupied by the same household for 10 years or more. The housing stock varies with Kaimuki (#4), Manoa (#7), Nuuanu/Punchbowl (#12), and Kalihi/Palama (#15) having over 20% of its stock of housing dating before 1940. The newest areas are Downtown (#13) and Waikiki (#9) having about 50% of its housing built after 1970. Additional information on the housing stock can be found in the Updated Environmental Baseline Report (December 1989).

**Table 3.10**  
**Part 1**  
**SUMMARY OF POPULATION AND INCOME CHARACTERISTICS - 1980**

Neighborhood	Total Population	Race and Ethnicity Group (% of Total)						Spanish Origin
		White	Afr.-Amer.	Amer. Indian	A/Islander	Spanish Origin		
4 Kaimuki	19,603	20	<1	<1	75	3	3	
5 Diamond Head	21,191	25	<1	<1	69	4	4	
6 Palolo	14,110	13	<1	<1	81	5	5	
7 Manoa	22,605	26	<1	<1	70	3	3	
8 McCully	26,664	22	<1	<1	73	4	4	
9 Waikiki	17,384	64	<1	<1	30	5	5	
10 Makiki	28,695	36	<1	<1	58	4	4	
11 Ala Moana	10,032	34	<1	<1	62	4	4	
12 Nuuanu	16,166	20	<1	<1	77	4	4	
13 Downtown	8,674	32	<1	<1	61	6	6	
14 Liliha	21,068	11	<1	<1	85	4	4	
15 Kalihi/Palama	40,144	9	<1	<1	86	8	8	
16 Kalihi Valley	17,613	10	<1	<1	86	9	9	
17 Moanalua	12,948	32	4	<1	60	8	8	
18 Aliamanu/Salt Lake	3,199	41	5	<1	49	9	9	
19 Airport	28,436	76	7	<1	12	6	6	
20 Alea	30,084	30	2	<1	60	8	8	
21 Pearl City	42,577	18	<1	<1	76	6	6	
22 Waipahu	33,927	15	2	<1	77	12	12	
23 Ewa	35,585	43	2	<1	49	12	12	

**Table 3.10  
Part 2  
SUMMARY OF POPULATION AND INCOME CHARACTERISTICS - 1980**

Neighborhood	Median Age	Number of Households	Number of Families	School Enrollment:		Median HH Income (1979)	HH w/Income At or Below 80% Median (%)
				K - 8th	High School		
4 Kaimuki	38.0	6,314	4,970	1,684	1,139	\$26,260	30
5 Diamond Head	34.9	7,853	5,436	1,890	1,088	\$20,453	39
6 Palolo	32.1	4,092	3,393	1,683	863	\$21,457	38
7 Manoa	29.3	6,536	4,569	1,563	1,263	\$27,347	30
8 McCully	31.4	12,188	6,718	2,152	1,197	\$16,082	52
9 Walkiki	39.9	9,852	3,923	820	493	\$14,562	56
10 Makiki	32.3	14,050	6,816	1,888	978	\$17,179	49
11 Ala Moana	40.1	5,505	2,373	485	271	\$14,842	55
12 Nuuanu	35.3	5,361	3,973	1,695	995	\$22,714	37
13 Downtown	34.4	4,406	1,968	567	248	\$14,631	57
14 Liliha	37.2	6,429	5,118	2,072	1,211	\$22,107	37
15 Kalihi/Palama	28.5	10,837	8,565	6,248	3,021	\$14,280	57
16 Kalihi Valley	28.4	3,885	3,530	2,755	1,554	\$23,513	35
17 Moanalua	26.3	3,400	3,254	1,810	840	\$21,532	37
18 Aliamanu/Salt Lake	24.9	9,290	7,975	4,836	2,106	\$18,221	40
19 Airport	22.3	5,416	5,207	4,021	1,051	\$14,149	63
20 Aiea	28.5	8,925	7,376	3,833	2,329	\$25,393	30
21 Pearl City	27.6	11,140	10,364	7,353	3,744	\$29,345	19
22 Waipahu	25.0	8,261	7,378	5,753	2,639	\$23,865	36
23 Ewa	23.5	8,998	8,287	6,956	2,855	\$19,458	41

Source: City and County of Honolulu, Department of General Planning, Development Plan Status Review, Vol. II, Social, Economic and Environmental Conditions For Future Development, September 1988, Tables II-1, II-2, and II-9.

### 3.3.2 Community Facilities and Services

Community facilities and services include libraries, shopping centers, churches, police stations, fire stations, schools (public and private), hospitals, and clinics. The Updated Environmental Baseline Report (December 1989) identifies the location of those facilities currently existing within the neighborhoods of the project area.

### 3.4 VISUAL AND AESTHETIC RESOURCES

An important part of the AA/DEIS was the consideration given to the possible visual or aesthetic impacts a future system might have on existing resources. For more detailed information regarding all alternatives see the AA/DEIS. The visual resources listed in Table 3.11 are primarily important views from the amended LPA corridor. Exceptional trees, historic properties, and parklands, which also are sensitive visual resources, are discussed in Sections 3.7, 3.9, and 3.10 and are not included in Table 3.11. Residential areas adjacent to the proposed guideway alignments and stations also are considered sensitive resources because viewsheds and the visual quality of the immediate area could potentially be affected, especially near stations.

Table 3.11 SENSITIVE VISUAL RESOURCES ALONG THE AMENDED LOCALLY PREFERRED ALTERNATIVE		
Section	Street	Visual Resource
1	Ala Ike St. & Kamehameha Hwy.	View of Waianae range
1	Ala Ike St. & Kamehameha Hwy.	View of Koolau range
1	Kamehameha Highway	View to Pearl Harbor across Neal Blaisdell Park
1	Kamehameha Highway	View of Waianae range
1	Kamehameha Highway	View to Pearl Harbor across Richardson Rec.Center
3	Dillingham Boulevard	View of Koolau range
3	Dillingham Boulevard	Kamani trees <i>and Monkeypod trees</i>
4	Nimitz Highway	View of waterfront, Chinatown, and Hawaii Capital Special Districts & Merchant St. Historic District
4	Halekauwila Street	View of Punchbowl & Hawaii Capital Special District
4	Ward Avenue	View of Koolau range
4	Waimanu Street	View of Koolau range at Ward Avenue
5	Waimanu-Kona Streets	Views of Koolau range at Pensacola and Piikoi Streets
5	Kapiolani Boulevard	Monkeypod trees, view of Koolau range
7	University Avenue	View of Koolau range
7	UH campus (Quarry)	View of Koolau range

Source: Spencer Mason Architects, 1989, and Parsons Brinckerhoff Quade & Douglas, Inc., 1990, 1992.

### 3.5 AIR QUALITY

This section is a summary of the detailed information documented in a separate Air Quality Impact Report (September 1989) supporting the AA/DEIS. The City and County of Honolulu is in attainment with the

National Ambient Air Quality Standards (NAAQS). A summary of the NAAQS and State of Hawaii standards is presented in Table 3.12. The State Department of Health monitors air quality at five locations on Oahu. Three locations are relevant to the study area: the Department of Health in Downtown Honolulu, Pearl City, and Barbers Point. The regulated pollutants monitored at one or more of these stations include: (1) total suspended particulates (TSP); (2) particulate matter <10 microns (PM-10); (3) sulfur dioxide (SO<sub>2</sub>); (4) carbon monoxide (CO); (5) ozone (O<sub>3</sub>); (6) lead (Pb); and (7) nitrogen dioxide (NO<sub>2</sub>).

Table 3.12 SUMMARY OF STATE OF HAWAII AND FEDERAL AMBIENT AIR QUALITY STANDARDS				
Pollutant	Sampling Period	Federal Standards <sup>1</sup>		State Standards
		Primary	Secondary	
1. Total Suspended Particulate Matter (TSP) (micrograms per cubic meter)	Annual Geometric Mean	--	--	60
	Maximum Average in Any 24 Hours	--	--	150
2. PM-10 (micrograms per cubic meter)	Annual	50	50	-
	Maximum Average in Any 24 Hours	150	150	-
3. Sulfur Dioxide (SO <sub>2</sub> ) (micrograms per cubic meter)	Annual Arithmetic Mean	80	--	80
	Maximum Average in Any 24 Hours	365	--	365
	Maximum Average in Any 3 Hours		1,300	1,300
4. Nitrogen Dioxide (NO <sub>2</sub> ) (micrograms per cubic meter)	Annual Arithmetic Mean	100		70
5. Carbon Monoxide (CO) (milligrams per cubic meter)	Maximum Average in Any 8 Hours	10		5
	Maximum Average in Any 1 Hour	40		10
6. Photochemical Oxidants (as O <sub>3</sub> ) (micrograms per cubic meter)	Maximum Average in Any 1 Hour	235		100
7. Lead (Pb) (micrograms per cubic meter)	Maximum Average in Any Calendar Quarter	1.5		1.5

Source: U.S. Environmental Protection Agency, 40 CFR Part 50, 1987; and State Department of Health, 1986.

Note: <sup>1</sup> Primary Standards - protect public health with adequate margin of safety.  
Secondary Standards - protect public welfare through the prevention of damage to soils, water, vegetation, *artificial* materials, animals, wildlife, visibility, climate, and economic values.

Since 1978 and 1971, SO<sub>2</sub> and Pb, respectively, have not exceeded the state air quality standards. Levels of TSP exceeded the State standards once in 1980. Photochemical oxidants (i.e., ozone) exceeded the State standards three times in 1985 but did not in 1986 or 1987. State NO<sub>2</sub> standards have been met since 1973 and monitoring of this pollutant ceased in 1976. Carbon monoxide surpassed the State standards nineteen days in 1978; however, since then, the number of days exceeding the standards has



declined. In 1984, 1985, and 1987, the standard was surpassed only one day in each year. In 1986 the CO standard was exceeded a total of three days.

The maximum daily temperatures in Hawaii vary from the high 70s in winter to the mid-80s in summer and the minimum daily temperatures vary from the mid-60s to the low 70s. Temperatures as high as 93 degrees and as low as 53 degrees have been recorded in the airport area. The average annual rainfall as reported from the Honolulu International Airport is 23 inches. The northeast tradewinds predominate during much of the year, but from the fall through spring the area experiences more light, variable wind conditions, which is typically when the air quality standards were exceeded.

Based on existing and projected traffic conditions within the project area, thirteen worst-case intersections were selected as analysis sites for future air quality impacts of the project alternatives, including the TSM and the No-Build Alternatives. The following locations are shown in Figure 3.7 and discussed in more detail in the AA/DEIS.

- |   |   |   |                                     |
|---|---|---|-------------------------------------|
| A | Waimano Home Road @ Kamehameha Highway    | H | Pali Highway @ Beretania Street     |
| B | Pali Momi Street @ Kamehameha Highway     | I | Alakea Street @ Nimitz Highway      |
| C | Ala Liliko'i Street @ Salt Lake Boulevard | J | Ward Avenue @ Kapiolani Blvd.       |
| D | Puuloa Road @ Kamehameha Highway          | K | Kalakaua Avenue @ Kapiolani Blvd.   |
| E | Kalihi Street @ Dillingham Boulevard      | L | University Avenue @ Kapiolani Blvd. |
| F | Waiakamilo Road @ Dillingham Boulevard    | M | Dole Street @ University Avenue     |
| G | Liliha Street @ King Street               |   |                                     |

### 3.6 NOISE AND VIBRATION

The following is summarized from the Noise and Vibration Study for the Honolulu Rapid Transit Development Project (September 1989).

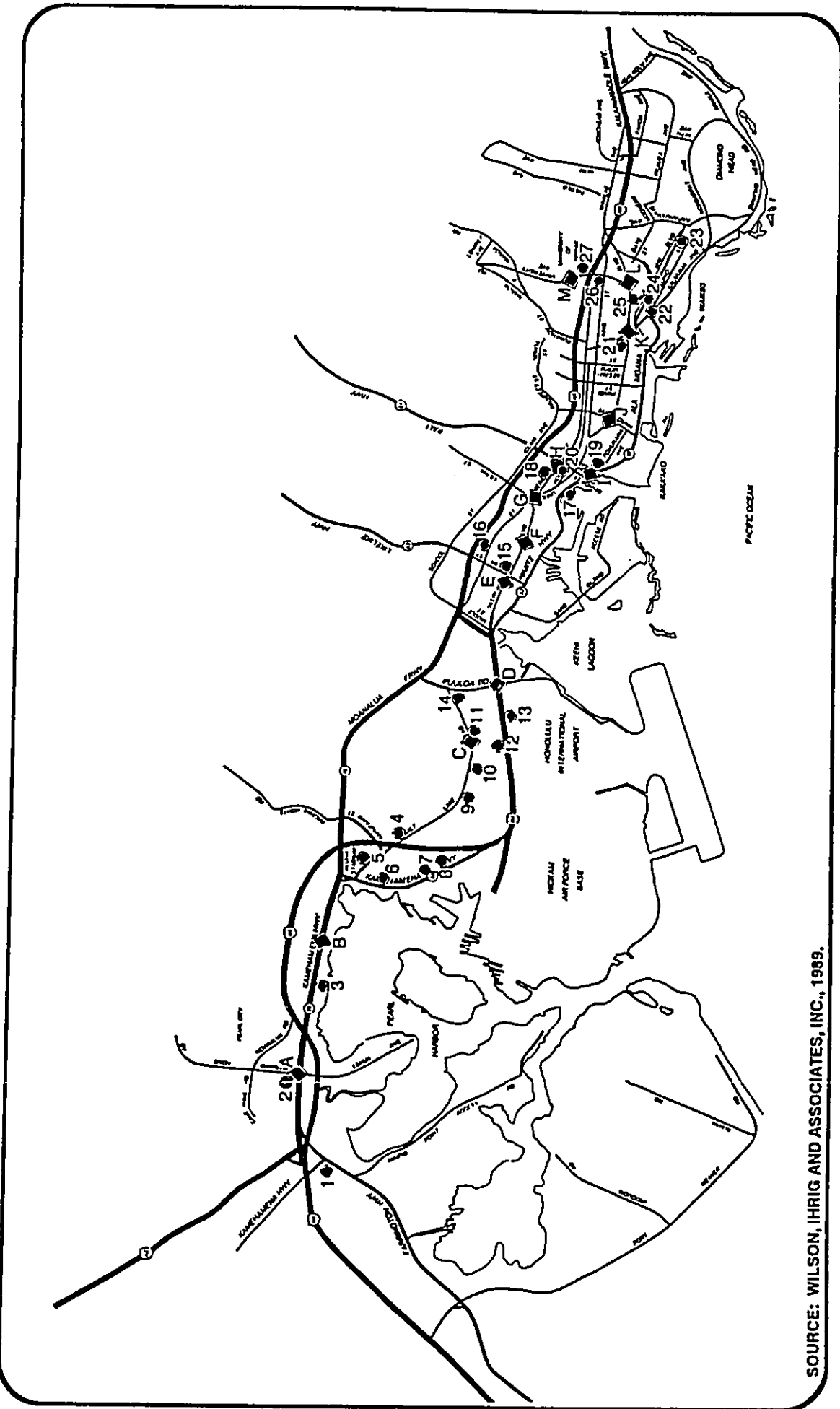
#### 3.6.1 Noise Measurements

Spot-check measurements, each of a 10-minute duration, were performed at twenty-five measurement locations, shown on Figure 3.7, along the fixed guideway alignments during four characteristic measurement periods:

Midday:	10:00 a.m. to 2:00 p.m.
Evening:	7:00 p.m. to 10:00 p.m.
PM Peak Period:	4:00 p.m. to 6:00 p.m.
Nighttime:	11:00 p.m. to 2:00 a.m.

Each measurement location was chosen to obtain the noise levels characteristic of an area or near a potentially noise sensitive building or group of buildings. Wherever possible, the measuring microphone was located at the setback line of the nearby buildings. Table 3.13 presents the results of the statistical analysis of the noise observed at each of the twenty-five short-term measurement locations. All of the noise levels are presented in terms of A-weighted sound level in decibels.

The results of 24-hour measurements, at thirteen locations, expressed as Community Noise Equivalent Levels (CNEL), also are shown in Table 3.13. The CNEL is a 24-hour descriptor that takes into consideration the additional annoyance caused by noise at night. Given that most community noise standards recommend 60 dBA CNEL as an upper limit for residential areas, these data confirm that most of the locations surveyed are currently subjected to noise exposure levels far higher than those considered clearly acceptable for residential use.



SOURCE: WILSON, IHRIG AND ASSOCIATES, INC., 1989.



0 3000 6000  
SCALE FEET

LEGEND  
 ● NOISE MEASUREMENT SITES  
 ◆ AIR QUALITY ANALYSIS SITES

**FIGURE 3.7**  
**NOISE AND AIR QUALITY ANALYSIS SITES**  
**HONOLULU RAPID TRANSIT PROGRAM**

Table 3.13 ESTIMATED OR MEASURED NOISE LEVELS		
Location Number (see map)	Leq <sup>2</sup> (dBA)	CNEL (dBA)
1	58-65	60-62
2	63-65	70 <sup>1</sup>
3	57-61	63-65
4	66-68	69-71
5	63-67	70 <sup>1</sup>
6	60-64	65 <sup>1</sup>
7	---	74 <sup>1</sup>
8	65-68	70-72
9	61-63	67 <sup>1</sup>
10	56-57	59-61
11	60-62	64-66
12	61-67	68-70
13	67-72	74-76
14	59-67	63 <sup>1</sup>
15	66-67	69-71
16	60-66	68-70
17	72-75	75-77
18	63-67	69 <sup>1</sup>
18a	---	67 <sup>1</sup>
19	---	68 <sup>1</sup>
20	67-73	75-77
21	67-72	73 <sup>1</sup>
22	67-70	73 <sup>1</sup>
23	67-71	75 <sup>1</sup>
24	64-69	70-72
25	66-69	71 <sup>1</sup>
26	68-70	72-74
27	61-62	63-65

Source: Parsons Brinckerhoff Quade & Douglas, Inc., 1990.

Notes: <sup>1</sup> Data denoted are from 24-hour measurement results. All other values are estimated from short-term data.

<sup>2</sup> Leq values are ranges for peak hour, day, and evening. The equivalent sound level (Leq) describes a receiver's cumulative noise exposure from all events over a specified time period.

### 3.6.2 Vibration

Vibration level data were taken simultaneously with the sound level data at the same locations. Vibration levels at most locations were generally well below a weighted vibration velocity level of 69 dBA, the approximate threshold of human perception. Only at four locations, Sites 21 through 24, were the peak vibration levels 69 dBA or higher, because of heavy vehicle passbys on adjacent roadways.

### 3.6.3 Noise and Vibration Criteria

Table 3.14 presents the general categories used to define communities along the fixed guideway corridors. Table 3.15 indicates the criteria for maximum passby noise used for the analysis of impact. Note that the levels indicated are the average of the sound level occurring as the vehicle passes by, usually a 1 to 4 second averaging period. Table 3.16 shows the criteria for maximum groundborne vibration from train operations.

Table 3.14 GENERAL CATEGORIES OF COMMUNITIES			
Area Category	Area Description	Typical Ambient Noise Level-dBA (Average or L <sub>50</sub> <sup>1</sup> )	Typical Day/Night Exposure Levels - L <sub>dn</sub>
I.	<u>Low Density</u> : Urban residential, open space park, suburban residential, or quiet recreational area. No nearby highways or boulevards.	40-50 - day 35-45 - night	Below 55
II.	<u>Average</u> : Urban residential, quiet apartments and hotels, open space, suburban residential, or occupied outdoor areas near busy streets.	45-55 - day 40-50 - night	50-60
III.	<u>High Density</u> : Urban residential average semi-residential/commercial areas, urban parks, museum, and non-commercial public building areas.	50-60 - day 45-55 - night	55-65
IV.	<u>Commercial</u> : Areas with office buildings, retail stores, etc., primarily daytime occupancy. Central Business Districts.	60-70	Over 60
V.	<u>Industrial areas or Freeway and Highway Corridors.</u>	Over 60	Over 65

Source: American Public Transit Association, 1981; and Wilson, Ihrig & Associates, Inc., 1990.

Note: <sup>1</sup> L<sub>50</sub> is the long-term statistical median noise level.

TABLE 3.15 CRITERIA FOR MAXIMUM AIRBORNE NOISE FROM TRAIN OPERATIONS			
Community Area Category	Maximum Passby Noise Level (dBA):		
	Single Family Dwelling	Multi-Family Dwelling	Commercial Buildings
I. Low-Density Residential	70	70	75
II. Average Residential	70	70	80
III. High-Density Residential	70	75	80
IV. Commercial	75	80	85
V. Industrial/Highway	80	80	85

Source: American Public Transit Association, 1981; and Wilson, Ihrig & Associates, Inc., 1990.

Note: These criteria are generally applicable at the near side of the nearest dwelling or occupied building under consideration or in residential areas at 50 feet from the track centerline, whichever is closer.

TABLE 3.16 CRITERIA FOR MAXIMUM GROUND BORNE VIBRATION FROM TRAIN OPERATIONS <sup>1</sup>			
Community Area Category	Maximum Passby Groundborne Vibration Velocity Level (dBA re 10 <sup>-6</sup> in/sec)		
	Single Family Dwelling	Multi-Family Dwelling	Hotel/Motel Building
<i>I. Low-Density Residential</i>	70	70	70
<i>II. Average Residential</i>	70	70	75
<i>III. High-Density Residential</i>	70	75	75
<i>IV. Commercial</i>	70	75	75
<i>V. Industrial/Highway</i>	75	75	75

Source: American Public Transit Association, 1981.

Note: <sup>1</sup> Criteria apply to the vertical vibration of the ground surface or of floor surfaces within the buildings.

### 3.7 ECOSYSTEMS

#### 3.7.1 Fish and Wildlife

The study corridor bisects and encompasses mostly urbanized land. Any remaining terrestrial wildlife habitats are generally highly modified and populated with introduced wildlife species. Numerous streams within the corridor provide habitat for species of introduced and indigenous fish and shrimp, migrating shorebirds, and one endangered water bird, the Hawaiian stilt. All streams have been modified in the lower reaches of the corridor and are of relatively poor ecological quality as discussed further in Section 3.8.

The Pearl Harbor National Wildlife Refuge consists of 61 acres of artificially-made wetland habitat in two separate units on the south shore of Oahu. The Waiawa unit (24.5 acres) lies near the east shore of Middle Loch on the Pearl City Peninsula within the Pearl Harbor Naval Base. The Honouliuli unit (36.5 acres) lies along the west shore of West Loch within the Pearl Harbor Naval Base. The refuge was established principally to replace lost stilt feeding habitat, but other endangered endemic water birds, migrant shorebirds, and waterfowl also use the area.

The Waiawa unit typically supports several endangered species, including Hawaiian stilts or Aeo (Himantopus mexicanus knudseni), Hawaiian Coot or Alae keo (Fulica americana alai), and Hawaiian Duck or Koloa (Anas wyvilliana). Other waterfowl known to occur in the Waiawa unit include scaup, shoveler, night heron, cattle egret, the lesser Pacific golden plover, the ruddy turnstone, sanderling, wandering tattler, tern, and osprey. The Pearl Harbor National Wildlife Refuge will not be affected by the project.

*The State of Hawaii lists the Oahu population of the White Tern (Gygis Alba) as endangered. White Terns are a relatively recent bird to the avifauna of Oahu. Prior to the 1960's they could only be seen with regularity in the Northwestern Hawaiian Islands. Their establishment on Oahu may be due to crowded conditions elsewhere which have forced the birds to look further afield for roosting and nesting localities. At present, the major site used by White Terns on Oahu continues to be Kapiolani Park with some activity scattered elsewhere in urban Honolulu. In a recent survey of certain trees to be trimmed or removed along the proposed fixed guideway alignment, no White Terns were observed (Bruner, 1992).*

#### 3.7.2 Vegetation

Study corridor vegetation consists of maintained landscape plantings or infrequently maintained weedy (ruderal) patches. The only large, naturally vegetated area which could be substantially affected by the transit project is the Navy Ewa Drum Storage Site, the location of the proposed maintenance and vehicle storage facilities. A botanical survey of this site was conducted in 1988, and serves as supporting documentation for this FEIS (Char, 1988). Vegetation on the Navy Ewa Drum Storage Site consists of a more or less dense, 12- to 15-foot-tall koa-haole scrub. Scattered kiawe, opiuma, Chinese banyan, and monkeypod trees reach 25 to 30 feet in height. A dense ground cover is found under the koa-haole shrubs. None of the plant species encountered is considered rare, threatened, or endangered.

No officially listed, proposed, or candidate threatened or endangered plant species designated by the Federal and/or State governments are known to occur along the proposed alignments or at the Drum Storage Site. Rare plant species are not found in these areas (Char, 1988).

Four "Exceptional Trees" are located along portions of the alignment proposed in the AA/DEIS. City Ordinance 78-91, as amended, defines an "Exceptional Tree" as:

A tree or grove of trees with historic or cultural value, or which by reason of its age, rarity, location, size, aesthetic quality or endemic status has been designated by the City Council as worthy of preservation.

No 'Exceptional Trees' are located along the alignment of the amended LPA. However, several streets within the guideway corridor contain mature vegetation within the median or streetscape, including Dillingham Boulevard, Kapiolani Boulevard, Ward Avenue, Piikoi Street, and Kalakaua Avenue.

### 3.7.3 Soils

The project area is predominantly underlain by the Lualualei-Fill land-Ewa soil association. This association is characterized by deep, nearly level to moderately sloping, well-drained soils that have a fine textured or moderately fine textured subsoil or underlying material, and areas of miscellaneous fill. The location of prime and unique agriculture lands, erodible soils, and hydric soils was determined. A list of soils and a mapping of their locations are provided in the Updated Environmental Baseline Report (December 1989). A discussion of soil locations relative to project impact is included in Chapter 5.0.

## 3.8 WATER

### 3.8.1 Surface Waters

Figures 3.8a, b, and c show the location of streams, harbors, lagoons, and canals in the project area. The U.S. Geological Survey maintains a network of stream sampling stations in Hawaii and produces an annual hydrologic report. The report includes long-term and annual stream flow for four streams, and water quality data for two of the streams along the fixed guideway corridor. All of the stream channels have been altered in the lower reaches, and none are of high ecological quality. Hawaii's Assessment of Nonpoint Source Pollution Water Quality Problems (November 1990), discusses Water Quality-Limited Segments (WQLS), which are waterbodies that cannot reasonably be expected to attain or maintain State Water Quality Standards without additional action to control nonpoint sources of pollution. Several such waterbodies are located in the project area. They are discussed in the following paragraphs.

Pearl Harbor receives flows from five perennial and three intermittent streams with a combined drainage basin of about 100 square miles. The volume of fresh water entering Pearl Harbor from the streams and five large springs has been estimated at 50 million gallons per day during the dry season and 100 million gallons per day during the wet season, creating a highly stratified estuary where a surface layer of brackish water flows out of the main channel with little tidal influence.

Water quality in Pearl Harbor is poor. The abundant rainfall at the heads of the streams that drain into Pearl Harbor results in runoffs which transport pollutants from upland forest, agricultural (primarily sugarcane and pineapple), commercial, industrial, military, and residential lands. A Department of Health survey of Pearl Harbor's Middle Loch lists violations of water quality criteria for nitrogen, phosphorus, turbidity, and fecal coliform. Flushing of the harbor is retarded by the narrow entrance channel and the configuration of the lochs. Siltation is also a major problem, necessitating frequent maintenance dredging. Sediments are continuously resuspended by ship traffic. The Department of Health report, cited above, categorizes WQLSs according to their prognosis for improvement. The report lists Pearl Harbor as an area that may be amenable to improvements.

References from as early as 1920 describe water pollution problems in Honolulu Harbor. Two streams (Kapalama and Nuuanu), as well as numerous ditches and storm drains, contribute runoff with associated pollutants. Water quality in the Kapalama Basin is particularly poor because of discharges from Kapalama

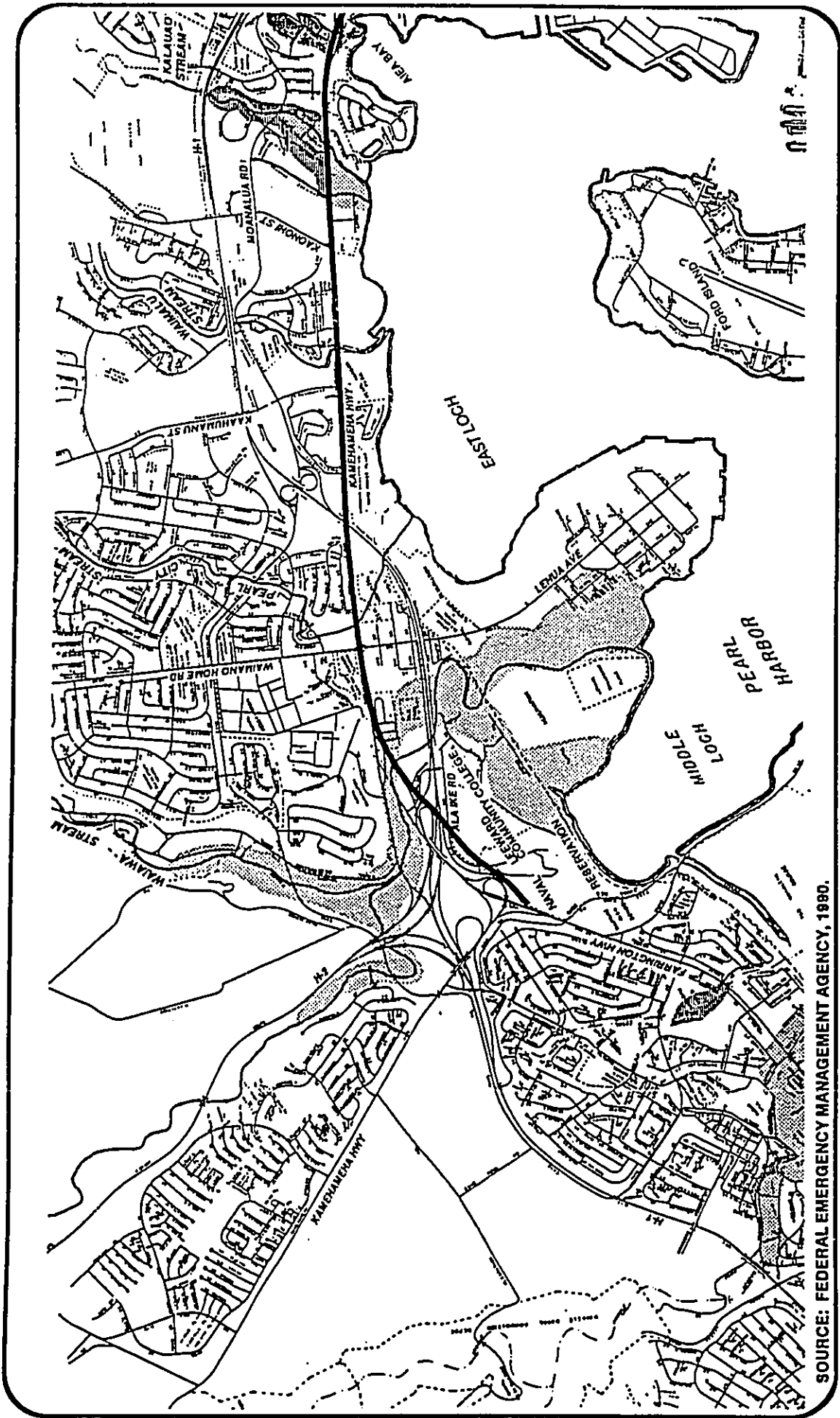


FIGURE 3.8a

FLOODPLAINS

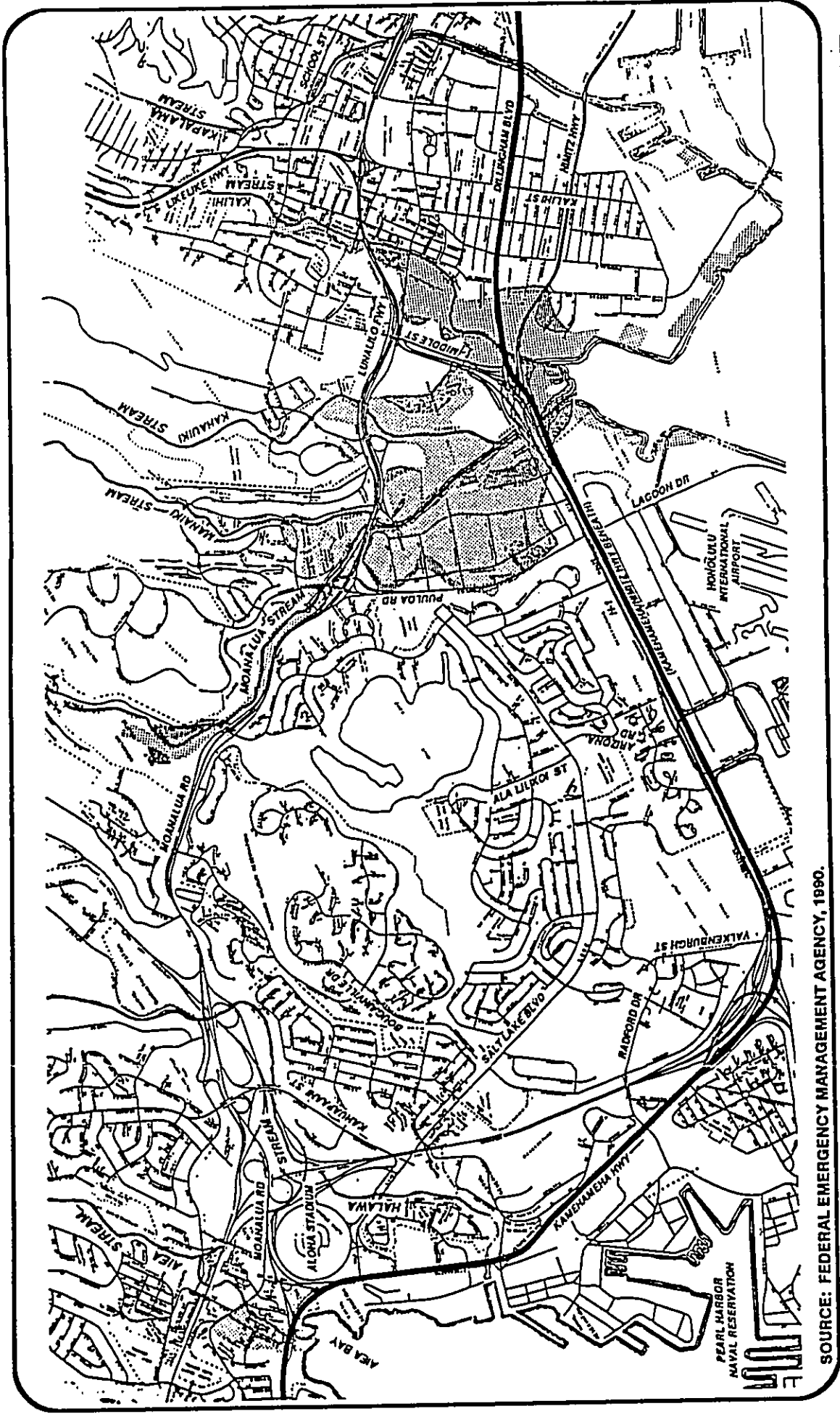
HONOLULU RAPID TRANSIT PROGRAM



- LEGEND
- AMENDED LPA
  - 100 YEAR FLOODPLAIN
  - 500 YEAR FLOODPLAIN







SOURCE: FEDERAL EMERGENCY MANAGEMENT AGENCY, 1990.

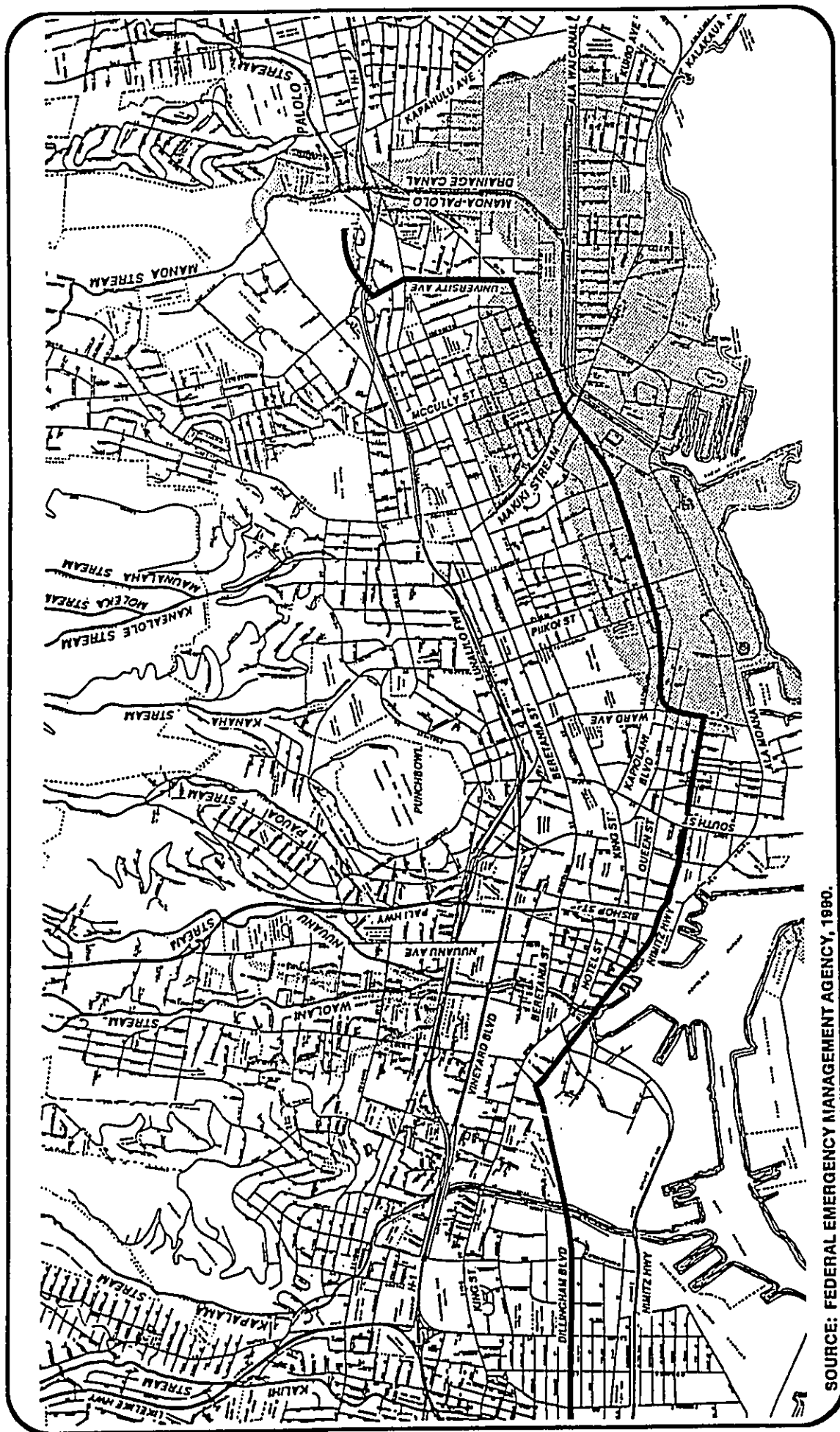
FIGURE 3.8b

FLOODPLAINS  
HONOLULU RAPID TRANSIT PROGRAM



- LEGEND
- AMENDED LPA
  - 100 YEAR FLOODPLAIN
  - 500 YEAR FLOODPLAIN





SOURCE: FEDERAL EMERGENCY MANAGEMENT AGENCY, 1980.

FIGURE 3.8C

### FLOODPLAINS

### HONOLULU RAPID TRANSIT PROGRAM



- LEGEND**
- AMENDED LPA
  - 100 YEAR FLOODPLAIN
  - 500 YEAR FLOODPLAIN



Stream. Sediment resuspension from ship traffic in the harbor and maintenance dredging create turbid waters. Studies of the Harbor indicate that coliform bacteria, nitrogen, phosphorus, and turbidity levels in the water regularly exceed state water quality standards. Department of Health samplings for heavy metals, chlorinated pesticides, and PCBs in 1978 and subsequently, indicate significant levels of copper, zinc, chromium, nickel, and lead. Significant levels of chlordane and dieldrin also have been identified. The Department of Health lists Honolulu Harbor as an area that may be amenable to improvements.

Keehi Lagoon is a highly physically modified environment. Dredging the seaplane runways greatly increased the volume of the lagoon while retarding flushing. Construction of an additional circulation channel when the Reef Runway at Honolulu International Airport was built did improve water quality in the lagoon, but a gradient of increasing turbidity and plant nutrient concentrations toward the innermost parts of the lagoon, where Kalihi and Moanalua Streams discharge, continue to exist. Other point source discharges to the lagoon include a drainage canal from Honolulu International Airport and adjacent industrial areas, and several additional drainage outlets along Lagoon Drive bordering the northwest shoreline of the lagoon. The currents in Oahu's southern coastal waters, which move from Honolulu Harbor into Keehi Lagoon, transport the polluted waters of Honolulu Harbor into Keehi Lagoon and recirculate suspended matter within the lagoon. Various causes, effects, and symptoms of water pollution in the lagoon have been documented, including petrochemical contamination of sediments and water, fish kills, and the presence of human enteric viruses. The lagoon regularly experiences violations of water quality parameters for phosphorus and turbidity. The Department of Health lists Keehi Lagoon as a high use area that is amenable to improvements.

*According to the Water Quality, Terrestrial, and Marine Biological Surveys, and Impact Analyses for Development of the Proposed Keehi Lagoon Canoe Racing Facility report prepared in 1990, the diversity of marine flora and fauna decreases along a gradient from the outer part of the lagoon inward to the project area, as wave energy, water circulation, and average salinity decrease. Barracuda, jellyfish, small aholehole, lizardfish, cardinalfish, and juvenile goatfish, surgeonfish, cowfish, and acanthurids have been observed within the lagoon. Within the mud bottom, the most abundant fauna observed were oligochaetes (thread-like worms). Within the shallow water areas oysters, sponges, tube worms, swimming crab, and mantis shrimp have been observed. Red mangrove has encroached heavily upon the wetlands in the vicinity of the lagoon; however, some open water areas still exist. Tilapia and mollies are abundant fish. Hawaiian stilts, black-crowned night herons, and golden plover feed in the wetland areas. Nearly all of the land surrounding the lagoon represents fill material deposited from dredging in the lagoon or from other sources.*

Two major storm drains discharge into Kewalo Basin. One drain serves the Ala Moana Park and Center and the residential and commercial areas to the north. The other drain serves the Ward Avenue-Kakaako District, a district consisting of mostly light industrial and commercial businesses. All areas are surrounded and affected by heavy vehicular traffic. Kewalo Basin's design hinders water circulation. As a result, the urban pollutants that collect in the basin remain concentrated for extended periods. The State has received complaints of various spills of oil and paint into the basin from storm drains. The Department of Health has noted exceedances of water quality standards for nitrogen, phosphorus, and turbidity. Kewalo Basin has been designated by the Department of Health as an area that may be amenable to improvements.

### **3.8.2 Groundwater**

The study corridor generally parallels the Honolulu coastline and is within the two- to four-mile-wide coastal band underlain by calcareous sedimentary material collectively termed caprock. Water in the caprock is brackish and not suitable for potable water development. The caprock is less permeable than water-bearing lava flows nearer the Koolau Range and constitutes a barrier which retards the seaward flow of groundwater. As a consequence, inland areas of central Honolulu have the highest water tables in southern Oahu. Beneath the caprock and underlying all of southern Oahu is an extensive basal aquifer

*that is heavily developed*, containing large supplies of fresh water. The basal groundwater is under artesian pressure; water levels range from ten to thirty feet above sea level. In the coastal caprock area, water levels are one to three feet above sea level.

Although the capacity of the caprock to store and transmit water is small compared to that of the basalt aquifer, caprock does contain large quantities of water that accumulates from rainfall, return irrigation, and leakage upward from the artesian portion of the basaltic aquifer. Caprock water has been developed for agricultural and industrial purposes *and* is generally of poor quality because of its relatively high chloride content.

*Numerous injection wells for waste discharge exist in central Honolulu, including those for thermal effluent, car-wash return, and rain water.* The chief recipient of injected discharges is caprock water. Because of the large head difference between water in the caprock and in the Koolau lavas, pollutants do not enter artesian-water resources from the caprock water.

In November 1987, the U.S. Environmental Protection Agency designated the Southern Oahu Basal Aquifer (SOBA) as the sole or principal source of drinking water for the Pearl Harbor area. Figure 3.9 delineates areas within the SOBA.

Groundwater in the Navy Ewa Drum Storage Site was subjected to a localized gasoline spill in March 1971, when approximately 315,000 gallons of gasoline were released because of vandalism. The Navy's recovery program resulted in recovery of most of the free gasoline product in the groundwater. The Navy is currently in the process of conducting an investigation to determine the presence/extent of remaining contamination.

### **3.8.3 Floodplains**

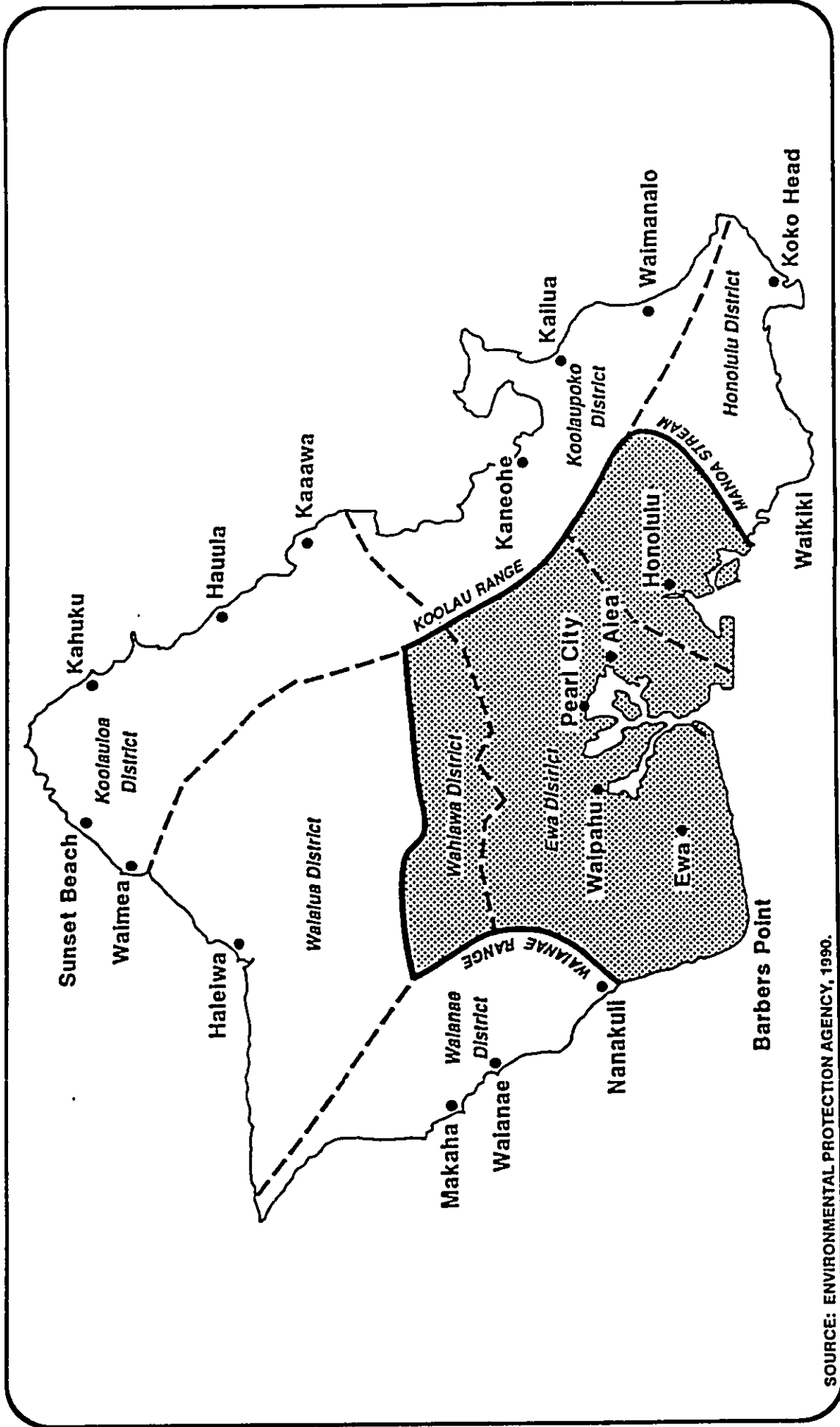
Guidance on floodplain management and protection is contained in Executive Order 11988 and U.S. DOT Order 5650.2. At the local level, the regulations and permitting related to floodplains is contained in Section 7.10 of the City and County Land Use Ordinance.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) indicate that several areas in the study area are within 100-year base floodplains (refer to Figures 3.8a, b, and c). These floodplains are associated with streams and a canal. The largest FEMA-indicated floodplain occurs Koko Head of Ward Avenue, makai of South King Street, and Ewa of Paoakalani Avenue. This area includes Ala Moana Beach Park and Ala Moana Center plus Waikiki. The floodplain includes the 100-year base floodplains associated with Manoa-Palolo Stream and the Ala Wai Canal; it also includes an area inundated by worst-case hurricane conditions.

The second largest floodplain area encompasses mauka of Keehi Lagoon, Koko Head of Puuloa Road, makai of Moanalua Road, and Ewa of Puuhale Road. Moanalua, Kahauiki, and Kalihi Streams are located within this 100-year floodplain. The three remaining 100-year floodplains are associated with the Waiawa, Aiea, and Kalauao Streams. These streams drain into Pearl Harbor.

### **3.8.4 Wetlands**

Figures 3.10a - 3.10c display the location of wetlands in relation to the fixed guideway alignment *based on the U.S. Fish and Wildlife Service National Wetlands Inventory. The National Wetlands Inventory is a useful corridor level screening tool, but is not the definitive designation of wetland areas.* Field surveys of the project area and coordination with responsible natural resource agencies *were necessary to obtain more precise*



SOURCE: ENVIRONMENTAL PROTECTION AGENCY, 1990.

**FIGURE 3.9**  
**SOUTHERN OAHU SOLE SOURCE AQUIFER**  
**DESIGNATED BOUNDARIES**  
**HONOLULU RAPID TRANSIT PROGRAM**

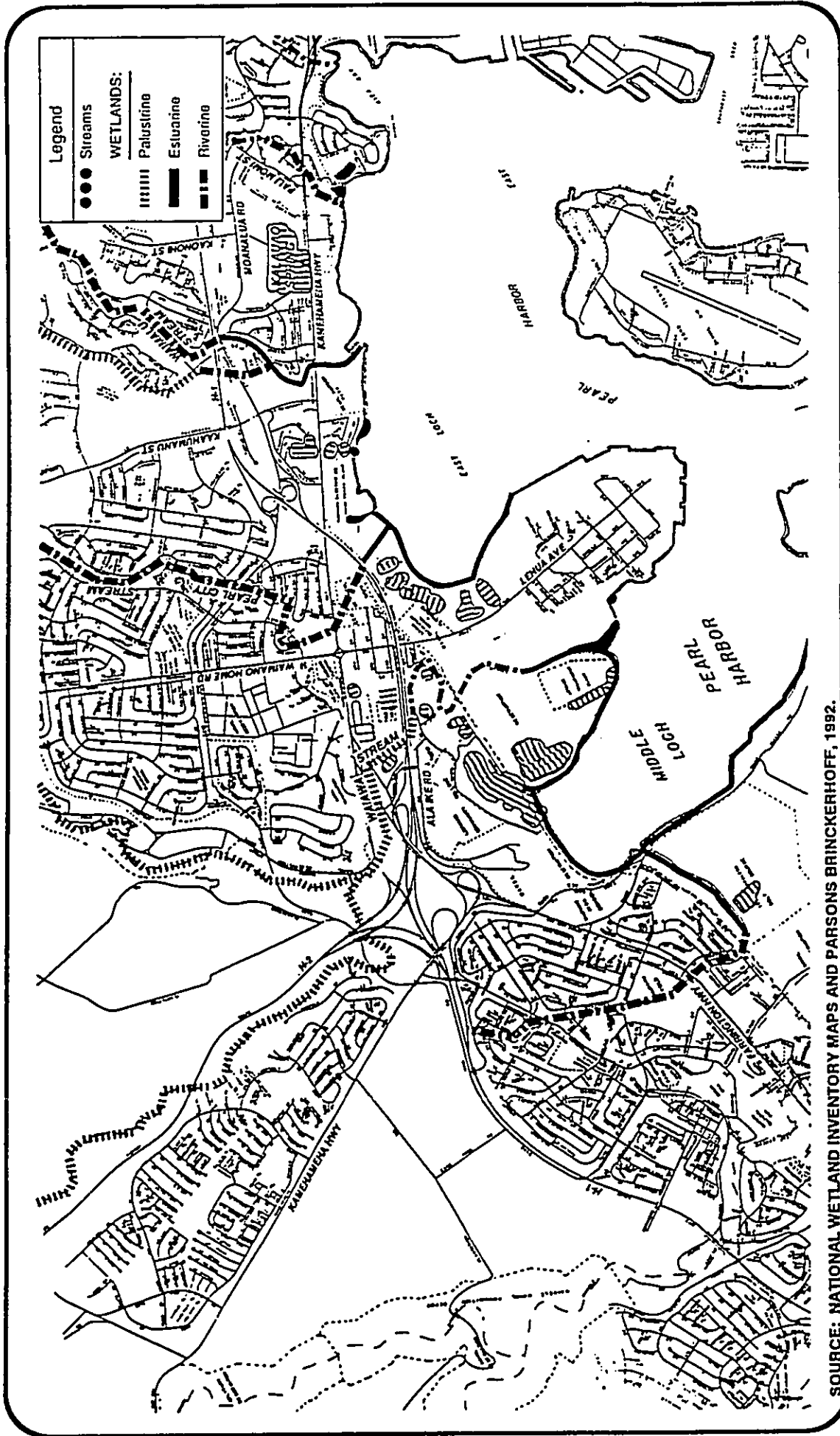


FIGURE 3.10a

STREAMS AND WETLANDS  
HONOLULU RAPID TRANSIT PROGRAM

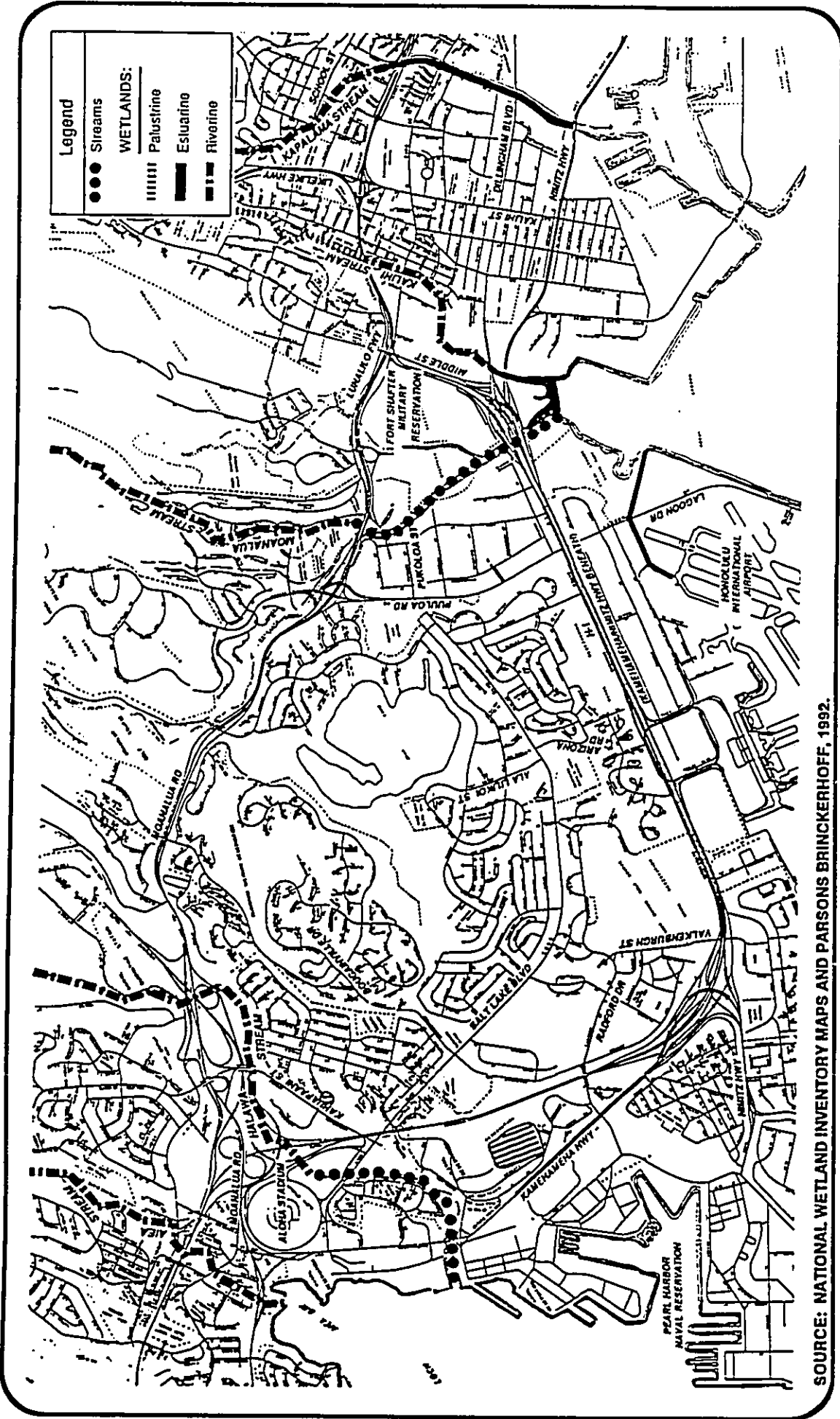


FIGURE 3.10b

STREAMS AND WETLANDS

HONOLULU RAPID TRANSIT PROGRAM

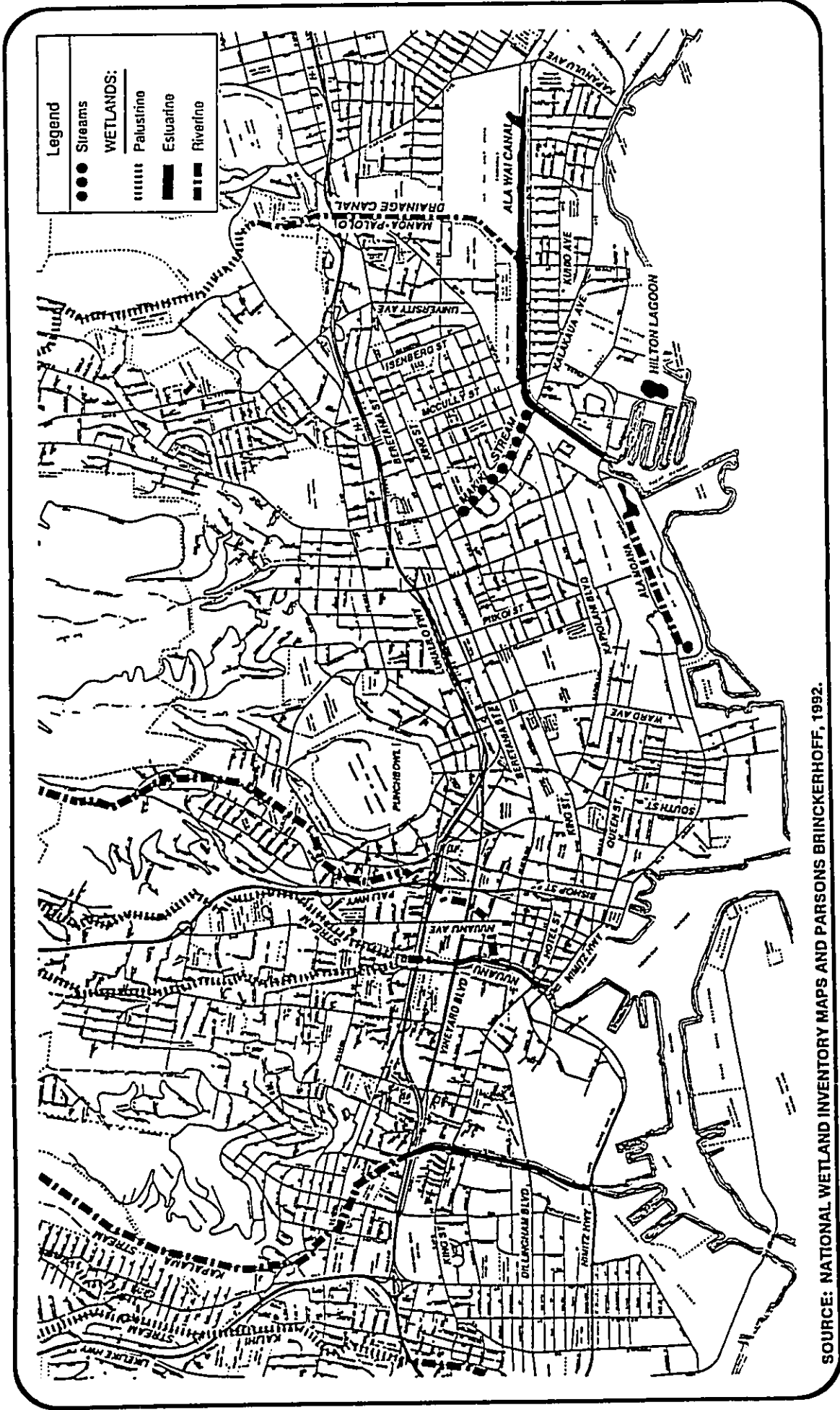


FIGURE 3.10C

STREAMS AND WETLANDS

HONOLULU RAPID TRANSIT PROGRAM



information, and these efforts have not identified any additional potential wetland areas. Indeed, several potential wetland areas designated in the National Wetland Inventory do not meet the 3-parameter criteria for wetlands of appropriate vegetation, soils, and hydrology.

### 3.8.5 Navigable Waters

The U.S. Coast Guard has determined that ten project area waterways are technically categorized as navigable waters. Legislation generally defines waters that are subject to tidal influence as navigable. Navigability is further defined by usage such that non-tidal streams carrying commercial traffic would be deemed navigable. Table 3.17 shows streams that are deemed navigable for the distances shown.

Table 3.17 NAVIGABLE WATERWAYS WITHIN THE STUDY CORRIDOR	
Name of Waterway	Navigable Length (Miles Upstream From Mouth)
Waiawa Stream	0.1
Waimalu Stream	0.1
Kalauao Creek	0.1
Aiea Creek	0.2
Halawa Creek	0.2
Moanalua Stream	1.0
Kalihi Stream	0.5
Kapalama Stream	0.5
Nuuanu Stream	0.5
Ala Wai Canal	Entire Length

Source: USDOT, United States Coast Guard, letter of June 13, 1989.

*In fact, navigation of these streams is extremely limited or nonexistent at the points where they are crossed by the guideway alignment. Where navigation does occur at the point of crossing, such as Nuuanu Stream, navigational use is limited to small recreational boating such as canoes and kayaks.*

### 3.8.6 Coastal Zone Management (CZM) Zones

The Hawaii CZM Program was approved by the U.S. Department of Commerce in September 1978 to protect valuable resources; preserve management options; ensure public access to beaches, recreation areas, and natural reserves; and provide for solid and liquid waste treatment within the special management area. Portions of the fixed guideway alternatives are located within the coastal zone special management area (SMA).

Chapter 205A, Hawaii Revised Statutes (HRS), as amended, stipulates that development that has any substantially adverse environmental or ecological effect will not be permitted, except when such adverse effect is minimized to the extent practicable and is clearly outweighed by benefits to public health and

safety, or compelling public interest. It calls for special controls for development within an area along the shoreline called the "special management area" (SMA) within the coastal zone. These controls are based on a general coastal management program for Hawaii. The City Department of Land Utilization is designated the administering agency. The corridor is located within, or adjacent to, this designated management area along Kamehameha Highway in Section 1, and along Kamehameha Highway from Aloha Stadium to Halawa Stream, and in the floodplain area around the Keehi Interchange in Section 2. A map of the Central Honolulu Coastline Special Management Area is included in the Updated Environmental Baseline Report (December 1989).

### **3.8.7 Water Recreation**

Recreational uses of water resources within or adjacent to the study corridor are primarily associated with the ocean. The State Department of Transportation Harbors Division's "Hawaii Administrative Rules for Shore Waters and Shores" provides general provisions for the uses of shore waters and shore areas. It divides the coastal areas into segments and specifies what water-based uses are allowed within specific zones. The study corridor falls within the South Shore Oahu Ocean Recreation Management Area which includes all ocean waters and navigable streams from Makapuu Point to the west boundary of the Honolulu International Airport Reef Runway.

Makai of Ala Moana Beach Park is the Ala Moana Commercial Thrill Craft Zone, which is restricted to commercial operators. Ewa of this zone and makai of Honolulu International Airport is the Keehi Lagoon/Kahakaaulana Islet Commercial Zone, which is the site of commercial thrill craft and other commercial ocean activities. Recreational thrill craft are accommodated in the Reef Runway Zone that parallels the airport's Reef Runway.

In addition to beach-oriented activities of swimming and sunbathing, people pursue various water recreation activities within these management areas. These activities range from surfing and snorkeling to commercial dinner cruises and thrill sports.

*Recreational use of the navigable streams in the corridor is minimal.*

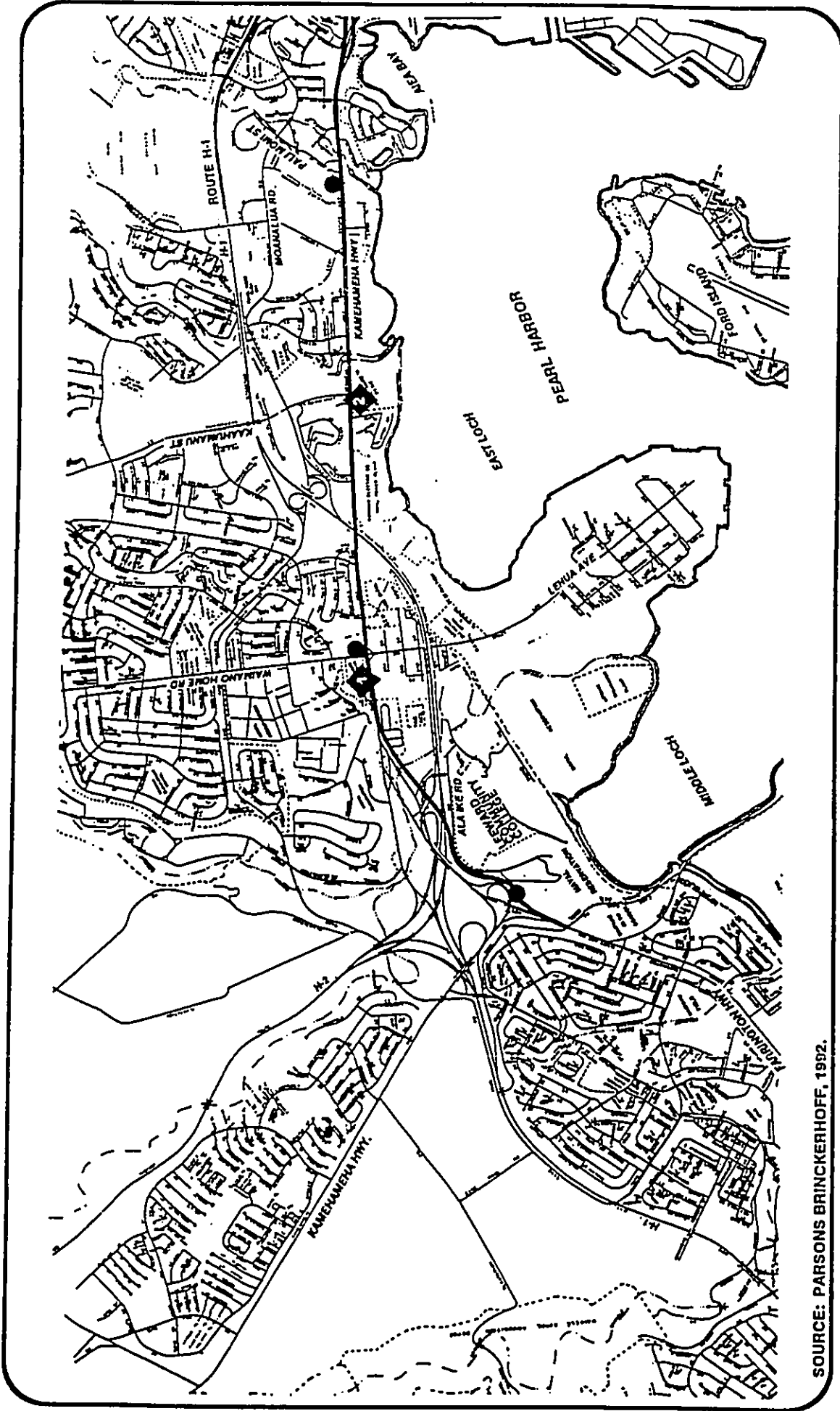
## **3.9 HISTORIC AND ARCHAEOLOGICAL RESOURCES**

### **3.9.1 Historic Resources**

Section 106 of the National Historic Preservation Act protects sites on, or eligible for, the National Register of Historic Places (NR) and establishes guidelines for identification of sites, analysis of effect, and consultation. The corridor was surveyed and an inventory of historic resources was prepared and updated subsequent to the AA/DEIS. For additional information regarding the survey and inventory for all alternatives see the AA/DEIS. Coordination with the State Historic Preservation Officer (SHPO) has continued throughout the process.

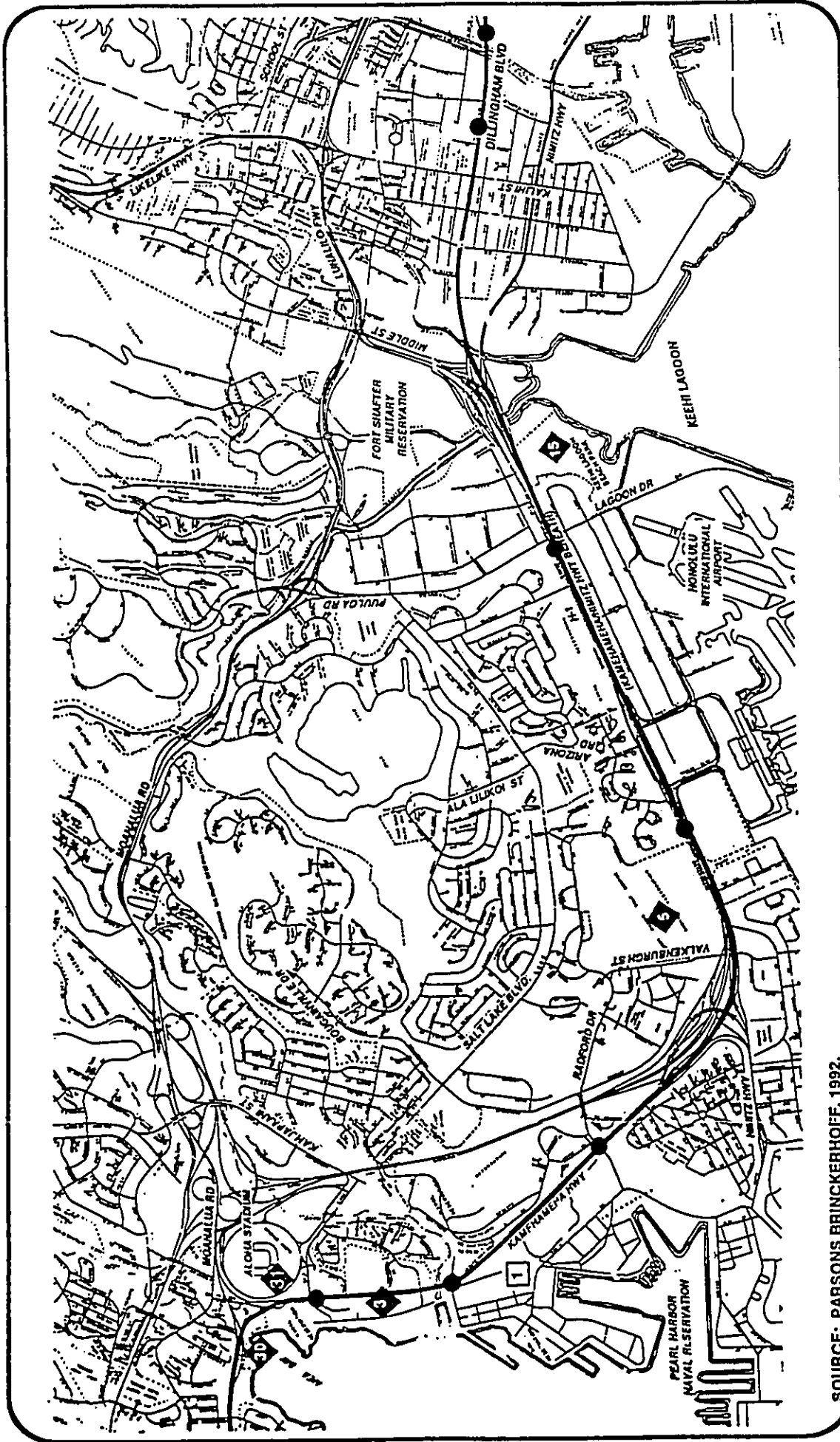
All historic sites identified in the AA/DEIS relative to the amended LPA are on the NR or on both the Hawaii Register (HR) and the NR.

Historic resources pertinent to the amended LPA are shown on Figure 3.11a, b, and c and listed in Table 3.18. A description of each historic resource associated with the amended LPA follows.



SOURCE: PARSONS BRINCKERHOFF, 1992.

**FIGURE 3.11a**  
**PARKLANDS AND HISTORIC SITES**  
**HONOLULU RAPID TRANSIT PROGRAM**



SOURCE: PARSONS BRINCKERHOFF, 1992.

FIGURE 3.11b

PARKLANDS AND HISTORIC SITES  
 HONOLULU RAPID TRANSIT PROGRAM

MAUIKA  
 EWA  
 KOKO HEAD  
 MAKAI

SCALE  
 0 2000 4000  
 FEET

LEGEND  
 AMENDED LPA  
 PARKLANDS  
 HISTORIC SITES  
 STATIONS

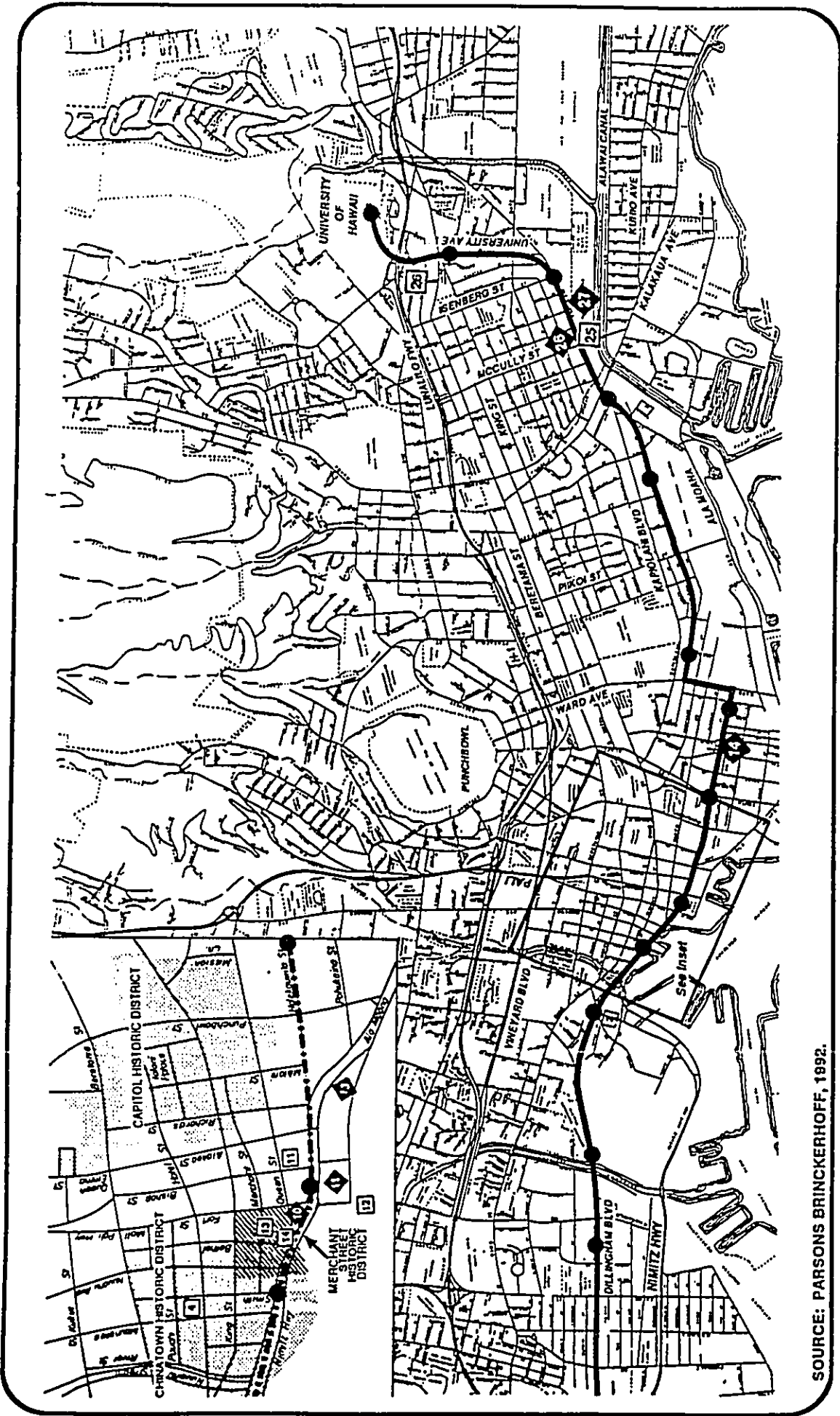


FIGURE 3.11C

PARKLANDS AND HISTORIC SITES  
HONOLULU RAPID TRANSIT PROGRAM

**Table 3.18**  
**LIST OF HISTORIC PROPERTIES ALONG THE**  
**AMENDED LOCALLY PREFERRED ALTERNATIVE**

Map Key	Street	Structure/Site	Date
1	Kamehameha Hwy.	+ Pearl Harbor Naval Base	Various
2	King	o Old OR&L Station & Office Building	1914 & 1925
4	Ber./Hotel/Nimitz	+ Chinatown Historic District	From 1860s
11	Nimitz	+ Dillingham Transportation Building	1930
12	Nimitz	+ Aloha Tower	1926
13	Nimitz	+ Merchant Street Historic District (MSHD)	various
14	Nimitz	+ Old Police Station (MSHD)	1930
*	Pohukaina	o Mother Waldron Park	1937
25	Kapiolani	o Ala Wai Park Clubhouse	1937
26	University	+ Church of the Crossroads	1934 & 1937

Source: Spencer Mason Architects, Historic Site Inventory Report for the Honolulu Rapid Transit Development Project, August 19, 1989, Parsons Brinckerhoff Quade & Douglas, Inc., 1991.

Notes: + On National Register or on both National and Hawaii Registers  
o Determined eligible for National Register  
\* Shown on Figure 3.11 as Parklands Site Number 14.

Pearl Harbor Naval Base

Pearl Harbor Naval Base encompasses approximately 5,100 acres of land and is located Ewa of Honolulu, in the Ewa District of Oahu. Various historically significant sites reside within Pearl Harbor's boundaries. In general, however, Pearl Harbor is historically significant because of its association with World War II and the Japanese attack on the military harbor. Two locations on base are of particular importance: Ford Island and the Arizona Memorial. Ford Island is positioned between Middle Loch, East Loch, Southeast Loch, and West Loch within the harbor. Several historic buildings have been identified on Ford Island, including retired airplane hangars. Ford Island once served as an auxiliary landing field. In 1962, the memorial was constructed between Ford Island and Southeast Loch to commemorate the service men who died aboard the U.S.S. Arizona the morning of December 7, 1941. Although the memorial is located within the harbor, the land immediately makai of Kamehameha Highway is the site of the Arizona Memorial Visitor's Center. The U.S.S. Bowfin and Submarine Museum are located Ewa of the center.

OR&L Station

The old Oahu Railway and Land (OR&L) Station is located at the corner of King Street and Iwilei Road and is part of a three-building complex also known as the Otani Block. The buildings are brick structures with the street facades of the King Street building arcade which runs the entire perimeter of the building. The continuous arcade is capped by a projected band at the parapet.

The Office and Document Storage Building was built in 1914 of reinforced concrete. It is of a stark Georgian Revival style with a heavy cornice on three sides and heavy pediment gable end on the east side. The second floor was originally used for offices. Sometime between 1919 and 1927 (based on Fire Maps) a small building, labeled as a "vault" on the maps, was installed. It is separated from the Office and Documents Building by about 2 1/2 feet.

The historic significance of the OR&L Station is derived from its transportation function within the surrounding industrial area. The main part of the station was built in 1925 and it served as an important terminus to the train line that moved sugar and tourists to Kahuku.

#### Chinatown Historic District

The Chinatown Historic District is located in downtown Honolulu and is generally bounded by Nuuanu Avenue, River Street, Nimitz Highway, and Beretania Street. Chinatown was first settled by the Chinese in the 1800s. By 1884, the Chinese population in Honolulu had reached 5,000, but the number of Chinese engaged in plantation work had declined. Seventy-five percent of these Chinese were concentrated in the twenty-five acres of Downtown called Chinatown.

Chinatown is on the National Register as historically significant because it is the oldest part of downtown Honolulu with contiguous architecture and usage. Chinatown is the earliest ethnic community in Honolulu and still retains a distinctive cultural environment. Most of its merchants are Chinese, but its resident population has shifted to include a variety of ethnic groups, the largest of which is Filipino. Chinatown buildings which are considered to be of historical significance were constructed in the first decade of the 20th century, after the Chinatown fire in 1900. These buildings are primarily simple, two-and three-story structures of common materials.

#### Dillingham Transportation Building

The Dillingham Transportation Building was constructed in 1929 at 735 Bishop Street. The following description is taken from the July 1969 National Register of Historic Places Inventory Nomination Form.

The Dillingham Transportation Building is a four-story Italian Renaissance concrete and concrete block structure with three connected wings. The first floor features an arcade that extends between the projecting wings. The cut stone arches span between massive rectilinear columns which support a classical, dentiled cornice creating piers between a wrought iron hand rail and support classical concrete urns. The arcade roof is a simulated porch at the second floor level.

The main entry arch is flanked by rectilinear openings decorated with a twisted rope pattern. Above each of the openings is a medallion depicting a square rigged sailing ship and a modern (at the time of construction) steamship. The main entry at each of the other two projecting wings is a rectilinear opening with massive scrolls in terra cotta above. . . .

. . . The entry lobby is a wonder of design and decoration. Multi-toned glazed brick in many patterns and textures create a unique floor covering with the center being concentric circles ending in a multi-pointed star. Walls are buff marble divided with stripes of gold mosaic tile strips and red marble. The ceiling consists of paneled beams . . . surrounded at the perimeter by a crown molding. Elevator doors are of "modernistic" designs cast in aluminum.

After this elaborate entry all other interior spaces are of simple business-like design. The first floor actually consists of the ground floor and a mezzanine floor.

#### Aloha Tower

Aloha Tower is located at Honolulu Harbor, makai of Nimitz Highway, near Irwin Park and the harbor end of Fort Street Mall.

The Aloha Tower was at one time the tallest and most prominent building in Honolulu. It is a symbol of Hawaii's investment in tourism and of a time when sea travel was the main link with the rest of the world.

When the tower was finally completed and turned over to the Board of Harbor Commissioners in June, 1926, it was the pride of the islands. It was by far the most imposing building in the territory and offered a spectacular view of Honolulu and its harbor. Then as now, it housed various offices, including the Harbor Master's office.

Aloha Tower still stands to welcome visitors and the harbor pilots still carry out their jobs from the tenth-floor observation area. The tower is a reminder to all people of the hospitable nature of the Fiftieth State, and it is a symbol of a day when travel was more than going from one point to another, but an adventure in grace and comfort.

#### Merchant Street Historic District

The Merchant Street Historic District (MSHD) is generally bound by Nuuanu Avenue, King Street, Fort Street, and Queen Street. It consists of thirteen historic buildings in the vicinity of Merchant Street and Nuuanu Street. These buildings include the Royal Saloon, T.R. Foster Building, Irwin Block, Wing Wo Tai & Company Building, J.T. Waterhouse Building, Yokohama Specie Bank Building, Kamehameha V Post Office, Melcher's Building, Bank of Bishop & Company Building, Bishop Estate Building, Judd Building, Stangenwald Building, and Honolulu Police Station.

The MSHD is historically significant because it represents a cross-section of commercial uses and architecture present at the turn of the century in the old Downtown area.

#### Old Police Station

Construction of the Old Police Station began in 1930 and was completed on September 29, 1931. Located near the intersection of Merchant Street and Bethel Street, the original plans and construction extended from Bethel Street to Nuuanu Street on Merchant Street. Several law-related agencies were housed in the station. The building's basement was occupied by the vice squad, weights and measures, and military police and shore patrol, while the main floor activity included a receiving area, general offices, foot patrol, examiner of chauffeurs, and traffic department. The jail was on the second floor, and the top floor included the district courtrooms and offices.

Various repairs were made to the Old Police Station between 1965 and 1979. In 1986, a three-story structure was added to the Nuuanu Street facade in conjunction with the renovation of the existing structure. Although the structure has been somewhat altered, it remains historically significant because it is only the second such structure to occupy the site, replacing the 1886 building. This later structure represents the police department's growth and reputation. At the time it was built in 1930, the Spanish colonial revival style structure was becoming an accepted style for public edifices in Honolulu.

#### Mother Waldron Park

Mother Waldron Park consists of 1.76 acres of land in the Kakaako community. The park is bound by Coral, Halekauwila, and Pohukaina Streets and Lana Lane. According to the 1988 National Register of Historic Places Registration Form, Mother Waldron Park

. . . features a painted brick perimeter wall, approximately 3' high, which zig-zags down Coral Street. . . . Brick curbing and paving is used to further embellish the corner entries and delineates the sidewalk from the parking on the Coral Street side. . . .

The focal point of the playground is the comfort station pavilion, which stands in the middle of the park on the Diamond Head side.



Mother Waldron Park is historically significant because of its associations with the playground movement, for its architecture, for its associations with the earlier work of Margaret Waldron in the Kakaako District, and for its associations with the playground movement as discussed under the context section of the multiple property documentation form (State Historic Preservation Program 1988).

#### Ala Wai Park Clubhouse

The Ala Wai Clubhouse is approximately 100 feet *makai* of the median of Kapiolani Boulevard. According to a description taken from the Final Environmental Impact Statement Honolulu Area Rail Rapid Transit Project (1982),

It is situated on a 3.5-acre parcel, which was the first developed section of Ala Wai Park. It was constructed in 1937 as a clubhouse for the rowing clubs. During the Second World War, it was used by the Navy as an officers' club. In 1951 the Navy turned the property over to the City and County Parks Department, which converted the structure into a community clubhouse. Between 1965 and 1968, Kapiolani College occupied the building as a food preparation school. . . .

The historic significance of the clubhouse is not only its architecture, but its contributions to rowing, an island sports tradition. This 1937 structure is an example of the park commission architecture of this period.

#### Church of The Crossroads

Church of the Crossroads is generally bound by three roadways: University Avenue, H-1 Freeway, and Bingham Street. The church fronts University Avenue and is not obscured by other buildings. The site has six buildings on it, four of which are interconnected around a grassy open court by a continuous hipped pergola with conscious references to the Summer Palace outside of Peiping. The sanctuary was built in 1934 of stuccoed reinforced concrete walls, smooth concrete floors, and an exposed heavy timbered hip roof. Two small buildings on the east and southwest legs of the pergola are nearly identical and done with a decided Japanese influence with sliding shoji doors, low roof lines, and a stick-like construction. These now house classrooms and art gallery. Both were built around 1937.

The Church of the Crossroads is historically significant for several reasons. First, it is significant as a work of architect Claude A. Stiehl, who designed the chapel and the church's two smaller buildings. Second, the church has played a vital and active role in community activities since its inception. According to the Final Environmental Impact Statement Honolulu Area Rail Rapid Transit Project (1982), it is historically significant because:

. . . the architecture draws from many sources in a constant allusion to the diverse ethnic, religious and social backgrounds that make up the world, and in microcosm, Hawaii. The complex of buildings superbly integrates these diverse allusions to Eastern, Hawaiian and Western Art Deco and architectural forms and motifs into a sensitively scaled and detailed grouping rarely equalled elsewhere in the State of Hawaii. Its integration of art forms and architecture is excellent. Carvings by local artist Margaret Blasingame and Fritz Abplanalp are well interwoven with the overall design.

### **3.9.2 Archaeological Resources**

Results of the archaeological survey, as discussed in the AA/DEIS, indicate one archeological site adjacent to the amended LPA alignment. This site (3761) consists of a cluster of Chinese burials situated within the grounds of Leeward Community College. The research conducted indicates that it is likely that subsurface cultural deposits are present along the Ewa end of the study area. Specifically, it is possible

that buried fish ponds are present along the coastal portion and that pond fields and evidence of residential use are present in more inland portions in the area between the Navy Ewa Drum Storage Site and Aloha Stadium.

Little study has been conducted within the portion of the study area from Aloha Stadium to Downtown. There is a possibility that fish ponds remain exist along coastal areas. Two heiaus are thought to exist in the Kapalama area, but the locations are not known.

There have been only a limited number of archaeological projects within the Downtown/Kakaako area. There are recorded sites; all are outside of the fixed guideway corridor. Potential is high, however, for the presence of resources throughout the Downtown and Kakaako areas.

There are no recorded archaeological sites within the University Avenue section of the amended LPA corridor; however, Hawaiian artifacts have been uncovered in the vicinity of the intersection of University Avenue and King Street.

### 3.10 PARKLANDS

Parklands within the corridor have been identified through review of available mapping, coordination with City, State and Federal agencies, and field survey. A description of each park, including size and ownership, is listed on Table 3.19. Locations of parklands are also shown on Figure 3.11a, b, and c.

Since the AA/DEIS was issued, additional information regarding Walker Park has been obtained. It has been determined that Walker Park is not designated as a "park", despite its appellation. Although Walker Park is owned by the State, it is considered part of the Nimitz Highway easement, as remnant land and not a parkland.

*Since the SDEIS was issued, it has also been determined that Aloha Stadium should be added to the parklands inventory and treated as a Section 4(f) resource. A portion of the land (56.02 acres) encompassing Aloha Stadium was originally owned by the United States Department of the Interior and was transferred to the City and County of Honolulu in 1967. The terms of the transfer included provisions for the maintenance of the property for public recreation purposes, inclusive of its use as a stadium.*

Section 4(f) of the U.S. DOT Act of 1966 prohibits the use of land from a publicly owned park, wildlife refuge, or National Register of Historic Places site for transportation purposes unless there is no prudent or feasible alternative and all possible measures to minimize harm have been included in project planning. Results of investigation of potential Section 4(f) involvement of the amended LPA are included in Section 5.12 of Chapter 5.0.

**Table 3.19  
PARKLAND RESOURCES ALONG THE  
AMENDED LOCALLY PREFERRED ALTERNATIVE**

Map	Key Street	Park	Acreage	Classification <sup>1</sup>	Jurisdiction
1	Near Kam. Hwy.	Pacheco Playground	4.59	Neighb. Park	City & County
2	Kam. Hwy. <sup>6</sup>	Neal S. Blaisdell (Pearl Harbor) Park	25.89	Shoreline Park	City & County
3	Kam. Hwy. <sup>6</sup>	Richardson Rec. Ctr.	25.58	Military Park	U.S. Navy <sup>2</sup>
5	Morreel Drive	Navy Marine Golf Crse.	164.20	Military G.C.	U.S. Navy <sup>2</sup>
8	Fort Street	Fort Street Mall	2.42	Urban Park	City & County
10	Nimitz	Walker Park	0.55	Not applicable <sup>4</sup>	State of Hawaii <sup>4</sup>
11	Nimitz	Irwin Park	1.67 <sup>3</sup>	Urban Park	State of Hawaii
14	Pohukaina	Mother Waldron Park	1.76	Neighb. Park	City & County
15	Kam. Hwy. <sup>6</sup>	Keehi Lagoon Bch.Park	71.97	Athletic Fields	City & County
26	Kapiolani	Frank C. Judd Mini Park	0.37	Mini Park	City & County
27	Kapiolani	Ala Wai Clubhouse and Field	10.53	District Park	City & County
30	Kam. Hwy. <sup>6</sup>	Aiea Bay State	29.20	District Park	State DOT
31	Kam. Hwy. <sup>6</sup>	Aloha Stadium	97.44	Not applicable <sup>5</sup>	State of Hawaii

Sources: Parsons Brinckerhoff Quade & Douglas, Inc. Field Survey 1989, Update January 1992. City and County of Honolulu Department of Parks and Recreation, Index of Oahu Parks and Facilities, 1988.

Notes: 1 Classifications:

District Park - Community-based park servicing approximately 25,000 people, with playfield, clubhouse & passive areas.  
Neighborhood Park - Community-based park servicing approximately 5,000 people, with playfields, courts, and a comfort station.

Mini Parks - Small landscaped areas, servicing high-density residential areas with benches, tables, and children's play areas.

Urban Parks - Passive landscaped areas.

Shoreline Park - Area along shoreline, with facilities to support water activities, picnicking, and other passive activities.

Military Park - Park and recreation facilities reserved for the use of military personnel and dependents, though non-military users are often permitted access.

2 Privately owned parks, and parklands not open to the general public, are not covered by the provisions of Section 4(f).

3 Most of the area is used as a parking lot.

4 Landscaped right-of-way.

5 *Regional Stadium for athletic and recreational events.*

6 *Kamohameha Highway*



**Chapter 4**  
**Transportation Impacts**

## 4.0 TRANSPORTATION IMPACTS

This chapter presents the projected changes that the amended Locally Preferred Alternative (LPA) will have on transit service, ridership, and general traffic in the City and County of Honolulu, and in the study corridor specifically. Updated information on the No-Build and TSM Alternatives has been included as a point of reference. On the transit side, the first section highlights the changes in transit service levels associated with the alternatives, identifying improvements in transit travel times for trips between selected areas in the corridor and region. The second section identifies the likely impacts of the alternatives on travel volumes and examines the transit improvements designed to serve the corridor. Discussion focuses on the number of trips that could be expected in 2005 if no further transit improvements were made. It then presents the changes that the alternatives will likely cause, followed by a summary of the number of transit riders likely to use the alternatives. The third section discusses expected transit revenues. On the highway side, roadway impacts are discussed on three levels. These impacts include regional trip making, generalized impacts on roadways, and a more specific assessment of traffic impacts in the vicinity of the proposed transit park-and-ride facilities and stations. The final section discusses the impacts on parking.

This chapter focuses on significant impacts expected with each alternative. It also identifies significant differences among alternatives. The Service and Patronage Forecasting Methodology (March 1992) details the methods, assumptions, and analytical procedures used in this analysis. The travel forecasting methodology is generally compatible with that used in the AA/DEIS although it *takes advantage of the on-board bus survey conducted in April 1991, which improves the ability to identify the trip purpose and mode of access for each transit trip. The model also has an updated approach for forecasting non-home-based trips and a revised approach for forecasting visitor trips. A group of nationally recognized travel demand forecasting experts that was assembled by the FTA to review the technical aspects of the methodology and results. In February 1992 the group determined that the travel demand analysis was credible and yielded forecasts that appear reasonable.*

*In addition to the revision of the forecasting methodology, the 2005 population and employment forecasts, both island-wide totals and the geographic distribution, have been substantially revised from those used in the AA/DEIS as a result of more current data available from the 1990 census. Also, the land use projections have been updated since the publication of the Supplemental Draft Environmental Impact Statement (SDEIS, March 1992). This most recent revision to the population and employment projections results from the completion of the Waikiki Master Plan. As a result, the patronage forecasts for all the alternatives are different from those shown in both the AA/DEIS and the SDEIS. In the aggregate, these changes in population and employment forecasts, along with the 1991 on-board bus survey, result in 2005 patronage levels that are approximately 13% higher than those in the AA/DEIS, independent of the effects of changes in transit service levels. Also, this chapter presents, as "existing" information, transit ridership and service data from 1991. This differs from the AA/DEIS which presented ridership and service data from 1986 as "existing" conditions. Detailed discussion of transportation impacts and forecasting results are presented in the Transportation Impacts Results Report (July 1992).*

### 4.1 TRANSIT IMPACTS

#### 4.1.1 Levels of Service

This section first reviews the facilities and services provided by each alternative, stressing the differences among the alternatives, then examines a number of service measure differences, quantifying the areas

in which the transit service improves for different market travel segments. These discussions highlight the likely service impacts on individual tripmakers and provide a basis for understanding the overall differences in ridership among the alternatives.

The No-Build Alternative *represents the best utilization of the bus fleet purchased through FY 1992 to meet 2005 transit ridership demand. Given the restricted fleet size, the number of passengers per vehicle will grow beyond the design standards on most peak period bus routes.* In the No-Build Alternative, the improvements outlined for FY 1992 in the Short Range Transit Plan Update described in Sections 2.2.1 and 3.2.2.6 would be implemented. These improvements do not include major transit investments aside from the State plans for further high-occupancy-vehicle (HOV) and bus lane construction on the H-1 Freeway from Kunia Road to Waiawa, on the H-2 Freeway from Mililani to Waiawa, and on the Makai Viaduct-Nimitz Highway. Other highway improvements consistent with The Oahu Regional Transportation Plan (June 1991) are assumed in the No-Build Alternative but are not expected to have major effects on transit operating conditions. No additional park-and-ride lots would be built.

This No-Build Alternative would do little to enhance transit service because the buses would still operate in mixed-flow traffic through most of the corridor's congested parts. Only the HOV/bus lane on the Makai Viaduct-Nimitz Highway falls in the corridor. The congestion on highways like H-1 and on arterials documented in Section 1.1.4 would worsen for buses having to operate in mixed flow. Extrapolating the measurable trends in decreasing bus speeds systemwide, which were outlined in Section 1.1.1.2, overall, the level of service will decline. Today's number of buses would have to operate at speeds approximately 15% slower than at present. These lower speed assumptions are consistent with expected increases in highway congestion discussed in Section 1.1.3.

Table 4.1 shows some of the important service characteristics for the alternatives. Looking at the total annual revenue vehicle miles, including bus and fixed guideway, it can be seen that the amended LPA supplies about 24 million vehicle miles and the TSM Alternative supplies about 26 million vehicle miles, compared to about 18 million vehicle miles for the No-Build Alternative. In terms of passenger place miles, it can be seen that the amended LPA will provide about 32% more service than the TSM Alternative and about 90% more service than the No-Build Alternative.

While it is difficult to quantify the overall quality of service that would be provided by an alternative, it is possible to develop measures highlighting the differences among alternatives. One useful indicator is the transit travel time between various geographic areas in the corridor and important regional activity centers. Table 4.2 shows the differences in actual, unweighted transit travel times for the peak period for 1991 and forecasts for 2005 by alternative. *In comparing the year 2005 No-Build travel times with existing (1991), it can be seen that, for most trips displayed, No-Build travel times would be longer than existing times because of anticipated decreases in bus speeds and some frequency reductions due to reorientation of a limited peak fleet. The least change will occur for trips from West Loch in Ewa to the Central Business District (CBD). Growth in this outlying area will make it necessary to shift some of the existing bus service to this area. Therefore, the wait times for these trips will be shorter. Also, these trips are able to utilize the HOV lanes, so their level of service will not deteriorate to a great extent.*

*In comparing the TSM and the No-Build Alternatives, it can be seen that the TSM Alternative would have shorter travel times in all but two cases shown. The decreases would be most pronounced in those cases where increased demand would lead to more frequent service and, thus, to shorter waiting times, such as between Mililani and the Civic Center. On the other hand, travel times between Waikiki and Downtown and between Hawaii Kai and Ala Moana Center would be slightly longer because of slower bus operating speeds Downtown and around Ala Moana Center caused by high bus volumes.*

*In comparing the amended LPA and TSM Alternatives, it can be seen for all trips displayed that the amended LPA travel times are shorter. The most pronounced decreases are for trips to destinations served by rapid transit other*

**Table 4.1  
2005 SERVICE CHARACTERISTICS**

Alternative	Bus Components				Fixed Guideway Components				Annual Passenger Place Miles (Billions)
	Annual Revenue Vehicle Miles	Annual Revenue Vehicle Hours	Peak Buses in Service	Park-and-Ride Parking Spaces	Annual Revenue Vehicle Miles	Peak Vehicles in Service	Number of Stations	Guideway Lane Miles	
Existing	15,864,000	1,136,000	409	232	0	0	0	0.0	1.10
No-Build <sup>1</sup>	18,415,000	1,460,000	412	732	0	0	0	0.0	1.27
TSM	26,404,000	2,111,000	831	2,000	0	0	0	0.0	1.82
Amended LPA	18,610,000	1,414,000	558	4,080	5,321,000	44	22	31.8	2.41

Source: Barton-Aschman Associates/Parsons Brinckerhoff Quade & Douglas, Inc., May 1992.

Note: <sup>1</sup> If the No-Build Alternative were designed to accommodate peak-load-point demand with the same vehicle load standards as the other alternatives, the No-Build characteristics would be vehicle miles 21,061,000, vehicle hours 1,682,000, peak buses 576, and passenger place miles 1.45 billion.

**Table 4.2**  
**YEAR 2005 — PEAK PERIOD TRANSIT TRAVEL TIMES**  
 (Minutes — Door to Door, Including Walk and Wait)

Origin	Destination	Alternative			
		Existing	No-Build	TSM	Amended LPA
West Loch	Downtown (Fort & Merchant)	63	63	59	54
West Loch	Civic Center	68	69	67	62
West Loch	Waikiki (Kuhio & Olohana)	86	91	89	68
Waipahu	UH	80	103	93	62
Waikiki (Kuhio & Olohana)	Downtown (Fort & Merchant)	27	31	32	20
Waikiki (Kuhio & Olohana)	Kapolei	103	114	83	65
Waianae	Ala Moana Center	91	101	100	82
Pearl City	Civic Center	59	64	63	54
Pearl City	Ala Moana Center	72	86	83	52
Palolo Valley	Downtown (Fort & Merchant)	58	71	66	50
Mililani	Civic Center	69	83	69	57
Mililani	UH	91	100	100	62
Kaneohe	Downtown (Fort & Merchant)	47	58	57	53
Hawaii Kai	Downtown (Fort & Merchant)	53	60	58	57
Hawaii Kai	Ala Moana Center	65	74	75	51

Source: Barton-Aschman Associates, 1992.

than in the Downtown area. For example, amended LPA travel times are more than 15 minutes shorter than TSM travel times for trips from West Loch to Waikiki, Waikiki to Kapolei, Waianae to Ala Moana Center, Palolo Valley to Downtown, and Hawaii Kai to Ala Moana Center. Amended LPA travel times are more than 30 minutes shorter for trips from Waipahu to UH, Pearl City to Ala Moana Center, and Mililani to UH.

The transit travel times shown are intended to represent door-to-door times, including time gaining access to transit (walk or drive times), waiting time for transit vehicles (buses or trains where applicable), and riding times on transit vehicles. For example, Table 4.3 shows the travel time components for two representative trips, one from West



**Table 4.3  
YEAR 2005 — PEAK PERIOD TRANSIT TRAVEL TIMES**

<i>West Loch to Downtown (Fort &amp; Merchant) (in Minutes)</i>				
<i>Component</i>	<i>Alternative</i>			
	<i>Existing</i>	<i>No-Build</i>	<i>TSM</i>	<i>Amended LPA</i>
<i>Walk to Bus Stop</i>	8.0	8.0	8.0	8.0
<i>Wait for Bus</i>	10.0	5.0	5.0	3.0
<i>Ride Bus</i>	43.3	48.3	44.2	17.7
<i>Walk to Transit Station</i>	--	--	--	0.6
<i>Walk Within Station</i>	--	--	--	0.8
<i>Wait for Fixed Guideway Vehicle</i>	--	--	--	0.8
<i>Ride Fixed Guideway Vehicle</i>	--	--	--	20.4
<i>Walk Within Station</i>	--	--	--	0.8
<i>Walk to Destination</i>	1.8	1.8	1.4	2.0
<b>TOTAL TIME IN MINUTES</b>	<b>63.1</b>	<b>63.1</b>	<b>58.6</b>	<b>54.1</b>
<i>West Loch to Civic Center (in Minutes)</i>				
<i>Walk to Bus Stop</i>	8.0	8.0	8.0	8.0
<i>Wait for Bus</i>	10.0	5.0	5.0	3.0
<i>Ride Bus</i>	47.9	53.8	50.2	17.7
<i>Walk to Transit Station</i>	--	--	--	0.6
<i>Walk Within Station</i>	--	--	--	0.8
<i>Wait for Fixed Guideway Vehicle</i>	--	--	--	0.8
<i>Ride Fixed Guideway Vehicle</i>	--	--	--	21.8
<i>Walk Within Station</i>	--	--	--	0.8
<i>Walk to Shuttle Bus</i>	--	--	--	0.4
<i>Wait for Shuttle Bus</i>	--	--	--	1.5
<i>Ride Shuttle Bus</i>	--	--	--	4.4
<i>Walk to Destination</i>	2.4	2.6	4.2	2.6
<b>TOTAL TIME IN MINUTES</b>	<b>68.3</b>	<b>69.4</b>	<b>67.4</b>	<b>62.4</b>

Source: Barton-Aschman Associates, 1992.

H:\T0502\0024.rpt

Loch to Fort and Merchant streets (Downtown) and the other from West Loch to the Honolulu Civic Center. Both trips involve a single bus ride for the Existing, No-Build, and TSM Alternatives. Both trips for the amended LPA involve using a feeder bus from West Loch to Waiawa Station. Since, in the amended LPA, all buses heading Koko Head from West Loch serve as feeder buses while in the other alternatives the traveller must choose from among different routes serving different destinations, the wait time for the feeder bus is shorter than for the bus in the other alternatives. The trip to the Civic Center also involves using a shuttle bus at the destination end. Even with these transfers, the amended LPA travel time is shorter than for the other alternatives.

In the aggregate, travelers could expect to save considerable time with implementation of a fixed guideway alternative. Table 4.4 shows hours of travel time saved with the amended LPA by those riders who will be carried by the TSM Alternative.

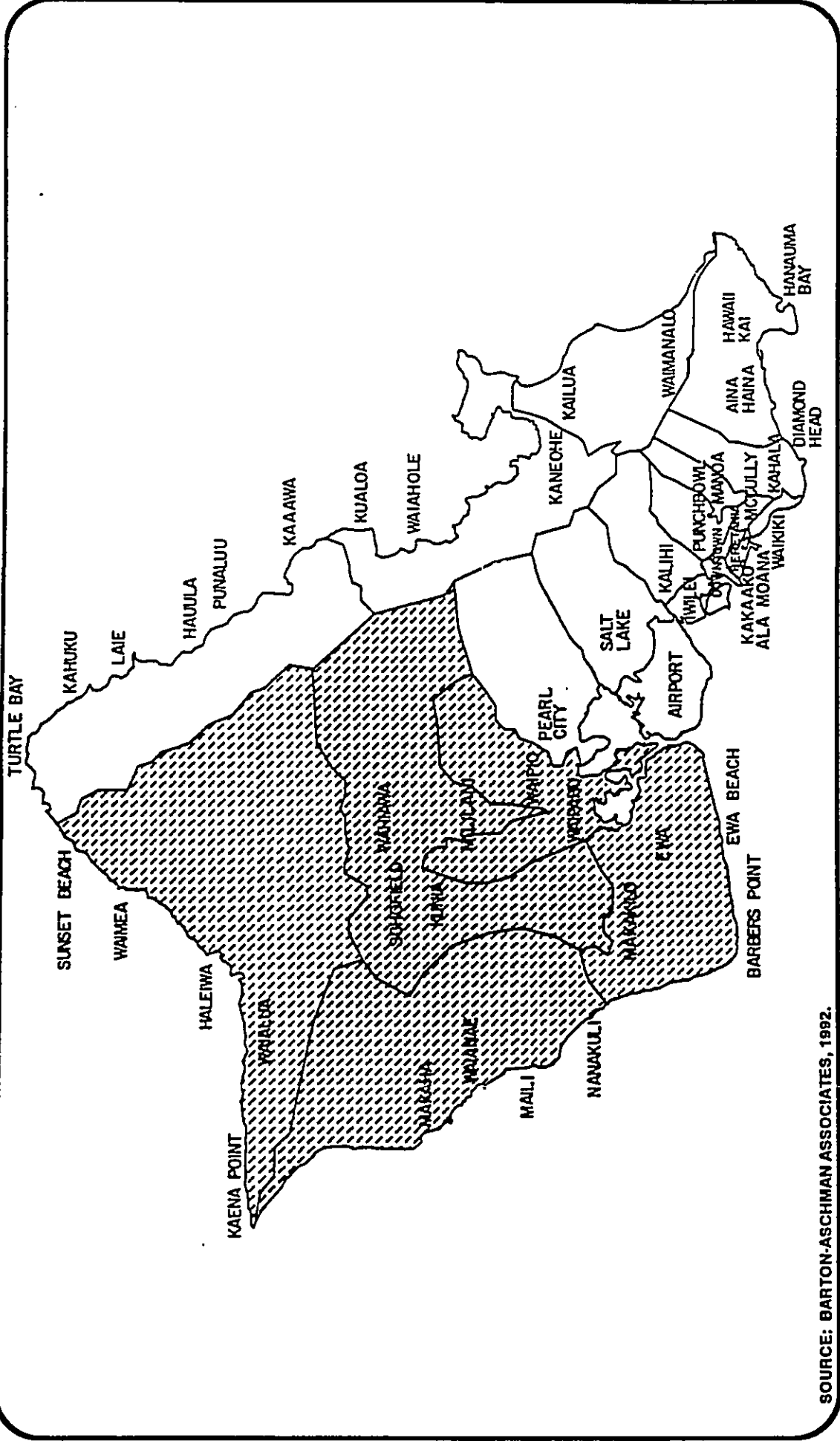
	Daily Total Hours Saved	Annual Added Trips	Average Minutes Per Trip	Annual Total Hours Saved	Annual Dollars Saved
Work	13,680	5,280,000	7.71	3,840,000	\$15,380,000
Non-Work	19,470	9,770,000	7.04	6,330,000	\$12,650,000
TOTAL	33,150	15,050,000	7.30	10,170,000	\$28,030,000

Source: Barton-Aschman Associates, 1992.

Note: Dollar savings are calculated on the basis of \$4 per hour saved for work trips and \$2 per hour saved for non-work trips, as specified by FTA guidelines.

While actual door-to-door travel time comparisons provide a feel for the differences among alternatives, a measure that better relates to travel behavior is a comparison of weighted travel times. Weighted travel times reflect the traveler's perceptions of time spent on individual components of a transit trip: walking to and from stations and bus stops, waiting for buses and trains, riding in transit vehicles, and transferring between vehicles. Generally, travelers perceive that time spent outside the transit vehicle is twice as long as time spent riding the vehicle. Figure 4.1 depicts the change in weighted travel times between the No-Build Alternative and the TSM Alternative for trips to Downtown. This figure shows that Ewa, Waianae, and Mililani will have improved service to Downtown with the TSM Alternative because of improved express bus services resulting from the HOV/bus lane additions on major highways. Figure 4.2 shows weighted travel time improvements for the amended LPA compared to the TSM Alternative. The amended LPA will decrease weighted travel times by 15 minutes or more for trips to Downtown from the North Shore, the Airport, and the University of Hawaii at Manoa.

Another measure of level of service is the number of transfers per transit trip. Table 4.5 shows the average number of transfers per trip. As can be seen on the table, the travel simulation model somewhat overestimates the percentage of transfers for trips with one transfer. Therefore, while the comparisons among alternatives which are shown are reasonable, the total number of transfers for each alternative may be overstated. The guideway alternative, as expected, will have more transfers than any all-bus alternative, with about half of all trips having one or more transfers. In the amended LPA, approximately 58% of all trips will use the fixed guideway system and 43% involve a transfer to or from a bus.

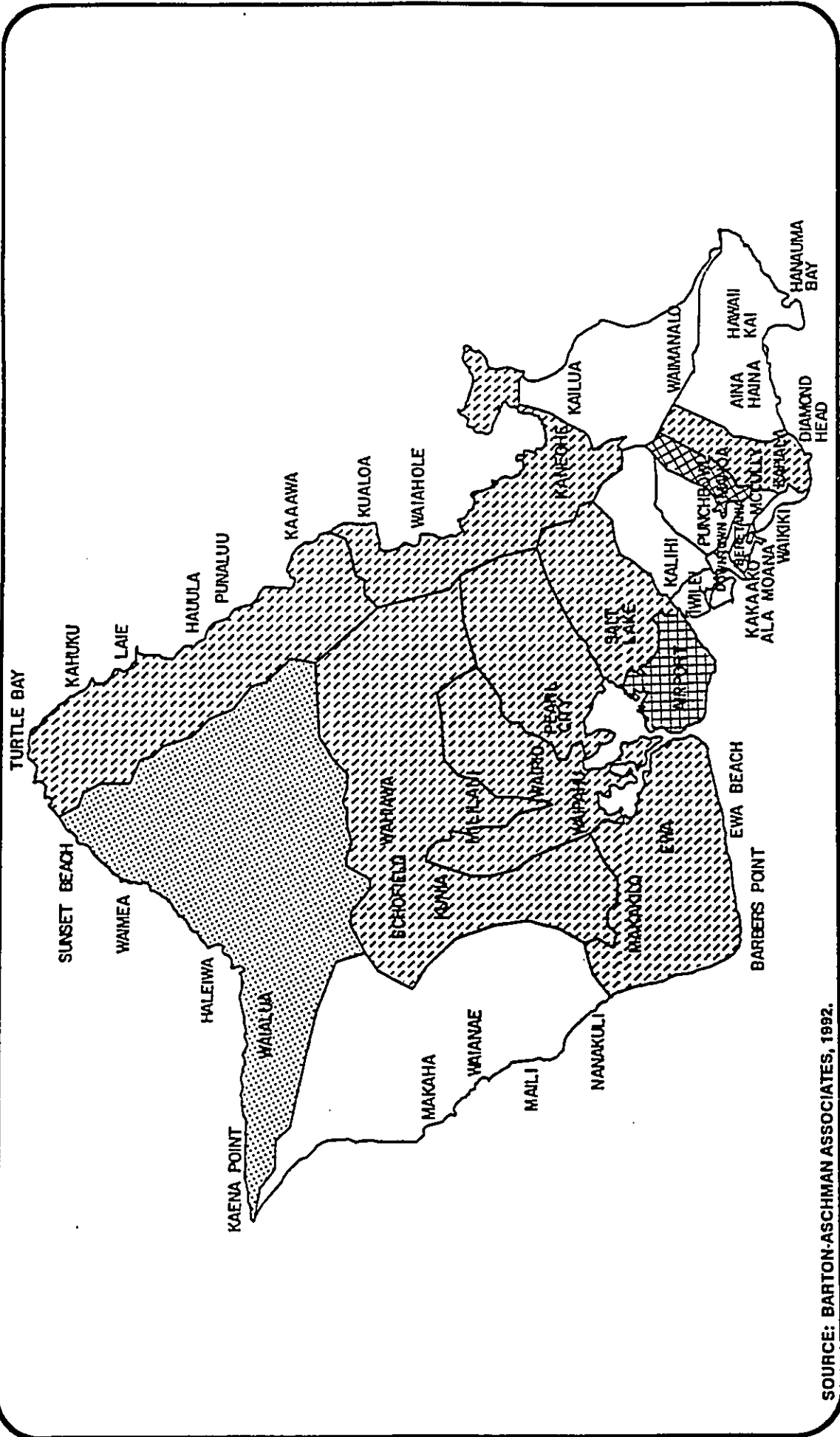


SOURCE: BARTON-ASCHMAN ASSOCIATES, 1992.



LEGEND  
 □ < 5 MINUTES SAVED  
 ▨ 5 - 15 MINUTES SAVED

**FIGURE 4.1**  
**CHANGE IN WEIGHTED TRAVEL TIME TO DOWNTOWN-TSM COMPARED TO NO-BUILD (YEAR 2005)**  
**HONOLULU RAPID TRANSIT PROGRAM**



SOURCE: BARTON-ASCHMAN ASSOCIATES, 1992.



- LEGEND**
- < 5 MINUTES SAVED
  - 5 - 15 MINUTES SAVED
  - 15 - 30 MINUTES SAVED
  - > 30 MINUTES SAVED

**FIGURE 4.2**  
**CHANGE IN WEIGHTED TRAVEL TIME TO DOWNTOWN-**  
**AMENDED LPA COMPARED TO TSM (YEAR 2005)**  
**HONOLULU RAPID TRANSIT PROGRAM**

Table 4.5 TRANSFERS PER TRANSIT TRIP			
Alternative	Percentage of Trips with:		
	0 Transfers	1 Transfer	2 Transfers
Existing (Surveyed)	85%	14%	1%
Existing (Simulated)	76%	23%	1%
No-Build	72%	27%	1%
TSM	71%	27%	2%
Amended LPA	48%	38%	14%

Source: Barton-Aschman Associates, 1992.

Another component of transit level of service is reliability of the service, or the likelihood that the service will remain on schedule. In most cases, the reliability of service is correlated to the amount of the service that utilizes exclusive facilities. Transit service in local mixed traffic is subject to delays caused by traffic congestion. Bus services in HOV/bus lanes are less subject to delays, but some delays, and hence unreliability, will occur, particularly where the HOV/bus lanes are not physically separated from general traffic. Transit service on an exclusive, grade-separated right-of-way is least subject to delays caused by other vehicles or outside events.

A final component of level of service is comfort. One measure of comfort is the probability of getting a seat on the transit vehicle during the peak hour. The best chance of getting a seat will be with the TSM Alternative, with about 75% of peak-hour passengers seated at the peak-load point. With the amended LPA, this percentage will decline to about 61%, reflecting the proportionately larger standing area on fixed guideway vehicles, compared with buses. Because many trips will have shorter travel times with the fixed guideway alternative, compared to the TSM Alternative, the time spent standing will also be less. The most significant difference in comfort is found in comparing the amended LPA with the No-Build Alternative. The No-Build Alternative, constrained to today's bus fleet size, will provide seats for only about 52% of the peak-hour demand. The remaining 48% will be accommodated in "crush" load conditions on the buses, with an average peak load of 97 passengers compared to the design standard of 69 passengers per bus.

Differences in service provided to the mobility-impaired will also exist among the alternatives. In 2005, transit services will be provided that meet the requirements of the Americans With Disabilities Act of 1990. With the No-Build and TSM Alternatives, access to regularly scheduled fixed-route transit for the semi-ambulatory handicapped will require the use of ramp- or lift-equipped buses. With the fixed guideway alternative, the handicapped will also have available a fully accessible fixed-guideway system which will offer level access between station platforms and vehicle floors, and elevator access from the ground to the platform.

#### 4.1.2 Patronage

This section describes both the projected travel markets and changes in transit travel expected with each alternative. The discussion of the travel market examines both overall travel patterns by surface travel modes and their market share. The discussion provides a starting point for evaluating each alternative since the merits of each option depend, to a large degree, on the extent to which it will improve upon the

*No-Build* Alternative ridership. The Service and Patronage Forecasting Methodology (March 1992), provides a detailed explanation of the transit ridership forecasting procedures.

The alternatives will provide various levels of service resulting in different ridership at the major activity centers such as: Downtown, Waikiki, Kakaako, and Ala Moana. Table 4.6 shows the forecast transit trips among the alternatives to these four activity centers. The amended LPA will produce 75,800 transit trips to Downtown, compared with 62,500 for the No-Build Alternative and 65,000 trips for the TSM Alternative. The fixed guideway alternative will improve ridership to Downtown compared to the TSM Alternative. Similarly, the fixed guideway alternative will improve ridership to Kakaako compared to the No-Build and TSM Alternatives.

The fixed guideway alternative also will improve ridership to the Ala Moana Center area, producing 16,600 trips for the amended LPA, compared with No-Build and TSM Alternatives with a ridership of 12,800 and 13,200, respectively.

Table 4.7 examines trip origins from districts generally considered low-income areas. The low-income areas, defined as those with 10% or more of their residents below the poverty level in 1979, include the following neighborhoods in the study corridor: Waikiki, Downtown, Kalihi/Palama, and Kalihi Valley.

The low-income districts shown in Table 4.7 include Downtown, Waikiki, Iwilei, and Kalihi, as discussed and Waianae. The last area falls outside the study corridor; however, it is within the City and County of Honolulu and will be affected by improvements in the study corridor. The build alternatives will provide better transit service to these low-income areas than the No-Build Alternative, as measured in total transit trips generated. The fixed guideway alternative will provide better service and attract more transit ridership than the TSM Alternative.

Table 4.8 shows the regional impact on travel, measured in person trips, for the alternatives. The overall transit modal shares range from a low of 8.0% with the No-Build Alternative to a high of 10.3% with the amended LPA. Compared to the No-Build Alternative, the other alternatives will increase transit's modal share at an increment of 0.7% with the TSM Alternative up to 2.3% with the amended LPA.

Table 4.9 summarizes the transit trips by purpose and by alternative. The table indicates that there will be 249,200 total daily transit trips in 2005 for the No-Build Alternative, which will represent an increase from the 1991 ridership of 206,500. Of the No-Build Alternative trips, 155,900 will occur during the peak period (26,300 in the peak hour) and 93,300 will be in the off-peak. Peak-period trips will decline as compared to the present because of the constraint of limiting the No-Build Alternative to today's bus fleet size. These buses will be traveling at lower speeds on increasingly congested streets in 2005 and thus provide poorer service. As discussed in Section 4.1.1, off-peak-period growth will be caused by increasing service in the off-peak period, as compared to today.

The TSM Alternative shows an overall forecast of 272,400 average weekday transit trips for 2005, a 9% increase over the No-Build Alternative. The largest increase is in home-based work and home-based non-work trips (11%), the smallest in non-home-based trips (4%). Of the TSM Alternative trips, 177,700 will occur during the peak period (30,000 in the peak hour) and 94,700 will occur in the off-peak. The fixed guideway alternative has a 2005 forecast of 321,300 average weekday transit trips. This increase is 29% compared with the No-Build Alternative. Of the LPA trips, 210,200 will occur in the peak period (35,500 in the peak hour) and 111,000 will occur in the off-peak period. For trip purposes, the most significant increase compared with the No-Build Alternative, on a percentage basis, is for non-home-based trips, with an increase of 70%. The large increase in non-home-based trips reflects the attractiveness of fixed guideway transit, with easily identifiable station locations and frequent and reliable schedules, as discussed in the Service and Patronage Forecasting Methodology (March 1992).

**Table 4.6**  
**DISTRIBUTION OF DAILY TRANSIT TRIPS TO SELECTED**  
**ACTIVITY CENTERS/DISTRICTS**  
(2005 -- All Trip Purposes)

Alternative	Total Trips	Activity Centers/Districts			
		Downtown Trips	Kakaako Trips	Ala Moana Trips	Waikiki Trips
No-Build	249,200	62,500	31,900	12,800	19,900
TSM	272,400	65,000	33,100	13,200	20,700
Amended LPA	321,300	75,800	42,000	16,600	23,700

Source: Barton-Aschman Associates, 1992.

**Table 4.7**  
**TRANSIT TRIPS FROM**  
**SELECTED LOW-INCOME AREAS**  
(2005 -- All Trip Purposes)

Alternative	Total Trips	Selected Low-Income Areas				
		Downtown Trips	Waikiki Trips	Iwilei Trips	Kalihi Trips	Waianae Trips
No-Build	249,200	15,800	36,800	10,500	26,700	8,300
TSM	272,400	16,200	38,000	11,000	27,700	10,600
Amended LPA	321,300	19,900	42,600	12,800	28,800	11,900

Source: Barton-Aschman Associates, 1992.

**Table 4.8  
REGIONAL IMPACT ON TRAVEL  
(2005)**

Alternative	2005 Daily Transit Trips -- All Purposes	Modal Transit Share (%)
No-Build	249,200	8.0
TSM	272,400	8.7
Amended LPA	321,300	10.3

Source: Barton-Aschman Associates, 1992.

**Table 4.9  
DAILY TRANSIT TRIPS BY PURPOSE  
(2005)**

Alternative	Home-Based Work	Home-Based Nonwork	Non-Home-Based	Visitor	Total
No-Build	96,100	85,900	28,600	28,700	249,200
TSM	106,400	106,100	29,600	30,200	272,400
Amended LPA	125,200	111,800	48,700	35,500	321,300

Source: Barton-Aschman Associates, 1992.



An analysis was conducted to compare the amended LPA to the AA/DEIS alternatives that included a line to Waikiki. An alternative that includes the Waikiki line generated 323,900 trips compared to the amended LPA without the Waikiki line with 321,300.

The improved operating speeds and frequent service at stations provided by the fixed guideway alternative will increase annual ridership in the range of 15 million new riders above that of the TSM Alternative.

The discussion of likely impacts on transit service and ridership has, to this point, focused on the system level rather than the specific transit mode used by each trip. Table 4.10 shows the volumes at each fixed guideway station by mode of access (walk, bus, and auto).

Examining the table shows that, in general, bus access predominates at the Ewa end of the corridor, from Waiawa to Dillingham Plaza, and walk access predominates on the Koko Head side. At the Koko Head end, bus access from Waikiki will feed the Ala Moana and Kalakaua/Kapiolani Stations. The Isenberg Station has more bus access than walk access because bus routes from Kaimuki and Kahala will feed into it, while the University/King Station provides bus access to the fixed guideway for trips from Palolo Valley, Waialae, and East Honolulu.

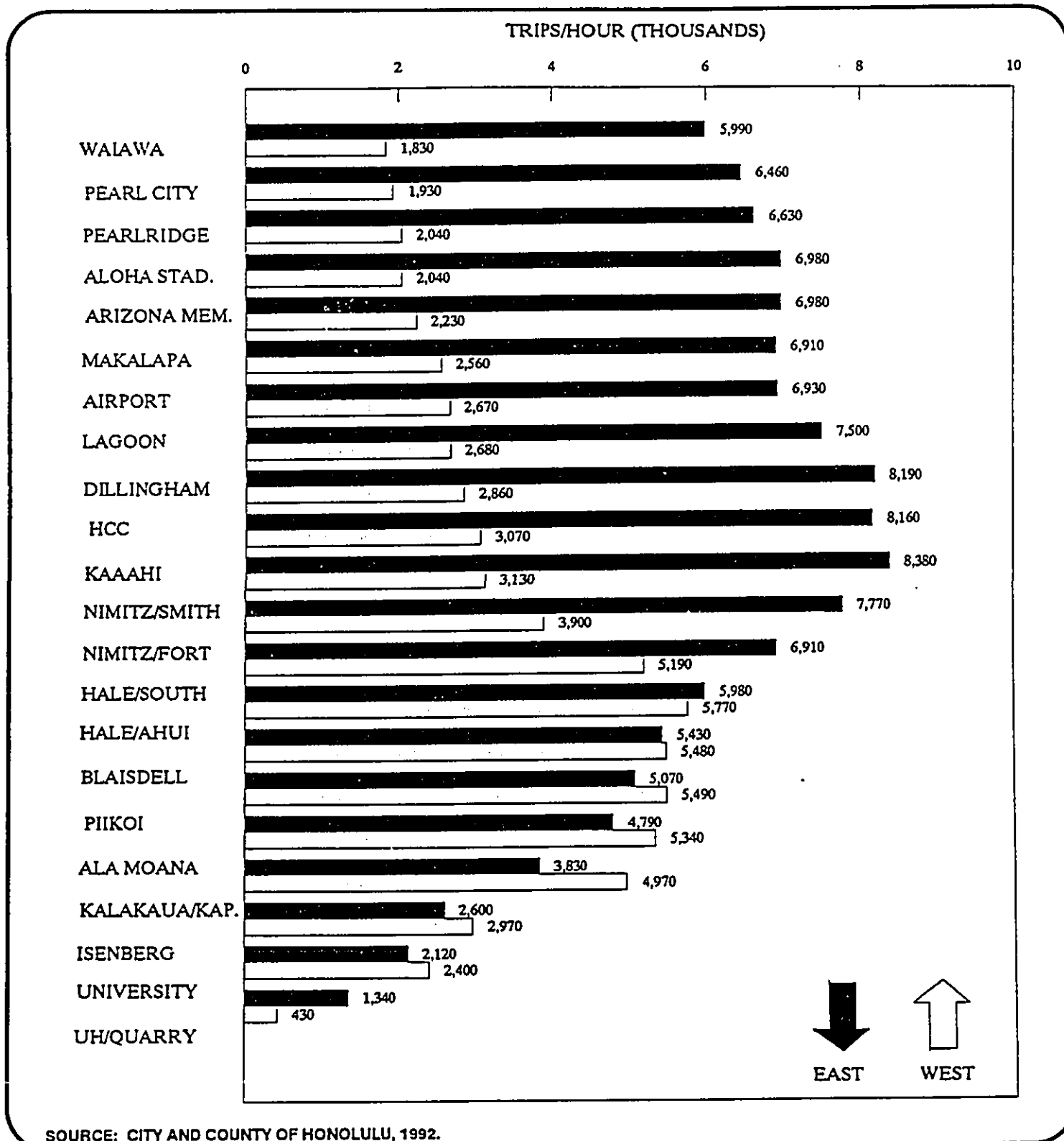
Figure 4.3 shows the a.m. peak hour volume for the amended LPA. The daily two-direction peak-load volume for the amended LPA will fall between the Halekauwila/South and Nimitz/Fort Stations. The Kaaahi Station to Nimitz/Smith Station link will carry the highest one-direction peak-hour ridership. Ridership along this segment is forecast to be 8,380 for the amended LPA, with a corresponding two-way peak-hour volume of 11,510.

#### 4.1.3 Farebox Revenues

The existing fare system is assumed to remain in the future (with fares growing at the rate of inflation), including free transfers between bus lines and between bus and fixed guideway. Table 4.11 shows projected farebox revenue for each alternative. In FY 1991, TheBus revenue was \$18.8 million from passenger fares. For 2005, the alternatives will be expected to generate in farebox revenues, \$23.6 million for the No-Build Alternative, \$25.6 million for the TSM Alternative, and \$30.4 million for the amended LPA, all in 1991 dollars. The revenue as a percentage of the system operating costs will cover 17% for the TSM Alternative, 20% for the amended LPA, and 23% for the No-Build Alternative.

Table 4.10 FIXED GUIDEWAY STATION VOLUMES BY MODE OF ACCESS AMENDED LPA 2005 Daily Volumes				
Station	Walk	Bus	Auto	Total
Waiawa	380	28,230	1,040	29,650
Pearl City	3,460	1,810	180	5,450
Pearlridge	4,070	220	100	4,390
Aloha Stadium	480	1,820	180	2,480
Arizona Memorial	1,620	340	30	1,990
Makalapa Gate	970	2,170	20	3,160
Airport	2,330	30	20	2,380
Lagoon	2,130	4,680	240	7,050
Dillingham Plaza	2,430	8,340	280	11,050
Honolulu Community College	3,480	140	0	3,620
Kaaahi	2,050	1,620	140	3,810
Nimitz/Smith	9,820	1,130	30	10,970
Nimitz/Fort	14,560	4,310	150	19,020
Halekauwila/South	6,050	2,360	40	8,450
Halekauwila/Ahui	5,300	1,850	20	7,170
Neal Blaisdell Center	4,170	90	30	4,290
Piikoi/Kona	2,870	50	60	2,980
Ala Moana Center	7,440	3,080	50	10,570
Kalakaua/Kapiolani	4,300	14,940	270	19,510
Isenberg	590	4,290	130	5,010
University/King	2,410	11,120	90	13,620
University/Quarry	8,490	80	30	8,600
TOTALS	89,390	92,690	3,120	185,200

Source: Barton-Aschman Associates/ Parsons Brinckerhoff Quade & Douglas, Inc., 1992.



**FIGURE 4.3**

**AM PEAK HOUR VOLUME  
ON RAPID TRANSIT LINE  
HONOLULU RAPID TRANSIT PROGRAM**

Table 4.11 ESTIMATED ANNUAL FAREBOX REVENUE - 2005 (1991 Dollars in Millions)		
Alternative	Revenue	Percentage of O&M Cost
No-Build	\$23.6	22.6%
TSM	\$25.6	16.6%
Amended LPA	\$30.4	20.4%

Source: Parsons Brinckerhoff Quade & Douglas, Inc., 1992.

## 4.2 HIGHWAY AND PARKING IMPACTS

In this section, generalized impacts of the proposed rapid transit project on vehicular and transit travel demands along the corridor are first evaluated, followed by a discussion of projected localized impacts on traffic operating conditions along various sections of the alignment.

### 4.2.1 Congestion

#### 4.2.1.1 Corridor Travel Demands

The existing highway network in the region and study corridor will change with the implementation of The Oahu Regional Transportation Plan (June 1991). The implementation of the transit improvements will have an additional influence on corridor vehicular travel by diverting some people from their private automobiles onto transit. The 23,200 additional transit trips on the TSM Alternative, compared to the No-Build, will result in a reduction of auto vehicle trips by 16,500 per day. Of the 72,000 additional transit trips on the amended LPA, compared to the No-Build, 54,100 will represent trips diverted from auto, resulting in a reduction of vehicle trips by 38,600 per day. The other 17,900 new transit trips on the amended LPA will be either trips not otherwise made, or trips diverted from walking. *These reductions of vehicle trips would be most pronounced in the corridor directly served by rapid transit. Table 4.12 shows estimates of daily trips across several screenlines (see Figure 1.3 for locations). The total person trips are based on the Hali 2005 forecasts adjusted to reflect the most recent household and employment forecasts. The transit person trips are obtained from the PE/FEIS transit loadings (excluding "induced" non-home-based trips in the amended LPA). Highway vehicle trips are obtained by subtracting transit person trips across a screenline from total person trips and dividing the resulting highway person trips by a screenline auto occupancy factor from Hali 2005. The highway vehicle trips represent likely relative comparisons among the alternatives; the absolute volume forecasts should be considered less reliable.*

*As can be seen in Table 4.12, with implementation of the amended LPA, daily traffic volumes at screenlines in the center of the corridor, from Kalauao to Nuuanu, will be reduced by more than 5% compared to the TSM Alternative and by more than 6%, up to 7.5%, compared to the No-Build Alternative.*

*Table 4.13 shows the expected traffic impacts during the peak hour at key screenlines. The amended LPA will result in larger reductions in traffic volumes during the peak hour than on a total daily basis. Reductions of more than 14%, compared to the No-Build Alternative, can be expected from Kalauao to Nuuanu and at the Waikele screenline.*

**Table 4.12**  
**DAILY TRAFFIC CONDITIONS AT KEY SCREENLINES**  
**Year 2005**

Screenline	No-Build						TSM						Amended LPA							
	Total Person Trips <sup>1</sup>	Transit Person Trips	Transit Modal Share	Highway Vehicle Trips <sup>2</sup>	Transit Person Trips	Transit Modal Share	Highway Vehicle Trips <sup>2</sup>	Transit Person Trips	Transit Modal Share	Highway Vehicle Trips <sup>2</sup>	% Change Compared to No-Build	Transit Person Trips	Transit Modal Share	Highway Vehicle Trips <sup>2</sup>	% Change Compared to No-Build	Transit Person Trips	Transit Modal Share	Highway Vehicle Trips <sup>2</sup>	% Change Compared to No-Build	% Change Compared to TSM
Waikale	242,100	24,800	10%	144,900	30,600	13%	141,000	39,500	16%	135,100	-2.7%	39,500	16%	135,100	-6.8%	39,500	16%	135,100	-6.8%	-4.2%
Kipapa	188,700	11,400	6%	119,800	12,300	7%	119,200	15,600	8%	117,000	-0.5%	15,600	8%	117,000	-2.3%	15,600	8%	117,000	-2.3%	-1.8%
Kalaiao	437,000	39,600	9%	272,200	46,200	11%	267,700	67,000	15%	253,400	-1.7%	67,000	15%	253,400	-6.9%	67,000	15%	253,400	-6.9%	-5.3%
Moanalua	458,100	50,700	11%	277,100	57,800	13%	272,300	81,500	18%	256,200	-1.7%	81,500	18%	256,200	-7.5%	81,500	18%	256,200	-7.5%	-5.9%
Kapalama	524,100	72,400	14%	325,000	79,300	15%	320,000	103,600	20%	303,500	-1.5%	103,600	20%	303,500	-6.9%	103,600	20%	303,500	-6.9%	-5.5%
Nuuuanu	607,100	76,800	13%	404,800	82,400	14%	400,500	110,400	18%	379,200	-1.1%	110,400	18%	379,200	-6.3%	110,400	18%	379,200	-6.3%	-5.5%
Ward	628,100	94,300	15%	430,500	100,900	16%	425,200	120,200	19%	409,600	-1.2%	120,200	19%	409,600	-4.9%	120,200	19%	409,600	-4.9%	-3.7%
Manoa-Palolo	625,600	65,100	10%	424,600	69,700	11%	421,100	85,300	14%	409,300	-0.8%	85,300	14%	409,300	-3.6%	85,300	14%	409,300	-3.6%	-2.8%
Kapakahi	150,700	8,500	6%	96,100	11,200	7%	94,300	13,200	9%	92,900	-1.9%	13,200	9%	92,900	-3.3%	13,200	9%	92,900	-3.3%	-1.5%
Trans-Koolau	198,300	13,900	7%	128,100	16,300	8%	126,400	17,900	9%	125,300	-1.3%	17,900	9%	125,300	-2.2%	17,900	9%	125,300	-2.2%	-0.9%

Source: Barton-Aschman Associates/Parsons Brinckerhoff Quade & Douglas, Inc., 1992.

Notes: <sup>1</sup> From the Hali 2005 Study, adjusted to reflect latest 2005 household and employment forecasts.

<sup>2</sup> Utilizes screentline auto occupancy factors from Hali 2005.

Table 4.13  
**PEAK HOUR, PEAK DIRECTION TRAFFIC CONDITIONS AT KEY SCREENLINES**  
 Year 2005

Screenline	No-Build						TSM						Amended LPA											
	Total Person Trips <sup>1</sup>		Transit Modal Share		Highway Vehicle Trips <sup>2</sup>		Transit Person Trips		Transit Modal Share		Highway Vehicle Trips <sup>2</sup>		% Change Compared to No-Build		Transit Person Trips		Transit Modal Share		Highway Vehicle Trips <sup>2</sup>		% Change Compared to No-Build		% Change Compared to TSM	
Sevenson	10,890	2,060	19%	6,420	3,190	29%	5,600	-12.8%	3,710	34%	5,220	-18.7%	-6.8%	3,710	34%	5,220	-18.7%	-6.8%	3,710	34%	5,220	-18.7%	-6.8%	-6.8%
Waikole	9,440	940	10%	6,250	1,030	11%	6,180	-1.1%	1,450	15%	5,880	-5.9%	-4.9%	1,450	15%	5,880	-5.9%	-4.9%	1,450	15%	5,880	-5.9%	-4.9%	-4.9%
Kipapa	24,040	3,550	15%	15,230	4,800	20%	14,300	-6.1%	6,530	27%	13,020	-14.5%	-9.0%	6,530	27%	13,020	-14.5%	-9.0%	6,530	27%	13,020	-14.5%	-9.0%	-9.0%
Kalaiao	22,910	4,390	19%	13,690	5,580	24%	12,810	-6.4%	7,510	33%	11,390	-16.8%	-11.1%	7,510	33%	11,390	-16.8%	-11.1%	7,510	33%	11,390	-16.8%	-11.1%	-11.1%
Moanalua	26,210	6,450	25%	15,290	7,490	29%	14,480	-5.3%	9,590	37%	12,860	-15.9%	-11.2%	9,590	37%	12,860	-15.9%	-11.2%	9,590	37%	12,860	-15.9%	-11.2%	-11.2%
Kapalama	30,360	6,570	22%	19,300	7,130	23%	18,850	-2.3%	9,930	33%	16,580	-14.1%	-12.0%	9,930	33%	16,580	-14.1%	-12.0%	9,930	33%	16,580	-14.1%	-12.0%	-12.0%
Nuuuanu	28,260	5,540	20%	19,250	6,190	22%	18,700	-2.9%	6,990	25%	18,030	-6.3%	-3.6%	6,990	25%	18,030	-6.3%	-3.6%	6,990	25%	18,030	-6.3%	-3.6%	-3.6%
Ward	28,150	4,010	14%	19,470	4,730	17%	18,890	-3.0%	5,360	19%	18,380	-5.6%	-2.7%	5,360	19%	18,380	-5.6%	-2.7%	5,360	19%	18,380	-5.6%	-2.7%	-2.7%
Manoa-Palolo	9,040	760	8%	6,090	1,130	13%	5,820	-4.4%	1,370	15%	5,640	-7.4%	-3.1%	1,370	15%	5,640	-7.4%	-3.1%	1,370	15%	5,640	-7.4%	-3.1%	-3.1%
Kapakahi	13,880	1,370	10%	9,410	1,650	12%	9,200	-2.2%	1,860	13%	9,040	-3.9%	-1.7%	1,860	13%	9,040	-3.9%	-1.7%	1,860	13%	9,040	-3.9%	-1.7%	-1.7%

Source: Barton-Aschman Associates/Parsons Brinckerhoff Quade & Douglas, Inc., 1992

Notes: <sup>1</sup> Person trips from Table 4.12, multiplied by Hali 2005 screeline KID factors.

<sup>2</sup> Utilizes screeline daily auto occupancy factors from Hali 2005, adjusted to peak-hour assuming that the auto passenger peaking percentage is 75% of the auto driver peaking percentage.

In some cases, the forecast reduction in auto traffic will be countered by an increase in bus traffic. This effect will be most pronounced with the TSM Alternative. At key locations, King and Beretania Streets in Downtown and around Ala Moana Center, TSM Alternative increases in bus volumes will be of a sufficient magnitude to cause reduction in bus operating speeds.

Table 4.14 shows the projected changes in annual vehicle miles traveled (VMT) on Oahu for 2005. Compared to the No-Build Alternative, the TSM Alternative will reduce annual auto VMT by 33 million miles but will increase annual bus VMT by 9 million miles. The amended LPA will reduce annual auto VMT by 90 million miles and will increase bus VMT by less than one million miles.

Table 4.14 CHANGE IN PROJECTED ANNUAL VEHICLE MILES TRAVELED (VMT) COMPARED TO THE NO-BUILD ALTERNATIVE (2005)		
Alternative	Auto VMT	Bus VMT
TSM	- 33 million miles (- 0.5%)	+ 9.1 million miles (+ 43%)
Amended LPA	- 90 million miles (- 1.4%)	+ 0.2 million miles (+ 1%)

Source: Parsons Brinckerhoff Quade & Douglas, Inc., 1992.

#### 4.2.1.2 Localized Traffic Impacts

*This section summarizes projected localized traffic impacts and mitigation measures relative to the amended LPA transit project. Detailed information regarding the traffic forecasting methodology, and a more complete discussion of project and cumulative traffic impacts and suggested mitigation measures, is contained in the Transportation Impacts Results Report (July 1992).*

*It is anticipated that the proposed rapid transit project would have two general types of impacts on traffic conditions: guideway impacts, created as a result of traffic shifts resulting from closure of median openings and elimination of existing left-turn locations due to placement of support columns in the roadway median; and station impacts, resulting from traffic increases due to patron and bus trips generated by the stations. The primary issue regarding both types of impacts would be impacts on intersection capacity and operating conditions, although the guideway columns could also impact access to adjacent land uses and, at certain locations, increase travel distances. The following criteria were used to determine locations at which these types of impacts may be significant:*

- *Capacity Impacts - Intersection capacity impacts are classified as either beneficial, insignificant, or significant. Capacity impacts would be considered to be significant if implementation of the project causes an increase in volume/capacity ratio of 0.03 or more (over Year 2005 base conditions without the project), with a resulting level of service of E or F. Insignificant (i.e., adverse, but not significant) impacts would result if the V/C ratio increases by less than 0.03 or the resulting level of service is D or better, representing acceptable conditions. Capacity impacts would be considered beneficial if the V/C ratio decreases from the base conditions (as a result of overall reductions in vehicular travel).*

- Access Impacts - Access impacts would be considered to be significant if one of the following two conditions is met for locations at which median openings and/or left-turns are to be eliminated by the guideway:
  - Traffic shifts due to closure of the median or elimination of left-turns require additional travel of at least 0.5 miles (e.g., the most likely alternative route is at least 0.5 miles longer or the nearest available locations for left-turns/U-turns are greater than 0.25 miles away, thus requiring additional roundtrip travel of at least 0.5 miles).
  - The cross-street is the only or primary outlet for an area and the parallel street system is such that travel via alternate routes is either very circuitous or not possible.

In order to evaluate potential project traffic impacts, forecasts were made of future traffic conditions both with and without the proposed project for the Year 2005. Year 2005 base traffic volumes (i.e., projected volumes without project) would consist of two major elements: ambient background traffic growth due to ongoing development throughout the island and traffic expected to be generated by known cumulative development projects in the vicinity of the alignment. As discussed previously, increased transit usage as a result of the rail system is expected to generally reduce vehicular traffic within the corridor compared with the No-Build Alternative. However, during operations, four types of activities associated with the project will generate measurable levels of vehicular trips which could create localized impacts: patrons driving to stations with park-and-ride lots and parking at the station; patrons driven to/from the station and dropped-off/picked-up (i.e., "kiss-and-ride"); bus traffic to and from the stations; and employee shift changes at the rapid transit vehicle maintenance and storage yard facility (employee vehicular trip generation at stations is assumed to be negligible, particularly during peak traffic periods).

The amended LPA will result in construction of new median islands and closure of existing median openings at a number of minor intersections along the alignment. Driveway access to properties along the alignment (i.e., on Kamehameha Highway, Dillingham Boulevard, Nimitz Highway, Ward Avenue, Kona Street, Kapiolani Boulevard, and University Avenue) will be maintained, although direct left-turn access into and out of driveways will be restricted or eliminated along the sections with new median islands or closed median openings.

Levels of service were projected for most intersections (85) along the alignment and at selected intersections (30) off of, but near, the alignment. Level of service is a qualitative measure used to describe the condition of traffic flow, ranging from excellent conditions at level of service (LOS) A to overloaded conditions at LOS F. Table 4.15 summarizes the projected Year 2005 levels of service for those intersections at which the project is projected to have a capacity impact (projected conditions at the intersections not expected to have impacts as a result of the amended LPA are included in the Transportation Impacts Results Report (July 1992)). In general, capacity impacts at most intersections along the alignment are expected to be either insignificant or beneficial, due to the projected reductions in corridor vehicular travel resulting from increased transit ridership. As indicated in Table 4.15, however, the project is projected to significantly impact operating conditions at fourteen intersections along the alignment and one intersection off of the alignment, due to increased traffic in the vicinity of stations and/or traffic shifts due to median or left-turn closures.

#### Waiawa to Aloha Stadium

In the Waiawa to Aloha Stadium section, the amended LPA will result in the closure of existing median openings and elimination of left-turns at a number of minor intersections along Kamehameha Highway in the Pearl City and Pearlridge areas. Levels of service were projected for twenty intersections on Kamehameha Highway along the alignment and six intersections off of the alignment. As indicated on Table 4.15, the project is projected to have a significant capacity impact at two of these intersections. Project impacts at the remaining twenty-four intersections are expected to be either insignificant or beneficial.



**Table 4.15  
SUMMARY OF SIGNIFICANT CAPACITY IMPACTS  
(YEAR 2005 INTERSECTION LEVELS OF SERVICE)**

Intersection	YEAR 2005 NO-BUILD			YEAR 2005 WITH AMENDED LPA			YEAR 2005 WITH AMENDED LPA AND PROJECT MITIGATIONS					
	AM Peak Hour	PM Peak Hour	Type of Impact (c)	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour			
	V/C Ratio	V/C Ratio	LOS	V/C Ratio	V/C Ratio	V/C Ratio	V/C Ratio	V/C Ratio	V/C Ratio			
<b>WALAWA TO ALOHA STADIUM</b>												
<b>INTERSECTIONS ALONG ALIGNMENT</b> Kamehameha Hwy. & Kakaia Road	22 (a)	14 (a)	E	-25 (a)	-76 (a)	F	F	0.49	0.78	C	Yes	
<b>INTERSECTIONS OFF ALIGNMENT</b> Kamehameha Hwy & Waiawa Rd (RB Kam)	37 (a)	-43 (a)	F	-82 (a)	-143 (a)	F	F	0.46	0.54	A	Yes	
<b>ALOHA STADIUM TO KEEHI INTERCHANGE</b> No intersections have significant impacts.												
<b>KEEHI INTERCHANGE TO IWILEI</b>												
<b>INTERSECTIONS ALONG THE ALIGNMENT</b> Dillingham Bl & Laemaka St. Dillingham Bl & Puuhale Road Dillingham Bl & Makoua St. Dillingham Bl & Kahi St. Dillingham Bl & McNeil St. Dillingham Bl & Waiakamalo Rd. Dillingham Bl & Kakaia St.	0.76 0.95 1.13 0.89 0.84 1.04 0.81	0.84 1.04 1.07 1.13 0.74 1.00 0.83	D F F C E E D	0.72 1.01 1.11 0.07 0.92 1.10 1.00	0.91 1.16 1.16 1.34 0.90 1.22 1.00	C F F E E F E	E F F D F E	0.72 0.90 0.98 0.91 0.86 1.03 0.83	0.83 1.02 1.00 1.19 0.79 0.96 0.76	C D E E D F D	D F E F C E C	Yes Yes Yes No Yes Yes Yes
<b>INTERSECTIONS OFF ALIGNMENT</b> Dillingham Bl & Kakaia St.	0.73	0.97	E	0.71	0.98	C	E	0.55	0.62	A	Yes	
<b>DORNTON/WEST KAKAAKO</b>												
<b>INTERSECTIONS ALONG ALIGNMENT</b> Wood Av. & Waiawa St.	-142 (a)	-288 (a)	F	-142 (a)	-287 (a)	F	F	0.74	0.84	C	Yes	
<b>EAST KAKAAKO TO KALAKAUMAPIOLANI</b>												
<b>INTERSECTIONS ALONG ALIGNMENT</b> Kona St. & Keenemoku St.	13 (b)	33 (b)	E	35 (b)	94 (b)	F	F	0.49	0.77	A	Yes	
<b>UNIVERSITY</b>												
<b>INTERSECTIONS ALONG ALIGNMENT</b> Kapuleani Bl & McCully St. Kapuleani Bl & University Av. University Av. & S. King St./Brentano St.	0.08 0.90 1.24	0.08 0.74 1.19	E E F	0.03 0.99 1.33	1.15 0.75 1.49	F C F	F C F	0.93 0.90 1.33	0.97 0.68 1.49	E D F	E B F	Yes Yes No

Source: Kakai Associates, 1992.

Notes:  
 (a) Intersection controlled by stop sign(s) on minor street approach(es). Indicates available reserve capacity and LOS for the most constrained movement(s) at the intersection.  
 (b) Intersection controlled by stop signs on all approaches. Indicates average delay (seconds per vehicle) and LOS.  
 (c) Project impact considered significant if V/C ratio increases by 0.03 or more and resulting LOS is E or F.

Significant project impacts on access to cross streets or adjoining land uses are projected as a result of proposed project median closures at the following locations in the Waiawa to Aloha Stadium section, due primarily to lengthy forced circuitous travel or inadequate left-turn storage capacity at receiving intersections to accommodate expected traffic shifts:

- Kamehameha Highway median openings between Puu Momi Street and Puu Poni Street,
- Kamehameha Highway median opening west of Kuleana Road,
- Kamehameha Highway at Lipou Place, and
- Kamehameha Highway at Aiea Kai Place.

#### Aloha Stadium to Keehi Interchange

In the Aloha Stadium to Keehi Interchange section, the amended LPA will not eliminate any existing median openings or left-turns at intersections along either Kamehameha Highway or Nimitz Highway. Therefore, no significant project impacts on access are anticipated in this section. Levels of service were projected for nine intersections along the alignment and one intersection off of the alignment in this section. The project is not expected to significantly impact conditions at any of these intersections.

#### Keehi Interchange to Iwilei

In the Keehi Interchange to Iwilei section, the amended LPA will include a new median island along Dillingham Boulevard which will eliminate left-turns into or out of driveways serving adjacent land uses, elimination of left-turns from Dillingham Boulevard at three intersections (Mokauea Street, McNeill Street and Ala Kawa Street), and closure of the existing median opening west of Laumaka Street. Levels of service were projected for ten intersections on Dillingham Boulevard along the alignment and five intersections off of the alignment. As indicated on Table 4.15, the project will have a significant capacity impact at seven of these intersections. Project impacts at the remaining eight intersections are expected to be either insignificant or beneficial (the Dillingham Boulevard/Kaaahi Street off-alignment intersection, although it will not have a significant impact as a result of the project, is included on Table 4.15 because mitigation of the projected poor future operating condition will improve vehicular access to the proposed Kaaahi Station).

The amended LPA will have significant impacts on access to cross streets or adjoining land uses as a result of proposed project median closures or left-turn prohibitions at the following locations in the Keehi Interchange to Iwilei section, due primarily to lengthy forced circuitous travel if the left-turning traffic is required to shift:

- Dillingham Boulevard median opening west of Laumaka Street, and
- Dillingham Boulevard at Ala Kawa Street.

Although construction of a median island along Dillingham Boulevard will eliminate existing left-turns into and out of mid-block driveways along Dillingham Boulevard, the presence of a parallel street system both mauka and makai of Dillingham Boulevard throughout most of the section will provide alternate routes and the impact on driveway access is considered to be insignificant.

#### Downtown/West Kakaako

In the Downtown/West Kakaako section, the amended LPA will not eliminate the existing median openings or left-turns at intersections along Nimitz Highway, Halekauwila Street or Ward Avenue, with the sole exception of closure of the existing median opening providing left-turn access from westbound Nimitz Highway into Pier 11. Therefore, no significant project impacts on access are anticipated in this section. Levels of service were projected for sixteen intersections along the alignment and nine intersections off of the alignment in the downtown and Kakaako areas. As indicated on Table 4.15, the project will have a significant capacity impact at only one of these intersections. Project impacts at the remaining twenty-four intersections are expected to be either insignificant or beneficial.

#### East Kakaako to Kalakaua/Kapiolani

*In the East Kakaako to Kalakaua/Kapiolani section, the amended LPA will close the existing median openings along Kona Street between Piikoi Street and Keeaumoku Street adjacent to the Ala Moana Center. Levels of service were projected for eleven intersections along the alignment and four intersections off of the alignment in this section. As indicated on Table 4.15, the project will have a significant capacity impact at only one of these intersections. Project impact at the remaining fourteen intersections are expected to be either insignificant or beneficial.*

*Although the guideway may require closure of all existing median openings on Kona Street adjacent to the Ala Moana Shopping Center between Piikoi Street and Keeaumoku Street, it is expected that traffic can shift to alternate routes including Keeaumoku Street, Kapiolani Boulevard, and Ala Moana Center driveways directly to Piikoi Street. Additional travel may be required within the Ala Moana Center parking structure to access alternate driveways; however, this impact will be insignificant. Therefore, no significant access impacts are anticipated in this section.*

#### University

*In the University section, the amended LPA includes the construction of a new median island along Kapiolani Boulevard between Hauoli Street and Wiliwili Street which will eliminate left-turns and cross traffic at three existing intersections and left-turns into or out of driveways serving adjacent land uses. Implementation of the project also will result in closure of the existing median openings at all unsignalized intersections along Kapiolani Boulevard between Wiliwili Street and University Avenue and along University Avenue between Kapiolani Boulevard and King Street. A new median island will be constructed along University Avenue between King Street and Varsity Place. Furthermore, columns required for the guideway curve from Kapiolani Boulevard to University Avenue are expected to result in the loss of one of the two southbound through lanes on University Avenue at Kapiolani Boulevard.*

*Levels of service were projected for fifteen intersections along the alignment and five intersections off of the alignment in this section. As indicated on Table 4.15, the project will have a significant capacity impact at three of these intersections. Project impacts at the remaining seventeen intersections will be either insignificant or beneficial.*

*Median construction and closure along Kapiolani Boulevard between Hauoli Street and Wiliwili Street will have significant impacts on access to cross streets and adjoining land uses in this section, due primarily to lengthy circuitous travel for left-turning or cross traffic forced to shift to alternate routes.*

#### Mitigation Measures

*Significant project capacity impacts will be mitigated to insignificance at all of the locations that have significant impacts, with two exceptions: the Dillingham Boulevard/Kalihi Street and University Avenue/King Street/Beretania Street intersections. A variety of mitigation measures are being considered to mitigate the projected significant project impacts. These mitigation measures are described in detail in the Transportation Impacts Results Report (July 1992).*

*The capacity mitigation measures include installation of new traffic signals, provision of added turn lanes, and redesign of the guideway to maintain median openings and/or left-turns at a number of locations which were otherwise proposed to be closed in order to reduce traffic shifts to significantly impacted intersections. These mitigation measures, singularly or in combination of the several measures, will be instituted to reduce the level of impacts to insignificance (as defined on pages 4-19 and 4-20). The final column in Table 4.15 indicate projected Year 2005 conditions with implementation of the capacity mitigation measures.*

*Other mitigation measures to mitigate significant project impacts on access to cross streets or adjoining existing land uses include removal of existing U-turn restrictions to permit U-turns at specified locations and redesign of the guideway to maintain median openings and/or left-turns at specified locations which were otherwise proposed to be closed. With implementation of these recommended access mitigation measures, each of the identified significant access impacts will be mitigated to insignificance.*

*Length requirements for left-turn storage pockets were projected at the locations where left-turns will be maintained along the alignment, based on the forecast volume of left-turns and the existing traffic signal timing. It is projected that additional left-turn storage capacity, beyond the existing left-turn lane lengths, will need to be provided at many of the intersections along the alignment. A number of potential mitigation measures will be implemented to reduce storage length requirements. These mitigation measures include physical measures such as maintaining median openings and/or left-turns at specified locations which were proposed to be closed (in order to reduce traffic shifts and resulting storage length requirements) and operational measures such as modifying traffic signal timing to shorten cycle lengths or providing both leading and lagging left-turn phases at particular intersections (as opposed to the standard one left-turn phase per cycle), therefore reducing the amount of vehicles which would need to be stored at one time.*

#### **4.2.2 Parking at Stations**

*The greatest demand for auto parking is anticipated at those stations with park-and-ride lots. Parking at the lots will be free and thus will not encourage transit riders to seek off-lot parking sites. For those stations that will either fall within the boundaries of existing shopping centers or those stations that will be close to a shopping center, some drivers might park in the shopping lots in spite of encouraging auto-transit connections only at park-and-ride stations. These will include areas around the proposed Pearl City, Pearlridge, Dillingham Plaza, Ala Moana Center, and Piikoi/Kona Stations.*

If parking near stations without park-and-ride lots results in a parking shortage in the area, control measures would be implemented. These could include restricting on-street parking during business hours or restricting long-term parking (for two hours or longer, for example). At many of the proposed station locations, on-street parking is not permitted. Parking at these stations could also be controlled by owners restricting access to, or duration of, parking at these areas. Effective enforcement of parking restrictions could include fines and towing. In addition, the affected neighborhood residents could also request that the City establish Residential Parking Permit (RPP) programs in their areas. If implemented, the RPP Program will restrict non-residents from parking on-street.

#### **4.2.3 Parking Supply**

As discussed in Section 4.2.1, the various alternatives will divert some auto drivers and occupants from their cars onto transit. Many of these trips during the morning peak period will be headed Downtown. As compared to the No-Build Alternative, the diversion from auto to transit will reduce demand for parking in Downtown by about 1,000 long-term spaces for the TSM Alternative to nearly 4,000 long-term spaces for the amended LPA. These reductions will be spread over the Chinatown, Civic Center, Kukui Redevelopment, and Financial Districts, as discussed in Section 3.2.4. These reductions in long-term demand will allow some shifting of spaces from long-term to short-term uses, consistent with the City and County's objectives.

Placement of the guideway will require the elimination of some on-street parking. Approximately 60 on-street parking spaces along Halekauwila Street will be eliminated. All the existing spaces on the mauka side will be taken along with about twelve spaces along the makai side. Some parking will remain between the columns on the makai side. The lost spaces serve the State Judiciary Complex and various businesses along Halekauwila Street. A rapid transit station will be located in this area. *It is expected that the increased transit access to the area with the transit station will more than mitigate the loss of on-street parking*

*in this area.* In addition, various developments in Kakaako will include public parking spaces in proximity to businesses currently served by the on-street spaces that will be lost.

The amended LPA also will result in elimination of some on-street parking along University Avenue. Approximately *thirty* on-street spaces will be lost: *twenty-one* spaces will be eliminated on the Koko Head side of University Avenue and *nine* spaces will be eliminated on the Ewa side between Kaaha and King Streets.



**Chapter 5**  
**Environmental**  
**Consequences**

## 5.0 ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the potential environmental consequences of the amended Locally Preferred Alternative (LPA). It discusses land use and economic development, displacements and relocation of existing uses, neighborhoods, and visual and aesthetic resources. Other environmental consequences covered include air quality, noise, ecosystems, water, energy, historic and archaeological resources, and parklands. The chapter then discusses Section 4(f) and construction impacts. For a more complete description of the environmental consequences of the fixed guideway alternatives considered in the AA/DEIS and the SDEIS, see Chapter 5.0 of the respective documents.

### 5.1 LAND USE AND ECONOMIC DEVELOPMENT

#### 5.1.1 Regional Impacts

The City and County of Honolulu (City) is characterized by a strong economy, a well-established set of land use policies and controls, a low unemployment rate, and a positive development climate. As an already highly urbanized area, the region in which the study corridor falls has market characteristics and is developed to such an extent that land use impacts from the amended LPA will be unlikely to result in changes in the amount of or overall trend of existing or planned development in the region. Case studies in other urban areas have found that fixed guideway transit facilities produce no net change in growth and development at the regional level.

#### 5.1.2 Corridor Level Impacts

##### 5.1.2.1 Accessibility

The impact of the alternatives on land use at the corridor level can be related to relative increases in accessibility, as defined by comparative ridership and travel times between the TSM Alternative and the amended LPA. Table 4.2 and Figures 4.1 and 4.2 contained in Chapter 4.0, Transportation Impacts, summarize comparative travel times for selected major activity points within the corridor. As shown, travel times for peak-period trips across the corridor will improve significantly with the amended LPA relative to the TSM Alternative.

An examination of total transit trips from the patronage forecasting also indicates that transit mobility in the study corridor will increase. Total daily transit trips for the No-Build and TSM Alternatives will be 249,200 and 272,400 respectively. The amended LPA will be characterized by 321,300 total daily transit trips.

The relative transit accessibility of areas within the study corridor can be defined by increases in total transit riders (by transportation zone) for the amended LPA as compared with the TSM Alternative. The following areas will have transit ridership increases for the amended LPA in excess of 20% greater than the TSM Alternative:

Section I:	Pearlridge Center, Aiea;
Section II:	Aloha Stadium, Airport, <i>Pearl Harbor, Salt Lake</i> ;
Section III:	Iwilei Industrial Area;
Section IV:	Kakaako, <i>Financial District</i> ;
Section V:	<i>Ala Moana Center, Kapiolani Business District</i> ; and
Section VII:	Manoa, University of Hawaii, Moiliili.

The following areas had transit ridership increases of greater than 10% and less than 20% *for the amended LPA* relative to the TSM Alternative:

Section I: Pearl City;  
 Section III: Liliha/Palama, Kalihi;  
 Section IV: Chinatown, Punchbowl, *Waterfront*; and  
 Section VII: McCully.

Areas adjacent to both the Ewa and Koko Head ends of the study corridor also will experience increased transit ridership relative to the TSM Alternative. These areas include Maunalani Heights, Waipahu, Ewa, Ewa Beach, and Barbers Point. Based on a comparison of total transit trips by transportation zone, the TSM Alternative would improve accessibility throughout the study corridor relative to the No-Build Alternative.

The amended LPA will generally improve access within and among the neighborhoods. A comparison of total transit trips by transportation zone for the amended LPA versus the TSM Alternative indicates that the following major activity sites will benefit from the construction of a fixed guideway system:

- Leeward Community College
- West Oahu College
- Pearl City Shopping Center
- Pearlridge Center
- Aloha Stadium
- Arizona Memorial
- Pearl Harbor
- Hickam Air Force Base
- Honolulu International Airport
- Dillingham Plaza
- Honolulu Community College
- Waiakamilo Shopping Center
- Honolulu Downtown District
- City, State and Federal Government Buildings
- *Kakaako*
- Ala Moana Center
- University of Hawaii

#### 5.1.2.2 Land Use and Development

Although transit mobility and travel times will improve, the impact of either the TSM Alternative or the amended LPA on land use at the corridor level will be to focus and reinforce existing land use and development trends rather than promote new development or produce substantial land use changes. The location and rate of development and/or redevelopment within the study corridor is a function of the existing strong economy, market forces, and local planning policies and practices; these factors are and will remain, independent of the TSM Alternative or the amended LPA.

The impact of these alternatives on corridor-level land use will be limited to a redistribution of development to focus on corridors where accessibility is increased and to station areas where land use controls, land use trends, and patterns of land ownership are conducive to development or redevelopment.

For those areas currently undergoing change as a result of both market forces and existing land use controls, the amended LPA may serve as a catalyst and accelerate the rate of land use change, or enhance existing land use trends. According to the City Department of General Planning, the following general areas are currently in transition: Kalihi-Palama residential and commercial/industrial area, Iwilei industrial area, Chinatown, Kakaako, and Ala Moana/Kapiolani business area. Of these areas, Iwilei, Kakaako, and Ala Moana/Kapiolani are noted previously as receiving a 20% or greater increase in transit ridership, and the remaining two areas are projected to receive an increase in transit ridership of 10 to 20%. Land use and development within all of these areas will likely be enhanced by the amended LPA.

Although definitive predictions are not possible at the present level of planning, one way the amended LPA can foster new development or redevelopment is under circumstances where the purchase of land required for the guideway removes one or more of the existing constraints to development. One area where this potential is high is in Kakaako, along Waimanu and Kona Streets, where acquisition of some



existing small businesses will be required. Land not required for the fixed guideway and stations will be sold or leased at the current market values and thus available for development, which will lessen the existing constraint of small parcels with numerous owners.

### 5.1.2.3 Consistency With Land Use Plans

At the corridor level, the proposed TSM Alternative and amended LPA are consistent with the Hawaii State Plan (1989); the Development Plans for the Primary Urban Center, Ewa, and Central Oahu; and the General Plan of the City and County of Honolulu (1991). Because the amended LPA will improve accessibility and level of service, it is more consistent with goals and objectives related to an improved transportation system than is the TSM Alternative, which performs at a lower level of service. Area-specific discussions of consistency with plans and zoning are contained in Section 5.1.3, Station Area Impacts.

The planning for the Kakaako area recognizes a future regional fixed guideway system serving Kakaako. Coordination has been conducted during the planning stages with the Hawaii Community Development Authority (HCDA), and consultation will continue throughout the implementation process to ensure compatibility with the many development projects and general planning goals of Kakaako.

Note that the *Halekauwila* portion of the amended LPA falls within the Kakaako Community Development District, which is under the jurisdiction of the HCDA. The agency coordinates the Kakaako Plan for development and controls land uses. The development of a fixed guideway on *Halekauwila Street* will continue to stimulate existing redevelopment trends.

The amended LPA will be compatible with the Aloha Tower Development Corporation (ATDC) development of the Aloha Tower site. The Honolulu Waterfront Master Plan Final Report (1989) supports a rapid transit plan providing a high level of public access to the waterfront area. Coordination will continue with the Office of State Planning to ensure compatibility of the amended LPA with development plans.

This amended LPA is also compatible with the general objectives of the City and County Land Use Ordinance Special Districts. The amended LPA passes through both the Chinatown and the Hawaii Capital Special Districts. Because the objectives and design goals of the Special Districts are specific, continued coordination with the City and representatives of the affected communities have been and will continue to be conducted throughout the design process. The project is compatible with the Chinatown Special District objectives since it will provide access to the district and yet be located along the makai boundary, an area undergoing some redevelopment.

The *Halekauwila Street* portion of the amended LPA is located in the Hawaii Capital Special District. The Ewa border of the district is Alakea Street and the Koko Head border is South Street. *Halekauwila Street* is outside of the historic core of the district; therefore, the location of the alignment will not affect the district.

Coordination with the U.S. Department of the Navy (Navy) has been conducted regarding use of the Ewa Drum Storage Site and compatibility with Navy plans for land in the vicinity of the Makalapa Gate and Arizona Memorial Stations. The Navy supports the amended LPA alignment for a fixed guideway system because it will provide the best service to naval facilities.

Coordination has been conducted with Hickam Air Force Base. No conflicts or inconsistencies with planning goals of the base have been identified.

Additional study (authorized by City Council Resolution 90-284, CD-1) and continued coordination with the University of Hawaii resulted in the relocation of the University Station from Metcalf Street to the University Quarry. Besides the University in general, the University/Quarry Station will also serve the proposed 10,000-seat arena, also to be located in the Quarry.

#### 5.1.2.4 Consistency With Proposed Development Projects

At the corridor level, no impact on development projects is expected with the amended LPA. As noted previously, development in the Honolulu area is driven by numerous factors that are independent of the presence of the amended LPA or TSM Alternative corridor transit system. The amended LPA is compatible with the proposed development projects within the corridor.

Many specific proposed development projects are located at potential locations of fixed guideway stations. These specific sites are discussed in Section 5.1.3. *Eight* stations of the amended LPA are adjacent to proposed development or expansion projects: Kaaahi; Nimitz/Smith; Nimitz/Fort; *Halekauwila/South*; *Halekauwila/Ahui*; Ala Moana Center; Kalakaua/Kapiolani; and the University/Quarry. From a corridor perspective, the amended LPA will serve proposed development better than the TSM Alternative.

#### 5.1.2.5 Socioeconomic Trends and Distribution

The proposed TSM Alternative or amended LPA would produce no substantive impact on the distribution or trends related to population, employment, housing, or income characteristics of the Honolulu area or within the study corridor.

#### 5.1.2.6 Impacts on Existing Business Community

Construction impacts on businesses are discussed in Section 5.13.

Section I - Waiawa to Aloha Stadium. No impacts on adjacent businesses will be likely to occur in Section I. Driveway access to businesses will be maintained; minor modifications to left turn bays will be made to accommodate the guideway columns. The existing number of travel lanes on Kamehameha Highway will be maintained.

Section II - Aloha Stadium to Keehi Interchange. The Aloha Stadium Station and the guideway itself will affect Aloha Stadium parking lots. The Aloha Stadium Station will be located in the overflow parking area for the stadium. Mitigation measures such as restriping, landscaping, and enhanced pedestrian access will result in an overall positive impact on the stadium. Improved travel times to Aloha Stadium will improve access to the stadium and reduce parking demand at events.

The amended LPA will have a positive impact on the Honolulu International Airport area and the Airport Industrial Park by providing improved transit travel times and, therefore, accessibility to these areas.

The amended LPA will be elevated above the Koko Head-bound lanes of the Nimitz Highway business access frontage road, immediately adjacent to the existing H-1 Freeway structures. The aerial guideway structure will be elevated above the level of the existing H-1 structure, spanning the existing frontage road lanes. Support columns will be placed on the makai side along the business frontage. Business access will be maintained. Although the fixed guideway structure will be an additional structural element visible to the business communities, it will not interfere with the visibility of the business strip from the frontage road.

Section III - Keehi Interchange to Iwilei. A median will be constructed along Dillingham Boulevard to accommodate both the fixed guideway columns and left turn bays. This elimination of the existing continuous left turn lane will have a slight negative impact on those businesses and other properties with driveways that will not be directly accessible from the new left turn bays. Other developments such as the proposed Liliha Civic Center will have improved access as a result of the project.

Section IV - Downtown/West Kakaako. Parking along Ward Avenue will be maintained since the fixed guideway columns will be designed to allow parking between columns. However, on-street parking in the

vicinity of the stations on Halekauwila Street will be eliminated. The proposed Kauhale Kakaako project, expected to be completed in 1993, includes 500 public spaces that will provide some replacement parking in Kakaako Ewa of Ward Avenue.

Section V - East Kakaako to Kalakaua/Kapiolani. Both Waimanu Street and Kona Street will be widened to accommodate the fixed guideway. Two businesses on Waimanu Street and 16 businesses along Kona Street from Kamakee Street to the Kalakaua/Kapiolani Station will be required, as discussed in Section 5.2. Land not required for the guideway and stations will be available for redevelopment.

The fixed guideway will pass through the mauka side of the Ala Moana Center. Careful integration of the guideway design with the shopping center will mitigate any potential negative effect on vehicle and pedestrian circulation within the shopping center parking areas. The improved travel times to Ala Moana Center from various areas within the study corridor will be a positive impact on the center.

Table 2.5 shows the current and anticipated number of peak-hour buses at the Ala Moana Center. The amended LPA shows a decrease from current conditions of 27 buses in the peak hour. This decrease will be a positive impact to the center.

Section VII - University of Hawaii. Generally, the businesses in the commercial strip along University Avenue near its intersection with King Street will not *experience any negative impacts*, except for localized impacts on the adjacent sidewalk caused by the station's vertical access elements. Some business displacement will occur at the University/King Station. The alternative locations for a park-and-ride lot will displace up to 22 additional businesses (see Section 5.2). The location of the University/Quarry Station will result in the need to relocate some University facilities.

The amended LPA also will result in elimination of some on-street parking along University Avenue *between Kapiolani Boulevard and Varsity Place*. Approximately 30 on-street spaces will be lost. Twenty-one spaces will be eliminated on the Koko Head side of University Avenue. Nine spaces will be eliminated on the Ewa side.

### 5.1.3 Station Area Impacts

The most influential component of the fixed guideway system will be the station areas, because stations become the focus of transit users activity and tend to focus development activity. The impact that stations have on the existing land use characteristics of adjacent areas is partly dependent on market forces currently operating within the area and the land use controls in place to guide development and redevelopment. The transit stations will not foster new markets but will serve as catalysts and focal points for development.

Analyses of station area land use impacts have been coordinated with the City Department of General Planning. The analyses focused on the probable impact of a fixed guideway facility on current land use trends and development opportunities for properties that fall within a quarter mile of each station.

Beginning at the Ewa end of the study corridor, each station area is discussed by section, noting various factors likely to influence project impact. Station area land use impacts are summarized, in more general terms, in Table 5.1. At most station sites, the fixed guideway system will reinforce land use and development activities already planned or underway. At five station sites, factors favor intensified land uses not presently underway. In addition to land use impacts, a projected walk-on ridership indicates that at *four* stations (where walk-on ridership is projected at 1.5 times the average) retail opportunities will be enhanced.

Table 5.1 AMENDED LOCALLY PREFERRED ALTERNATIVE STATION AREA LAND USE IMPACTS		
Factors in Place For Project Promotion Of Intensified Uses	Stimulation Of Existing Development Trends	Stable Land Use; No Project Effect
Waiawa Lagoon Piikoi/Kona Isenberg University/King	Pearl City Pearlridge Dillingham Plaza Honolulu Community College Kaaahi Nimitz/Smith <sup>1</sup> Nimitz/For <sup>1</sup> <i>Halekauwila/South<sup>1</sup></i> <i>Halekauwila/Ahui</i> Neal Blaisdell Center Ala Moana Center <sup>1</sup> Kalakaua/Kapiolani	Aloha Stadium Arizona Memorial Makalapa Gate Airport University/Quarry

Source: Parsons Brinckerhoff Quade & Douglas, Inc., December 1991.

Note: <sup>1</sup> Walk-on ridership projections indicate enhanced retail opportunities.

#### Section I - Waiawa to Aloha Stadium

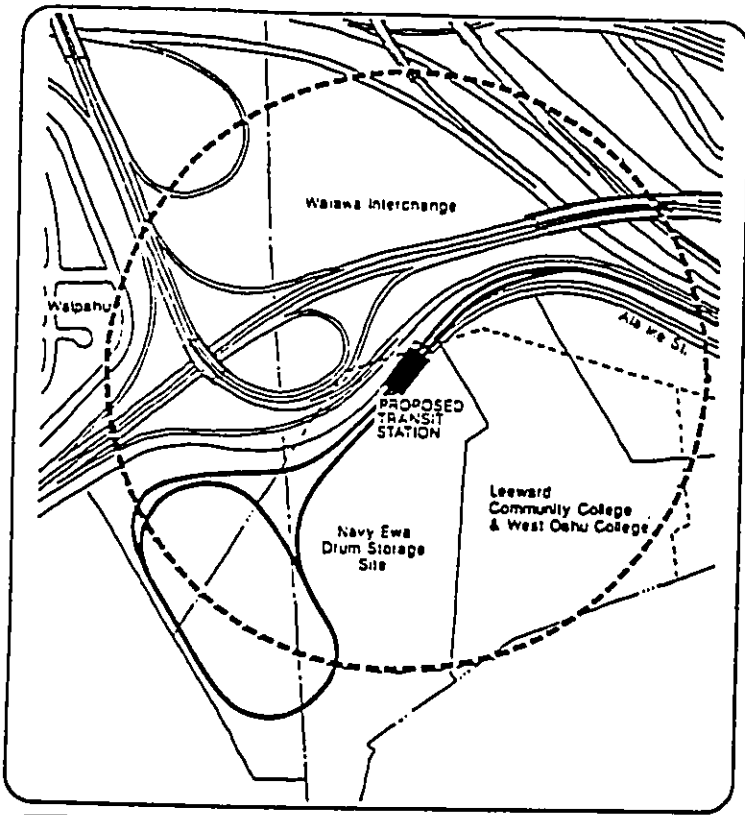
The following three station areas are included in the amended LPA.

**Waiawa.** This proposed station and its 800-space park-and-ride lot (with expansion capacity to 1,600) will be located on part of the vacant 43-acre Navy Ewa Drum Storage Site, formerly used as a fuel storage depot, and owned by the Navy (see Figure 5.1). The terminus yards and shops and maintenance facility also will be located on this parcel. The residual lands not required for either the station complex or the yards and shops can be variously developed. This development will require amending the Development Plan (DP) and zoning because the current DP designation is Industrial and the zoning is Agricultural (AG-2).

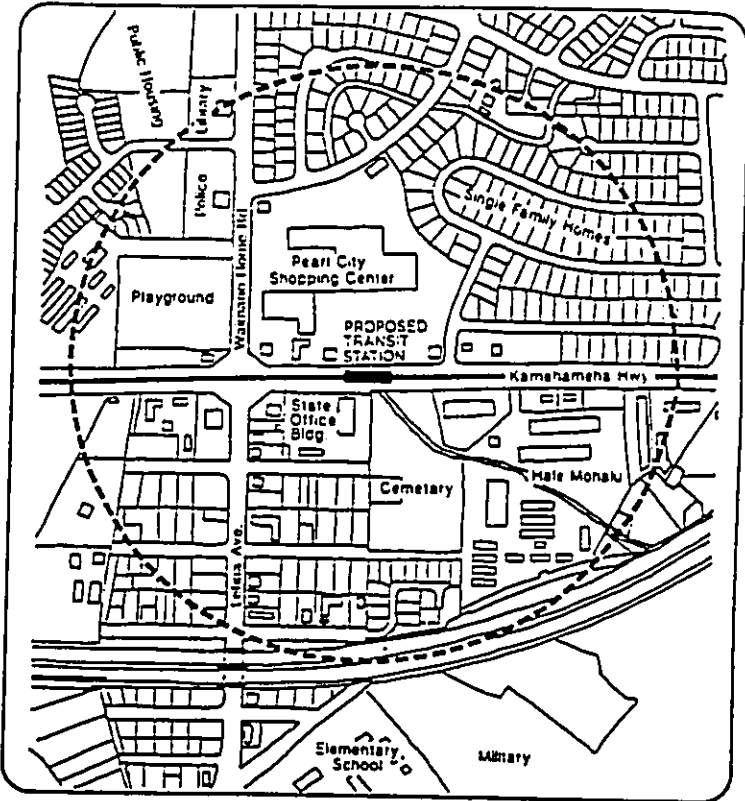
Existing and planned residential subdivisions mauka and Ewa of the Waiawa Interchange will not be affected by the station.

**Pearl City.** This station will be located on Kamehameha Highway, in front of the parking lot for the Pearl City Shopping Center, between the intersections with Waimano Home Road/Lehua Avenue and Puu Momi Street (see Figure 5.2). The small lot pattern and individual ownership of the stable residential area between Kamehameha Highway and the H-1 Freeway deter redevelopment. Although this station is not expected to generate new development, it may stimulate rehabilitation of existing development, a trend in the makai half of the proposed station impact area that is occurring to a limited extent.

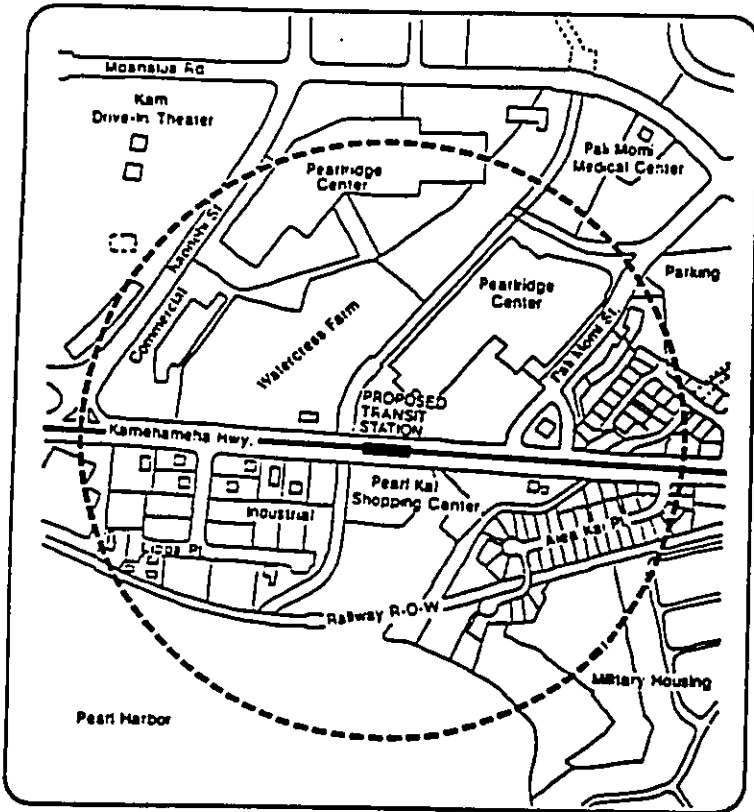
**Pearlridge.** This station will be located on Kamehameha Highway fronting Pearlridge Center, a regional shopping center with over 1.2 million square feet of gross leasable space (see Figure 5.3). The area is experiencing a trend toward increased retail and people-oriented activities. The shopping center owners are interested in expanding the retail area, an action which has the potential to connect the shopping center and the station.



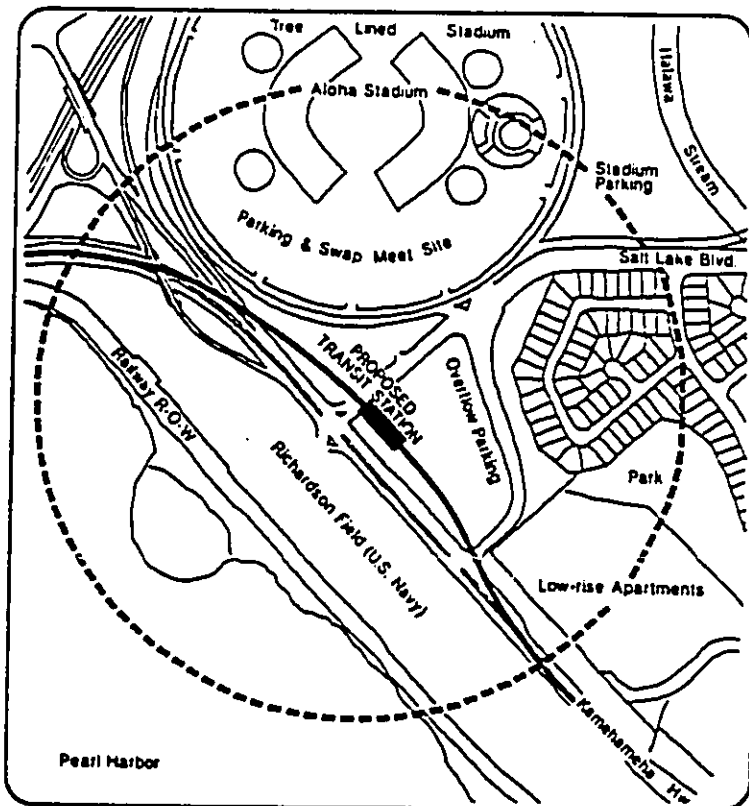
**FIGURE 5.1**  
**WAIAWA STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM



**FIGURE 5.2**  
**PEARL CITY STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM



**FIGURE 5.3**  
**PEARLRIDGE STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM



**FIGURE 5.4**  
**ALOHA STADIUM STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM

SOURCE: PARSONS BRINCKERHOFF, 1991, 1992.

While land uses at the Pearlridge Center will remain the same, the improvement in transit accessibility due to fixed guideway transit may accelerate pressure for redevelopment of the Kam Drive-In site for commercial uses. The development of the Pearl Kai Shopping Center makai of Kamehameha Highway and increased commercial uses in the area will create pressure to reclassify parcels makai of the highway from industrial to commercial. Although this trend will be present with or without the station, the station will be expected to stimulate earlier demand for additional commercial development. With the exception of a few single-family homes, most land in the station impact area is owned by a single landowner, Bishop Estate, a land ownership pattern that can facilitate future development.

#### Section II - Aloha Stadium to Keehi Interchange

The following stations *are* located in Section II of the amended LPA.

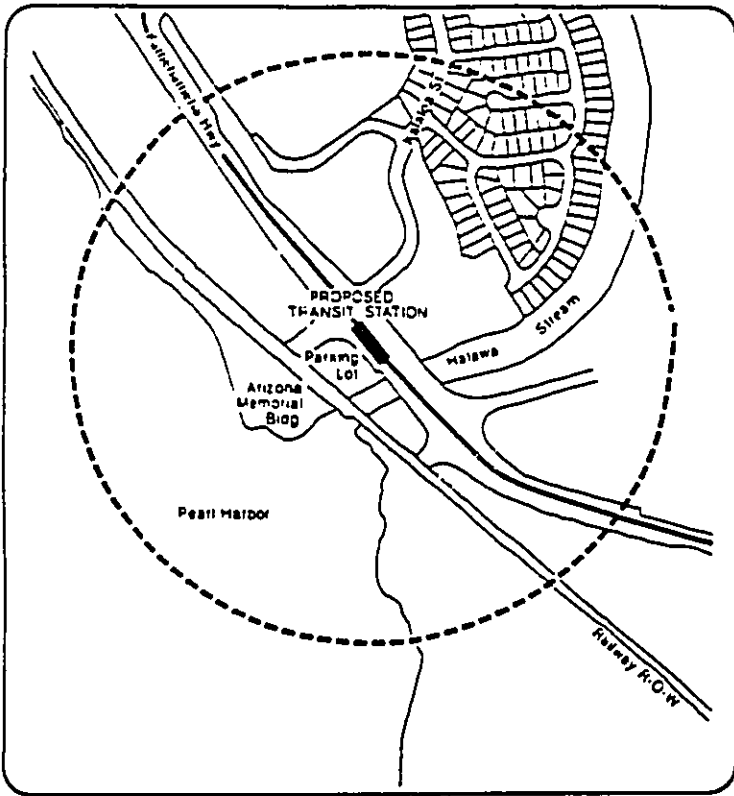
Aloha Stadium. This station and an 830-stall park-and-ride lot will be located in the Aloha Stadium overflow parking lot, makai of the stadium at the Salt Lake Boulevard/Kamehameha Highway intersection (see Figure 5.4). The station and the park-and-ride lot will have no impact on the established swap meet that utilizes the main stadium parking area. The availability of parking during the work week when stadium events do not normally take place makes the potential joint use of the parking area for park-and-ride and stadium parking feasible. *There will be 750 parking stalls available for transit riders during the week and available for stadium events at other times; 80 stalls will be dedicated to transit users at all times.* For example, Sunday is the highest parking demand for the swap meet, but the lowest for the park-and-ride. The improved accessibility provided by a fixed guideway system may alleviate parking demand problems during stadium events. Land uses in the remainder of the stadium impact area will not be likely to change as a result of the amended LPA.

Arizona Memorial. This station will be located on Kamehameha Highway across from the parking lot for the Arizona Memorial (see Figure 5.5). The Arizona Memorial is one of the highest volume attractions on the island and parking is limited. The station will improve the accessibility of the memorial to visitors and improve accessibility for Pearl Harbor employees. Much of the land within the station impact area is military; it is unlikely that the station will affect use of these lands.

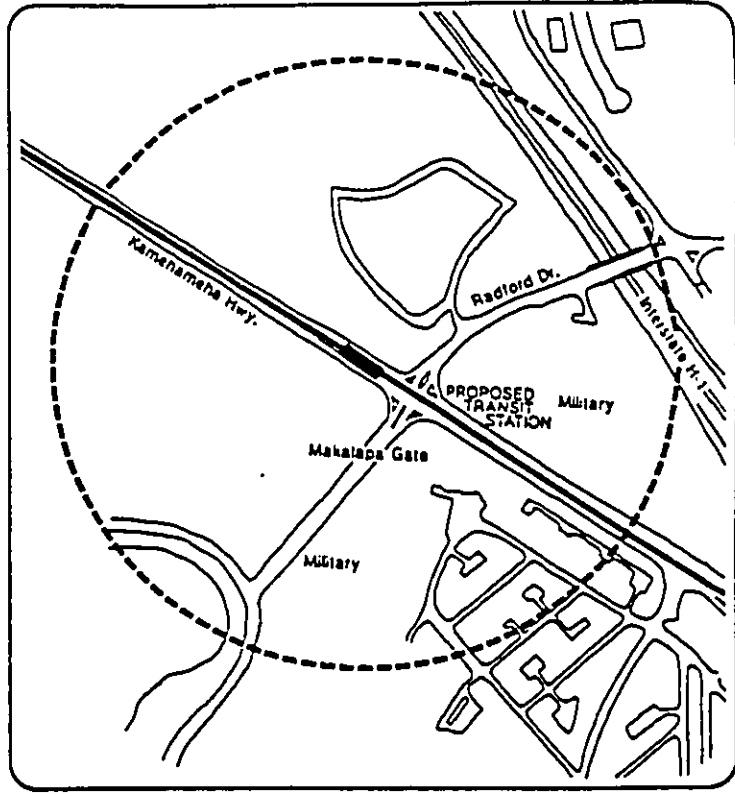
Makalapa Gate. This station, at the intersection of Kamehameha Highway and Radford Drive (see Figure 5.6), is not expected to have any land use impacts on the surrounding military developments. The *transit* system will provide improved accessibility to the employees at the naval base.

Airport. Rapid transit service to the airport will be via a station on the makai side of Nimitz Highway Ewa of Aolele Street adjacent to the parking lot of the Interisland Terminal (see Figure 5.7). The primary function of the station will be to provide a transit connection to the airport and to Hickam Air Force Base. There is ongoing coordination with the State Department of Transportation regarding the "people-mover" at the airport. As the lands makai of the station are under the jurisdiction and planning of the State Department of Transportation, Airports Division, the station is not expected to have any land use impacts.

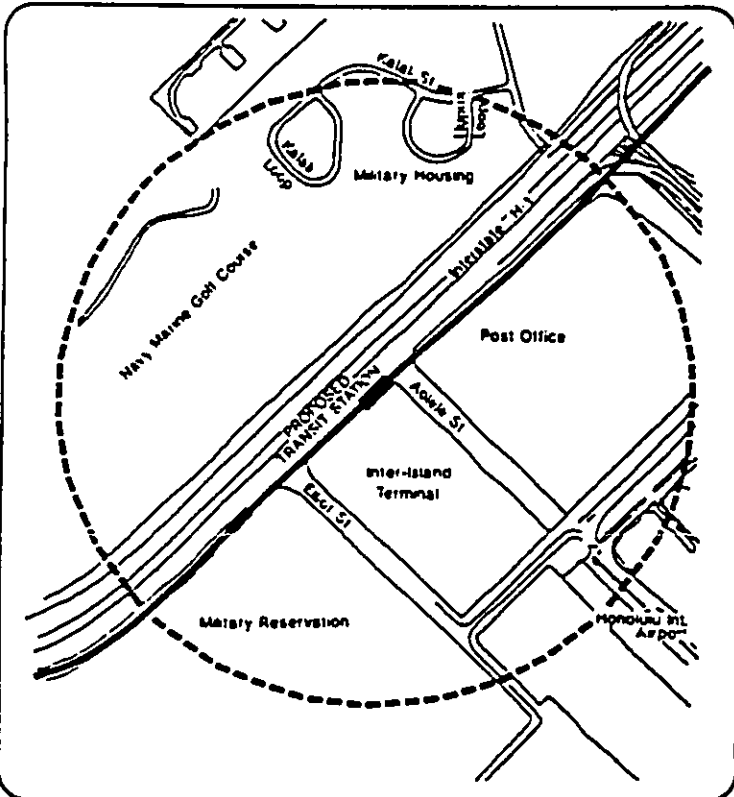
Lagoon. This station and a 450-stall park-and-ride lot will be located in a heavily industrialized and vehicle-oriented area along Nimitz Highway (see Figure 5.8). The industrial character of the area is maintained by the DP policy. The makai industrial strip between the freeway and the airport is an airport special area, with height controls and use restrictions. There is an existing trend towards more commercial uses on the makai side of the freeway. The likely long-term impact of the station may be to create pressure for additional commercial uses. The lands in this area are generally owned by a single owner, which will facilitate future redevelopment within the airport district area should market conditions warrant redevelopment. The areas mauka of the freeway, including the military's Camp Catlin housing area are stable. Access from the station site across the freeway to the mauka side is limited. No land use impact on the mauka side is expected.



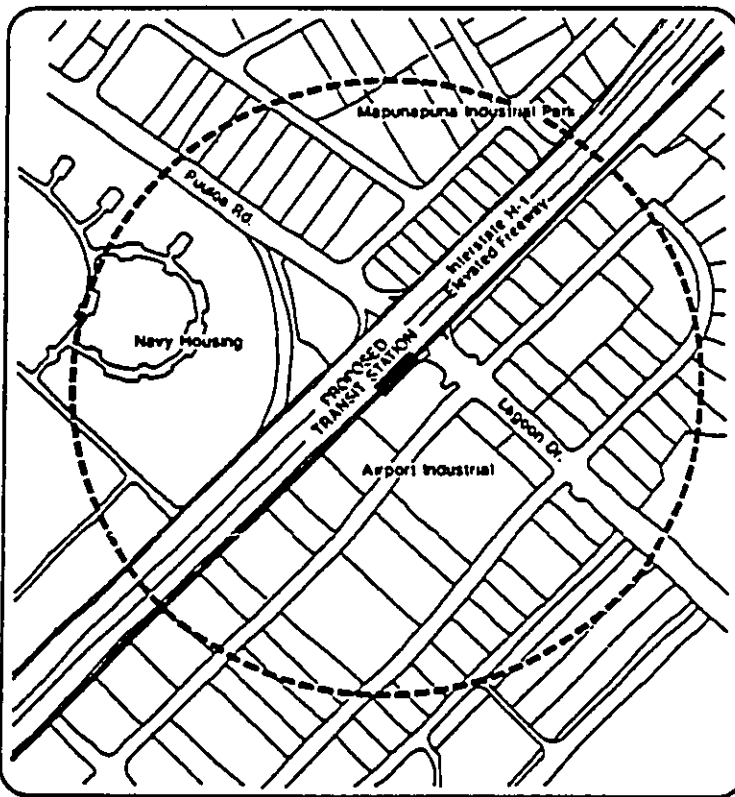
**FIGURE 5.5**  
**ARIZONA MEMORIAL STATION**  
 EXISTING LAND USE & IMPACT AREA  
 HONOLULU RAPID TRANSIT PROGRAM



**FIGURE 5.6**  
**MAKALAPA GATE STATION**  
 EXISTING LAND USE & IMPACT AREA  
 HONOLULU RAPID TRANSIT PROGRAM



**FIGURE 5.7**  
**AIRPORT STATION**  
 EXISTING LAND USE & IMPACT AREA  
 HONOLULU RAPID TRANSIT PROGRAM



**FIGURE 5.8**  
**LAGOON STATION**  
 EXISTING LAND USE & IMPACT AREA  
 HONOLULU RAPID TRANSIT PROGRAM

SOURCE: PARSONS BRINCKERHOFF, 1992.

### Section III - Keehi Interchange to Iwilei

The following station areas *are* located in Section III of the amended LPA.

Dillingham Plaza. This station will be located in an area that is primarily industrial within the larger Kalihi-Palama aging industrial and housing district (see Figure 5.9). Under the No-Build Alternative, little change in the station impact area is anticipated. With the amended LPA, the station will be compatible with any proposed plans for expansion of Dillingham Plaza. Because Bishop Estate, a private property owner, owns and leases out two-thirds of the land within the station impact area, major development will be feasible over time. Although neither the King Street corridor nor the Dillingham Boulevard corridor show any inclination toward the greater densities allowed by the development plan, the amended LPA will reinforce the current trend toward shifting the area's growth priorities from King Street to Dillingham Boulevard. Recent new construction has all been along Dillingham Boulevard.

Honolulu Community College. A station will be located in front of Honolulu Community College, Ewa of Ala Kawa Street. (see Figure 5.10). Redevelopment in the mixed industrial and housing area mauka of the college would be encouraged if pedestrian access through the college to the station were provided. Redevelopment makai of Dillingham Boulevard would be feasible, and would be enhanced if housing is allowed as a mixed use. Zoning and possibly DP changes would be required if an impetus toward new housing and less industrial use either mauka or makai of the college develops.

### Section IV - Downtown/West Kakaako

*The Nimitz/Smith Station is located in the Chinatown District.* The Chinatown area is experiencing continued pressures to redevelop to a higher density because of its highly marketable location next to the Central Business District (CBD). However, development is constrained by the Chinatown Special District and National Historic District provisions. Major impediments to private sector redevelopment efforts in the past have been the pattern of small and irregular lot sizes and the predominance of trust and absentee owners.

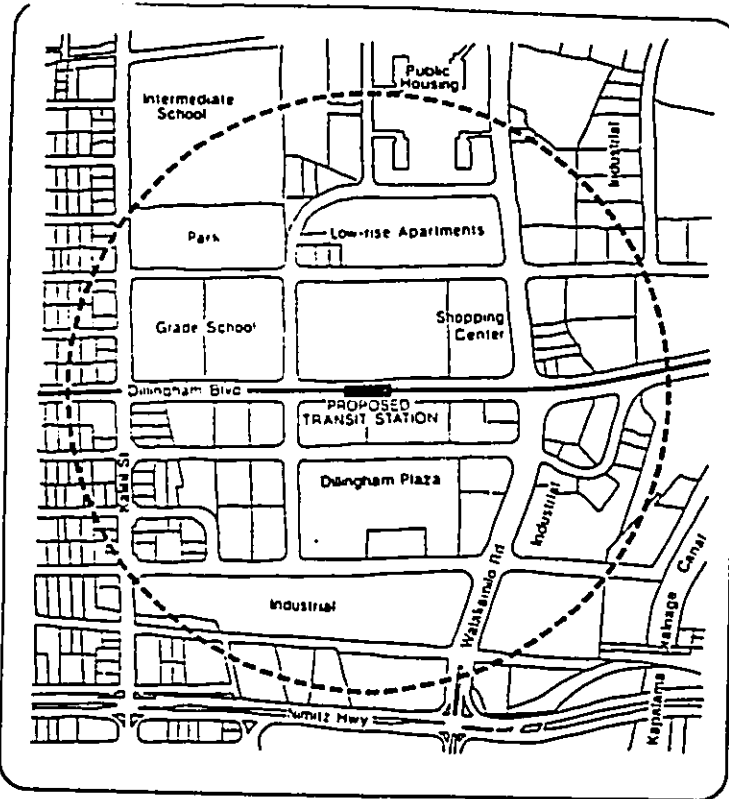
The Nimitz/Fort Station is located in the Financial District of the CBD. The Financial District will probably continue to be a high-value, high-growth area for another two decades, rivaling Kakaako as Honolulu's premier growth center. It is an area where the patterns of both existing central business activities and development are well established. The amended LPA, therefore, is expected to have no impact on growth in this district.

The following stations are located in Section IV of the amended LPA.

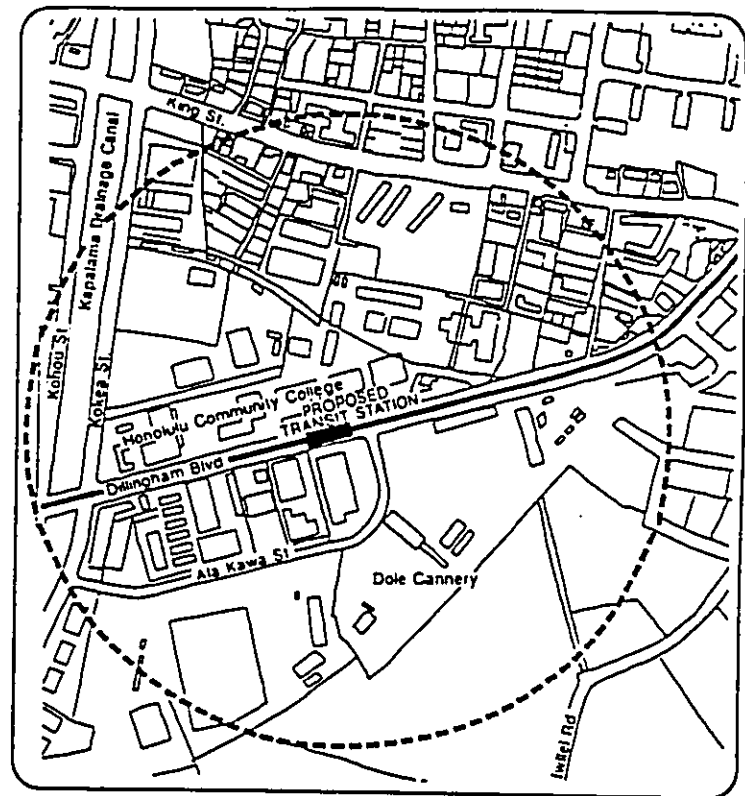
Kaaahi. This station will be located adjacent to Kaaahi Street, Ewa of Iwilei Road (see Figure 5.11). The Liliha Civic Center, the State Government Office Complex, is proposed adjacent to the station.

The part of Iwilei bounded by Dillingham Boulevard, King Street, Nimitz Highway, and Sumner Street will be expected to have the greatest potential for station-related land use impacts. The current revitalization and transformation of the industrial district to include office development is resulting in increased traffic congestion and parking demand. The revitalization and transformation of the Iwilei industrial district to include more offices is due in part to spiralling real estate prices in the Kapiolani Boulevard corridor and in the Financial District, as well as land use constraints in Chinatown. The availability of large land parcels, proximity to Downtown, and mixed-use zoning in Iwilei are factors in the attractiveness of the area for commercial development. The construction of the station in the area will be compatible with and likely will reinforce redevelopment trends in the Iwilei area. However, Ewa of the station site, a small lot ownership pattern could hinder the lot consolidation needed for higher density development.

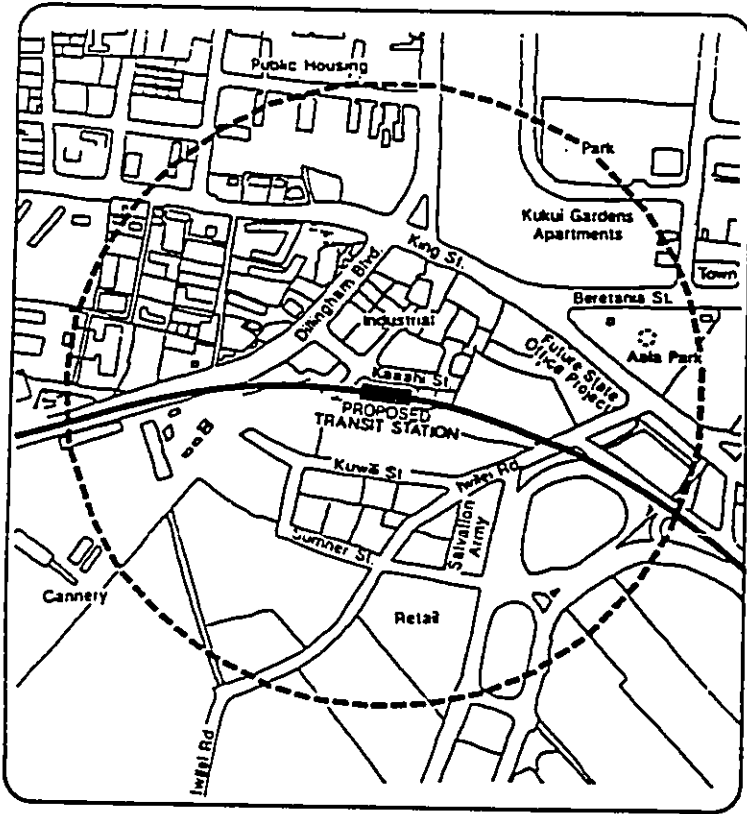




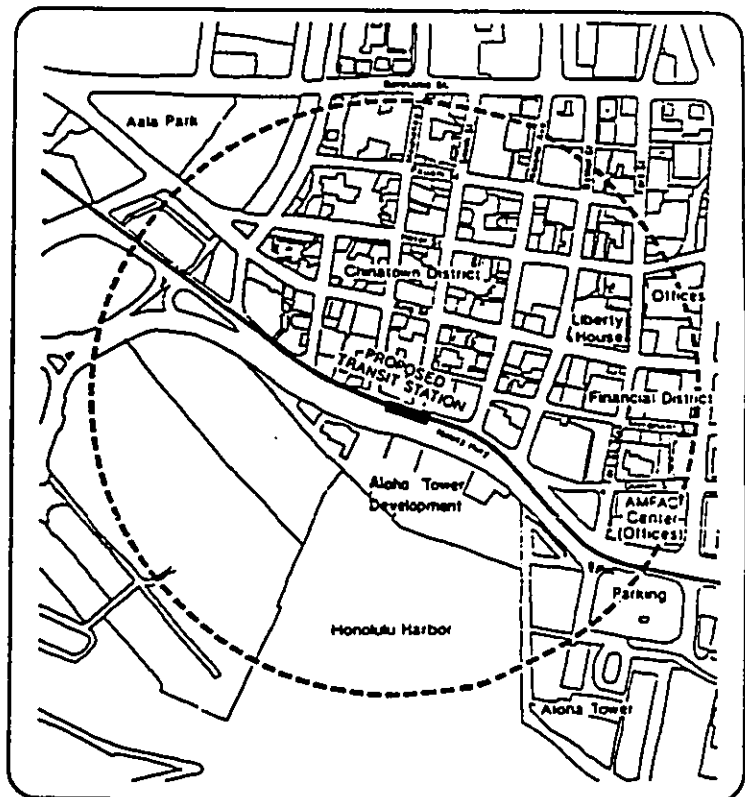
**FIGURE 5.9**  
**DILLINGHAM PLAZA STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM



**FIGURE 5.10**  
**HONOLULU COMMUNITY COLLEGE STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM



**FIGURE 5.11**  
**KAAAHĪ STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM



**FIGURE 5.12**  
**NIMITZ/SMITH STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM

SOURCE: PARSONS BRINCKERHOFF, 1992.

Nimitz/Smith. Around the station is an area with restricted access and parking (see Figure 5.12). The station impact area has the potential to become an important visitor destination stop, which will include Chinatown and the waterfront redevelopment anticipated in the Honolulu Waterfront Master Plan Final Report (1989). The station will be compatible with and may reinforce both Chinatown revitalization and waterfront development by mitigating traffic congestion and reducing parking demand.

Nimitz/Fort. Mauka of Nimitz Highway, land within the station impact area are in their final developed form and will not incur change as a result of the station (see Figure 5.13). Makai of the highway, the Waterfront Master Plan and the Aloha Tower redevelopment plan, which could be influenced by the presence of the station, are under the jurisdiction of the state.

Halekauwila/South. This station is unlikely to have a significant impact on land use since the existing Kakaako redevelopment trend is already well-established and supported by an infrastructure improvement program (see Figure 5.14). By providing an alternative mode of transportation, the Halekauwila/South Station may help alleviate an existing parking problem, which may influence development.

Halekauwila/Ahui. This station will have impacts similar to the Halekauwila/South Station (Figure 5.15).

#### Section V - East Kakaako to Kalakaua/Kapiolani

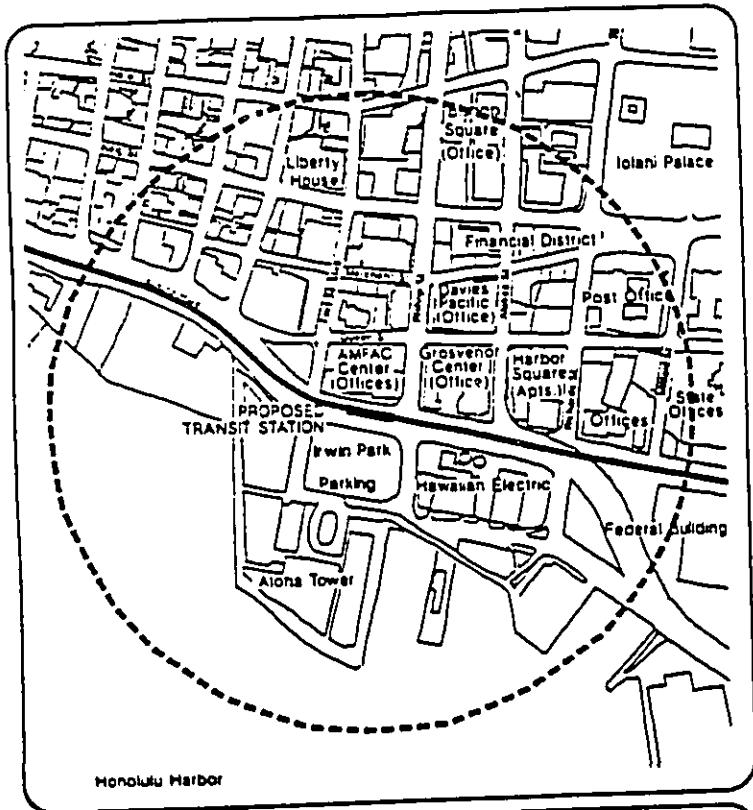
In addition to the Halekauwila/South and Halekauwila/Ahui Stations discussed above, two of the proposed stations in this section will be located within the boundaries of the Kakaako District: Neal Blaisdell Center and Piikoi/Kona. The master plan for this area provides for extensive new infrastructure and redevelopment for a variety of land uses. Because the HCDA has the authority to assemble land and to enter into agreements with private parties to construct public facilities, future joint development at or near station sites is feasible in the Kakaako area. Continued close coordination with the HCDA will be required to effect a joint development project.

The following stations are located in Section V of the amended LPA.

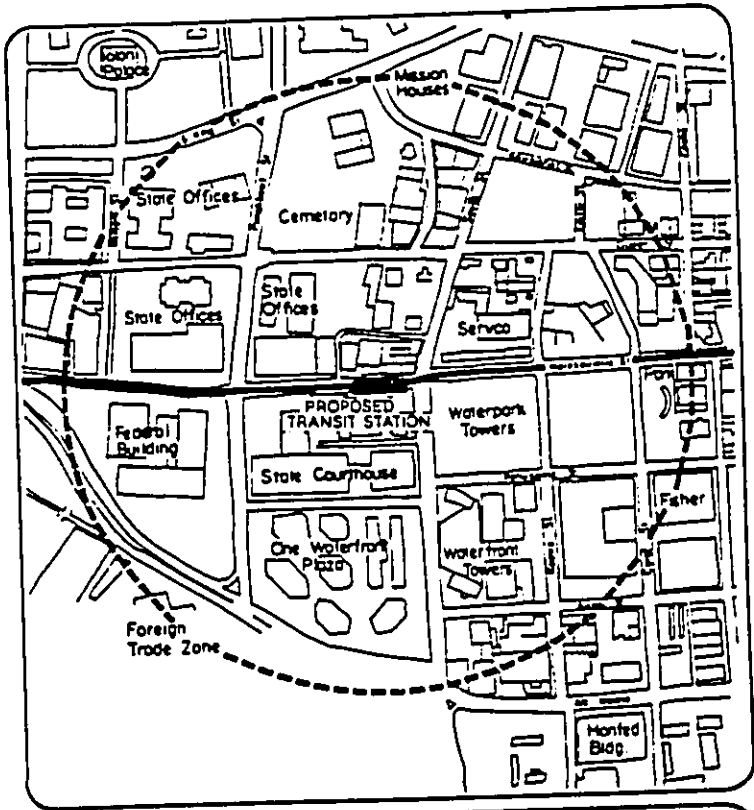
Neal Blaisdell Center. This station, on Waimanu Street at Cummins Street (Figure 5.16), will provide service to functions at the Center and to the surrounding area, which is in high demand for office/retail space. No direct land use impact will be expected. The presence of the proposed station could hasten the pace of redevelopment along Kapiolani Boulevard by potentially reducing parking demand.

Piikoi/Kona. Ewa of Piikoi Street, the station impact area (see Figure 5.17) will be within Kakaako and is subject to HCDA's land use controls and infrastructure program. Development is largely dependent on these infrastructure improvements. Because the major arterials (Pensacola Street, Piikoi Street, Kapiolani Boulevard, and Ala Moana Boulevard) in this area carry high volumes of traffic, the fixed guideway will provide an alternative mode of travel. The station will be compatible with plans for redevelopment in the Kakaako area and along Kapiolani Boulevard. Because a significant amount of land acquisition and removal of existing businesses will be required along Waimanu and Kona Streets, the project will create development opportunities by consolidating small land parcels.

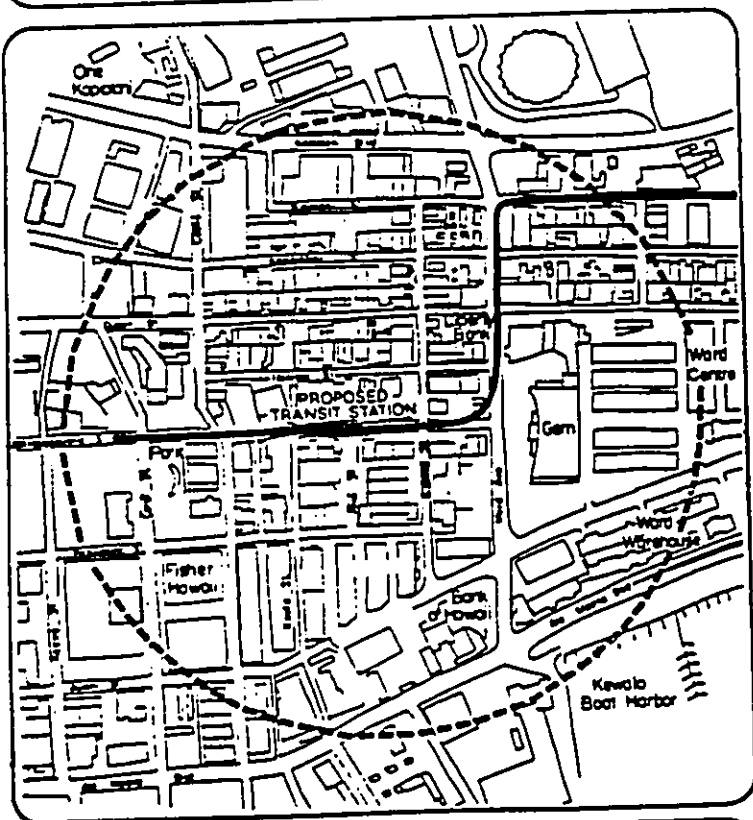
Ala Moana Center. Ala Moana Center is one of the major destinations in Honolulu. The fixed guideway station, located between Keeaumoku and Kaheka Streets (see Figure 5.18), however, probably will have only a slight influence on future land uses. By affording a mode of transportation that does not require parking, the fixed guideway system may enhance the rate of commercial and retail development. The presence of a station will also be compatible with redevelopment along Keeaumoku Street and the proposed expansion of Ala Moana Center.



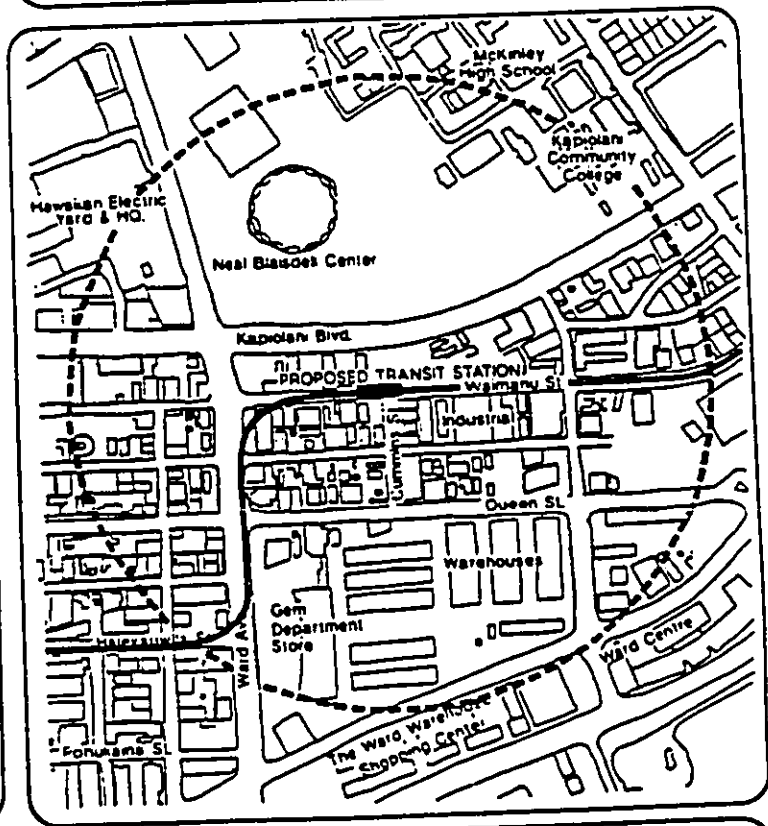
**FIGURE 5.13**  
**NIMITZ/FORT STATION**  
 EXISTING LAND USE & IMPACT AREA  
 HONOLULU RAPID TRANSIT PROGRAM



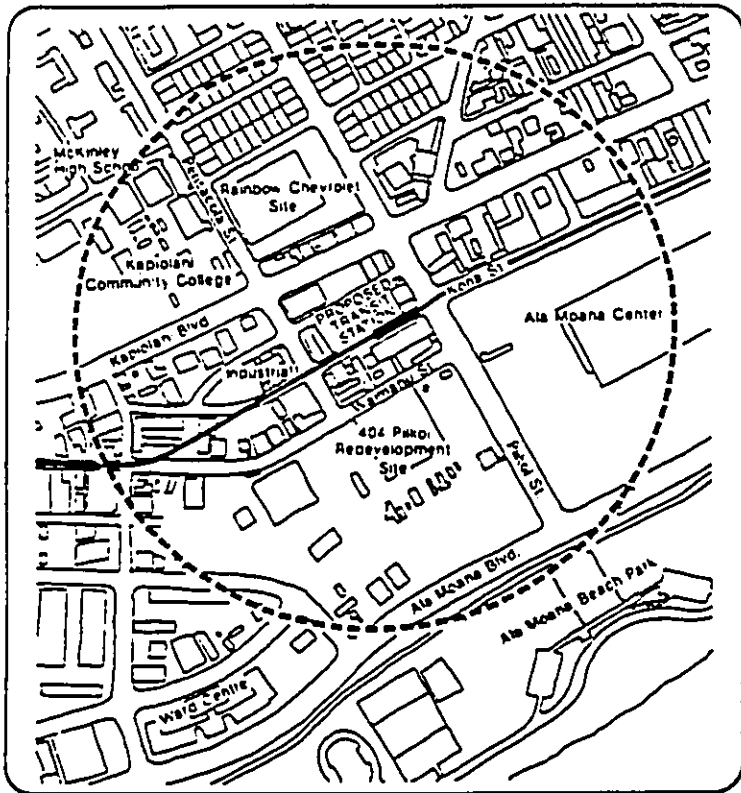
**FIGURE 5.14**  
**HALEKAUWILA/SOUTH STATION**  
 EXISTING LAND USE & IMPACT AREA  
 HONOLULU RAPID TRANSIT PROGRAM

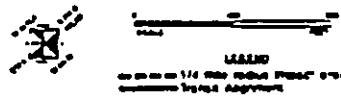


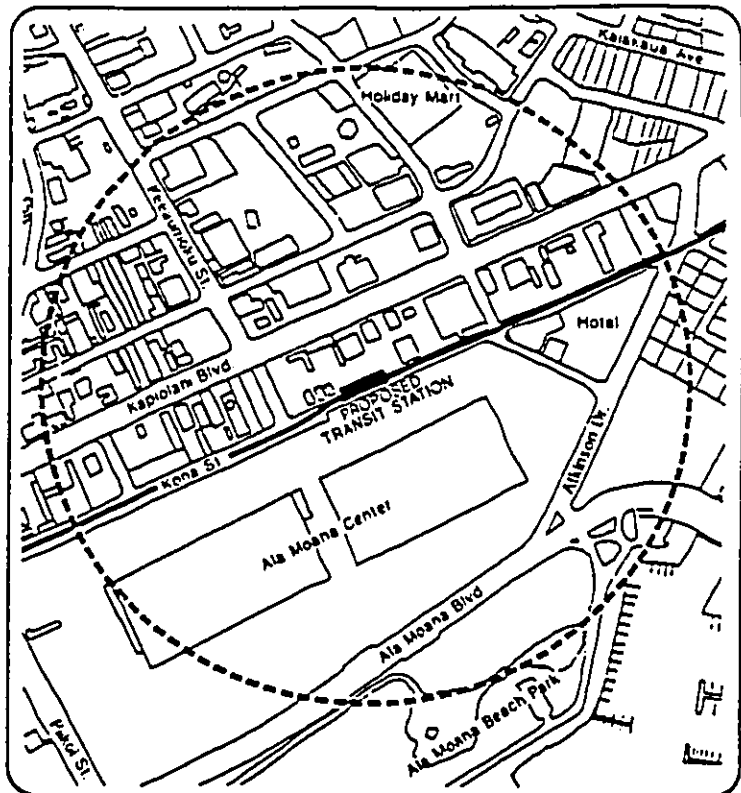
**FIGURE 5.15**  
**HALEKAUWILA/AHUK STATION**  
 EXISTING LAND USE & IMPACT AREA  
 HONOLULU RAPID TRANSIT PROGRAM

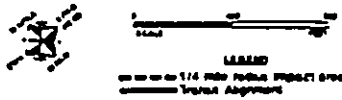


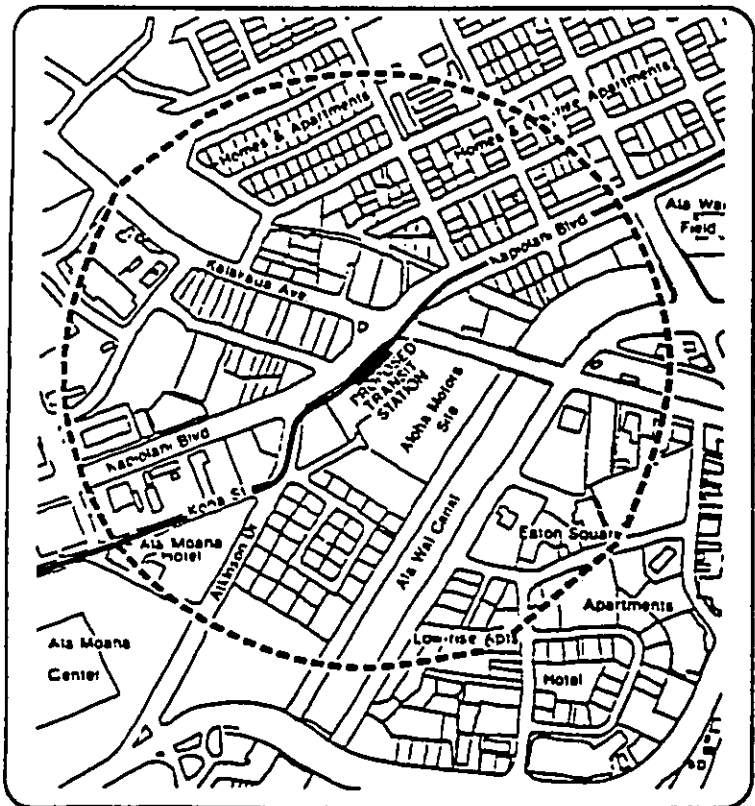
**FIGURE 5.16**  
**NEAL BLAISDELL CENTER STATION**  
 EXISTING LAND USE & IMPACT AREA  
 HONOLULU RAPID TRANSIT PROGRAM

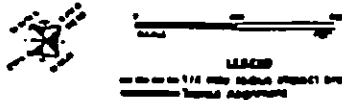


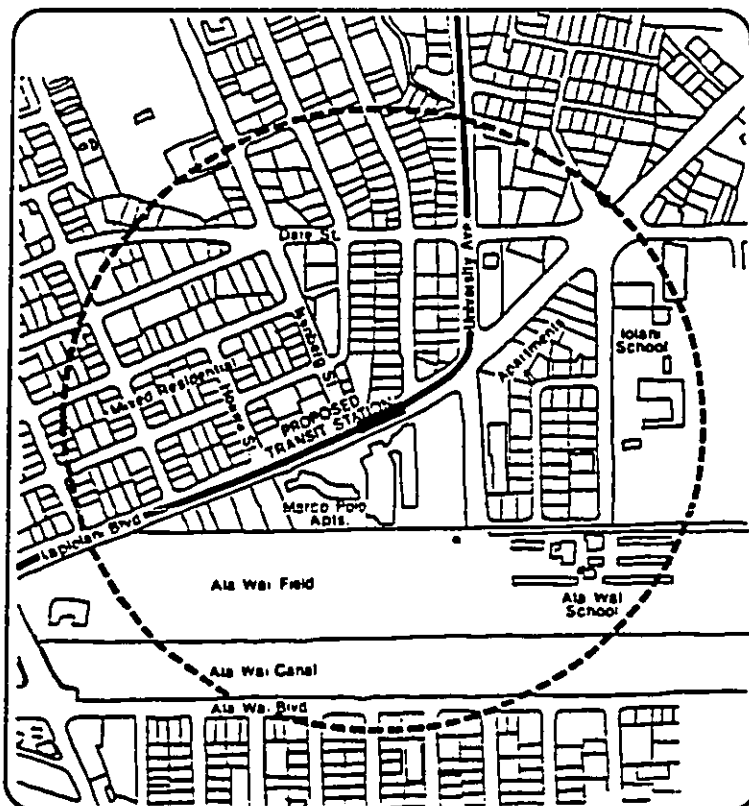

**FIGURE 5.17**  
**PIIKOI/KONA STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM

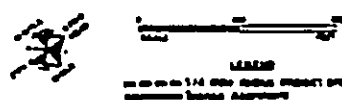



**FIGURE 5.18**  
**ALA MOANA CENTER STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM




**FIGURE 5.19**  
**KALAKAUA/KAPIOLANI STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM




**FIGURE 5.20**  
**ISENBERG STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM

SOURCE: PARSONS BRINCKERHOFF, 1992.

Kalakaua/Kapiolani. This station will be located on Kapiolani Boulevard near its intersection with Kalakaua Avenue, fronting the former Aloha Motors site (Figure 5.19). The Aloha Motors site is currently proposed as a major convention center complex. A good opportunity exists for future joint development, integrating the station with the convention center complex. With or without a future transit station, the immediate area will be developed at higher densities than the present use. Portions of the area are constrained by the small lot ownership pattern, hindering lot consolidation.

#### Section VII - University

The following stations are in Section VII of the amended LPA.

Isenberg. The fixed guideway station in this area of Moiliili (see Figure 5.20) will create a high potential to influence land use, accelerating development in the area, but consistent with land use plans.

University/King. This area is a major community crossroad (see Figure 5.21). Recent trends do not indicate any significant change to the area's low-rise character. As such, a fixed guideway station here may significantly influence future development in the long term in response to improved accessibility.

University/Quarry. This station will serve primarily the University of Hawaii's students and facilities by accessing directly to the Lower Campus (see Figure 5.22). The station is not expected to influence development in the adjacent residential area makai of the University, nor within the University itself. The station will support the proposal of the University for a 10,000-seat arena in the Quarry and will be compatible with the University's Master Plan. Coordination with the University will continue. Although the proposed system will offer an alternative mode of travel, the Department of General Planning indicates that it is unlikely to lead to reduced parking requirements since the University area has long had a severe parking shortage.

#### **5.1.4 Impacts on Services and Tax Base**

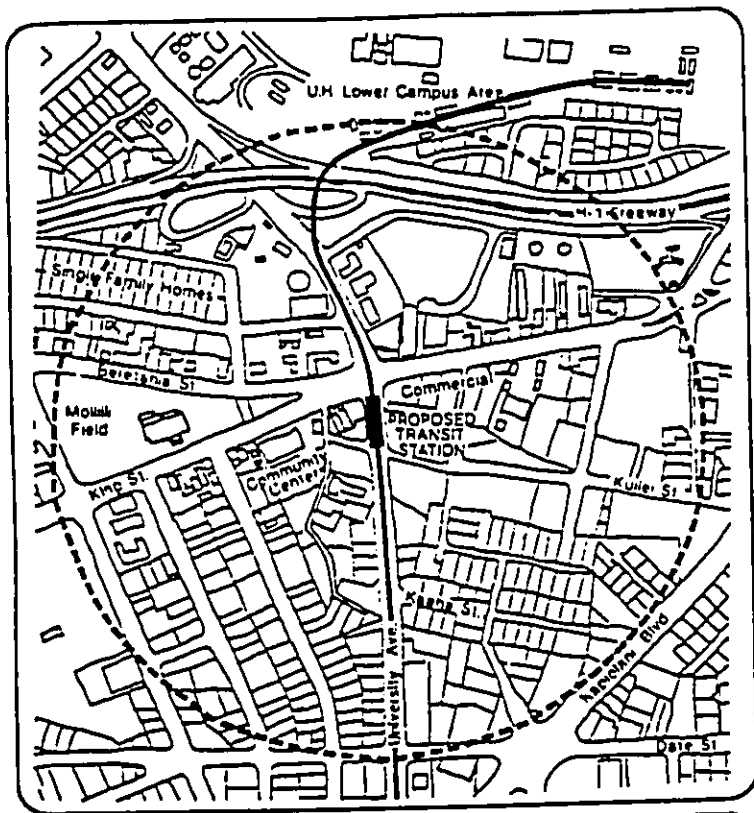
The No-Build and TSM Alternatives would not have any impact on services or tax base.

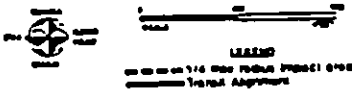
Impacts on Service Infrastructure. Implementation of the amended LPA is unlikely to create direct demands for additional infrastructure investment. Much of the development and redevelopment that is anticipated within the corridor, particularly in the station areas, will occur regardless of whether the system is in place or not. The infrastructure necessary to support that development is largely independent of the amended LPA.

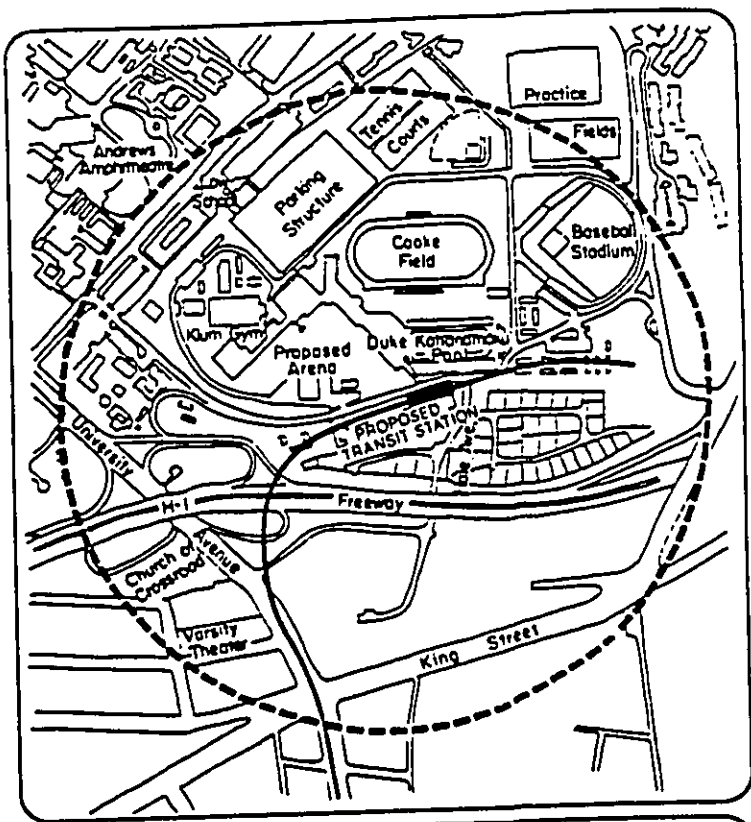
The amended LPA will likely serve as a catalyst for development and alter the implementation time frame, subject to market demand. This is particularly true for those areas like Kakaako where major infrastructure investments are taking place as part of an overall State master plan redevelopment process.

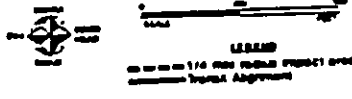
Coordination with the suppliers of utilities indicate that the existing infrastructure can support either the No-Build, TSM, or amended LPA alternatives.

Potential for Joint Development and Value Capture. No committed joint development opportunities exist within the study area. However, several future opportunities emerging in response to market demand may provide the City with the potential to exact financial contributions from both private developments and redevelopment projects being undertaken by the City. Cooperation with the HCDA may result in a number of possible joint development projects.




**FIGURE 5.21**  
**UNIVERSITY/KING STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM




**FIGURE 5.22**  
**UNIVERSITY/QUARRY STATION**  
**EXISTING LAND USE & IMPACT AREA**  
 HONOLULU RAPID TRANSIT PROGRAM

The City does not have an official policy or set of guidelines enabling value capture of joint development projects. Currently, development projects are considered on their own merit and "value" to the general public is recaptured through a process of negotiation and compromise during project design.

The City recognizes the need to identify policies enabling them to take advantage of potential fixed guideway related value capture and joint development opportunities. Under the auspices of an inter-departmental task force, potential new policies for joint development and value capture options and their implications for future financing of the project are being explored.

### 5.1.5 Economic Impacts

Economic and employment impacts from the construction and operation phases of the amended LPA will be experienced throughout the study area. In addition to the direct increases in economic activity associated with construction and operation, secondary impacts also will occur as the project's construction, operation, and maintenance expenditures filter throughout the local economy, generating additional rounds of consumer and business spending. Construction expenditures derived from local sources, such as through an excise tax on local residents and businesses, represent a redirection of consumer spending rather than additional money in the local economy. Thus, there may be a reduction in jobs from other sectors of the economy due to construction of the rapid transit system. Expenditures from non-local sources, such as federal intergovernmental grants and an excise tax on tourists, will create an overall increase in the economic activity of the area.

Construction and operating costs have been estimated for each of the alternatives. This section summarizes the economic impacts, including estimates of the direct impacts of expenditures and employment, as well as indirect economic activity generated by construction, operations, and project maintenance.

*Construction Phase* The City has projected the economic impacts of the rapid transit construction expenditures, adjusting for the effects of the 0.5% General Excise and Use Tax (GET) surcharge and accompanying tax credit for both the five-year rapid transit construction period and the ten-year term of the GET surcharge and tax credit. The results are shown in Table 5.2.

Source	Gross Impacts 5 Years	Net Impacts 5 Years		Net Impacts 10 Years	
	(in 000's 1991\$)	(in 000's 1991\$)	(in 000's YOES)	(in 000's 1991\$)	(in 000's YOES)
Business Receipts	\$2,860,863	\$2,702,462	\$3,218,824	\$2,472,593	\$2,858,775
Personal Income	\$1,217,594	\$1,165,595	\$1,377,791	\$1,094,335	\$1,266,273
Jobs (FTE) <sup>2</sup>	30,319	27,551		23,851	
GET Revenue	\$127,601	\$130,439	\$164,311	\$129,439	\$153,919
Personal Income Tax Revenue	\$66,968	\$64,108	\$76,275	\$60,188	\$69,645

Source: KPMG Peat Marwick, June 1992.

Notes: <sup>1</sup> All values are shown in 1991 dollars and year-of-expenditure (YOE) dollars.

<sup>2</sup> Jobs are shown as full-time equivalent (FTE) employment (i.e., approximately 2080 hours per year).

The substantial contributions of the project to business activity, household income, job creation, and State tax revenues occur primarily during the first five years when the project is being built. The Federal government financial contribution of \$618 million toward the construction of the project represents significant new money coming into the economy increasing business activity, jobs, and household income. The project's economic benefits occur primarily during the years 1993 through 1997 (most heavily during the years 1993 through 1995) -- during a period in which most Hawaii economists project diminished growth in the Hawaii and Honolulu economy. In this sense, then, the rapid transit project is a strong counter-cyclical investment project which will stabilize the economy during a period of diminished economic growth. During the years 1998 through 2003, during which the GET surcharge and tax credit will result in relatively small negative economic impacts, most economists project robust economic growth for the Honolulu and Hawaii economy. Furthermore, the operation and maintenance of the rapid transit project will directly create over 400 FTE jobs per year and will directly and indirectly create over 1,000 FTE jobs per year.

**Operations Phase** The economy of the study area will also experience increased activity as a result of routine operations and maintenance expenditures and employment required for the completed fixed guideway system.

Total bus transit employment is projected to increase from about 1,150 in Fiscal Year (FY) 1992 to about 1,270 in FY 2000 under the amended LPA. Rail operations will employ about 420 persons in FY 2000.

## 5.2 DISPLACEMENTS AND RELOCATIONS

The amended LPA has been planned to follow existing road rights-of-way and take advantage of vacant land parcels to minimize displacements and relocations. Required relocations have been identified based on the level of engineering information developed for this FEIS. Minor amounts of land acquisition or easement acquisition, in most cases consisting of a linear strip 4 to 15 feet wide, will be required at several locations along the alignment.

Table 5.3 summarizes the expected relocation requirements. All relocations will be for business and institutional properties; no residential relocations will be required for the amended LPA. The majority of the businesses and institutions can be relocated because of the type of use and their relatively small size. In some cases, businesses may choose to cease operations rather than to relocate.

Alternative	Acres Required	Businesses/ Institutions Displaced	Number of Structures Affected	Estimated No. of Employees <sup>1</sup> Affected
No-Build	0	0	0	0
TSM	0	0	0	0
Amended LPA	39.8 <sup>2</sup>	55 <sup>3</sup>	31	673

Sources: Parsons Brinckerhoff Quade & Douglas, Inc. field observations, January 1992  
 1990/91 Hawaii Business Directory  
 City and County of Honolulu, Department of Housing and Community Development, phone survey, June 1992

Notes: <sup>1</sup> Estimate based on data from the 1990/91 Hawaii Business Directory.

<sup>2</sup> Includes all right-of-way requirements.

<sup>3</sup> The University area park-and-ride lot would require 1 to 22 additional business displacements, depending on the number and location selected. The University area park-and-ride lot is not part of the amended LPA.



### 5.2.1 Acquisitions

Section I The amended LPA will require the acquisition of the Navy Ewa Drum Storage Site from the Navy to accommodate the Waiawa Station, maintenance facility, and park-and-ride lot. The 43.8-acre Ewa Drum Storage Site is currently owned by the Navy. The property is proposed to be conveyed to the City in exchange for 28.3 acres of City property on the Waiawa Peninsula. This transfer has been authorized by Section 2840 of the National Defense Authorization Act for Fiscal Years 1992 and 1993 (Public Law 102-190).

Although the City no longer used as a sewage treatment plant (STP), tanks and other structures remain on the property. The federal legislation requires the City to study both the STP site and the Ewa Drum Storage Site to ascertain the presence of hazardous substances. If such substances are found, the Navy will be responsible for the cost of cleaning up the Ewa Drum Storage Site and the City will be responsible for the STP site.

Additionally, the City is required by the legislation to pay for the cost of the demolition and removal of the STP facilities and for the cost of road access improvements to the site, including a new bridge across Waiawa Stream. The City also must pay the Navy if there is any difference in the excess value of the Ewa Drum Storage Site as compared to the STP site with the required improvements. The City and the Navy are negotiating a formal Memorandum of Agreement regarding the property transfer. A separate document will be prepared addressing the environmental impacts of the land swap, including the *demolition of existing structures on the STP site and roadway/bridge construction.*

After the property transfer has been effected, the STP site will be subject to redevelopment by the Navy. The Draft Pearl Harbor Complex Master Plan (October 1991) shows that the site would be used in the future for fuel storage. This site will become the Pearl City Fuel Annex and would be the site for the replacement of deteriorated fuel tanks at other locations in the Pearl Harbor complex. These improvements are in the Capital Improvement Plan for the Navy Supply Center Pearl Harbor but are not currently programmed in a specified fiscal year.

Discussions with the Navy in February 1992 indicate that other uses for the site may be considered, including housing. Once the planned improvements have been formalized and programmed, they will be the subject of additional environmental documentation to be prepared by the Navy.

The amended LPA guideway will affect one West Oahu College building and require 0.46 acre. West Oahu College (part of the University of Hawaii) will be moved to a permanent location to be determined. A small portion of right-of-way (0.13 acre) will be needed once the guideway crosses the H-1 Freeway.

Section I Mauka of Kamehameha Highway, construction of the Pearl City Station will require acquisition of a small portion of the Pearl City Shopping Center parking lot, *eliminating approximately 20 parking spaces.* The station will also require acquisition of a small portion of property on the makai side of Kamehameha Highway.

Mauka of Kamehameha Highway, the Pearlridge Station will require acquisition of approximately 15 private parking spaces. On the makai side, approximately 38 private parking spaces will be taken.

Since the guideway throughout most of Section I will be located in the median of Kamehameha Highway, additional right-of-way for the guideway will not be required.

Section II The construction of the guideway along Kamehameha Highway fronting the Aloha Stadium Station will touch down in the existing overflow stadium parking area. The overflow parking area contains approximately 1,000 parking stalls. After construction of the Aloha Stadium Station, the parking area will provide 750 parking stalls to be used by mass transit riders during the work week and for stadium patrons

during non-work hours and weekends. An additional 80 parking stalls will be reserved at all times for mass transit patrons.

The amended LPA will require easements for small portions of Navy-owned property for the Arizona Memorial Station (approximately 0.23 acre) and the Makalapa Gate Station (0.17 acre). The Arizona Memorial property is presently used as an unimproved overflow parking lot for buses serving the Memorial and Visitors Center. The property acquisition is equivalent to approximately four bus parking spaces. The Makalapa Gate Station will require an easement from the Navy, taking approximately five parking stalls, but will not affect any structures.

Right-of-way acquisition is required makai of Nimitz Highway, from just Ewa of Elliot Street to approximately Koko Head of the Main Post Office, to accommodate the Airport Station. A small strip of right-of-way fronting Nimitz Highway will be required from Rodgers Boulevard to the Lagoon Station. Some private parking along Nimitz Highway will be required for the column placements.

The amended LPA will require two parcel acquisitions to accommodate the Lagoon Station and its park-and-ride lot near the intersection of Nimitz Highway and Lagoon Drive. The two parcels contain one car dealer and parts business. Approximately 0.12 acre will be required from Keehi Lagoon Beach Park for a column and aerial guideway right-of-way. Right-of-way acquisition will also be required from the Disabled American Veterans (DAV) property along its mauka boundary.

Section III The station support columns and vertical circulation elements for the Dillingham Plaza and Honolulu Community College Stations will require property acquisition but will not displace any businesses. Approximately 0.71 acre will be acquired along Dillingham Boulevard from Koko Head of Puuhale Road to just Koko Head of Ala Kawa Street.

Section IV The amended LPA will require the acquisition of five businesses in the Iwilei Industrial Park to accommodate the guideway and Kaaahi Station.

The Nimitz/Smith Station requires an easement through one City-owned parcel, acquired as part of the Smith-Maunakea development, between Smith Street and Maunakea Street on Nimitz Highway's mauka side.

A 0.36-acre right-of-way will be needed between Halekauwila Street/Richards Street and the Halekauwila/Ahui Station. The Halekauwila/Ahui Station will displace two businesses on Halekauwila Street, Ewa of Ahui Street. A 0.02-acre right-of-way will be acquired between the Halekauwila/Ahui Station and the Ward Avenue intersection.

One building will be acquired at the mauka corner of Halekauwila Street and Ward Avenue as the alignment turns mauka onto Ward Avenue. The building currently provides space, including parking, for four businesses.

At Ward Avenue and Waimanu Street, the guideway will require two parcels of property, displacing five businesses.

Section V Acquisition of 11 parcels, containing 18 businesses, will be required to accommodate the guideway through this area. As the alignment continues Koko Head the Honolulu Gas Company will also need to be relocated. Three parcels also will be required to accommodate the Piikoi/Kona Station. These three parcels have a total of nine businesses, six of which will be displaced by the proposed station. Right-of-way will be required along portions of the parcels on Waimanu and Kona Streets.

The amended LPA will require acquisition of three businesses on the mauka side of Kona Street. Four businesses on two parcels will be acquired near the intersection of Kona Street and Atkinson Drive.

One business will be displaced as a result of the construction of the Kapiolani/Kalakaua Station.

Section VII Additional right-of-way will be needed to accommodate the vertical circulation elements of both the Isenberg and University/King Stations and to provide feeder bus access at the University/King Station. A single parcel, accommodating 18 businesses with an approximate total of 124 employees, is required to accommodate the University/King Station.

The guideway through the University/Quarry area will be parallel to Lower Campus Road within the University's boundaries. Several portable University buildings will be temporarily relocated to accommodate the fixed guideway and University/Quarry Station. These will include the ROTC classrooms and several administrative buildings. The *Speech Pathology and Audiology* building will also be permanently relocated. There is ongoing coordination with the University regarding their Master Plan, including integration of the station with the proposed arena.

Land will have to be acquired at any of the alternative park-and-ride lot locations. At the Varsity Theater location a commercial parking lot will be displaced. At the University Avenue/King Street location 20 small businesses on a single parcel will be displaced. Selection of the Oasis location will result in the need to displace one business.

### **5.2.2 Relocation Assistance Program**

Since the project is proposed to use federal funds, it will be subject to 49 CFR, Part 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs. Within the City, the Department of Housing and Community Development administers the relocation program. Under the federal rules and regulations, probable relocation benefits for the businesses displaced are summarized in the following paragraphs and reflected in the capital cost estimates.

Businesses and Non-Profit Organizations Moving expenses will be reimbursed for all actual and reasonable expenses incurred in moving, whether by professional mover or by the displacee. Proof of expense will be required. Alternatively, in lieu of this reimbursement, businesses that meet certain qualifications can elect an optional payment, which will be an amount equal to the average annual net earnings, before taxes, of the business for the last two tax years, not less than \$1,000 nor more than \$20,000. Not-for-profit organizations may elect for a fixed payment, equal to the average net income after expenses for 2 years, not to exceed \$20,000, but at a minimum of \$1,000. The displacing agency is required to assist the displacee of a non-profit organization in locating a suitable new location. This requirement does not necessitate that the displacing agency find a new location for the displacee but rather assist the displacee as best it can.

Residential Relocations Although no required residential displacements have presently been identified for the amended LPA, federal and municipal residential relocation assistance programs are available and will be applicable should any residential use of the affected buildings be identified during subsequent project phases.

### **5.3 NEIGHBORHOODS**

The study area includes 20 major neighborhood areas, as defined in Section 3.1.7.1. The amended LPA will serve all of these neighborhoods. The amended LPA will pass directly through the following nine neighborhood areas: Waipahu, Pearl City, Aiea (includes Pearlridge community), Airport, Kalihi/Palama, Downtown (includes Chinatown), Ala Moana/Kakaako, McCully/Moiliili, and Manoa.

### **5.3.1 Barriers To Social Interaction**

The No-Build Alternative in itself would not impose additional barriers to social interaction or community functioning. However, the No-Build Alternative could result in increased traffic congestion, and its resultant access and mobility restrictions. The increased bus volumes associated with the TSM Alternative would not impose any new barriers to social interaction throughout the study area.

The amended LPA will not present barriers to social interaction because (1) the guideway will follow existing streets and highways that presently create corridors within, or boundaries between, neighborhoods and (2) the guideway is elevated and will not significantly hinder pedestrian or vehicular access, or social travel patterns. The guideway will have no adverse impact on social interaction or community cohesion in the neighborhoods.

The guideway and stations, although not creating a barrier to social patterns or interaction, may be perceived as a visual intrusion in the neighborhoods of Kalihi-Palama and McCully/Moiliili.

### **5.3.2 Pedestrian and Bicycle Travel**

The No-Build Alternative would affect pedestrians and bicyclists as increased traffic volumes on through streets and congestion at intersections exacerbate the potential for conflict between motorized vehicles and pedestrians and bicyclists. The TSM Alternative would have a minor impact on pedestrian and bicycle travel, resulting from increased bus volumes on streets.

Because the fixed guideway will be fully grade-separated and elevated, in general, pedestrian movement within or between the neighborhoods will not be deterred. The introduction of physical medians and/or channelized pedestrian crossings and facilities will improve safety on many streets within the fixed guideway corridor. Pedestrian access from the street level to the station platforms and/or mezzanine will be provided by a combination of elevators, escalators, and stairs and meet the requirements of the Americans with Disabilities Act (ADA). These structures at the Pearl City and Pearlridge Stations will serve the dual purpose of providing station access and providing a 24-hour grade-separated crossing of streets. Because provision of pedestrian overpass connections to stations also will provide an alternative to at-grade crossing of streets for those stations with access on both sides, pedestrian movements may be enhanced.

The fixed guideway will produce no adverse impact on established bike lanes or trails. Reduction of lane widths associated with expansion of medians to accommodate the guideway and stations may increase competition for roadway lanes on Dillingham Boulevard and University Avenue.

*The City is considering allowing bicycles to be transported on the rapid transit system. Whether or not they will be permitted and what restrictions, if any, will be imposed is an unresolved issue at this time.*

### **5.3.3 Safety and Security**

Since the TSM Alternative involves an expanded bus operation with HOV provisions, the safety and security measures and procedures currently in use by TheBus would continue to apply to this alternative.

Because the fixed guideway will be physically separated from vehicle and pedestrian traffic, it will not deter from the safe operation of streets and sidewalks, nor will its operation be jeopardized by street level activity. At-grade pedestrian crossings of streets at stations will be designed in accordance with the City's traffic engineering guidelines and recommended practice. The fixed guideway stations will interface with the feeder bus facilities, streets, and sidewalks. The stations will be designed to be well-lit to minimize areas of low visibility and to discourage loitering.

The safety and security of the fixed guideway system will be enhanced through an operations plan that includes a fulltime transit security force to patrol both stations and trains, and system-wide closed-circuit television (CCTV) camera surveillance. While the exact security staffing and operations plan for the proposed system has not yet been developed, typically existing rapid transit systems are staffed for the duration of daily operations. Camera surveillance will monitor pedestrian activity and fare equipment at all stations. Breaches of security or safety will be reported directly to transit security force personnel or to the local police force.

*The City is working in cooperation with the Navy to develop station designs for the Arizona Memorial and Makalapa Gate Stations that will assure compliance with physical security requirements. The design drawings for the Arizona Memorial and Makalapa Gate Stations will be subject to Navy approval.*

*The primary means of preventing stray currents will be to electrically isolate the mainline running rails. The system will use insulated positive and negative power rails. The positive power distribution circuit will have a minimum effective in-service resistance to earth of at least one million ohms (electrical resistance =  $V \cdot A^{-1}$ ) per 1,000 feet. The negative system in each propulsion power substation will be isolated from ground and all negative cables will be insulated at the same level as the positive cables. The combination of these design features and the high electrical resistance between the elevated guideway and earth ground will reduce the incidence of stray current migration to less than the minimum acceptable level of 0.5 amperes per 1000 feet.*

*Each substation will have stray current test and drainage facilities. Test facilities will also be provided on all electrically bonded system structures to permit measurement and monitoring of stray currents. The System Contractor will be required to demonstrate compliance with the stray current prevention requirements during system acceptance prior to the initiation of system operation. In addition, the Contractor will monitor stray currents during the ongoing operation of the system and mitigate if necessary as part of the Operations and Maintenance Contract.*

#### **5.3.4 Community Facilities and Services**

The No-Build and TSM Alternatives would not have any direct effect on community facilities, businesses, and services. The TSM Alternative, at the local neighborhood level, would involve increased bus activity on streets that are currently well travelled. Increased bus activity would not impact community facilities and services along those streets.

Section I: Because the guideway will be located within the median of Kamehameha Highway, generally without disrupting the adjacent land uses, no impact on community facilities, including schools and churches, will occur. Leeward Community College will be moderately positively affected since its students, faculty, and employees will have an alternative travel mode to the college. Although in proximity to Aiea Cemetery in the triangular space between highway ramps Ewa of Aloha Stadium, the proposed guideway will remain within the right-of-way of Kamehameha Highway and will not encroach on the cemetery.

Section II: *The amended LPA will provide improved access to the Honolulu International Airport and Aloha Stadium.*

Section III: Positive impacts on Honolulu Community College are expected because transit travel times to the Kalihi/Palama area will be reduced and, hence, transit accessibility will improve.

Section IV: The amended LPA will improve transit accessibility to some of the government buildings and services Downtown.

Section V: Accessibility to the Neal Blaisdell Center will improve with the amended LPA.

Section VII: No impacts on community facilities along Kapiolani Boulevard or University Avenue will likely result from the fixed guideway since it will be located in the median of those two streets. Several

University buildings will require relocation; however, there will be increased accessibility to the University as a result of the location of the University/Quarry Station.

#### 5.4 VISUAL AND AESTHETIC RESOURCES

The existing sensitive visual resources are identified in Sections 3.4 (Visual and Aesthetic Resources) and 3.1 (Land Use).

This phase of impact identification and recommended mitigation is part of a larger ongoing process that began with analyses of earlier transit alignment alternatives. The sensitive resources identified here were important factors considered in the design and definition of the fixed guideway route and station locations.

##### 5.4.1 Description of Fixed Guideway System

The elevated fixed guideway system will present a structural addition to the visual environment. Typically, the support columns will be approximately four feet by six feet. The curved guideway shape, 25 feet in width, will be characterized by a uniform natural concrete color and texture. Typical guideway units are designed around span lengths of 180 feet. The spacing will be flexible in order to maintain driveway access and take advantage of location opportunities. Maximizing the span length will reduce the intrusion of support piers along the alignment.

Each station consists of two 90-foot spans supporting two-vehicle platforms 190 feet in length. This two-span design is less obstructive than other earlier designs showing four- and five-span arrangements. The stations will be designed to be functional and will have architectural characteristics appropriate to the surrounding neighborhood. Stations will be simple and streamlined. *Design elements such as landscaping and surface treatments relating to the area adjacent to the station will be incorporated into the final station design.*

##### 5.4.2 Analysis of Significant Visual Changes

While an aerial fixed guideway will introduce a new visual element to any landscape, the degree of impact depends on the existing aesthetic quality, topography, and land uses of the affected area. Generally, when the aerial structure is within the right-of-way of a major highway in an industrial or undeveloped area, as it will be through much of the corridor Ewa of Iwilei Road, the visual impacts will be minor. Even if there is a significant visual resource such as a distant mountain view, the aerial guideway likely will not cause noticeable adverse effects. *Koko Head of Iwilei Road, the visual impacts will be more noticeable as the alignment traverses through the Downtown on Nimitz Highway adjacent to the waterfront.* The aerial structure generally will be 20 to 40 feet above grade. Motorists' views from roadways of the visual resources will only be slightly impaired by the standard, side-by-side, twin-track configuration (25 feet wide). Scenic views, sensitive residential areas, and public parks are all more sensitive to the visual and aesthetic disturbances of an aerial guideway *and are discussed in more detail in the following paragraphs.*

The aerial guideway will create new view opportunities for the system's riders. Throughout the corridor, the rider will have relatively unobstructed makai and mauka views not available to pedestrians and motorists today, particularly Ewa of Downtown. In particular, the guideway will offer good views of Pearl Harbor and the Arizona Memorial. Within the Downtown area, the elevated guideway will provide positive views for the transit rider.

The No-Build and TSM Alternatives would not have any impact on existing visual resources. Detailed analysis of visual impacts of the amended LPA by segment is included below. For additional discussion of the visual impacts of the other fixed guideway alternatives considered, refer to Section 5.4 in the AA/DEIS.

Section I - Waiawa to Aloha Stadium The most sensitive views identified in this section are from the motorist's perspective and focused on the Waianae and Koolau mountain ranges. Specific viewpoints are from Ala Ike Street and Kamehameha Highway, in the vicinity of Pearl Harbor across from Neal Blaisdell Park, and across from the Richardson Recreation Center.

The residential communities of Pearl City, Aiea, and Pearlridge are separated from the highway and the elevated fixed guideway by commercial-strip and light-industrial development. The fixed guideway will not obstruct views of the distant mountains either for the motorists or the residents of adjacent communities. Near Ala Ike Street where the guideway will cross above the H-1 Freeway, the distant mauka views will not be significantly affected. The tall apartment buildings that currently have views of Pearl Harbor also will be unaffected by the guideway.

Section II - Aloha Stadium to Keehi Interchange The amended LPA will pass through a mixture of land uses, both military and civilian. Because residential areas are set well back from the highway, and land use on the makai side of the H-1 Freeway is generally airport-related and industrial, visual impacts will be minimal in this section. *Views of the harbor from Aloha Stadium will not be affected.*

Section III - Keehi Interchange to Iwilei Residential areas are predominantly located in the portion mauka of Dillingham Boulevard; the industrial and commercial areas are largely makai of Dillingham Boulevard. The sensitive views of the Koolau mountain range from the residential area will, therefore, not be affected by the guideway.

The Kamani trees on the mauka and makai sides of Dillingham Boulevard near Honolulu Community College will have to be significantly trimmed, and in some cases removed, to afford adequate clearance for the guideway and the Honolulu Community College Station (see Figures 5.23 and 5.24). Since the mature trees provide a distinctly positive visual relief and cohesion to the mixed industrial, commercial, and residential area, trimming or removal will constitute an adverse impact. Mitigation for this impact will be to avoid the trees as much as possible in final design and in station areas, to try to incorporate them into the station design, while still providing necessary clearance for the operation and maintenance of the transit system. Mitigation also will include planting additional trees as part of the project landscaping.

Section IV - Downtown/West Kakaako The Kaaahi Station and guideway will be located adjacent to the proposed Liliha Civic Center, Ewa of the OR&L Station. Impacts to this historic resource are discussed in Section 5.10. The alignment continues through an active industrial section of Honolulu. The amended LPA then follows the wide Nimitz Highway (see Figures 5.25, 5.26, 5.27, and 5.28) along the harbor.

Although the alignment within Nimitz Highway will pass through the makai edge of the Chinatown Historic District and be adjacent to the Merchant Street Historic District, the visual impact on the historic features of both of these districts will be minimal. Impacts to these historic districts are discussed in Section 5.10. *The State Historic Preservation Officer (SHPO) and the Advisory Council for Historic Preservation (ACHP) will review the final design of the guideway and stations relevant to historic districts and buildings.*

*The guideway alignment also passes along the makai portions of two special districts as it traverses the Central Business District (CBD). These districts are the Chinatown Special District and the Hawaii Capital Special District. Within each district, prominent views have been defined in the Land Use Ordinance (1990). For the Chinatown Special District relative to the guideway, makai views from both Maunakea Street and Nuuanu Avenue have been designated prominent views. In the Hawaii Capital Special District relative to the guideway, prominent views include the following:*

- *Millilani Street and Mall between Halekauwila and King Streets;*
- *Punchbowl Street between Beretania Street and Ala Moana Boulevard;*
- *South Street between King and Pohukaina Streets; and*
- *Richards Street between Halekauwila and Beretania Streets.*

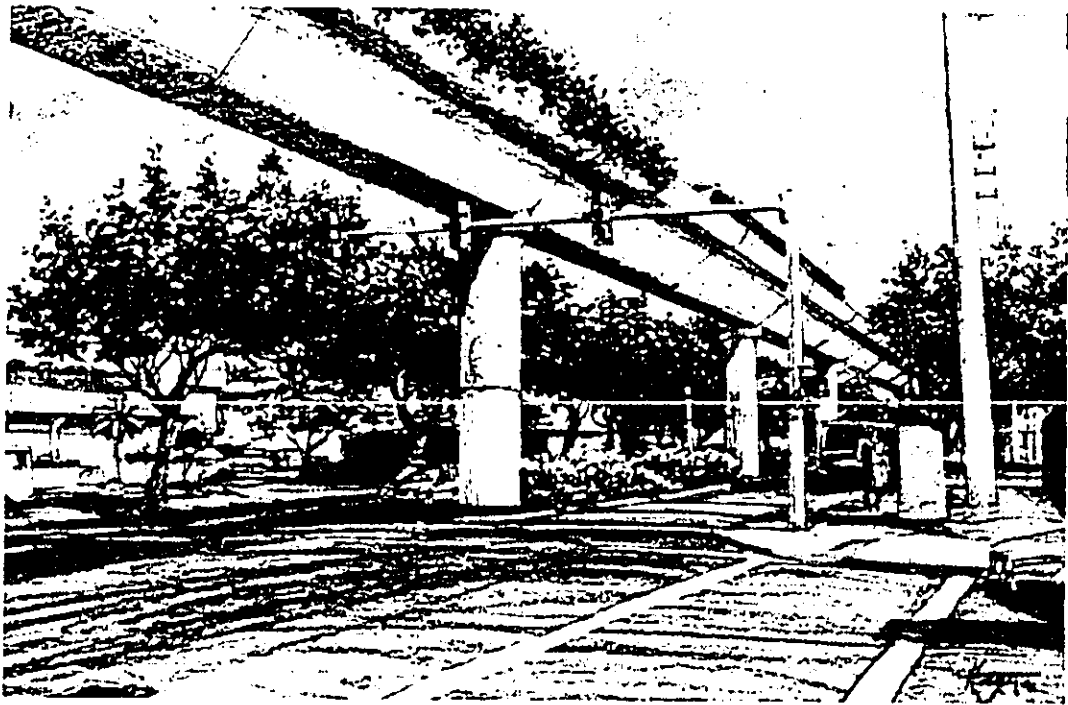


SOURCE: ICF KAISER ENGINEERS, 1992.

**FIGURE 5.23**

**EXISTING VIEW DILLINGHAM BOULEVARD  
AT HONOLULU COMMUNITY COLLEGE  
LOOKING KOKO HEAD**

**HONOLULU RAPID TRANSIT PROGRAM**



SOURCE: ICF KAISER ENGINEERS, 1992.

**FIGURE 5.24**

**PROJECTED VISUAL CHANGE DILLINGHAM BOULEVARD  
AT HONOLULU COMMUNITY COLLEGE  
LOOKING KOKO HEAD**

**HONOLULU RAPID TRANSIT PROGRAM**





SOURCE: ICF KAISER ENGINEERS, 1992

FIGURE 5.25

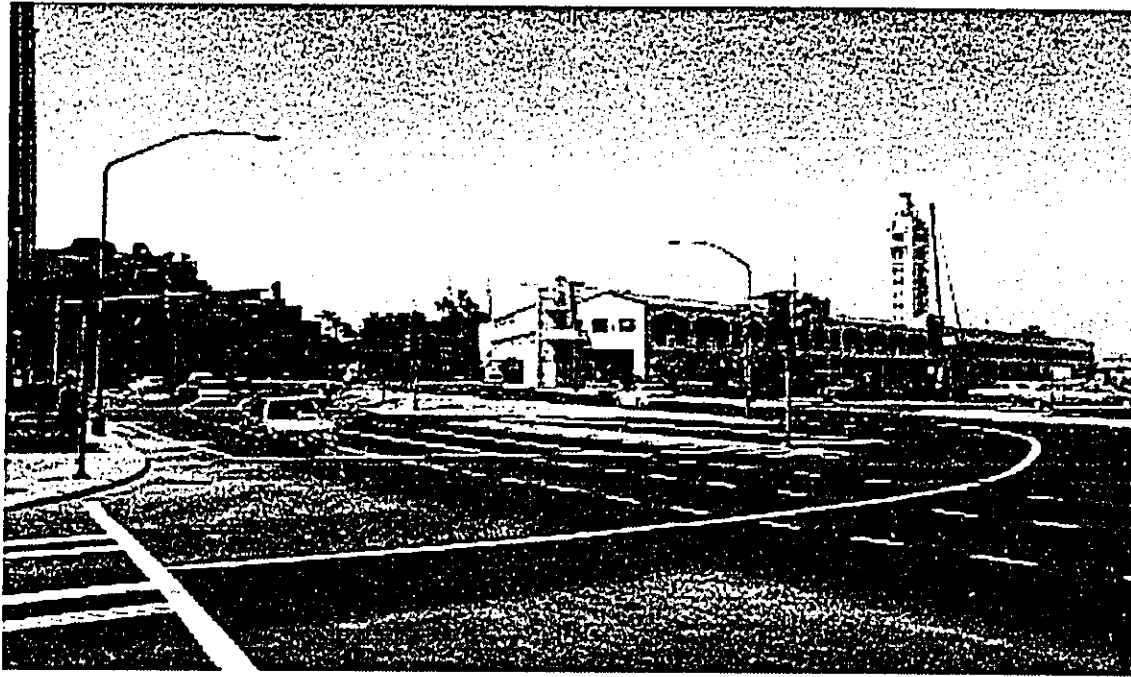
EXISTING VIEW NIMITZ HIGHWAY  
AT BISHOP STREET LOOKING EWA  
HONOLULU RAPID TRANSIT PROGRAM



SOURCE: ICF KAISER ENGINEERS, 1992

FIGURE 5.26

PROJECTED VISUAL CHANGE NIMITZ HIGHWAY  
AT BISHOP STREET LOOKING EWA  
HONOLULU RAPID TRANSIT PROGRAM

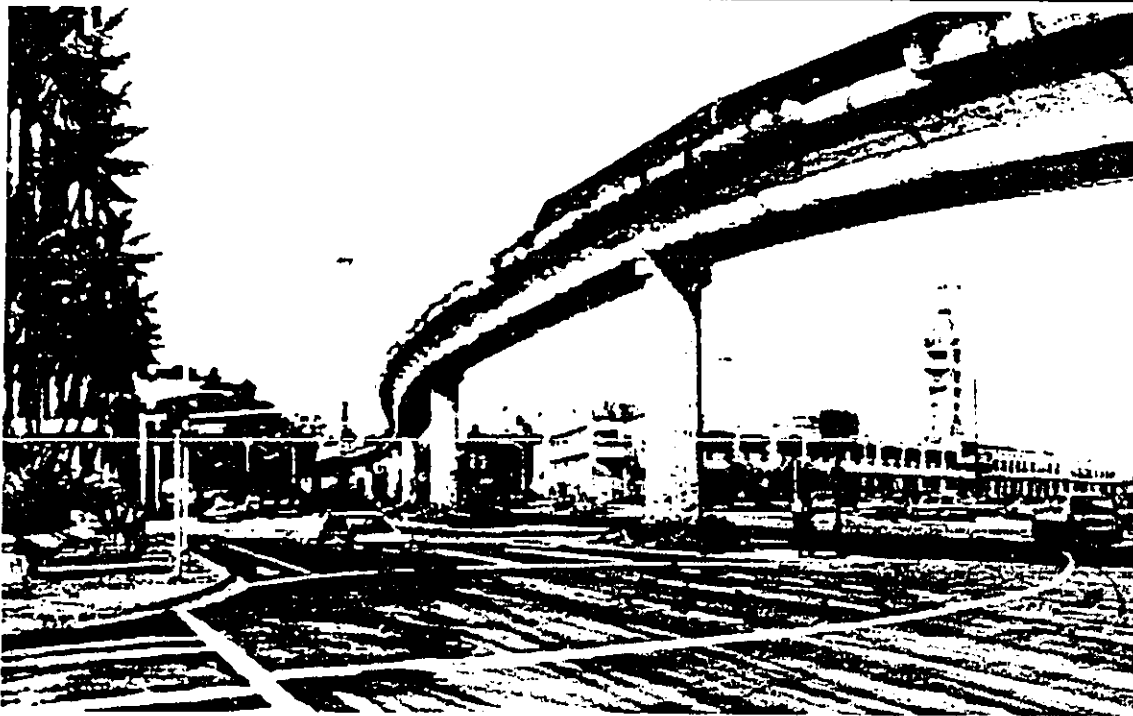


SOURCE: ICF KAISER ENGINEERS, 1992

FIGURE 5.27

EXISTING VIEW NIMITZ HIGHWAY  
AT NUUANU AVENUE LOOKING KOKO HEAD

HONOLULU RAPID TRANSIT PROGRAM



SOURCE: ICF KAISER ENGINEERS, 1992

FIGURE 5.28

PROJECTED VISUAL CHANGE NIMITZ HIGHWAY  
AT NUUANU AVENUE LOOKING KOKO HEAD

HONOLULU RAPID TRANSIT PROGRAM

*Although the guideway has been designed to minimize the visual impacts, it will be visible looking makai along the view corridors and partially obstruct views (see Figures 5.29 and 5.30). Design elements to minimize visual impacts include maximizing column spacing and size, minimizing guideway size and landscaping the median and including planters on the guideway within 200 feet of the stations.*

The stations have been sited to avoid use of any of the designated corridors.

The Nimitz/Smith Station will be located such that it avoids the Maunakea Street intersection but extends into the Smith Street intersection. The guideway's straddle bents and columns will be placed away from the intersections to minimize disruption of the view corridor. The City is coordinating the design of the Nimitz/Fort Station with the Aloha Tower Development Corporation. The effect on Walker Park and Irwin Park is described in Section 5.11.

Kakaako is a mixed-use, industrial neighborhood with a similarly diverse visual character. The visual impact on the setting of Mother Waldron Park is discussed in Section 5.10. The Kakaako Community Development District Plan (1982) designated several streets as view corridors, including Punchbowl Street, South Street, Cooke Street, and Ward Avenue. The alignment will affect all of these views to some degree. The guideway likely will have a positive visual effect on the industrial Waimanu, *Halekauwila*, and Kona Streets, where the existing visual character is not aesthetic.

Section V - East Kakaako to Kalakaua/Kapiolani To accommodate the guideway structure, several buildings will have to be removed on the mauka side of both Waimanu and Kona Streets. Given the existing deteriorated condition of many buildings used for light industrial and automotive-related activities on these streets, the elevated guideway and any associated redevelopment will not have a negative effect on the area.

Kona Street, through the Ala Moana Center, functions as a de facto bus transfer station. In addition to the heavy bus activity on the street, pedestrian access from Kona Street to the shopping center is through a vast parking area, punctuated by parking deck support columns and ramps leading to the multi-level parking decks above. The introduction of an elevated transit guideway will be visually compatible with the existing environment.

The monkeypod trees on Kapiolani Boulevard are a sensitive visual resource. The Kalakaua/Kapiolani Station will require removal of a few trees on the makai side of the street, constituting a minimal, localized adverse impact that will be mitigated through landscaping. The general visual quality of the tree-lined boulevard will not be significantly altered.

Section VII - University While the guideway will not significantly affect distant views at Kapiolani Boulevard and Isenberg Street, the removal of selected monkeypod trees along the makai side of Kapiolani Boulevard at Kalakaua Avenue and within the Kapiolani Boulevard median from McCully Street to University Avenue is considered a significant adverse impact because of the positive visual cohesion the trees add to the area. The guideway and stations will be designed in such a manner as to minimize the number of trees affected and the landscaping plans include *some* restoration of trees *that will be determined during final design*.

Because of the distance from Ala Wai Park and the Ala Wai Park Clubhouse to the guideway, impact on the park's visual environment will be minimal. See discussion in Sections 5.10 and 5.11.

University Avenue is surrounded by low- and medium-scale residential development makai of the H-1 Freeway. In this area, overhead utilities and street lighting also characterize the local street vista. The guideway will not have an adverse visual impact on the streetscape.



SOURCE: ICF KAISER ENGINEERS, 1992.

**FIGURE 5.29**  
**EXISTING VIEW AT**  
**FORT STREET MALL FROM KING STREET LOOKING MAKAI**  
**HONOLULU RAPID TRANSIT PROGRAM**



SOURCE: ICF KAISER ENGINEERS, 1992

**FIGURE 5.30**  
**PROJECTED VISUAL CHANGE AT**  
**FORT STREET MALL FROM KING STREET LOOKING MAKAI**  
**HONOLULU RAPID TRANSIT PROGRAM**

### 5.4.3 Mitigation

To minimize visual intrusion and proximity effects, urban design elements *reflecting the adjacent neighborhood's character* will be incorporated into the station design. *Community Advisory Committees are meeting with the station architects and the City to provide input into the design.* The guideway, although visible, has been designed *by the System Contractor* to minimize visual impacts through the following: the support columns will typically be four feet by six feet; the curved guideway shape, 25 feet in width, will be characterized by a uniform color and texture; typical guideway units are designed to span lengths of 180 feet; and maximizing span lengths reduces intrusion of support piers along the alignment.

Landscaping will be incorporated into the design of the amended LPA. *Highway medians will be landscaped in accordance with the RFP drawings with Singapore Plumeria and Dwarf Hibiscus, with Wedelia as ground cover below. The guideway will have planter boxes with Miss Manila Bouganvillea within 200 feet of the stations. Each station will be landscaped. Exact landscape materials will be determined by the station designers.* Landscaping has been included in the cost estimate for the project. Interested City agencies and the public will be encouraged to review the proposed landscaping plans and provide input.

## 5.5 AIR QUALITY

A complete description of the air quality study conducted for this project is contained in a separate technical report, supporting the AA/DEIS, SDEIS, and this FEIS. The following is a summary of the results.

### 5.5.1 Mesoscale Analysis

Projected 1995, 2000, and 2005 daily vehicle miles traveled (VMT) for Oahu were provided by the City, Department of Transportation Services, for the No-Build, TSM, and fixed guideway alternatives assessed in the AA/DEIS. The analysis in the AA/DEIS showed very little difference in emissions between alternatives based on the VMT and projections of population and employment. Because the differences in emissions were slight, and the changes in VMT, population, and employment forecasts prepared since the AA/DEIS was published are relatively minor, the same analysis is used in this FEIS. An average increase over the 10-year period of 34 to 36% in daily automobile VMT on Oahu is expected. The amended LPA will result in a 1.1% decrease and 1% increase in auto and bus VMT, respectively, as compared to the No-Build Alternative. The TSM Alternative would result in a 0.4% reduction in auto VMT, but a 43% increase in bus VMT.

Table 5.4 presents the estimates of annual emissions resulting from the three transportation scenarios. The amended LPA will result in a slight (1 to 3%) reduction in emissions over the 10-year period, when compared with the No-Build Alternative. The TSM Alternative would result in negligible differences compared to the No-Build Alternative for most pollutants by 2005 and a 2.5% increase in sulfur oxide emissions.

The general trend in CO, HC, and NO<sub>x</sub> emissions is downward over the 1995-2000 period despite the increase in VMT, but upward in 2005. This is attributable to the federal emissions standards on newly manufactured motor vehicles. However, this effect disappears when all in-use vehicles meet existing standards. At that point any increase in VMT is accompanied by an increase in emissions. In contrast, PM and SO<sub>x</sub> emissions appear to rise over the same period because there are no motor vehicle emission standards for these pollutants.

**Table 5.4**  
**COMPARISON OF ESTIMATED ANNUAL MOBILE SOURCE EMISSIONS**  
**BY MODE OF TRAVEL AND TRANSPORTATION SOLUTION**  
**(1995, 2000, and 2005)**  
**Annual Emissions (tons)**

Pollutant		No-Build		TSM			Fixed Guideway		
		Auto	Bus	Auto	Bus	% Diff. <sup>1</sup>	Auto	Bus	% Diff. <sup>1</sup>
CO	1995	130,668	444	128,262	444	-1.8	129,046	457	-1.2
	2000	103,209	408	100,799	408	-2.3	101,697	420	-1.4
	2005	123,909	303	122,162	425	-1.3	121,094	283	-2.3
HC	1995	14,228	139	13,966	139	-1.8	14,051	143	-1.2
	2000	9,950	113	9,717	113	-2.3	9,804	116	-1.4
	2005	11,701	76	11,536	107	-1.1	11,435	71	-2.3
NO <sub>x</sub>	1995	9,669	556	9,491	556	-1.7	9,549	571	-1.0
	2000	8,745	468	8,541	468	-2.2	8,617	481	-1.2
	2005	11,276	334	11,117	469	-0.2	11,020	313	-2.4
PM	1995	2,054	190	2,016	190	-1.7	2,028	195	-0.9
	2000	2,197	190	2,146	190	-2.1	2,165	195	-1.1
	2005	2,773	145	2,734	204	+0.7	2,710	136	-2.5
SO <sub>x</sub>	1995	494	96	485	96	-1.5	488	99	-0.5
	2000	529	96	517	96	-1.9	521	99	-0.8
	2005	668	74	658	103	+2.5	652	69	-2.7

Sources: J.W. Morrow Environmental Management Consultant, Air Quality Impact Report, Revised September 11, 1989 and Parsons Brinckerhoff Quade & Douglas, Inc., September 1989.

Note: <sup>1</sup> "% Diff." is based on difference in total emissions (Auto & Bus) when compared with the No-Build Alternative.

### 5.5.2 Microscale Analysis

Carbon monoxide levels were projected at eleven intersections using the CALINE4 computer model. The intersection locations used in the analysis were provided by the City Department of Transportation Services as indicative of worst-case potential localized air quality impacts occurring as a result of the fixed guideway project. Table 5.5 indicates that under "worst case" conditions (i.e., traffic and meteorological), all of the major intersections will meet the federal 1-hour CO standards of 40 milligrams per cubic meter, but all except for the intersections of Dole Street and University Avenue, and Alakea Street and Nimitz Highway will exceed the State standards of 10 milligrams per cubic meter within 5 to 10 meters of the intersection. Beyond 10 meters, in most cases, all standards will be met. Also, under more probable meteorology, all standards will be met. Based on meteorological data, worst-case conditions will be expected to occur less than 8% of the time.

**Table 5.5  
ESTIMATES OF MAXIMUM 1-HOUR  
CARBON MONOXIDE CONCENTRATIONS  
(2005)**

Intersection	Concentration (mg/m3):		
	No-Build	TSM	Fixed Guideway
Dole Street @ University Avenue	9.8	9.7	10.0
University Avenue @ Kapiolani Boulevard	19.8	19.9	17.7
Kalakaua Avenue @ Kapiolani Boulevard	15.3	15.3	15.3
Ward Avenue @ Kapiolani Boulevard	11.5	11.5	10.8
Alakea Street @ Nimitz Highway	8.5	8.5	8.1
Liliha Street @ King Street	13.8	14.1	13.3
Waiakamilo Road @ Dillingham Boulevard	12.5	12.5	13.3
Kalihi Street @ Dillingham Boulevard	13.0	13.3	12.0
Puuloa Road @ Kamehameha Highway	12.1	12.2	10.9
Pali Momi Street @ Kamehameha Highway	10.3	10.3	10.5
Waimano Home Road @ Kamehameha Highway	10.8	11.1	10.9

Sources: J.W. Morrow Environmental Management Consultant, Air Quality Impact Report, Revised September 11, 1989 and Parsons Brinckerhoff Quade & Douglas, Inc., September, 1989.

Note: Under worst-case meteorological conditions, a 1-hour concentration in excess of 23.3 milligrams per cubic meter will result in a violation of the 8-hour federal standard.

Eight-hour concentrations were calculated by applying a persistence factor of 0.43 to the 1-hour concentrations. When using this approach, any 1-hour CO concentration greater than 11.6 milligrams per cubic meter will indicate an exceedance of the state's 8-hour standard of 5 milligrams per cubic meter. Similarly, any 1-hour concentration over 23.3 milligrams per cubic meter will indicate an excess of the federal 8-hour standard of 10 milligrams per cubic meter. Comparing these "cutoff" values to the 1-hour concentration estimates in Table 5.5 indicates that there will be no exceedances of the federal 8-hour standards. For the amended LPA, the state 8-hour standards will be exceeded within 10 meters at the following intersections: University Avenue at Kapiolani Boulevard; Kalakaua Avenue at Kapiolani Boulevard; Liliha Street at King Street; Waiakamilo Road at Dillingham Boulevard; and Kalihi Street at Dillingham Boulevard. For the No-Build and TSM Alternatives, there would be exceedances of the State standards at the same locations as the fixed guideway alternative. There would also be an exceedance at Puuloa Road at Kamehameha Highway.

Concern has also been expressed about the bus/rail interface with Waikiki and the possible production of carbon monoxide (CO) hot spots from idling buses. The buses stopping at both the Ala Moana Center and at Kalakaua/Kapiolani Stations (the planned interface locations) will not be stopped for long periods. Therefore, the buses will not be idling for long periods of time. In actuality, the number of buses at Ala Moana Center during the peak hour will decrease from a current 85 buses to 56 buses in 2005. In 2005, the intersection of Kalakaua Avenue/Kapiolani Boulevard is expected to meet the federal 1-hour CO standards but exceed the State 1-hour CO standards. However, the addition of 33 buses during the peak

hour from an existing 67 buses to 100 buses passing through that intersection will have a minimal effect on CO emissions since buses are not large producers of CO. All of the buses in 2005 will meet the new Urban Bus Standards. For the year 2005, Table 5.4 shows that CO emissions for buses will be about 36% less than the 1995 emissions reflecting the less polluting transit vehicles.

### **5.5.3 Electrical Generation Impacts**

An analysis was conducted to estimate the effect the fixed guideway system will have on Oahu's energy demand and how this increase in electrical generating plant production will increase air pollutants. Approximately 60 million kilowatt-hours of electricity per year will be required to operate the fixed guideway system. A comparison of emissions anticipated for the amended LPA with the 1980 Oahu emissions inventory suggests that the additional emissions will be relatively small (0.5-1.7%) but do add to the growing inventory of power generation emissions on Oahu. It does not appear at this time that federal or State air quality standards would be exceeded by these additional emissions. *It should be noted that Hawaiian Electric Company is currently planning to expand its generating capacity through the construction of a power plant at Campbell Industrial Park. The growth at this industrial park and at the Kahe Generating Station will result in consumption of the allowable Prevention of Significant Deterioration (PSD) increments for the area. Complete consumption of the TSP and SO<sub>2</sub> increments will result in restriction of further permitting of new air pollution sources in the area.*

### **5.5.4 Conformity With State Implementation Plan (SIP) and the Provisions of the Federal Clean Air Act**

In terms of National Ambient Air Quality Standards (NAAQS), the City falls within an attainment area currently designated as having air quality that is better than national standards or that cannot be classified (CFR 40 Part 81). The EPA has issued interim guidance regarding a project's conformity with the SIP. That guidance does not require project conformity in an attainment area. Therefore, a project conformity determination is not needed.

*Major amendments to the Federal Clean Air Act have occurred since publication of the 1990 AA/DEIS. The amended LPA will comply with the provisions of the Act.*

## **5.6 NOISE**

Detailed information on the methodology, analysis, and results of the noise impact studies is contained in a separate Noise and Vibration Study for the Honolulu Rapid Transit Development Project (September 1989) prepared as a supporting document to the AA/DEIS, SDEIS and this FEIS.

### **5.6.1 Assumptions on Technology**

The AA/DEIS examined the expected noise levels of four separate technologies. These technologies included: rubber tires on concrete, beam straddling monorail, conventional steel wheel/steel rail, and magnetic levitation. Since preparation of the AA/DEIS, a preferred transit system has been selected. The system consists of a steel-wheeled articulated vehicle, known as the C-200, which will operate on continuously-welded steel rail. This system provides further noise reduction over all of the technologies assessed in the AA/DEIS. Section 5.6.2 compares the noise levels of the C-200 with the AA/DEIS



technologies. The System Contractor's noise consultant predicted the noise performance for the proposed rapid transit system for Honolulu and found that the noise levels will be less than the City's specification limits throughout a significant portion of the entire alignment. Throughout the remainder of the alignment, the transit system will meet the City's specification limits.

Several key features of the proposed guideway vehicle and guideway design are responsible for the low noise levels. The proposed guideway incorporates 4-foot-high sound barrier walls for the full length of the guideway. The sound barrier walls will be provided on both sides of the vehicle on both tracks. Thus, the wayside noise for trains on the far track is the same as for trains on the near track, or slightly less because of the added distance. Systems that use outboard sound barriers can produce higher wayside noise when trains are on the far track, particularly at elevations above the guideway. Resilient wheels will lessen noise generation. Also, the vehicle is designed to ensure that noise and vibration are kept to a minimum. Design features include the adoption of rubber bushings and rubber spring systems in the design of the *suspension systems* and the introduction of insulation and sound deadening materials in the vehicle body. In addition, the modern AC propulsion (forced-ventilated) motors are less noisy than motors used on many conventional rubber-tired and steel-wheeled systems. Examples of transit vehicles employing the noisier self-ventilated motors include those used in the Miami and Baltimore systems. As a result of the design features of the C-200 vehicle, the anticipated noise levels for this system will be less than for those technologies discussed in the AA/DEIS.

#### 5.6.2 Peak Pass-by Noise Levels, Fixed Guideway Alternative

The estimated maximum wayside noise levels for the guideway vehicle at 50 and 100 feet from the track centerline for the ultimate-length train (three car) traveling at different speeds are shown in Table 5.6.

Table 5.6 ESTIMATED MAXIMUM PASSBY NOISE LEVELS - (dBA)		
Speed (mph)	At 50 Feet	At 100 Feet
10	63	60
30	67	64
40	68	65
55	70	67

Source: Oahu Transit Group, 1991; ICF Kaiser Engineers, 1991.

As shown, the expected noise levels will be higher as the speed of the train increases. A decrease of approximately 3 dBA will be anticipated at all speeds as the distance from the track increases from 50 to 100 feet.

The distances required to meet the airborne noise criteria, presented in Table 3.15, are presented in Table 5.7.

Speed (mph)	70 dBA	75 dBA	80 dBA
55	50	17	<15
40	30	<15	<15
30	20	<15	<15
10	<15	<15	<15

Source: Oahu Transit Group, 1991; ICF Kaiser Engineers, Inc., 1991.

Note: <sup>1</sup> The airborne noise criteria are based on the noise levels of an individual passby but do not account for the duration of each passby or the number of events per hour or day.

As discussed previously, the C-200 vehicle, with integrated noise barrier walls, provides further noise reduction over all of the technologies assessed in the AA/DEIS. For example, to meet a noise level of 70 dBA at a speed of 40 miles per hour, the monorail and maglev technologies would require a distance of 125 feet from the track centerline. To meet the same criteria, rubber tire on concrete and steel wheel/steel rail technologies would require distances of 165 feet and 250 feet, respectively.

*With implementation of the preferred technology assessed in this FEIS, exceedances of the noise criteria are possible at three locations due to the installation of crossovers and turnouts in these areas. Crossovers will be located along Kamehameha Highway near Kaahumanu Street and along Kona Street Ewa of the Ala Moana Hotel. Construction of turnouts south of the Aloha Stadium Station near some apartment buildings is also planned. The effective barrier attenuation at these locations will be reduced by about 2 dBA for receivers located 50 feet from the centerline of the guideway because there will be no center walkway barrier at these locations. As the trains pass over the rail joints and frogs at crossovers and turnouts, the noise levels will further increase by 6 dBA compared to standard tracks. Mitigation options will be explored further to minimize noise impacts. The special trackwork will be relocated to less noise-sensitive areas, if technically possible. If this is not possible, then the System Contractor is obligated to measure the noise levels of the operating system. Mitigation measures will be provided, if needed, so that any noise-sensitive buildings will not be exposed to levels exceeding the criteria. Such measures could include installation of double pane windows or noise insulation into the affected buildings.*

The proposed University of Hawaii arena could be located as close as 60 feet from the track centerline, depending on the final arena layout. No adverse noise impacts to the proposed facility are expected. Although a portion of the University of Hawaii's swimming pool complex is located 10 feet from the guideway, the activities within that building are not noise-sensitive in nature, and no adverse impacts will be expected. Potential vibration impacts to the pools are discussed in Section 5.6.3.

*An ROTC classroom building will be located within about 10 feet of the nearest track centerline. Adverse train noise impacts are not expected since the trains will be operating at slow speeds in this area, and adverse noise levels are not expected below the guideway. The potential vibration impacts are discussed in Section 5.6.3.*

*Concern has been expressed about the location of Kalihi-Kai and Pearl City Elementary Schools relative to the fixed guideway. At distances of 44 feet and 50 feet from the nearest track centerline, respectively, no adverse noise impacts to these schools are expected since the schools would be exposed to noise levels less than 75 dBA.*

Concern has also been expressed about potential noise impacts to planned development in the Kakaako area. Planned development along Halekauwila Street includes construction of the Waterpark Tower Condominiums on the makai side of Halekauwila Street between South and Keawe Streets and construction of the Kauhale Kakaako project on the mauka side of Halekauwila Street between Kamani and Ahui Streets. The Kauhale Kakaako Project will include residential rental units, industrial, and commercial space. The plans for the Waterpark Tower Condominiums show that the development will be located a minimum of 26 feet from the guideway centerline. At this distance noise levels will be less than 70 dBA, resulting in no adverse impacts. The centerline of the nearest guideway will be located 41 feet from the housing portion of the Kauhale Kakaako development. At this distance, no negative noise effects are anticipated.

The Na Lei Hulu Kupuna elderly housing rental project is now being constructed on the mauka side of Halekauwila Street across from Mother Waldron Park between Cooke and Coral Streets. The centerline of the nearest guideway will be located 39 feet from this housing project. The train will operate at a speed of about 35 mph in this area. At this distance, the noise levels will be less than 70 dBA, and no adverse impact will be anticipated. The General Services Administration also expressed a concern during their review of the AA/DEIS that a Pohukaina Street alignment would disturb office workers in the Prince Kuhio Federal Building and children attending the building's day care center. The amended LPA originally would have required a portion of the building's parking lot for the guideway transition from Nimitz Highway to Pohukaina Street. Under that proposal, no adverse noise impacts were anticipated. The amended LPA has been changed to follow Halekauwila Street instead of Pohukaina Street. The guideway will be farther from the Federal Building, and the noise levels will be even less.

### 5.6.3 Vibration and Groundborne Noise

Since the transit system will be on an aerial structure, vibration and groundborne noise impacts are expected to be minimal. A review of data from various heavy rail system test programs indicates that typical ground surface vibration levels for one to three car trains at speeds between 45 and 55 miles per hour will be in the range of 70 and 76 dBA re  $10^6$  in./sec at distances of 1 to 10 feet from the columns. At distances of 15 to 25 feet, the expected levels are 64 to 70 dBA and, at 50 to 60 feet, the levels expected are 58 to 64 dBA. Noise and vibration criteria are presented in Section 3.6.3.

The typical finding for aerial guideway operations is that the ground vibration is below the level of perception at distances greater than 10 to 15 feet from the guideway columns. At distances less than 10 feet, the ground surface vibration may be perceptible; however, the vibration is usually not of sufficient level to be perceptible in buildings unless they are directly attached to the column or the column footings. The decoupling loss or attenuation of the vibration as it is transmitted from the ground to a building results in a 5 to 10 dBA reduction, unless the building is very lightweight woodframe, so that even close to a column the vibration is of acceptable levels in buildings.

Specific design features of the selected technology which minimize ground vibration impacts include: continuous welded rail; resilient rail fasteners with specific range of dynamic stiffness; concrete guideway and girders; and neoprene resilient bearings between guideway girders and pier support caps. Because the selected technology includes these features, the ground vibration will be comparable to or lower than the ground vibration produced by other steel wheel/rail aerial guideway systems which incorporate similar features. Therefore, no special features or provisions are necessary for control of ground vibration at any location along the alignment. Columns and column foundations will be isolated from buildings at locations where the columns would be sited very close to the buildings.

The University of Hawaii has expressed concern about the proximity of some of its buildings to the fixed guideway. Of particular concern are the locations of the pool complex, the Speech Pathology and Audiology building, and an ROTC classroom. The Speech Pathology and Audiology building will likely be relocated as part of the University's proposed arena construction. However, if the University does not relocate the building for that purpose, it will be relocated as part of the rapid transit project. No adverse impacts to the ROTC building will occur as long as the

*building is of the typical heavy commercial/institutional construction with a reasonably loaded foundation and the guideway column footings are isolated from the building foundation elements. The column footings will be isolated from the foundation elements. Although vibrational impacts are unlikely, the System Contract provides that system-induced vibration be imperceptible at or in the surrounding buildings. The threshold of perception is defined by ANSI Standard S3.29. If perceptible vibration is apparent, then mitigation will be provided. No vibration impact is expected at the pool complex building. The pools, at 90 feet or greater distance from the guideway structure, are at a sufficient distance that the vibration will be very low and will not adversely affect the pools.*

#### **5.6.4 TSM Alternative**

The overall noise exposure level produced by traffic flow on streets and highways is highly dependent on the number of vehicles and the speed of the traffic. The type of vehicle has only a small effect unless the heavy vehicle or the bus-type vehicle becomes a major percentage of the total traffic. Since in neither the No-Build nor the TSM Alternative would the bus traffic become a major percentage of the total traffic along any of the routes or corridors, except possibly those with a high degree of congestion or capacity constraint, there will be little or no change in the noise exposure level along such routes or corridors.

Along congested or capacity-constrained routes where high-occupancy-vehicle (HOV) and exclusive lanes may be implemented, it is possible that there will be some change in the noise exposure level at locations directly adjacent to the route. However, the change will be small. The maximum difference which *can* occur will be if the existing traffic mix along a highway corridor was changed from predominantly automobiles to predominantly buses. In such an event, the noise exposure level can increase by 1 to 2 dBA. However, because the use of exclusive transit lanes does not eliminate the high volume of cars and trucks using the normal lanes, the degree of influence that the bus traffic will have on the overall noise exposure is very small. Generally, the maximum to be expected is in the range of 0.5 to 1 dBA increase.

There would be no change in the maximum passby noise level for the buses for the TSM Alternative when compared with the No-Build Alternative. Any increase in noise exposure caused by the increased or shifted bus traffic would be small, less than 1 dBA, as outlined above. In assessing the potential noise impact, an increase in noise exposure of 1 dBA is difficult to detect, while an increase of 2 or 3 dBA is just noticeable.

The noise impact caused by the TSM Alternative compared with continuing the existing all-bus public transportation system, would be negligible along the routes used for the public transportation system.

#### **5.6.5 Road Traffic Noise Impact**

To assess any change in environmental noise levels for the No-Build Alternative relative to the conditions existing during 1987, the change in noise levels due to change in traffic volumes at selected locations within the study corridor was analyzed. Future traffic noise levels (during the year 2005) would increase by a maximum of 1.2 dBA compared with the traffic noise impact for the year 1987. An increase in noise level of 1 dBA is very difficult to detect, whereas an increase of 2 or 3 dBA is just noticeable.

Because there is only a slight difference in traffic volumes among the No-Build, TSM, and amended LPA, the traffic noise impact during the year 2005 for all the alternatives is expected to be similar. For the fixed guideway alternative, the traffic noise levels at each selected location are expected to decrease by about 0.1 dBA by the year 2005 compared with the No-Build Alternative.

The traffic noise impact analysis indicates that, in the year 2005, the differences in traffic volumes and the noise environment for the No-Build and TSM alternatives and the amended LPA will be insignificant.

### 5.6.6 Noise Impact at Park-and-Ride Lots

As a part of the TSM Alternative, park-and-ride lots would be located at the following locations:

- Hawaii Kai (*existing*)
- Wahiawa Armory (*existing*)
- Mililani Mauka (*under construction*)
- West Loch (*under construction*)
- Royal Kunia (Village Park)
- Kapolei
- Navy Ewa Drum Storage Site (Waiawa Station)
- a Windward site

For the amended LPA, park-and-ride lots for express bus service will be provided as presented in Chapter 2.0, and includes all of the park-and-ride lots in the TSM Alternative plus that of the Waiawa (expanded), Aloha Stadium, and Lagoon Stations. Three options for a park-and-ride lot near the Koko Head terminus are also being considered *for future development, but are not part of the amended LPA*. One alternative is located at the makai/Koko Head intersection of University Avenue and King Street. Behind the Varsity Theater at the corner of Coyne and Kaialiu Streets is the second proposed site. The third option would be located on the Oasis Nightclub and Lounge property on the mauka side of Old Waiialae Road.

Because the majority of the park-and-ride lots are common to both the TSM Alternative and amended LPA, resulting in almost identical noise impacts along the major streets servicing the park-and-ride lots, assessment of noise impacts was presented in the AA/DEIS for the proposed Waiawa and Aloha Stadium park-and-ride lots only. Both of these will also be a part of the amended LPA transit system and will be located at transit stations.

To assess any change in environmental noise levels along the major streets servicing the proposed Waiawa and Aloha Stadium park-and-ride lots, the change in noise levels due to change in traffic mix and volumes along the major streets servicing the lots was analyzed. The change in traffic noise levels during the year 2005 for the TSM and fixed guideway alternatives relative to the No-Build Alternative, based on both the peak-hour and average daily traffic volumes, was estimated to be 0.9 dBA or less.

Traffic noise impact analyses for the major streets servicing the proposed Waiawa and Aloha Stadium park-and-ride lots indicate that in the year 2005 the differences in traffic volumes, traffic mix, and the noise environment for the No-Build and TSM alternatives and the amended LPA would be insignificant.

Since preparation of the AA/DEIS, a proposed park-and-ride lot at the Lagoon Station *has* been added to the facilities to be provided in the amended LPA. Because the surrounding area in the Lagoon Station area *is* commercial and industrial in nature, no significant impacts are expected. Although the actual extent of additional traffic activity in this area is not known at this time, it should be noted that a 100% increase in traffic volume would be expected to increase the noise level by only 3 dBA. This is not considered a significant impact. The additional traffic activity, as a result of the park-and-ride activity, will be well less than a doubling of traffic.

*The three park-and-ride lot options in the University area (not a part of the amended LPA) would be located in areas which are predominantly commercial in nature. However, some residential buildings are also present. For the option behind the Varsity Theater, approximately 50% of the total vehicles would access the lot from the mauka direction on University Avenue and from the University Avenue ramp off the H-1 Freeway. About 20% would travel to the lot from the makai direction on University Avenue, and a like percentage would access the lot from the Koko Head direction on King Street. In the morning, an estimated 10% of the total vehicles would enter the lot from the Ewa direction on King Street, and the same percentage would leave the lot in the evening traveling in the Ewa direction on Beretania Street.*

A total of 100 parking spaces would be provided under this option. Approximately 40% of the vehicles would likely enter or leave the lot during the peak hour. Therefore, during the peak hour, about 20

additional vehicles would be anticipated to travel to or from the lot on University Avenue mauka of the lot, less than 10 additional vehicles from each street would access the lot on University Avenue makai of the lot and on King Street Koko Head of the lot, and very few vehicles would enter the lot from the Ewa direction on King Street in the morning peak, and leave the lot in the Ewa direction on Beretania Street during the evening peak. The low additional traffic activity on these streets would have minimal impact since a doubling of traffic under most circumstances would increase noise levels by only about 3 dBA. The added traffic as a result of this lot would only represent a small percentage of the total traffic in the area. This analysis represents a worst case scenario since it assumes that these vehicles would not travel on these streets under the No-Build scenario. It is likely that the number of vehicle trips would be similar since many of these vehicles would be driven all the way to and from work or to other destinations on these streets if no park-and-ride lot were located here.

Access to the lot would be from Coyne Street. Therefore, during the peak hour, an estimated additional 40 vehicles would travel this street. The portion of Coyne Street used to access the lot consists of commercial uses, and no adverse noise impacts to the adjacent buildings would be anticipated. It is doubtful that any significant numbers of vehicles would access the lot using any of the streets in the residential area behind the Varsity Theater. *One house is located directly across Kaialiu Street about 50 feet from this lot option. Several houses are also located further Ewa on the block bounded by Coyne, Bingham, Kaialiu, and Isenberg Streets. The Church of the Crossroads is about 90 feet mauka of the proposed lot.* It is important to note that this lot would not introduce a new source of possible vehicle noise into the surrounding vicinity since this area is presently used for parking for the Varsity Theater. The lot is unlikely to have adverse noise impacts on the Church of the Crossroads since the peak times of lot usage would not normally coincide with church activities.

For the lot option located at the intersection of University and King Streets, traffic movement would be similar to the Varsity Theater option, except that only about 45% of the traffic would access this lot from University Avenue and the H-1 Freeway from the mauka direction and approximately 25% would come from the Koko Head direction on King Street. This option would provide 205 parking stalls. Therefore, during the peak hour, an estimated 45 vehicles and 20 vehicles would access the lot from the mauka and makai directions on University Avenue, respectively. Approximately 25 vehicles would access the lot via King Street from the Koko Head direction; and about 10 vehicles would enter the lot during the morning peak via King Street from the Ewa direction and the same number would exit the lot during the evening peak via Beretania Street in the Ewa direction. As with the Varsity Theater lot option, this represents a worst case scenario because it assumes that these cars would represent all new traffic to the area which would not otherwise occur without the lot. Even under this scenario, any additional noise to these major streets would be minimal considering that a doubling of traffic activity would result in only a 3 dBA noise level increase, and the added traffic would represent only a small proportion of the total traffic in the area.

During the peak hour, an estimated additional 100 vehicles would access the University/King lot option off Kahuna Lane. Approximately 45 vehicles would access Kahuna Lane from Kuilei Street off University Avenue and 55 vehicles would enter the lot directly from Kahuna Lane off King Street. Commercial activity predominates this area; however, multi-family housing is also located here. The additional traffic is not anticipated to cause unacceptable noise impacts.

For the Oasis park-and-ride lot option located on Old Waiālae Road, the surrounding area is mainly commercial and industrial in nature, and, therefore, the additional traffic generated by a lot at this location should result in no adverse impacts. However, a four-plex residential building is located mauka and in close proximity to this proposed lot option. This option, if selected, would provide 191 stalls. An estimated 76 vehicles would use the lot during the peak hour. The automobile traffic should cause no significant impact to *the residential* building due to the low additional traffic generated by this lot and because the cars would be going at very slow speeds within the lot. Note also that any additional street traffic traveling at higher speeds should have no impact on this multi-family building because it is located a long distance from the highway (approximately 170 feet). During the peak hour, 12 buses would provide

shuttle service to and from this park-and-ride lot. However, the buses would stop on the street and would not enter the lot to pick up and drop off passengers. The multi-family building would be exposed to noise levels of approximately 70 dBA from each bus operation, and, therefore, the buses would cause no adverse impact.

#### 5.6.7 Yard and Substation Noise

The Navy Ewa Drum Storage Site, located at the Ewa end of the alignment, is the site of the storage and maintenance yard facility for the amended LPA. This site is adjacent to the Leeward Community College and about 460 feet from residences located on the other side of Farrington Highway.

The activities in a storage and maintenance yard result in noise from a number of sources:

- Wheel squeal on curves;
- Clicks and pings as wheels pass over rail joints and through switches;
- Train rolling noise;
- Transit car auxiliary equipment operation;
- Coupling and decoupling of cars;
- Telephone or warning buzzers, announcement or call loudspeakers; and
- Noise created by maintenance work and car cleaning operations.

The principal noises that have been found to create annoyance in residential areas near transit system yards are:

- Noise from auxiliary equipment on the cars;
- Noise from car propulsion systems and the wheel and rail interaction when the cars are moving on the track;
- Pings, clicks, and bangs that occur as wheels pass through switches and over frogs and joints in the special trackwork included in the yard; and
- Wheel squeal that results when the cars move on short radius tracks or on a turnaround track.

All auxiliary equipment on modern transit cars are required to meet a specification of maximum level of 68 dBA at 15 feet from each individual item. With all equipment operating, the maximum allowable noise level is 60 dBA 50 feet from the center of the vehicle.

The nearest sensitive receptors to the proposed Waiawa yard site will be more than 300 feet from yard activity. The maintenance facility for the fixed guideway is expected to generate noise levels in the range of 49 to 67 decibels at a distance of 300 feet. Therefore, no significant impact on sensitive receptors is anticipated from yard-generated noise.

*Seventeen traction power substations (TPSS) will be required including TPSSs at 13 of the 22 transit stations; exceptions are the Arizona Memorial, Honolulu Community College, Nimitz/Smith, Nimitz/Fort, Halekauwila/South, Piikoi/Kona, Ala Moana, and Isenberg Stations. Two additional TPSSs will be needed, near Kaluamoi Drive and near Kalihi Stream. The remaining two TPSSs will be located at the Waiawa maintenance yard and shops. The substations will have capacities ranging between 2.5 and 3.5 megawatts. Both the transformers and auxiliary cooling equipment are potential noise sources. Actual noise levels generated are dependent upon both the specific equipment selected and the type of structure housing the equipment. Typical noise levels for TPSSs would be about 50 dBA at a distance of 50 feet. Selection of the specific substation equipment and housing for the project will be made during final design activities. The TPSSs will be designed to meet the noise standards specified in Title 11, Chapter 43 of the HDOH Administrative Rules for Community Noise Control. Chapter 43 specifies noise levels which cannot be exceeded for more than ten percent of the time within any twenty-minute period without a permit. Residential zoning districts (R-1 through R-7) allowable noise levels at the property line are 55 dBA during the day*

and 45 dBA at night. Allowable levels for apartment zoning districts A-1 through A-5 are 60 dBA and 50 dBA at the property line during the day and night, respectively.

The site of the Makalapa Gate substation is being discussed with the U.S. Navy. The design drawings for the substation will be subject to Navy approval. As currently designed, the TPSS will be located adjacent to Kamehameha Highway more than 240 feet from the nearest residential structure. At this distance, it is unlikely that adverse noise levels would occur. However, as discussed above, the TPSSs will be designed to meet HDOH noise standards.

#### **5.6.8 Noise and Vibration Mitigation**

There are three noise-sensitive areas located near crossovers and turnouts resulting in increased noise levels. For these areas, the special trackwork will be relocated to less noise-sensitive areas, if technically possible. If the technical adjustments cannot be accomplished, mitigation measures will be provided so that these areas are not exposed to noise levels exceeding the specified criteria. The TPSSs will be designed to be within the HDOH's allowable noise limits. In addition, the guideway columns will be isolated from buildings in close proximity to mitigate potential ground vibration impacts. It is unlikely that the system will cause vibration impacts. However, mitigation will be provided for buildings exposed to perceptible vibration.

### **5.7 ECOSYSTEMS**

#### **5.7.1 Vegetation**

A proposed park-and-ride lot at Waiawa is included in the TSM Alternative. The site proposed is presently undeveloped and supports relatively young successional vegetation, none of which is unique or concentrated in significant stands or groupings. Results of a botanical survey of this site were summarized in Section 3.7. The impact of the park-and-ride lot will consist of removal of existing vegetation, grading, and paving. Approximately four acres of vegetation will be affected.

The Navy Ewa Drum Storage Site at Waiawa will be the site of a maintenance facility, *park-and-ride lot, and station* for the amended LPA. The Waiawa site is the same location described above for the TSM Alternative park-and-ride lot. Approximately 25 acres of *vegetation* will be affected by the maintenance facility, and the Station facilities, including a park-and-ride lot, will require clearing and paving an additional *four acres* of vegetated land.

Additional park-and-ride lots will be included as part of the amended LPA at the Aloha Stadium and Lagoon Stations. *One to three site options* in the University area near the Koko Head terminus *are assessed in this FEIS as possible future projects that are not a part of the amended LPA.* Existing landcover in these affected areas consists mostly of urban uses. No substantive stands of natural or landscaped vegetation will be affected.

The placement of the fixed guideway structure and accompanying stations is proposed mostly within existing streets. Minimal natural vegetation will be affected. Urban vegetation placed for landscaping will require removal and replacement in several areas. In addition to randomly scattered shrubs and trees,



the amended LPA will require trimming or removal of mature stands of landscape vegetation in the following areas:

<u>Street</u>	<u>Limits</u>	<u>Location</u>	<u>Impact</u>
Dillingham	H-1 to Liliha Street	Mauka & Makai	Trimmed
Halekauwila	Richards St. to South St.	Mauka & Makai	Trimmed/Removed
Kona	Piikoi to Keeaumoku St.	Median	Removed
Kapiolani	At Kalakaua Avenue	Makai	Removed
Kapiolani	McCully Street to University Avenue	Median	Removed

In addition, a small portion of the mid- and end-sections of the University/Quarry alignment and station will not follow existing roadways. As a result, some vegetation will be affected. Urban vegetation, placed for landscaping, will require removal, replacement, or trimming. New landscaping will be required.

City Ordinance 78-91, as amended, defines an "Exceptional Tree" as "a tree or grove of trees with historic or cultural value, or which by reason of its age, rarity, location, size, aesthetic quality or endemic status has been designated by the City Council as worthy of preservation." The AA/DEIS names two "Exceptional Trees" located on the UH Manoa Campus, Koko Head of University Avenue between Dole Street and Campus Road. One is a Cannonball Tree (*Couroupita guianensis*); the other is a Jack-in-the-Box Tree (*Hernandia ovigera*). The amended LPA will not affect these trees.

The direct impact of removing existing landscape trees within the street corridors for the fixed guideway alternative will be a visual change in the streetscape (see Section 5.4). Mitigation of this impact will consist of revegetation and landscaping included within the proposed fixed guideway and station elements. Where feasible, trees will be preserved and utilized in project landscaping. Along several areas of the alignment, street landscaping will be enhanced through fixed guideway landscaping within 200 feet of station platforms and station landscaping.

Although planting plans will not be prepared until later stages of final design, desirable locations for special landscaping treatment include areas where (1) existing landscaping has been lost; (2) substantial opportunities exist for enhancement of existing streetscapes; (3) joint use is possible; (4) stations and parking lots are proposed; (5) mitigation of specific impacts can be accomplished, such as adjacent to parks or historic sites; and (6) specific relevant goals have been established, such as within special districts.

A commitment to mitigate impacts by replacing lost vegetation is included within the fixed guideway project, and appropriate funding has been allocated in the budget for landscaping.

### 5.7.2 Wildlife

As noted in Section 3.7, wildlife habitat is very limited within the urban corridors proposed for the transit improvements. The largest habitat removal impact will occur at the *Navy Ewa Drum Storage Site*, as noted in the previous discussion of vegetation impacts. This activity will directly affect individuals of species inhabiting the affected area that are relatively immobile or have small home ranges. The removal of this habitat will have little overall effect on wildlife populations. The site does not represent unique or special habitat within the project area. The proposed TSM Alternative and amended LPA would have no significant effect on the characteristics or size of populations of the resident wildlife species in the area.

None of the proposed project alternatives would affect the Pearl Harbor National Wildlife Refuge or any permanent or transient species of wildlife utilizing the refuge.

Fisheries and other aquatic resources *could* be affected by the project only as a result of secondary water quality impacts. Water quality impacts are discussed in Section 5.8. Appropriate mitigation techniques will be instituted during construction to *minimize runoff and* sedimentation in area streams and lagoons. No long-term effects from operation of the TSM Alternative or amended LPA are anticipated.

The amended LPA will require placement of piers within some streams. Construction of the piers will likely be within cofferdams, as described in Section 5.13. Long-term impacts of pier placement will be negligible because there will be no restriction of stream flow or movement of aquatic species. Permit coordination related to bridge construction and alteration of stream channels will be conducted with the U.S. Army Corps of Engineers, the U. S. Coast Guard, and the State Department of Land and Natural Resources (DLNR) during final design.

A concern has been identified by the DLNR regarding the bait fishery resource within Keehi Lagoon. The proposed TSM Alternative or amended LPA would produce no direct or secondary effects on this resource or its accessibility. As noted in Section 5.8.1, potential erosion and runoff impacts to area surface waters are expected to be minor. Because of the nature of the elevated guideway, earth disturbance will be limited to areas where support columns are placed, as well as at the parking lots, and the maintenance facility. Installation of appropriate mitigation measures will minimize site-specific impacts to Moanalua or Kalihi Streams. *As discussed in Section 5.13, a plan specifying measures to be taken to minimize water quality impacts will be formulated prior to construction.*

This project has been coordinated with the U. S. Fish and Wildlife Service, the National Marine Fisheries Service and the DLNR. Copies of coordination letters are included in Appendix A of the AA/DEIS and in a separate document, *Public and Agency Comments (July 1992)*. *During the scoping process, the DLNR requested that a survey of certain trees to be trimmed or removed be surveyed for the presence of White Terns (*Gygis alba*). The State of Hawaii lists the Oahu population of this bird species as endangered. The field survey consisted of repeated visits to the trees during different times of the day and night. No White Terns were observed during any of the visits.* The proposed TSM Alternative or amended LPA are not expected to have any effect on any other rare, threatened, or endangered wildlife species.

### **5.7.3 Farmland**

Prime agricultural soils are found within the study area but are classified "prime" only if irrigated and/or drained. All of the prime or statewide important farmland within the proposed fixed guideway alignment has been, or is planned to be, converted to urban or other non-agricultural use except for: (1) a parcel approximately 4,000 feet Ewa of Waimano Home Road along Kamehameha Highway; and (2) a parcel being used as a watercress farm on the mauka side of Kamehameha Highway, Ewa of the proposed Pearlridge Station. No land acquisition from either parcel will be required. Located within these same urban corridors, the park-and-ride lots associated with the TSM Alternative or amended LPA, and the maintenance facility associated with the amended LPA will not effect any prime, unique, or statewide important farmland.

The State Department of Agriculture has noted that the proposed project will not result in the conversion of prime or unique farmlands provided there is no taking of land from the above referenced two parcels. Coordination with the Soil Conservation Service has resulted in a concurrence that the project will have no effect on farmlands. Because there will be no conversion of agricultural land to non-agricultural use, the project is in compliance with the federal Farmlands Protection Policy Act (FPPA).

Potential impacts from erosion and sedimentation are discussed in Section 5.8. Impacts from soil disturbance and removal during construction, and proper disposal of excavated materials are discussed in Section 5.13.

## 5.8 WATER

### 5.8.1 Water Quality

*There is the potential for water quality impacts to occur during both construction and operation phases of the project. The primary construction phase impacts would be erosion and sedimentation associated with onshore construction activities, and turbidity associated with construction in the water. Mitigation measures will be employed to minimize impacts. Impacts during project construction are discussed in Section 5.13; operation phase impacts are discussed in this section.*

The TSM Alternative includes construction of one park-and-ride lot within the study corridor at Waiawa. The amended LPA includes this same park-and-ride lot and additional lots at the Aloha Stadium and Lagoon Stations. *Three lot options near the Koko Head terminus, which are not part of the amended LPA, are also analyzed here.* One maintenance facility will be included for the amended LPA at the Waiawa site.

The addition of impervious surface resulting from facility paving and construction will increase runoff and associated contaminants discharged to area storm-water systems and surface waters. The potential for runoff pollutants from large paved areas, such as parking lots, will be minimized through the installation of mitigation measures, such as oil/water separators installed in parking lot drains, *sediment traps*, and interception or diversion ditches around paved surfaces. *Specific measures will be resolved during final design, and a plan will be developed.* Because the proposed TSM Alternative and amended LPA would be located *predominantly* in an urban area, the additional impervious surface and associated contaminants would be minor when compared with the total drainage area and *pollutant loadings* to the project area storm-water systems and surface waterways. No long-term effect on surface water quality of area streams, lagoons, or harbors would be expected. If the Oasis site is selected *for future development* for the location of a new park-and-ride lot in the University area, that lot would be located near the Palolo Stream. To minimize pollutant runoff potential, *an action plan specifying measures to mitigate impacts would be prepared and implemented.*

Vehicles operating on the fixed guideway system will be serviced at the maintenance facility. The facility will generate effluent from vehicle washing activities, sanitary waste, and oil, solvents, and *other chemicals* from maintenance activities. Used oil will be collected and disposed of properly. Appropriate mitigation of potential impacts will include *segregation of wastewater streams generated from different activities, and appropriate pretreatment of effluent from the facility prior to discharge into the sewage or wastewater system.* *The Department of Public Works will require a sewer connection permit, and a National Pollutant Discharge Elimination System (NPDES) permit will be required by the HDOH for any storm water discharges to municipal separate storm sewers or waters of the United States. Submission of a plan to, and coordination with the City Department of Public Works and HDOH during final design of the transit system maintenance facility will ensure that effluent will meet established standards.*

Municipal water in the project area is supplied by the City Board of Water Supply. The proposed project has been coordinated with this agency. The maintenance facility will conserve water with modern, state-of-the-art facilities, such as a water-recycle vehicle-washing system. The proposed project is not anticipated to produce water demands incompatible with the existing and proposed water supply systems.

*In the 1970s, a gasoline spill resulting from vandalism occurred on the Navy Ewa Drum Storage Site proposed for the location for the Waiawa Station, park-and-ride lot, and the fixed guideway maintenance facility. To confine the spill and determine the extent of contamination of property, exploratory studies were conducted and a report documenting the findings was prepared. Investigations recommended recovery of the "free gasoline product" in the groundwater by constructing an interceptor trench and recovery wells. The wells were pumped until the "free gasoline product" was no longer recoverable. The Navy is currently in the process of conducting an investigation in accordance with CERCLA protocol to determine the present extent of the contamination, including dissolved*

*fractions of gasoline. The City is also, in coordination with the Navy, conducting a supplemental investigation. The Navy will be required to clean the property prior to transfer.*

No secondary impacts to surface water quality related to induced growth and development that could be attributable solely to the TSM Alternative or amended LPA are anticipated. This is discussed further in Section 5.8.2, which states that development is expected to occur within the urban area with or without the project.

Federal programs and activities are required to be consistent with the State Nonpoint Source Management Programs (SMP), pursuant to Sections 319(b)(2)(F) and 319(K) of the Clean Water Act. Best Management Practices (BMP) that have been identified in Hawaii's SMP and could be applicable to the H RTP include:

- Proper design and construction of access roads;
- Planting vegetation and/or mulching on highly erodible or critically eroding areas;
- Installation of debris basins;
- Construction of dikes or diversions to avoid runoff across erodible areas; and
- Use of grassed or lined waterways or outlets.

During the final design stages, this project will be coordinated with the HDOH, the state's lead agency for the implementation of the Nonpoint Source Program, to assure consistency with the state's SMP. *A stormwater runoff permit will be required by the HDOH prior to construction since the proposed rapid transit system would involve a construction area in excess of five acres.*

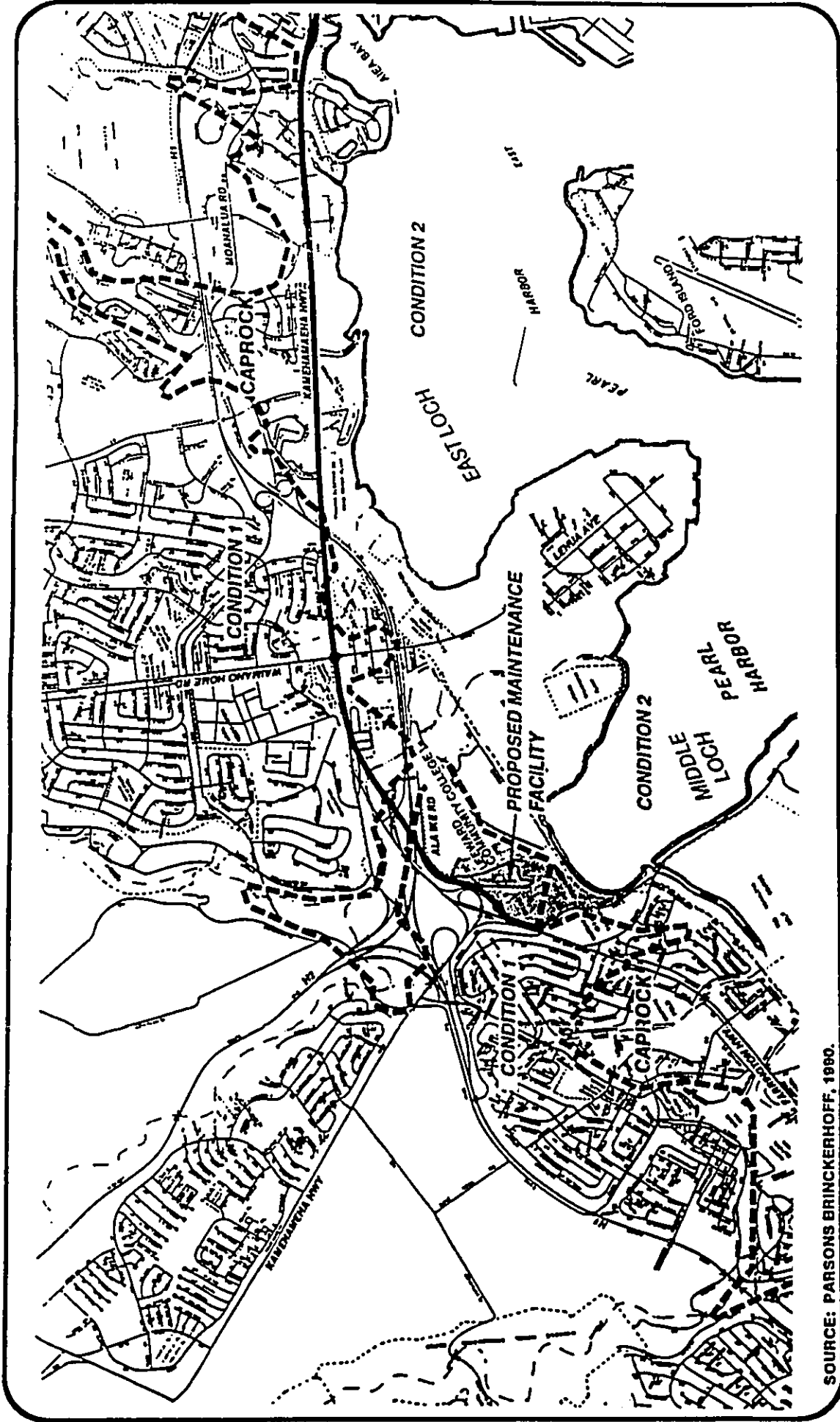
#### **5.8.2 Groundwater**

Construction of pier and station foundations associated with the amended LPA and the maintenance facility will intercept the groundwater table in several locations. These construction-related impacts are discussed in Section 5.13. No permanent dewatering or pumping will be associated with the project.

The Southern Oahu Basal Aquifer (SOBA) has been designated by the U.S. Environmental Protection Agency (EPA) as a sole source aquifer under Section 1424(e) of the Safe Drinking Water Act (P.L. 93-523) of 1974. A preliminary water quality assessment was submitted to EPA for Section 1424(e) review. The preliminary impact analysis was also reviewed by the U.S. Geological Survey, State Department of Health, SDLNR, and the U.S. Fish and Wildlife Service. Copies of comments received are included in Appendix A of the AA/DEIS. Comments have been incorporated into the text as appropriate. Note that additional comments were received during circulation of the AA/DEIS and the SDEIS. Responses to comments are included in Chapter 7.0 of this FEIS.

The SOBA occurs as a basal fresh-water lens floating on saline groundwater. In the project area, the coastal plain is underlain by caprock, which in turn overlies the SOBA and impedes the escape of groundwater from the basaltic aquifer. The caprock groundwater ranges to several hundred feet thick. Limits of the caprock in the project area are shown on Figures 5.31a, 5.31b, and 5.31c. Generally, three conditions of groundwater resource occur in the project area:

- (1) Unconfined SOBA;
- (2) Caprock underlain by confined basal aquifer. Underlying aquifers are saline and non-potable, but of important ecological use; and
- (3) Caprock underlain by confined SOBA. The saline caprock layer has no drinking or ecological use, and the SOBA is fresh drinking water with low vulnerability to contamination.



SOURCE: PARSONS BRINCKERHOFF, 1980.

FIGURE 5.31a

**GROUNDWATER CONDITIONS**  
**HONOLULU RAPID TRANSIT PROGRAM**

MAUKA  
 EWA  
 KOKO  
 HOOKU

SCALE  
 0 2000 4300  
 FEET

LEGEND  
 — AMENDED LPA  
 ● STATION  
 - - - CAPROCK BOUNDARY

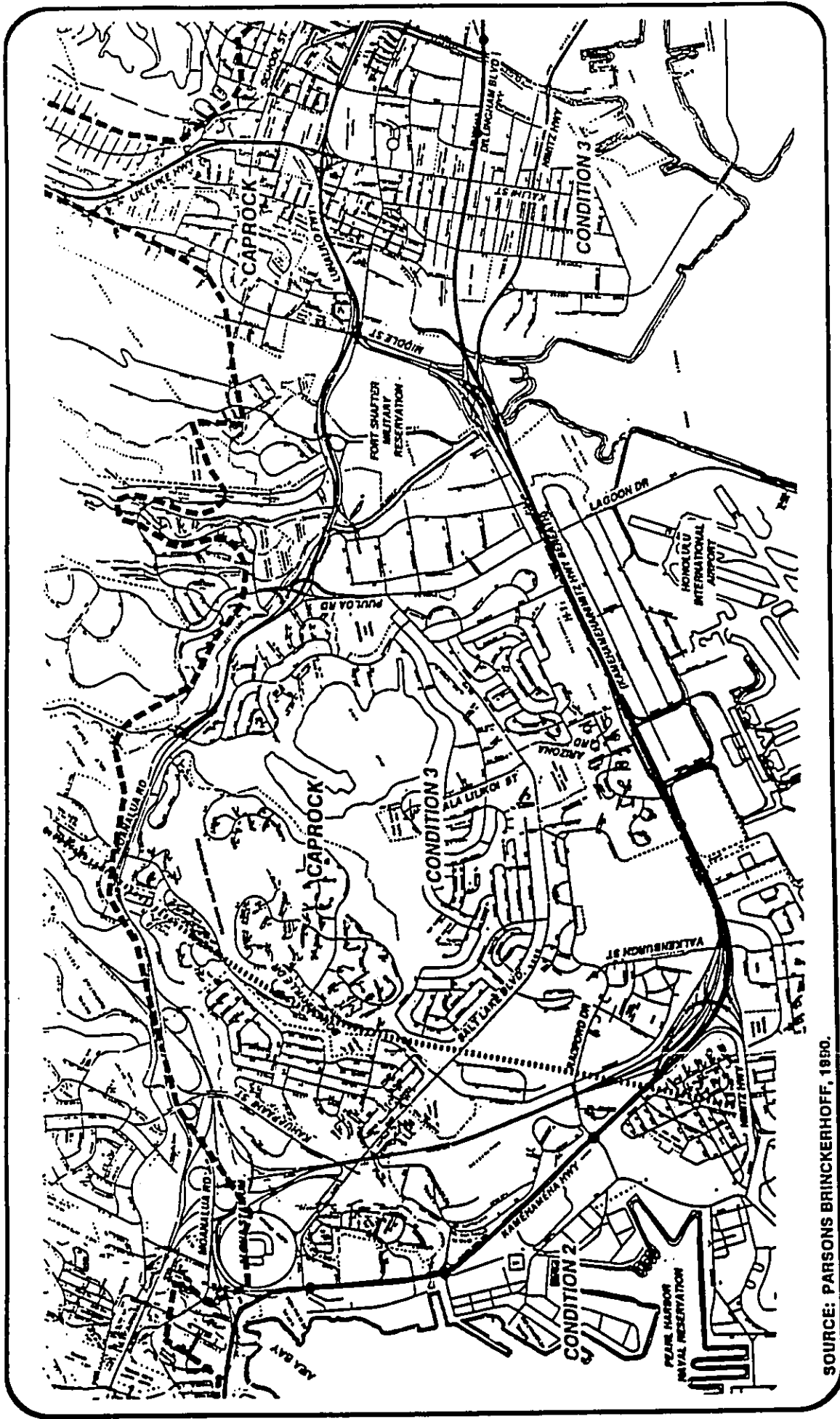


FIGURE 5.31b

GROUNDWATER CONDITIONS

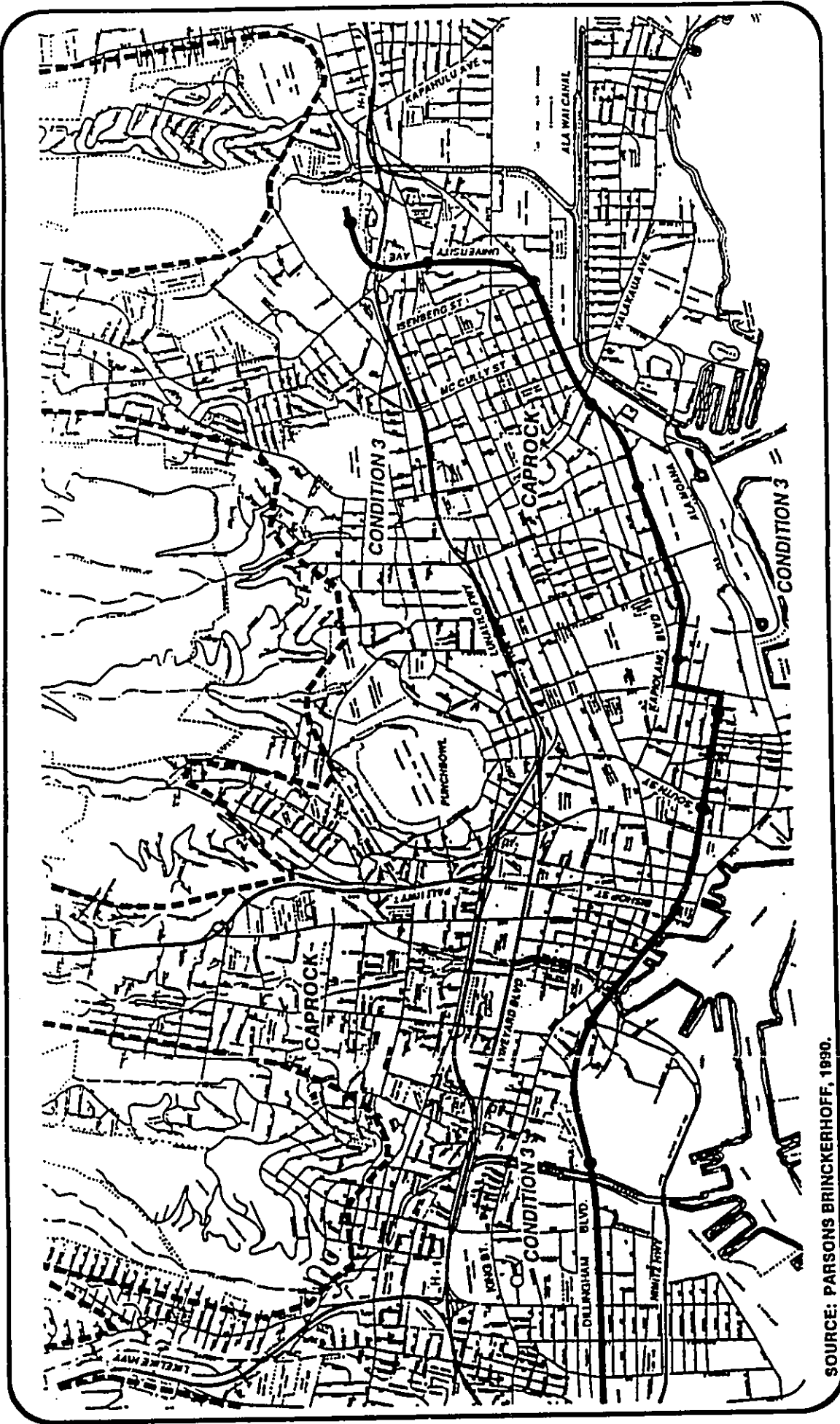
HONOLULU RAPID TRANSIT PROGRAM



- LEGEND
- AMENDED LPA
  - STATION
  - CAPROCK BOUNDARY
  - AQUIFER BOUNDARY



SOURCE: PARSONS BRINCKERHOFF, 1990.



SOURCE: PARSONS BRINCKERHOFF, 1990.

FIGURE 5.31C

GROUNDWATER CONDITIONS  
 HONOLULU RAPID TRANSIT PROGRAM



LEGEND  
 AMENDED LPA  
 STATION  
 CAPROCK BOUNDARY

From the Ewa terminus of the project corridor to the H-1 Freeway crossing of Kamehameha Highway, Koko Head of Pearl City, the alternatives will be mostly within the SOBA aquifer (condition 1 above). The Waiawa park-and-ride lot of the TSM Alternative, and the Waiawa and Pearl City Stations, the Waiawa park-and-ride lot, and the maintenance facility of the amended LPA are located within the area underlain by the SOBA.

From the H-1 Freeway to just Koko Head of Aloha Stadium, the amended LPA and its Aloha Stadium park-and-ride lot will be within an area not underlain by drinking water (condition 2 above). For the remaining length of the amended LPA, including the Lagoon park-and-ride lot, the three lot options near the Koko Head terminus (*not part of the amended LPA*), and the UH/Quarry Station, the caprock layer is thick and underlain by the SOBA (condition 3 above).

The proposed foundations of the guideway columns or stations will *not adversely* impact the quality of the sole-source aquifer. The potential for long-term impact to the SOBA is mainly at the Navy Ewa Drum Storage Site. Proposed facilities at this site include the amended LPA park-and-ride lot and the maintenance facility. The parking lot will produce runoff containing oil, grease, and other contaminants. The proposed maintenance facility will require the installation of underground storage tanks.

*Effluents* from activities within the facility, such as vehicle washing, and solvents, grease, and oils from vehicle maintenance activities, will be collected in a contained system, *pretreated as appropriate*, and discharged to the municipal wastewater system. Effluent will have to meet discharge standards and a sewer connection permit from the City Department of Public Works will be required. *The permit will ensure that the effluent will meet water quality standards.* Underground storage tanks (USTs) are subject to regulation under the 1984 amendments to the Federal Resource Conservation and Recovery Act (RCRA). USTs must meet requirements concerning installation, spill and overfill protection, corrosion protection, and leak detection.

Because of the amended LPA and the TSM Alternative facilities' locations within the unconfined SOBA, extensive mitigation will be required in the design of the maintenance facility (LPA only) and at the proposed parking lot (LPA and TSM) to eliminate potential contamination of the aquifer. These measures will be developed during final design and will be coordinated with the EPA, HDOH, and HDLNR. Such techniques as diversion ditches, oil/water separators, and impervious linings beneath underground tanks, in addition to EPA's UST requirements, are effective *preventive measures* of potential groundwater quality impacts. The EPA Section 1424(e) review and approval process will occur when final mitigation measures are chosen.

The addition of impervious surface resulting from facility paving and construction will not have a significant impact on the recharge of the SOBA. The project area is not within the aquifer's primary recharge area. No long-term impact on groundwater-flow characteristics are anticipated. *Localized short-term impacts during construction dewatering operations could occur and measures will be taken to avoid adverse impacts on adjacent structures (see Section 5.13). A plan specifying mitigating measures to be implemented will be prepared and implemented during construction.*

The project alternatives would have minimal secondary impacts on growth and development that could be attributed solely to the implementation of the TSM Alternative or amended LPA. Although the proposed fixed guideway alternative is compatible with development plans around station sites and opportunities for joint development exist, this development is expected to occur within the urban project area regardless of whether or not a transit improvement is implemented. The TSM Alternative or amended LPA will thus have no impact on existing sewage conveyance and treatment systems or create increased flows directly attributable to induced secondary development. Similarly, no additional demands on water supply are anticipated, other than those directly related to the maintenance facilities.



### 5.8.3 Floodplain Encroachment

The TSM Alternative would include no facilities within the 100-year floodplain and would produce no floodplain encroachments or impacts within the study corridor.

The guideway and several stations of the amended LPA will be located within the 100-year floodplain and the area designated as base floodplain due to hurricane flooding in the area of Ala Moana Center. The stations within the floodplain include *Halekauwila/Ahui*, Neal Blaisdell Center, Piikoi/Kona, Ala Moana Center, Kalakaua/Kapiolani, and Isenberg. The guideway structure and stations will be above the elevation of flood waters *because of their minimum elevation of 17 feet above grade*. Facilities at ground level will include the column supports for the guideway and the supports and access elements, such as stairs, at the stations. These facilities within the flood level will not cumulatively increase risk of flooding, or produce significant changes to the characteristics of the floodplain, within this highly developed coastal urban area.

The amended LPA will cross the 100-year floodplains associated with Waiawa, Kalauao, and Aiea Streams on structure and will not encroach on the floodplains. The amended LPA also will cross the 100-year floodplain associated with Moanalua, Kahauiki, and Kalihi Streams. No stations will be located within the floodplain in these areas.

The crossing of the base floodplain by the elevated guideway and stations will not be a "significant" encroachment as defined by DOT Order 5650.2 because the project will:

- Cause no increase in risk or consequences, including the potential for property loss and hazard to life, associated with the probability of flooding attributable to an encroachment;
- Cause no future damage substantial in cost or extent, nor interrupt or terminate any transportation facility needed for emergency vehicles, or any community's only evacuation route; and
- Have no impact on natural and beneficial floodplain values.

As noted in the economic development impact discussion, the fixed guideway alternative will provide service to existing and planned development. Continued development is anticipated within the Ala Moana area. This future development will need to comply with federal, state and local floodplain-protection regulations and permits. The fixed guideway alternatives will be compatible with proposed development activities but will not be a significant stimulus to cause new development that will otherwise not occur. The project will not, therefore, encourage or support incompatible floodplain development.

During final design of the selected alternative, all measures to control drainage and minimize the potential for flood damages will be incorporated into project design. Coordination will be conducted, and permits obtained, in compliance with all applicable state and local ordinances for flood control and drainage.

### 5.8.4 Wetlands

*The amended LPA will cross ten streams which are designated riverine or estuarine wetlands on maps of the National Wetlands Inventory, prepared by the U.S. Fish and Wildlife Service. Site investigations have not identified any additional wetland areas along the alignment of the amended LPA. While the National Wetland Inventory maps are a useful screening tool for corridor-level analyses, field examinations indicate that these streams do not meet wetlands criteria across their total widths.*

*The guideway will be designed to minimize column placement within these streams by altering span lengths where appropriate. Where column placement in streams cannot be avoided, support columns will be located outside of wetland areas that may occur along the banks of the streams to the maximum degree possible. In spite of this*

minimization, about 400 square feet of wetlands (0.009 acre) will be taken by pier foundations at the Halawa Stream crossing. This action falls within the scope of a U.S. Army Corps of Engineers nationwide permit covering U.S. Coast Guard approved bridges (see Section 5.8.5). Precautions will also be taken to ensure that construction activities and staging areas, including construction access and materials storage and disposal, are not located within wetland areas bordering streams. In addition, mitigation measures will be employed where construction activities occur adjacent to wetlands.

#### **5.8.5 Navigation**

The amended LPA will cross several streams that meet the criteria of navigability. Those streams deemed "navigable" in the reaches crossed by the guideway include the Aiea, Halawa, Moanalua, Kalihi, and Nuuanu. Guideway crossings of these streams are considered bridges, and bridge approvals will be obtained from the U.S. Coast Guard prior to construction. Impacts of these proposed bridges on navigation are nonexistent because actual navigation on these streams, where present, is limited to small pleasure craft that will be unimpeded by the proposed crossings. In addition, bridges that already establish maximum vertical and horizontal clearances already exist downstream of the proposed crossing at each of the streams, and the proposed guideway bridges will not decrease the clearances already established by these downstream bridges.

#### **5.8.6 Coastal Zones**

The amended LPA is within the coastal zone. The amended LPA will cross a very small area of the designated Special Management Area (SMA) of the coastal zone within the interchange just Ewa of Aloha Stadium and also will be within the SMA from Aloha Stadium to Halawa Stream. The amended LPA borders the edge of the designated SMA along Kamehameha Highway from the Ewa terminus to Halawa Stream and in the area of the Keehi Interchange. The project will have no impact on the characteristics of the coastal zone in these areas because the guideway and stations are elevated.

*A review of the City/State planning program that includes the project was completed and it was determined to be consistent with the Coastal Zone Management Plan. A project level review will be completed prior to grant approval.*

*The U.S. Environmental Protection Agency published a document, Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters. This guidance will be helpful in the formulation of an erosion and sedimentation control plan within the coastal zone during construction.*

#### **5.8.7 Recreational Use**

*The alternatives assessed in this FEIS would have no effect on the recreational use of, or access to, the area's water resources. The amended LPA is compatible with the proposed waterfront development plan.*

### **5.9 ENERGY**

Considerations of comparative energy usage among the alternatives considered in the AA/DEIS included both transit-system operating energy and energy required for construction. Coordination with the City and County of Honolulu electrical power suppliers during the preparation of the AA/DEIS and SDEIS confirmed their ability to supply sufficient electrical energy to operate a fixed guideway system.

The TSM Alternative would result in significantly increased bus fuel consumption associated with the operation of an 831-vehicle peak bus fleet relative to the No-Build Alternative. Neither the No-Build Alternative nor the TSM Alternative likely would result in significant increases in electrical energy consumption. As the fixed guideway system will be powered by electrical energy, its operation will result in a substantive increase in electrical energy consumption, relative to the TSM or No-Build Alternatives.

Comparisons of energy consumption during operations can be considered a function of miles of fixed guideway as well as feeder bus vehicle miles. A total of 15.9 miles of guideway will be constructed for the amended LPA. As will be expected, the amended LPA will require higher electrical energy consumption to operate the fixed guideway but less bus fuel energy consumption relative to the TSM Alternative. The larger bus fleet needed to cover the study corridor with the TSM Alternative will result in greater bus fuel consumption but lower electrical energy. *The amended LPA will require slightly more bus fuel consumption than the No-Build Alternative because it will offer a higher level of bus service than the No-Build Alternative which assumes the best utilization of the bus fleet purchased through FY 92.* Automobile gasoline consumption for the amended LPA and TSM Alternative will decrease by minor amounts (1 to 2%) relative to the No-Build Alternative due to the diversion of former automobile drivers to transit.

*Estimates of the electrical requirements of the amended LPA have been prepared based on extrapolations from a power analysis simulation for the preferred C-200 technology. The actual power requirements will not be available until final engineering. Based on the number of trains and hours of operation anticipated for the rapid transit system, annual electrical requirements are estimated at 60 million kilowatt hours/year. This number considers both the requirements for the trains (approximately 47 million kilowatt hours/year) and the other static loads, such as stations and the maintenance facility (13 million kilowatt hours/year). The system derives up to 10% of its power requirements from regenerative braking. That is, the energy used for braking is not wasted, it is used to propel other trains.*

*The rapid transit system will operate between 5:00 a.m. and 1:00 a.m. each weekday and between 6:00 a.m. and 1:00 a.m. each weekend day or holiday. Three basic use periods will occur each weekday and two use periods each weekend day or holiday. The base periods for a typical weekday will occur between 5:00 and 6:00 a.m., 8:00 a.m. and 3:00 p.m., and 6:00 p.m. and 9:00 p.m. The weekday peak periods will occur between 6:00 and 8:00 a.m. and 3:00 p.m. and 6:00 p.m. The weekday off-peak periods will occur between the hours of 9:00 p.m. and 1:00 a.m. For a typical weekend day or holiday, the base period will occur from 6:00 a.m. to 6:00 p.m. and the off-peak period will be from 6:00 p.m. to 1:00 a.m. Each use period has different demands for electricity. During the base, peak and off-peak hours, approximately 8.2, 11.2 to 11.7, and 4.4 kilowatt hours of electricity will be required, respectively. This includes both the energy necessary for trains and static loads. The total daily demand is estimated to be about 271 kilowatt hours per weekday.*

Construction of the rail transit system will require energy. Energy is consumed in operating equipment at the construction site, in producing and transporting construction materials, and in manufacturing vehicles and other equipment.

## **5.10 HISTORIC AND ARCHAEOLOGICAL RESOURCES**

Section 4(f) of the Department of Transportation Act of 1966 requires that no federally assisted transportation project use land from a significant publicly owned public park, recreation area, or wildlife and waterfowl refuge, or any significant historic site, unless a determination is made that (1) there is no feasible and prudent alternative to using that land and (2) such program or project includes all possible planning to minimize harm to the property resulting from such use. The Section 4(f) evaluation for this project has been prepared in a separate discussion in Section 5.12, to facilitate review.

Section 106 of the National Historic Preservation Act of 1966 requires that a federal agency consider the effect of a federally assisted project on any district, site, building, structure, or object listed on, or eligible for, the National Register of Historic Places and give the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the effects. Criteria of adverse effects are established in 36 CFR 800.9:

*\*An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to:*

1. Physical destruction, damage, or alteration of all or part of the property;
2. Isolation of the property from or alteration of the character of the property's setting, when that character contributes to the property's qualification for the National Register;
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
4. Neglect of a property resulting in its deterioration or destruction;
5. Transfer, lease, or sale of the property . . . (without) adequate restriction or conditions... included to insure preservation of the property's significant historic features.\*

In the case of the majority of subsurface archaeological sites, 36 CFR 800.9 (c) is applicable. This regulation states:

Effects of an undertaking that will otherwise be found to be adverse may be considered as being not adverse for the purpose of these regulations: (1) When the historic property is of value only for its potential contribution to archaeological, historical, or architectural research, and when such value can be substantially preserved through the conduct of appropriate research, and such research is conducted in accordance with applicable professional standards and guidelines.

The finding of no adverse effect as a result of appropriate research, however, no longer applies to the excavation of burial sites. Such excavations constitute an adverse effect, and, if required, will be carried out under the terms of a Memorandum of Agreement (MOA) Burial Plan, which will be prepared in coordination with the State Historic Preservation Officer (SHPO) and the Office of Hawaiian Affairs.

Detailed impact analysis and investigation of feasible mitigation measures will continue, in coordination with the SHPO and the ACHP *as detailed in the MOA (see Appendix A-5). An MOA has been entered into and is included in the Appendix, as part of the PE/FEIS studies, for all sites where an adverse effect is unavoidable.*

The application of the criteria of effect has been completed in consultation with the SHPO. This section of the FEIS has been reviewed by, and prepared in coordination with, the SHPO office. The project alternatives for this FEIS consist of the amended LPA and a TSM Alternative (see Chapter 2.0). The TSM Alternative consists of an increased bus transit system. The bus routes will continue to run on existing roadways and not take new land; new construction will be limited to the proposed park-and-ride lot at Waiawa, which is not located in proximity to any historic resources. The TSM Alternative would not affect any historic or archaeological resources.

#### **5.10.1 Archaeological Resources**

The amended LPA will have no effect on recorded archaeological resources within the project area. In general geographic areas of known subsurface archaeological deposits, an archaeological subsurface survey will be conducted as specified in the MOA. In areas where there are as yet no known subsurface archaeological deposits, the MOA specifies archaeological monitoring during construction as an appropriate approach for site identification in concert with other measures, with details of the monitoring plan to be worked out in consultation with the SHPO. In working out the plan to be followed, the probability of archaeological subsurface deposits in any given area and the degree of subsurface disturbance entailed by construction will be considered.

### 5.10.2 Finding Of No Adverse Effect

Of the 31 properties identified in the Historic Properties Inventory in the AA/DEIS, only ten properties are in the proximity of the amended LPA as shown on Table 3.18. In applying the Criteria of Effect, it was determined that *two properties, Old Police Station and Ala Wai Park Clubhouse, will experience no effect. Four properties, Pearl Harbor Naval Base, OR&L Station Property, Merchant Street Historic District, and the Church of the Crossroads, will experience no adverse effect from the amended LPA.* Although the amended LPA will require property from the OR&L Station property, and will also require an easement from the Pearl Harbor Naval Base, the SHPO has determined that this will not have any adverse effects on these properties (see *Section 106 Documentation, July 1992*). The *Chinatown Historic District, the Dillingham Transportation Building, Aloha Tower, and Mother Waldron Park* will experience an adverse effect from this alternative.

The evaluation of properties is shown in Table 5.8. (The numbers listed on the table refer to Figure 3.11 in Chapter 3.0.) All sites with a determination of No Adverse Effect are either physically buffered from the fixed guideway or adjacent to aerial structures that support the guideway but not adjacent to proposed stations. The fixed guideway alignment will not cause physical alteration of the properties or settings and will not introduce elements out of character with the historic characteristics that qualify these sites for the National Register. The amended LPA will be carefully assessed for potential vibration and ground movement impacts prior to construction and the SHPO will review all construction specifications and documents to ensure that appropriate precautionary methods will be taken.

Map Ref No.	Historic Resource	National Register Resource	No Effect	No Adverse Effect	Adverse Effect	ROW/ Easement Required
1	Pearl Harbor Naval Base	On		x		0.40 acre
2	OR & L Station Property	Eligible		x		0.23 acre
4	Chinatown	On			x	
11	Dillingham Transportation Building	On			x	
12	Aloha Tower	On			x	
13	Merchant Street Historic District	On		x		
14	Old Police Station	On	x			
*	Mother Waldron Park	Eligible			x	
25	Ala Wai Park Clubhouse	Eligible	x			
26	Church of the Crossroads	On		x		

Source: Parsons Brinckerhoff Quade & Douglas, May 1992.

Note: \* Shown as Parklands Number 14 on Figure 3.1/c.

Pearl Harbor Naval Base The amended LPA will consist of an elevated guideway in the median of Kamehameha Highway adjacent to the Pearl Harbor Naval Base and will include two stations serving the military base: Arizona Memorial and Makalapa Gate. The guideway will not infringe on, or otherwise affect, the property or functions of the base or its historic significance.

The station access at the Arizona Memorial will require an easement of approximately 10,000 square feet of property (see Figure 5.32) that currently serves to provide approximately four informal parking stalls for buses related to the Arizona Memorial. The use of the property will not affect the Base, according to the Navy, or its historic significance. Generally, the historically significant portions of Pearl Harbor Naval Base are located some distance Ewa of the Arizona Memorial Station. The station will enhance access to the Arizona Memorial.

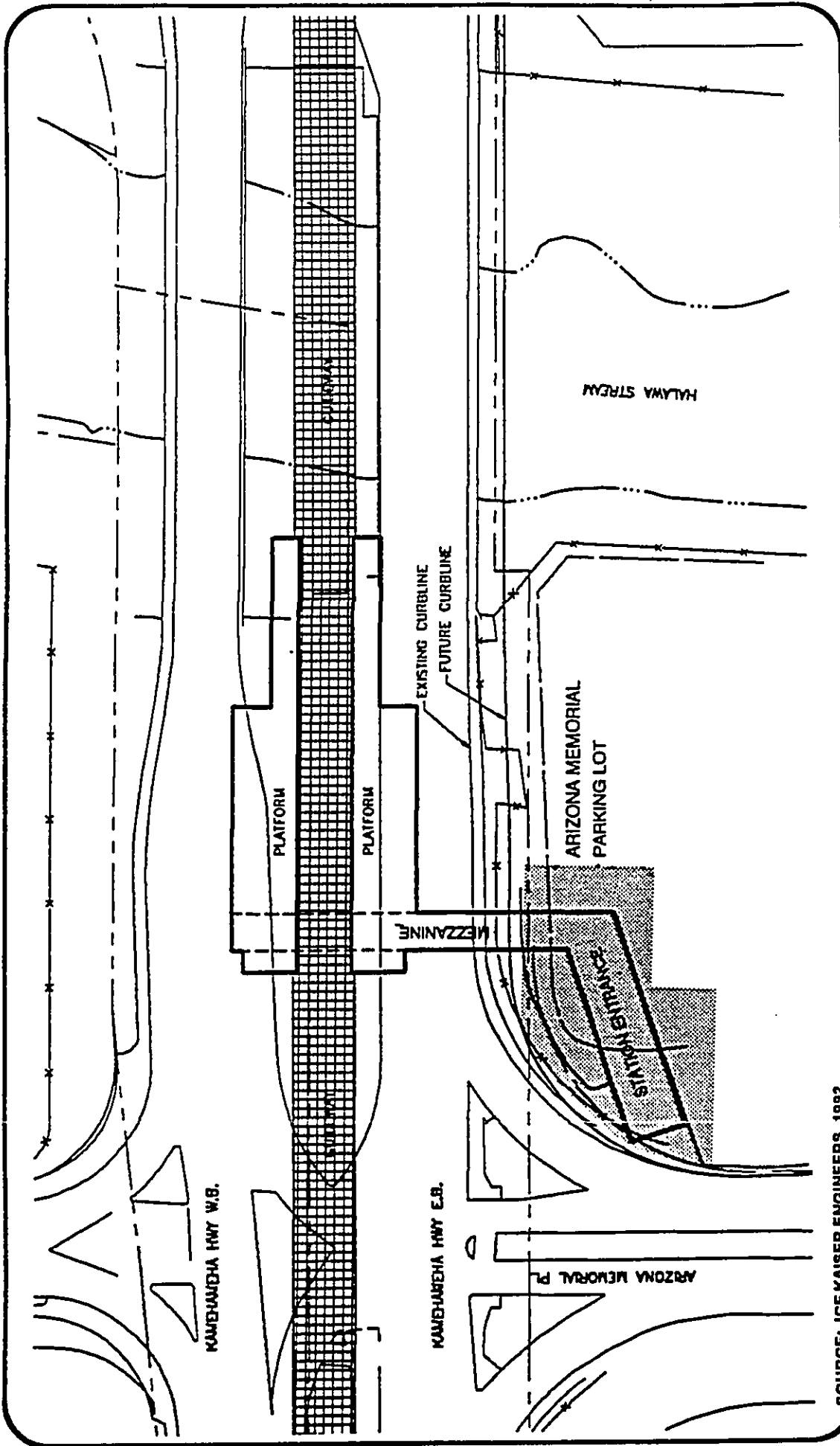
The station access at Makalapa Gate will require an easement of approximately 7,500 square feet of property (see Figure 5.33) that is currently used for approximately five parking stalls. Additional improvements under consideration at this station include a new sidewalk to the gate entrance, a retaining wall, and relocation of the security fence. Ancillary facilities, such as a train control room, are also under consideration. The use of this small portion of the naval base will provide additional access for its employees. Such a use is advocated by the Navy. The use of the property will not affect the historically significant portions of the base located some distance from the touchdown site.

Merchant Street Historic District (MSHD) The Merchant Street Historic District makai boundary along Nimitz Highway extends from Nuuanu Avenue to just Koko Head of Bethel Street (see Figure 5.34). The district's historic significance derives from the early 20th Century commercial/industrial development around the waterfront. The makai portion of the district, near Nimitz Highway, has historically been occupied by shipping-related industries. Nimitz Highway is 6 to 8 lanes wide. The guideway will be located entirely within highway right-of-way (just outside the district), 40 feet above grade and will not require acquisitions or alterations of property, or be out of character in mass or form with the historic industrial character of this area. No stations will be located in or adjacent to the district.

Old Police Station The fixed guideway for the amended LPA will be located in the median of Nimitz Highway as it passes approximately 150 feet from the Old Police Station in the MSHD (see Figure 5.35). Between the Old Police Station and Nimitz Highway, the City is currently constructing a residential project. As a result of the location of this project, the guideway will not have an effect on the Old Police Station.

Ala Wai Clubhouse The historic significance of the clubhouse is not only its architecture but also its contribution to rowing, an island tradition. The park clubhouse is set approximately 100 feet makai of the median of Kapiolani Boulevard. The guideway for the amended LPA, located in the median of Kapiolani Boulevard at a height of approximately 25 feet (see Figure 5.36), will not introduce visual or audible elements out of character with the property because of the considerable distance from the clubhouse and related recreational activities, buffering by trees and other landscaping, and existing ambient noise levels from the active thoroughfare. The lava rock wall around the clubhouse will not be touched by the proposed alignment.

Church of the Crossroads The church is historically significant because of its role in community activities and its architecture. The guideway will not further alter the property's setting, nor introduce elements out of character with this historic property. The church is set back from University Avenue, makai of a major H-1 Freeway interchange. The elevated guideway for the amended LPA will be approximately 140 feet Koko Head of the church as the alignment turns Koko Head mauka of Varsity Circle to cross the H-1 Freeway (see Figure 5.37). The elevation of the guideway will be at approximately 55 feet.



SOURCE: ICF KAISER ENGINEERS, 1992.

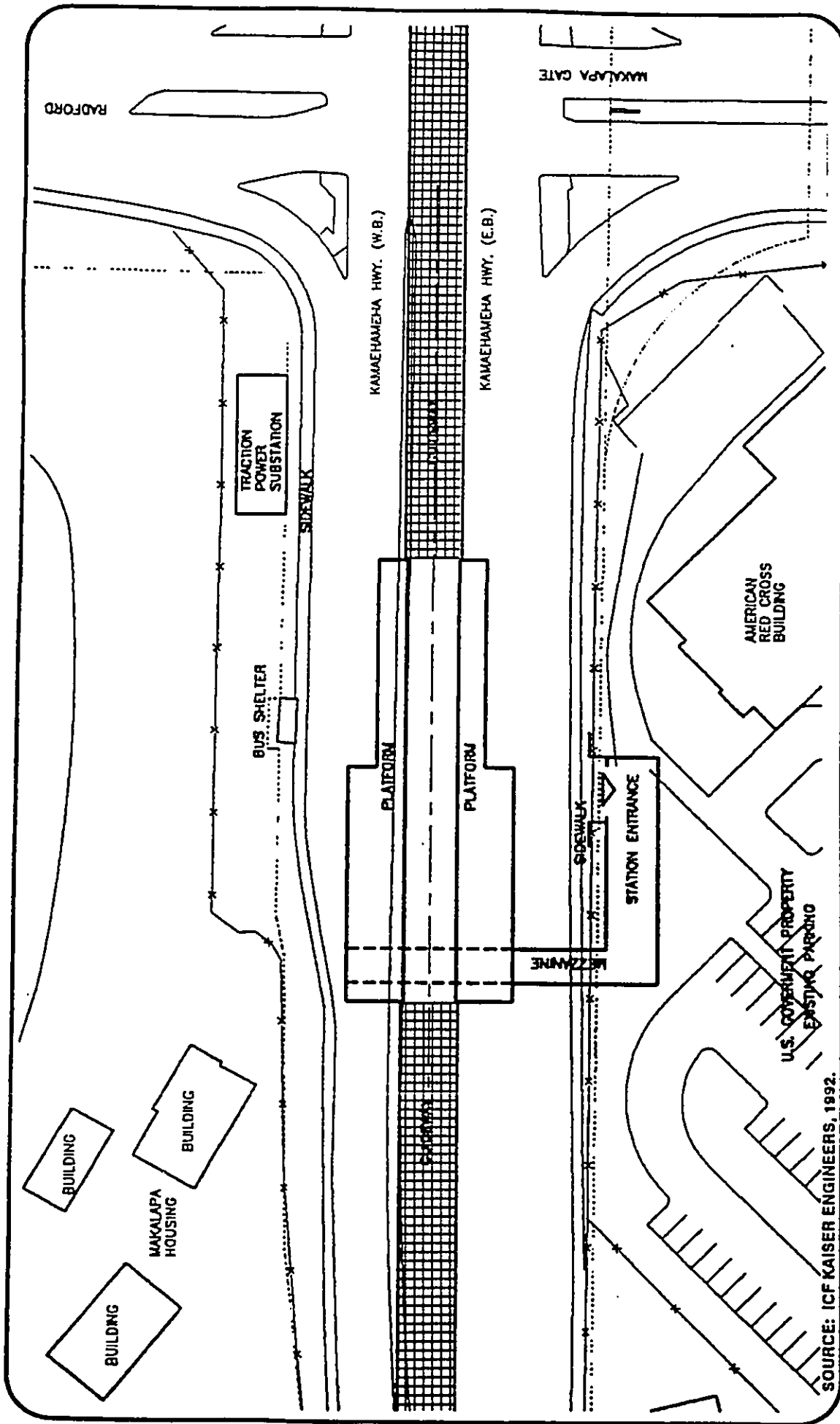
FIGURE 5.32

ARIZONA MEMORIAL STATION  
 (PEARL HARBOR NAVAL BASE)  
 HONOLULU RAPID TRANSIT PROGRAM



LEGEND  
 [Symbol] GUIDEWAY ALIGNMENT





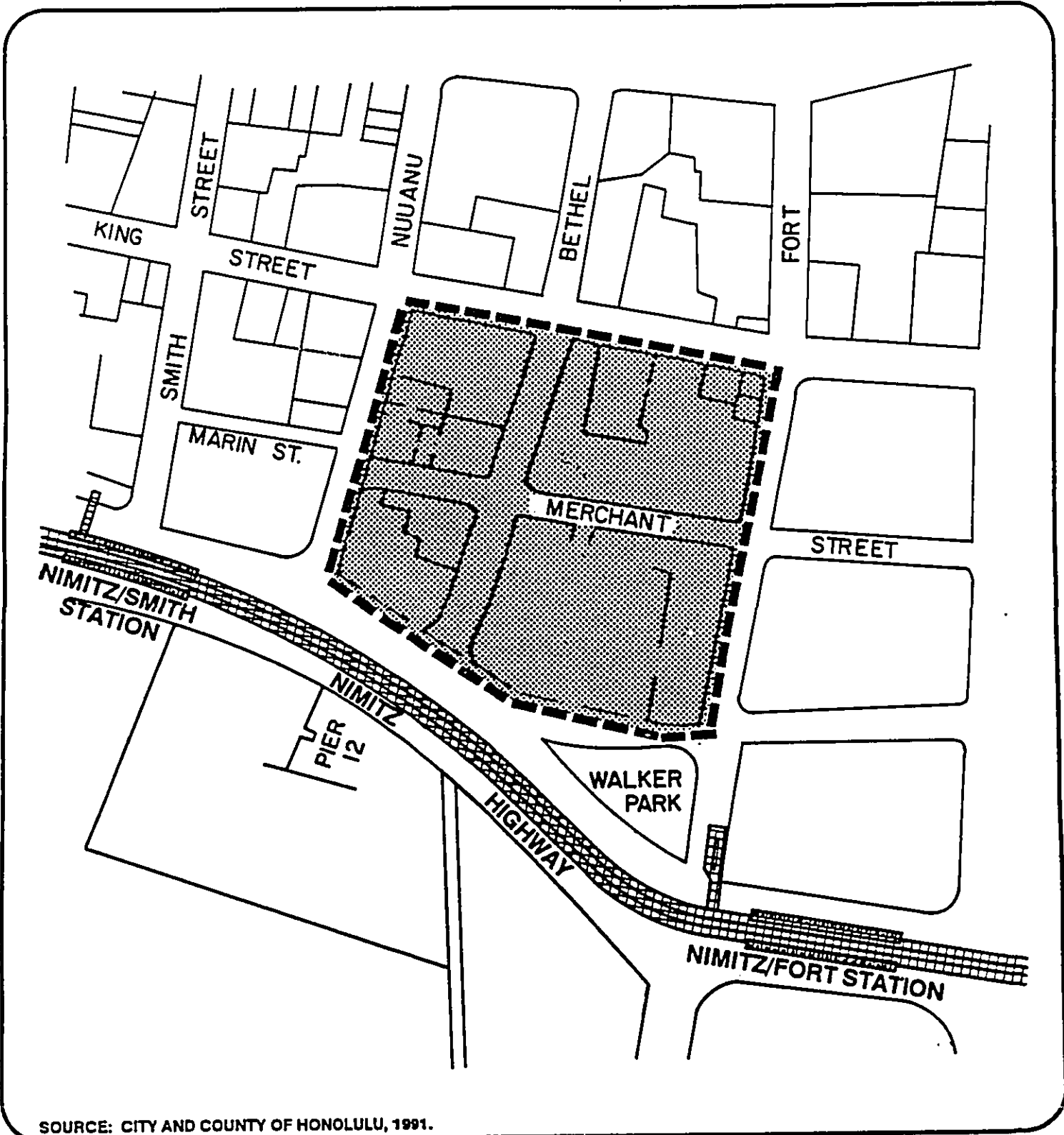
**FIGURE 5.33**

**MAKALAPA GATE STATION  
(PEARL HARBOR NAVAL BASE)  
HONOLULU RAPID TRANSIT PROGRAM**

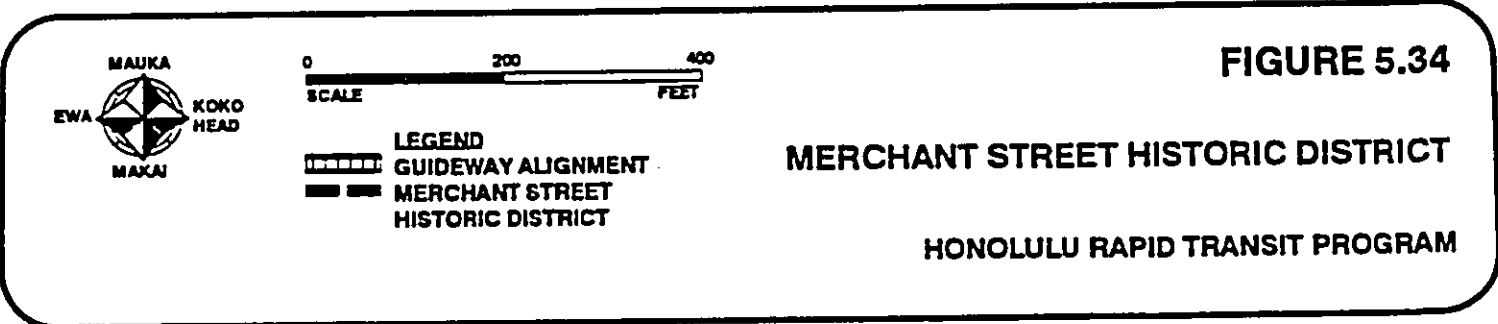


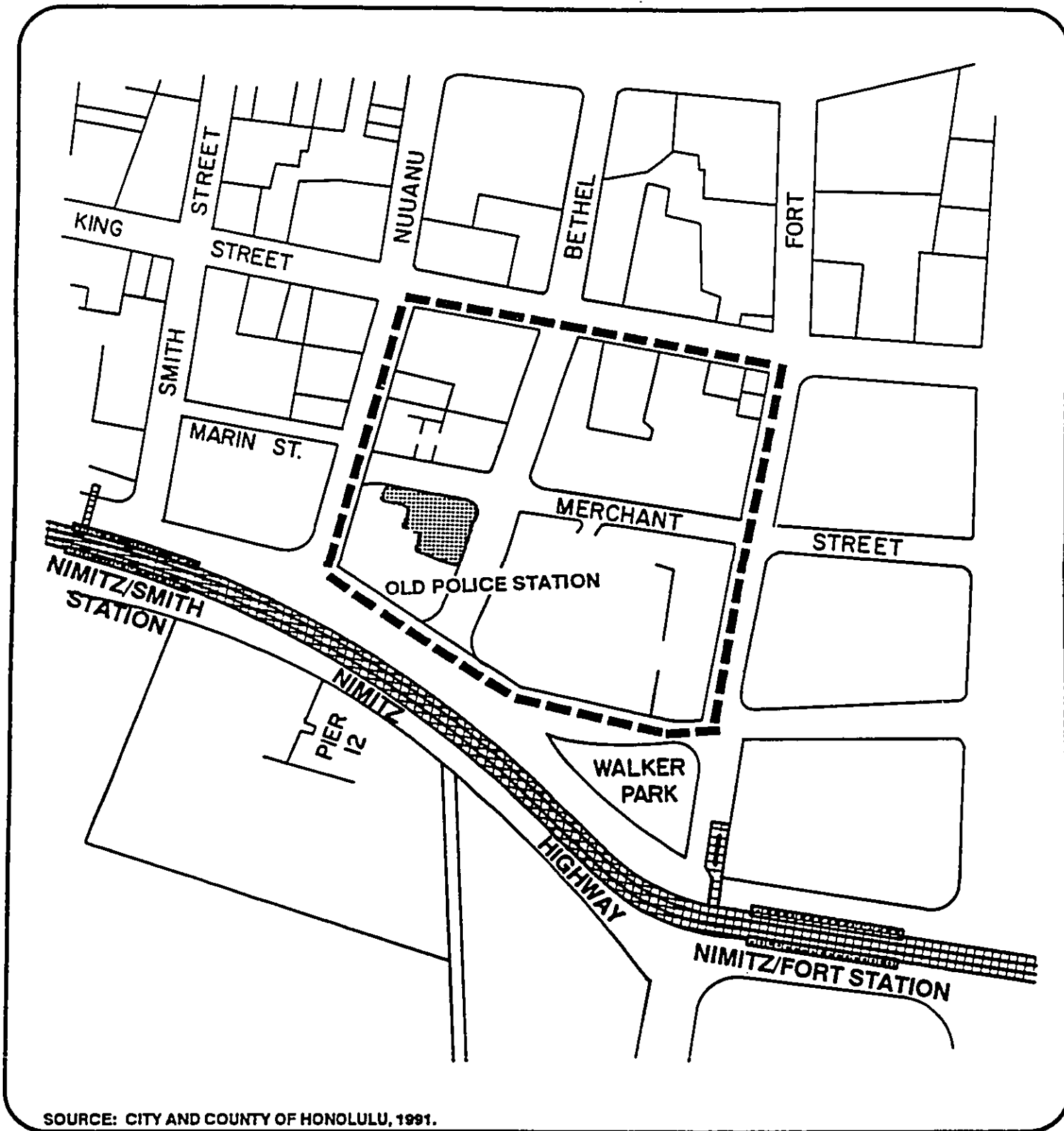
**LEGEND**  
GUIDEWAY ALIGNMENT



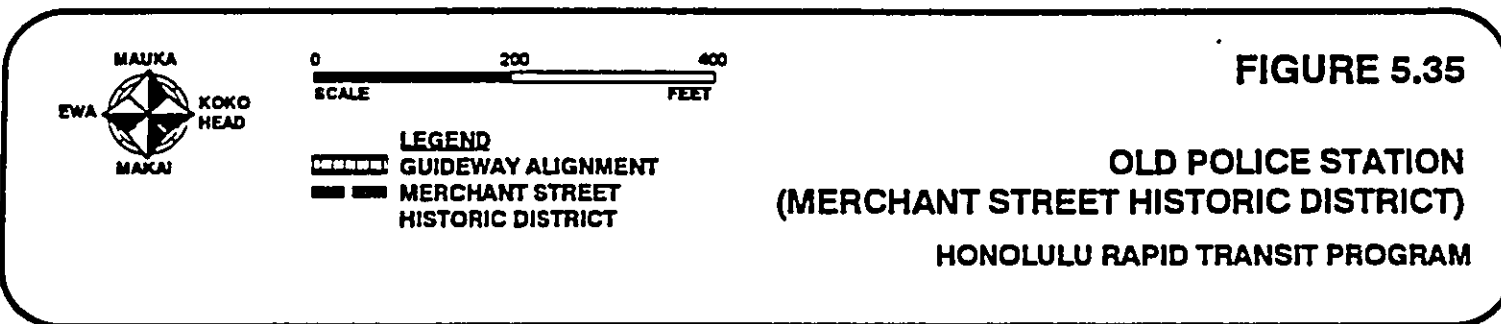


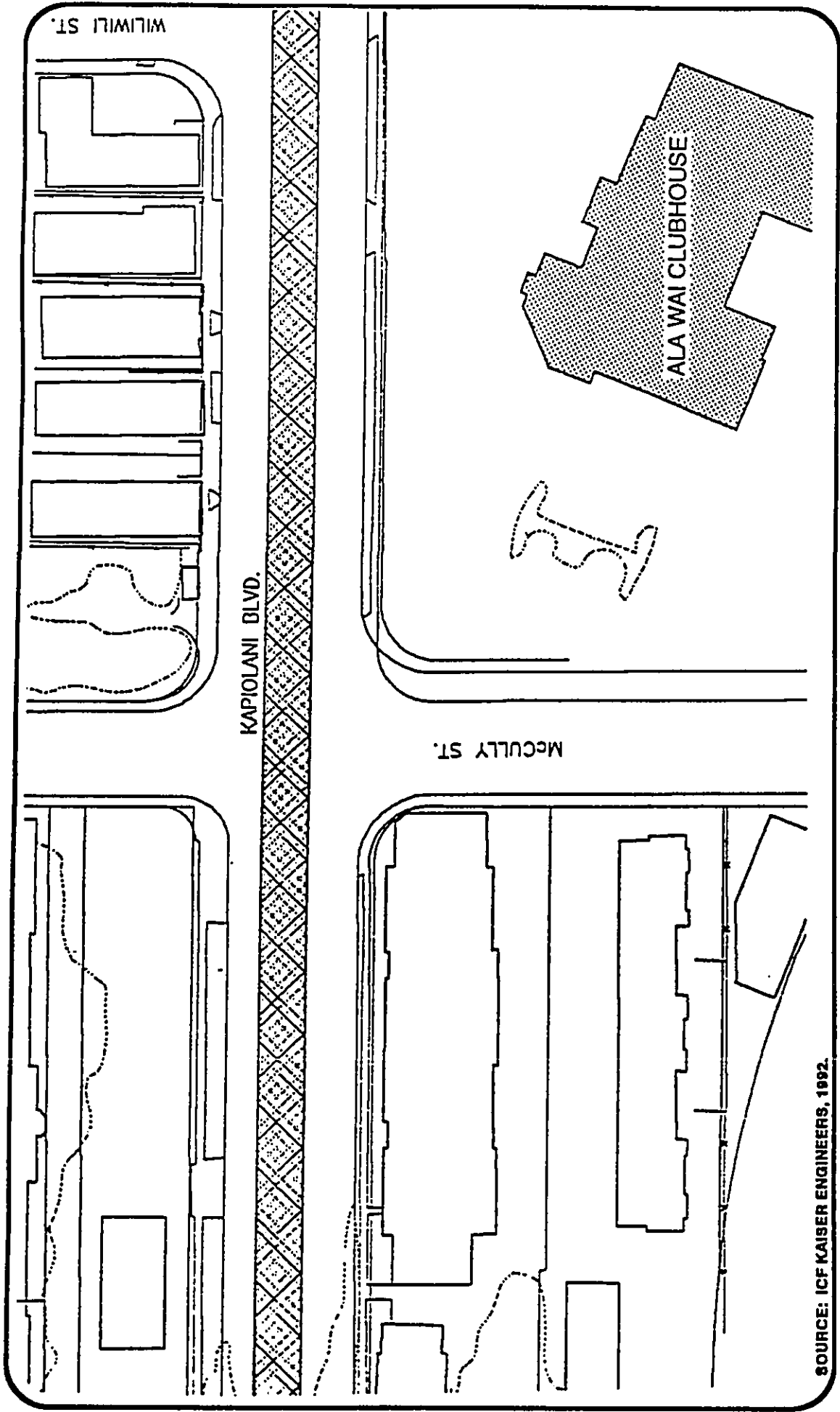
SOURCE: CITY AND COUNTY OF HONOLULU, 1991.





SOURCE: CITY AND COUNTY OF HONOLULU, 1991.





SOURCE: ICF KAISER ENGINEERS, 1992.



LEGEND  
GUIDEWAY ALIGNMENT

FIGURE 5.36

ALA WAI PARK CLUBHOUSE

HONOLULU RAPID TRANSIT PROGRAM

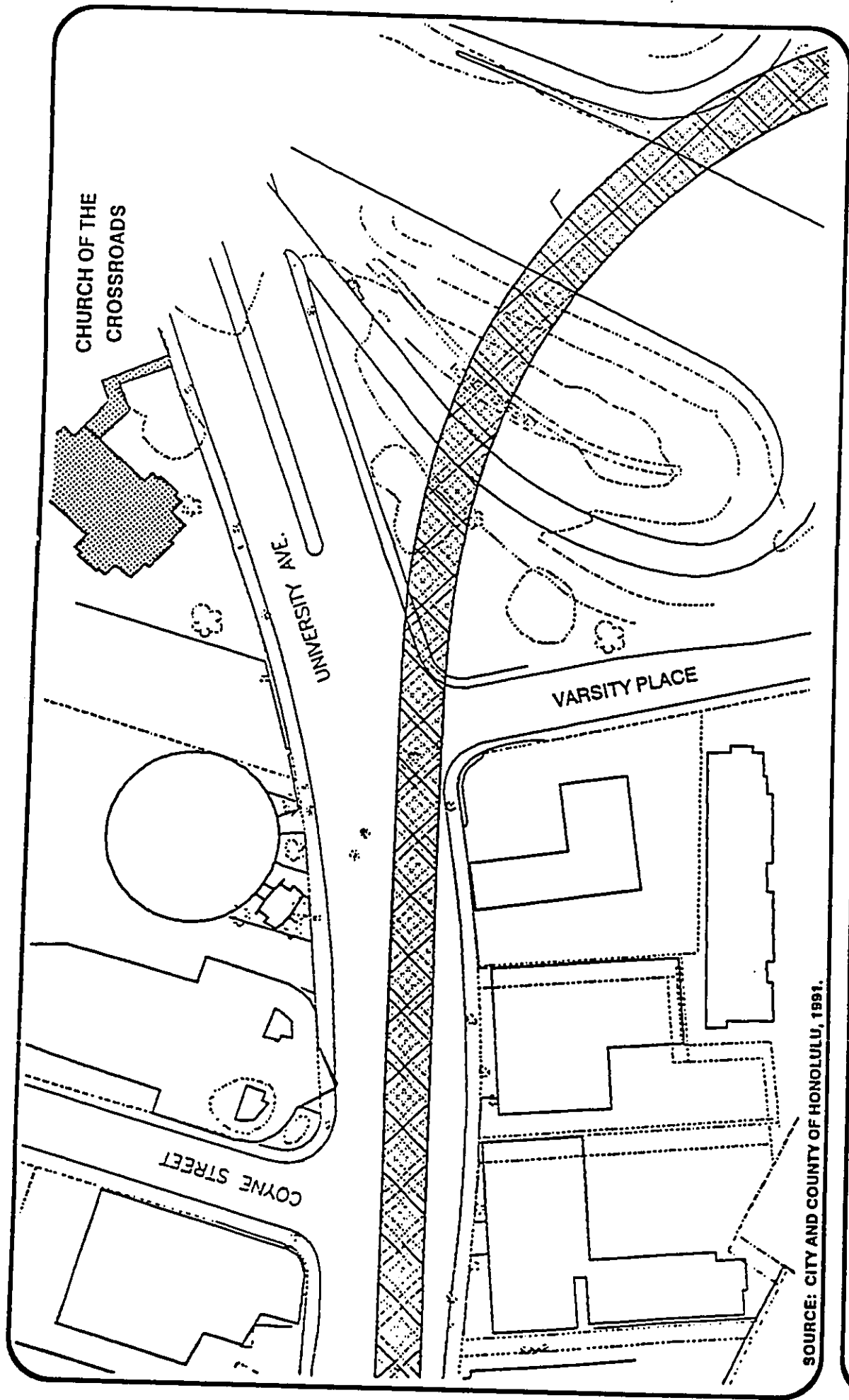


FIGURE 5.37

CHURCH OF THE CROSSROADS  
HONOLULU RAPID TRANSIT PROGRAM

EWA MAUKA  
KOKO HEAD

SCALE 0 40 80 FEET

LEGEND  
GUIDEWAY ALIGNMENT

**OR&L Station Property** *The OR&L Station building is historically significant because the station served as a transportation focal point for the surrounding industrial area. The transit project will not affect the building itself or these historic qualities. The amended LPA will remain in an aerial guideway configuration and include the Kaaahi Station Ewa of Iwilei Road (see Figure 5.38). The Liliha Civic Center will be Koko Head of the Kaaahi Station and makai of the OR&L Station building. The guideway will only be visible from the OR&L Station building as it crosses Iwilei Road approximately 300 feet makai; however, the proximity and scale of the Liliha Civic Center in comparison to the OR&L Station minimizes any negative visual impacts.*

*The guideway, however, will require an easement of 9,800 square feet on the makai portion of the OR&L Station property. Since there is no effect on the OR&L Station building itself due to the location of the Kaaahi Station and the guideway relative to the OR&L Station building, no additional mitigation will be required. There is ongoing coordination of the Liliha Civic Center and this transit project with the SHPO and the State Department of Accounting and General Services. The SHPO has concurred with a determination of no adverse effect.*

### **5.10.3 Finding of Adverse Effect and Mitigation**

*In applying the Criteria of Adverse Effect, four properties were found to be potentially adversely affected by the amended LPA: the Chinatown Historic District, Aloha Tower, the Dillingham Transportation Building, and Mother Waldron Park. The applicable Criteria of Adverse Effect for these properties is the "alteration of the character of the property's setting."*

**Chinatown** *A portion of the fixed guideway alignment (see Figure 5.39) is located along Nimitz Highway, within the makai boundary of the Chinatown Historic District as defined by the National Register. The aerial guideway will be approximately 40 feet above grade in the median of the highway. A station will be constructed between Maunakea and Smith Streets (see Figure 2.22) and will require use of a City-owned parcel (site of the Smith/Maunakea project) to accommodate the station touchdown on the mauka side of the highway. No displacements will occur.*

*The guideway and station are new structures within the boundary of Chinatown and will constitute a new visual element. The alignment, however, will be located within an existing transportation corridor, at the edge of Chinatown, and beyond the historic core precinct (see Figure 5.39) as defined in the Land Use Ordinance (Ordinance No. 86-96, as amended by Ordinance No. 89-52, April 18, 1989). Although the visual impact will be significant, the architectural and cultural significance of the district, therefore, will not be adversely affected by the alignment.*

*The following mitigation has been incorporated as part of the MOA:*

- *The City will develop the project design and specifications for construction in the Chinatown Historic District in consultation with the SHPO and will submit the plans to the SHPO and ACHP for concurrence;*
- *The City will landscape the portion of the project in the Chinatown Historic District in accordance with the landscaping plan designed in consultation with and approved by the SHPO to reduce the impacts of the project on the Chinatown Historic District;*
- *The City will protect structures in the Chinatown Historic District against damage during construction in accordance with sound construction practices to be developed and reviewed with the SHPO;*
- *The City will incorporate an interpretative display relating to the Chinatown Historic District into the Nimitz/Smith Station; and*

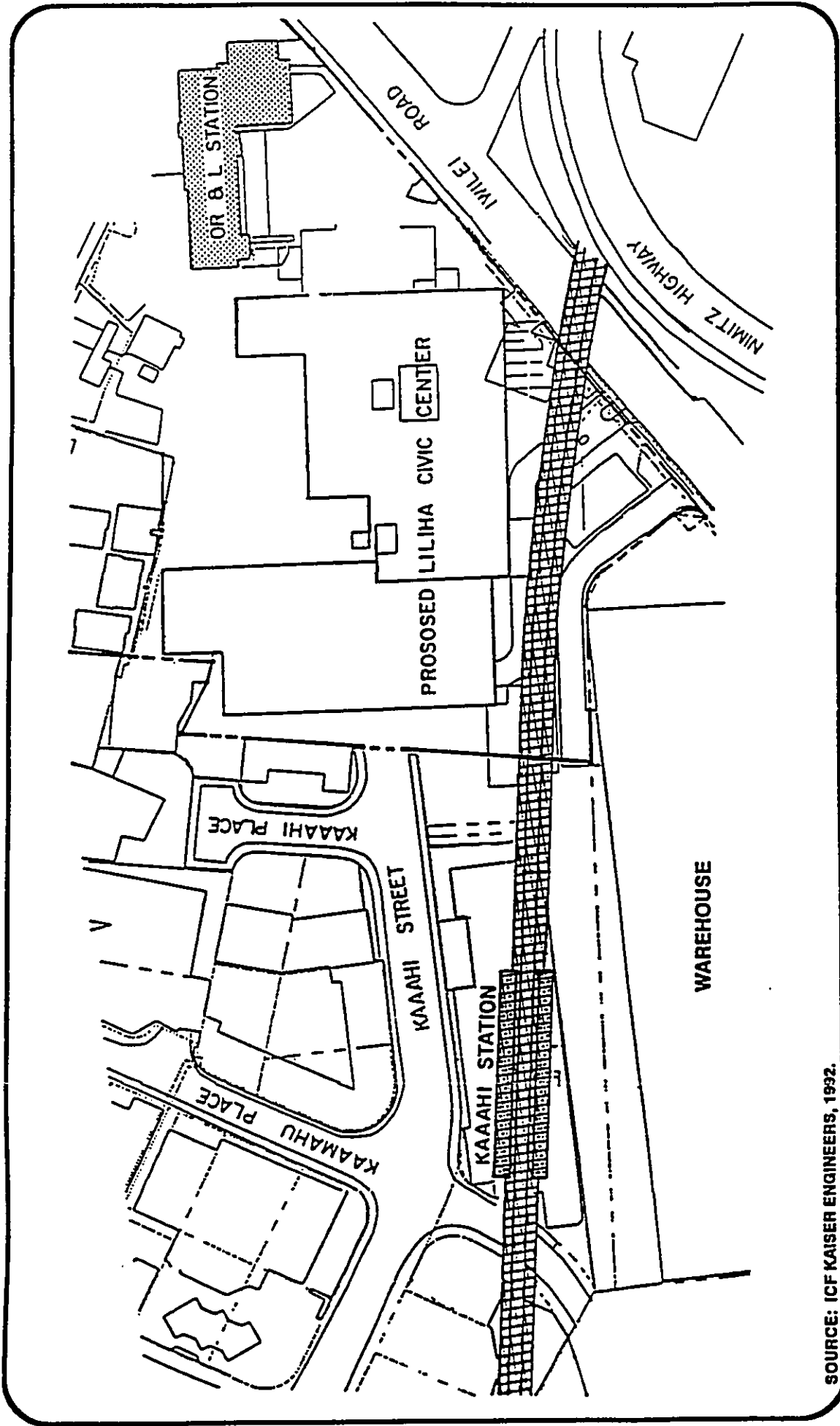
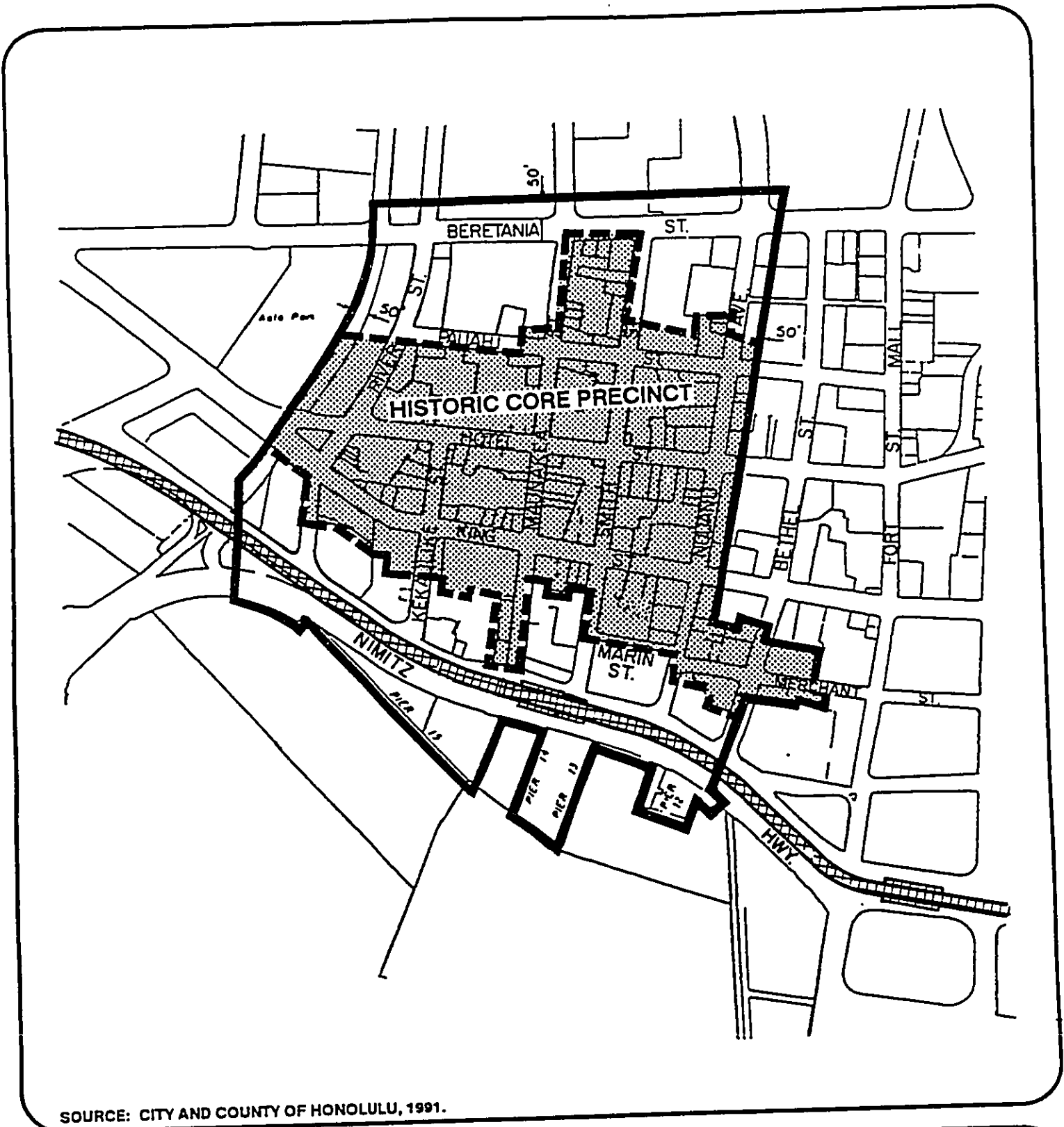


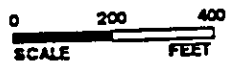
FIGURE 5.38

OR&L STATION

HONOLULU RAPID TRANSIT PROGRAM



SOURCE: CITY AND COUNTY OF HONOLULU, 1991.



- LEGEND**
- CHINATOWN HISTORIC DISTRICT/  
SPECIAL DISTRICT
  - CHINATOWN HISTORIC CORE PRECINCT
  - ▨ GUIDEWAY ALIGNMENT

**FIGURE 5.39**  
**CHINATOWN HISTORIC DISTRICT/  
 SPECIAL DISTRICT/  
 HISTORIC CORE PRECINCT**  
**HONOLULU RAPID TRANSIT PROGRAM**

- *Prior to the construction of the Honolulu Rapid Transit project, the City will contact the National Park Service (NPS) regional office Historic American Building Survey/Historic American Engineering Record (HABS/HAER) to determine what level and kind of recordation is appropriate for the Chinatown Historic District. The City will complete all documentation which must be accepted by HABS/HAER prior to construction in the Chinatown Historic District, and will provide copies of this documentation to the SHPO and appropriate local archives designated by the SHPO.*

**Aloha Tower** The fixed guideway will be located more than 500 feet from the Aloha Tower (see Figure 5.40); however, the top of the Aloha Tower is visible from the Fort Street Mall mauka of the guideway. The guideway is proposed at approximately 40 feet in height and will be at a lower elevation than the existing view angle to the top of the tower. However, as a result of proposed modifications to the site by the Aloha Tower Development Corporation the future view of the tower from the Fort Street Mall will be affected by the guideway. The SHPO has determined that there will be an adverse effect on the tower as a result of the guideway (see Section 106 Documentation, July 1992). The Aloha Tower Development Corporation proposal includes elaborate modifications and construction within the site of the Aloha Tower.

*Mitigation incorporated into the MOA includes the following:*

- *The City will develop the project design and specifications for construction in the immediate vicinity of the Aloha Tower in consultation with the SHPO and will submit the plans to the SHPO and ACHP for concurrence;*
- *The City will landscape the portion of the project in the Fort Street Mall view corridor in accordance with the landscaping plan designed in consultation with and approved by the SHPO to reduce the impacts of the project on Aloha Tower; and*
- *Prior to the construction of the Honolulu Rapid Transit project, the City will contact the NPS regional office HABS/HAER to determine what level and kind of recordation is appropriate for the Aloha Tower. The City will complete all documentation which must be accepted by HABS/HAER prior to construction adjacent to the Aloha Tower, and will provide copies of this documentation to the SHPO and appropriate local archives designated by the SHPO.*

**Dillingham Transportation Building** The fixed guideway alignment for the amended LPA will be located approximately 60 feet from the Dillingham Transportation Building and will be approximately 40 feet above grade. The closest station will be the Nimitz/Fort Station, located between Bishop and Fort Streets in the median of Nimitz Highway (see Figure 5.40).

The introduction of the 25-foot-wide guideway and station in proximity to the building will partially obstruct distant views of it from Nimitz Highway traveling Koko Head and from Irwin Park. The guideway will somewhat alter the character of the setting (see Figures 5.41 and 5.42).

Mitigation for the fixed guideway will include a review of column placement and ongoing coordination with the Aloha Tower development located Ewa-makai of the property to ensure integration of the fixed guideway elements into the area. *Additional mitigation included in the MOA is as follows:*

- *The City will develop the project design and specifications for construction in the immediate vicinity of the Dillingham Transportation Building in consultation with the SHPO and will submit the plans to the SHPO and ACHP for concurrence;*
- *The City will landscape the portion of the project in the immediate vicinity of the Dillingham Transportation Building in accordance with the landscaping plan designed in consultation with and approved by the SHPO to reduce the impacts of the project on the Dillingham Transportation Building;*



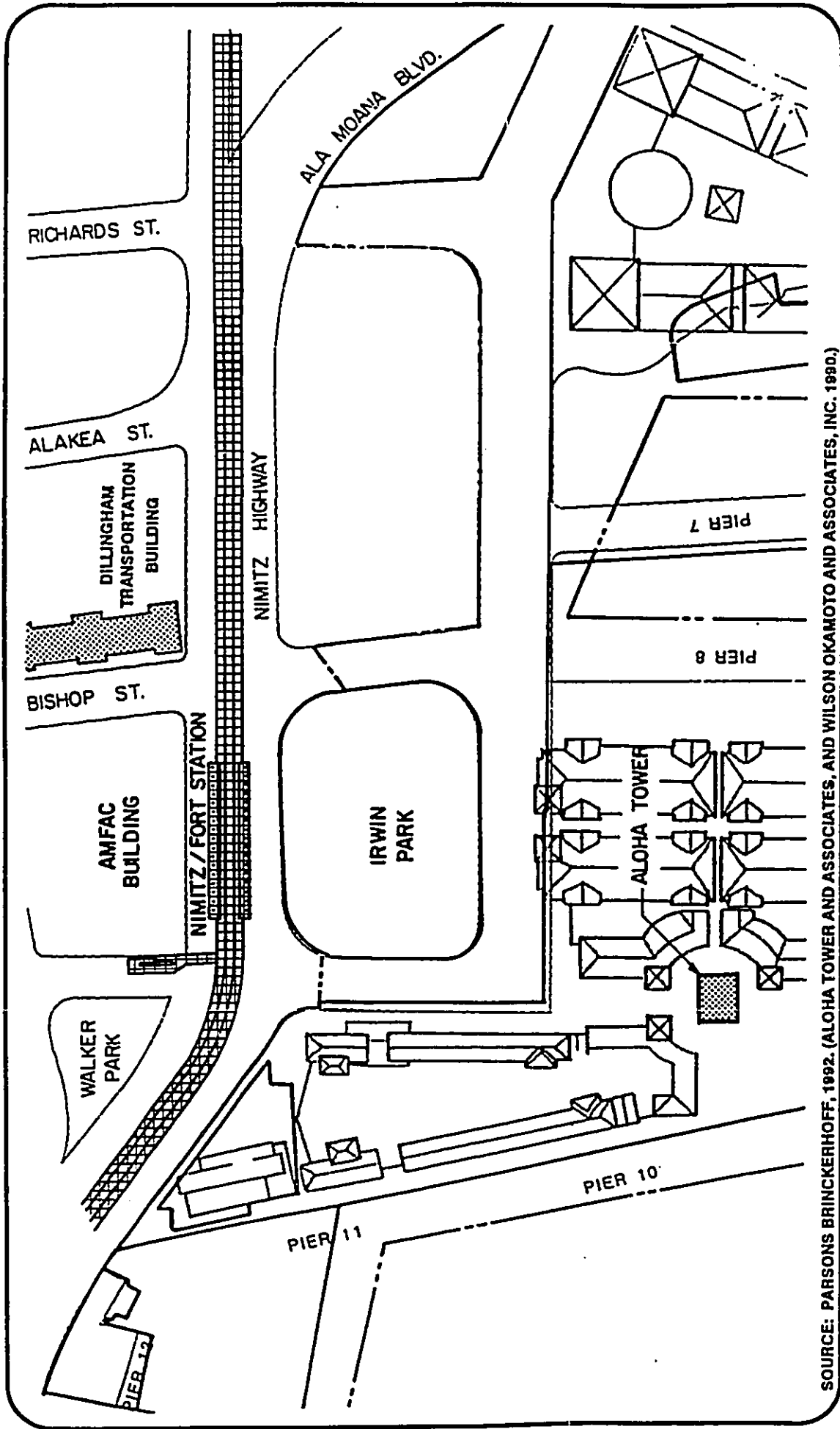
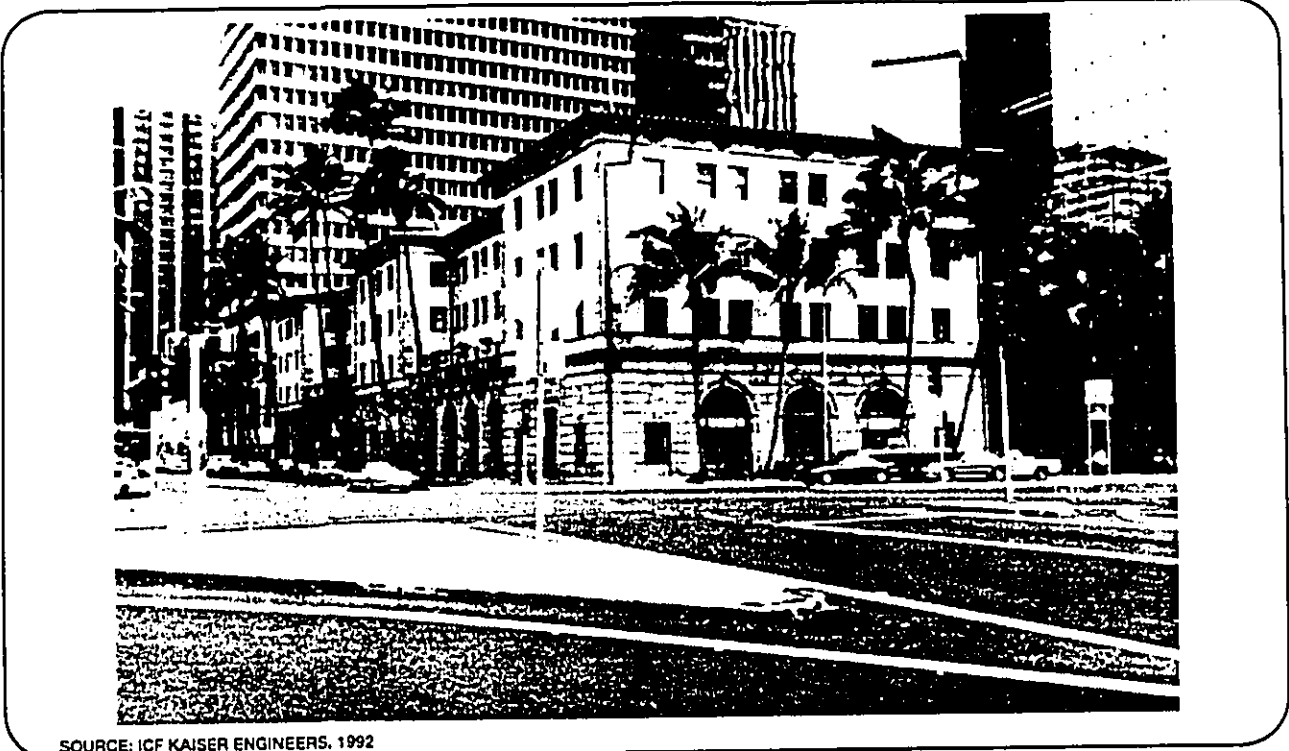


FIGURE 5.40

ALOHA TOWER  
 DILLINGHAM TRANSPORTATION BUILDING  
 HONOLULU RAPID TRANSIT PROGRAM

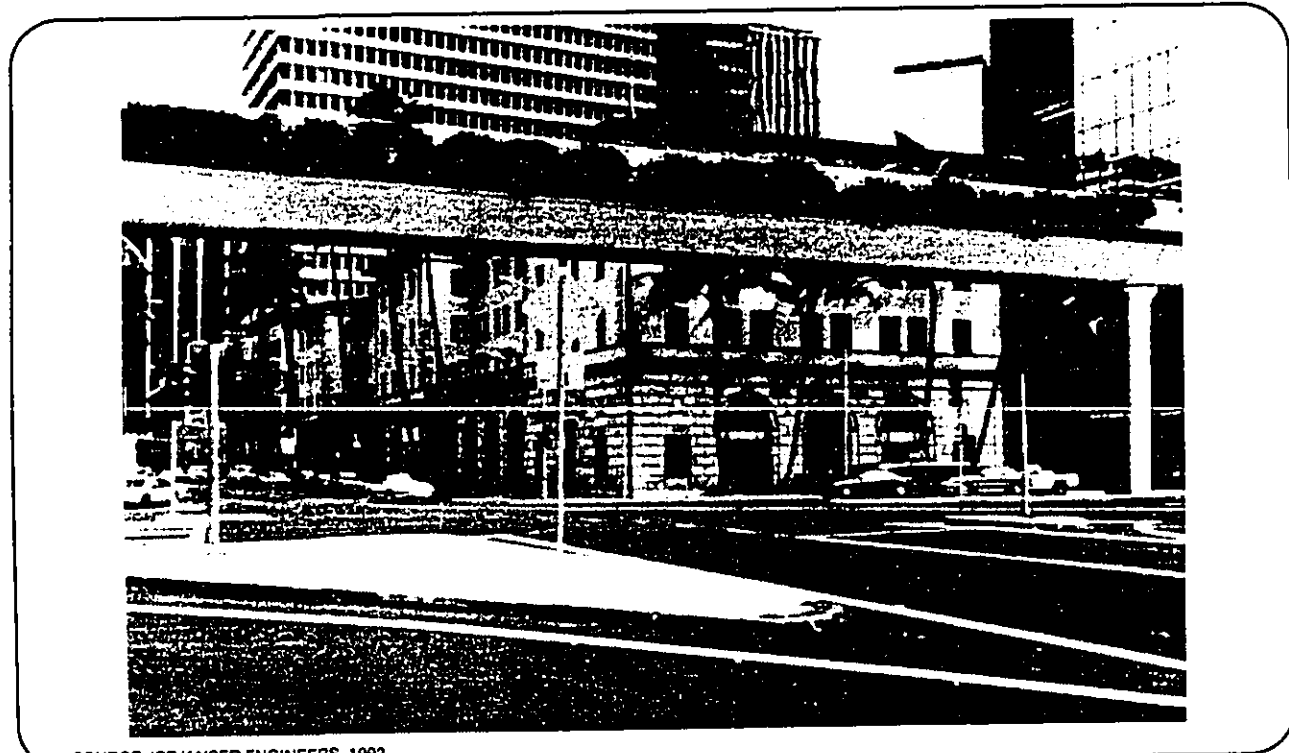


LEGEND  
 GUIDEWAY ALIGNMENT



SOURCE: ICF KAISER ENGINEERS, 1992

FIGURE 5.41  
EXISTING VIEW OF DILLINGHAM TRANSPORT BUILDING  
HONOLULU RAPID TRANSIT PROGRAM



SOURCE: ICF KAISER ENGINEERS, 1992

FIGURE 5.42  
PROJECTED VISUAL CHANGE OF  
DILLINGHAM TRANSPORTATION BUILDING  
HONOLULU RAPID TRANSIT PROGRAM

- *The City will protect the Dillingham Transportation Building against damage during construction in accordance with sound construction practices to be developed and reviewed with the SHPO; and*
- *Prior to the construction of the Honolulu Rapid Transit project, the City will contact the NPS regional office HABS/HAER to determine what level and kind of recordation is appropriate for the Dillingham Transportation Building. The City will complete all documentation which must be accepted by HABS/HAER prior to construction adjacent to the Dillingham Transportation Building, and will provide copies of this documentation to the SHPO and appropriate local archives designated by the SHPO.*

**Mother Waldron Park** Mother Waldron Park is significant for its association with the Playground Movement, its architecture, and its association with Playground Director Margaret Waldron's work with Kakaako children. *The guideway on Halekauwila Street is adjacent to the mauka side of this neighborhood park (See Figure 5.43). Because of existing levels of truck activity, the prevailing industrial nature of the area, and extensive construction in and adjacent to the park, the elevated guideway will not have an adverse impact on the use of the park with the amended LPA. However, the guideway will be a significant visual element in the setting of the park.*

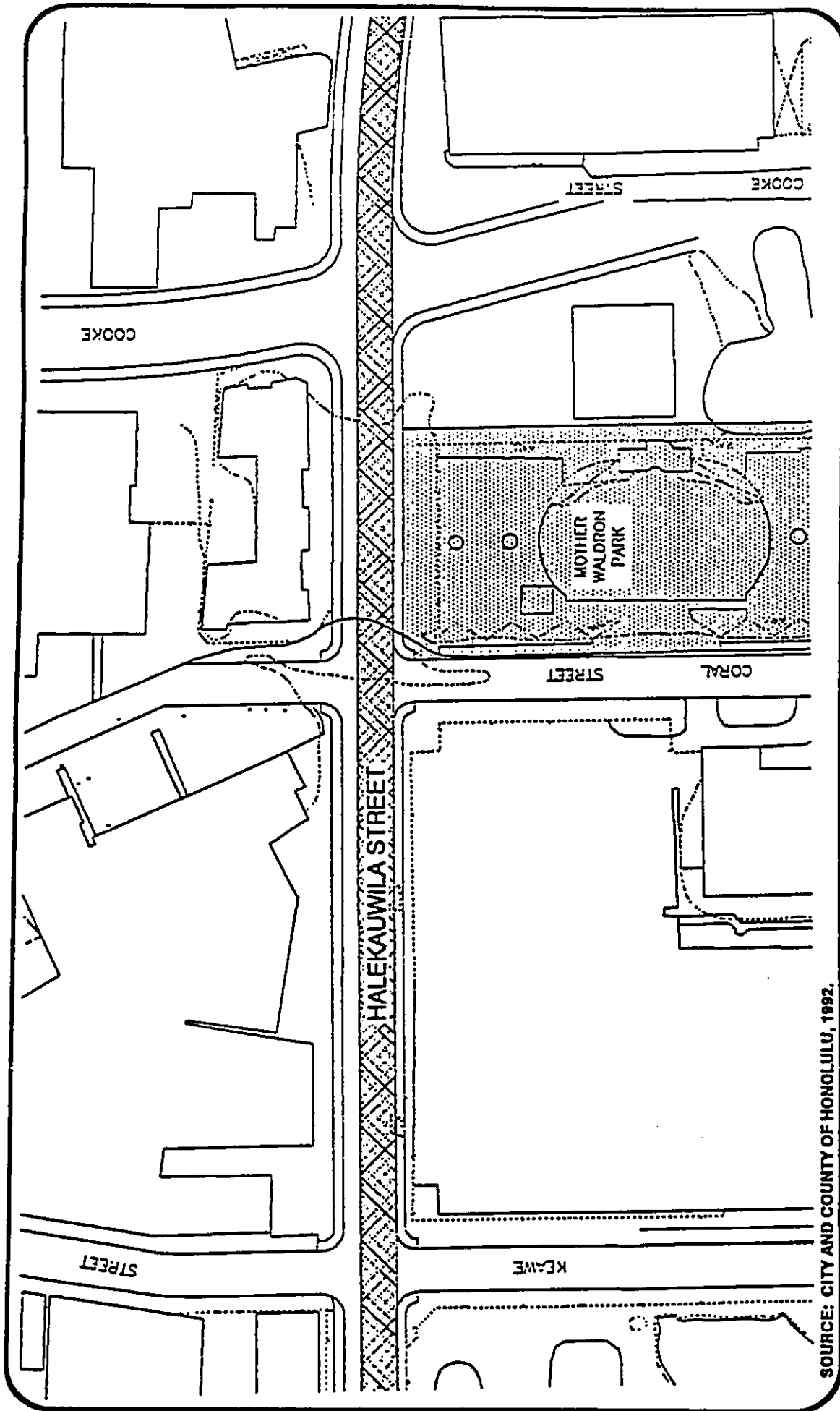
*The following mitigation has been incorporated as part of the MOA:*

- *The City will develop the project design and specifications for construction adjacent to Mother Waldron Park in consultation with the SHPO and will submit the plans to the SHPO and ACHP for concurrence;*
- *The City will landscape the portion of the project in the immediate vicinity of Mother Waldron Park in accordance with the landscaping plan designed in consultation with and approved by the SHPO to reduce the impacts of the project on Mother Waldron Park;*
- *The City will protect Mother Waldron Park against damage during construction in accordance with sound construction practices to be developed and reviewed with the SHPO; and*
- *Prior to the construction of the Honolulu Rapid Transit project, the City will contact the NPS regional office HABS/HAER to determine what level and kind of recordation is appropriate for Mother Waldron Park. The City will complete all documentation which must be accepted by HABS/HAER prior to construction adjacent to Mother Waldron Park, and will provide copies of this documentation to the SHPO and appropriate local archives designated by the SHPO.*

## **5.11 PARKLANDS**

Of the public parklands inventoried along the fixed guideway corridor in Chapter 3.10, only Keehi Lagoon Beach Park, and Aloha Stadium will be negatively affected by the fixed guideway alternative, each as a result of direct property taking. These parks are described in greater detail in the Section 4(f) Evaluation (Section 5.12). Alternatives that will avoid taking park property are examined and weighed against projected impacts on other Section 4(f) properties. Walker Park will also be affected.

*Mother Waldron Park was identified in the SDEIS as being "used" due to the acquisition of approximately 80 square feet adjacent to the locations of two columns. The columns would not have been placed in the park, but the land would have been used to provide sufficient sidewalk area adjacent to the columns. Further design modifications since the SDEIS have eliminated the "use" of Mother Waldron Park. The placement of C-piers at 180-foot intervals along Halekauwila Street, adjacent to Mother Waldron Park will eliminate two parking spaces and reduce sidewalk dimensions from six to four feet wide at pier locations. The guideway will not intrude into the park and no property acquisition is necessary.*



SOURCE: CITY AND COUNTY OF HONOLULU, 1992.



LEGEND  
GUIDEWAY ALIGNMENT



FIGURE 5.43

MOTHER WALDRON PARK

HONOLULU RAPID TRANSIT PROGRAM

*Aloha Stadium has been added as a Section 4(f) resource following review by FTA of land use covenants in the Quitclaim Deed which transferred the property from the United States Department of Interior to the City in 1967. The Quitclaim Deed requires the property be used and maintained for public recreational purposes. These land use requirements were also part of the agreement of transfer when the land was given to the State of Hawaii in 1970. A complete explanation of the covenants and resulting Section 4(f) evaluation are found in Section 3.1.2 of this report.*

Walker Park The Nimitz/Fort Station touchdown will be on the makai/Koko Head side of the Walker Park (see Figure 5.44). The touchdown is planned to be integrated with the pedestrian access for the Aloha Tower development. The design of the guideway will be integrated into the existing streetscape, including the adjacent Amfac Building and the right-of-way. Walker Park is considered part of Nimitz Highway right-of-way according to the State Department of Transportation; therefore, it is not a designated park and is not subject to Section 4(f).

*In addition to the four park properties previously discussed, nine other parks are located adjacent to roadways in which the amended LPA will be placed, and will not actually abut the guideway/station structures. Given the existing ambient environment around major highways and thoroughfares, the elevated transit guideway will not affect the visual quality, usage, or appreciation of the open spaces of these parks.*

Pacheco Playground, Neal S. Blaisdell Park, Aiea Bay State Park, and Richardson Recreation Center The guideway will be located within the median of Kamehameha Highway and separated by sufficient distance to avoid impacts on these parks.

Navy Marine Golf Course The guideway will be located across the H-1 Freeway Viaduct from the golf course and will have no impact on it.

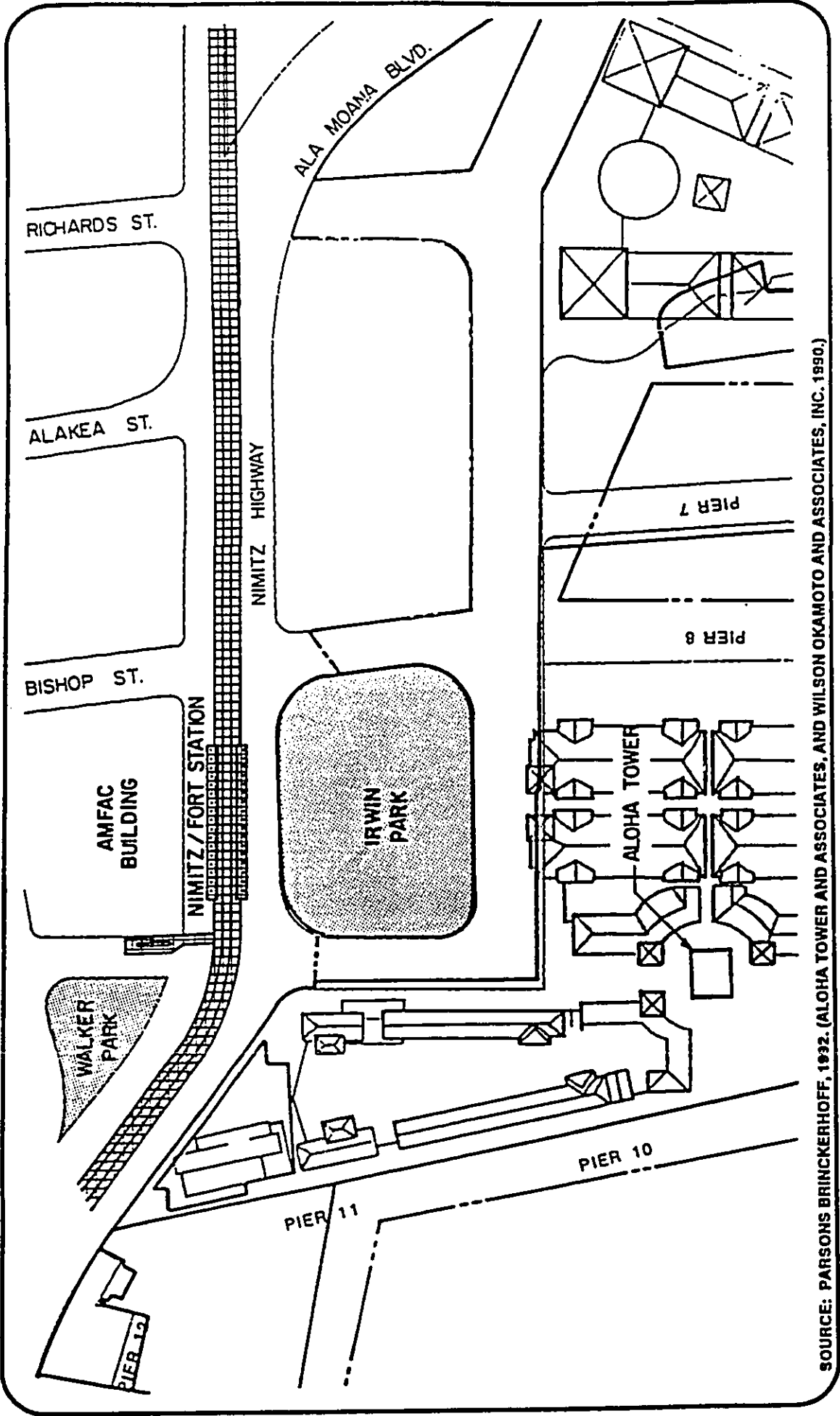
Fort Street Mall This urban park/plaza mauka of Walker Park will not be adversely affected by the operation of the alternative. Special precautionary measures will be implemented prior to, and during, construction to avoid or minimize temporary impacts such as noise, dust, and access disruption.

Irwin Park The guideway will be located mauka of Irwin Park (see Figure 5.44) in the median of Nimitz Highway. The Nimitz/Fort Station also will be located on Nimitz Highway adjacent to Irwin Park. The station design is being coordinated with the plans for the Aloha Tower Development, which includes Irwin Park. The guideway will not adversely impact the use of the Park.

Ala Wai Clubhouse and Field and Frank C. Judd Mini Park The visual quality and use of these facilities will not be compromised by the fixed guideway alignment in the median of Kapiolani Boulevard. The Ala Wai Clubhouse is located about 100 feet makai of the guideway (see Figure 5.36), and the park is heavily buffered with trees on the mauka side along Kapiolani Boulevard. The street is a major traffic artery, and the transit system likely will not noticeably increase noise levels at these two parkland resources.

## 5.12 SECTION 4(f) EVALUATION

Section 4(f) of the Department of Transportation Act of 1966 requires that no federally-funded program or project use land from a significant publicly owned public park, recreation area, or wildlife and waterfowl refuge, or any significant historic site, unless a determination is made that: (1) there is no feasible and prudent alternative to using that land; and (2) such program or project includes all possible planning to minimize harm to the property resulting from such use. The word "use" in this case means property that is taken or acquired for construction of a permanent transportation facility or, if not taken, the project substantially impairs the intended use of the property.



SOURCE: PARSONS BRINCKERHOFF, 1992. (ALOHA TOWER AND ASSOCIATES, AND WILSON OKAMOTO AND ASSOCIATES, INC. 1990.)

FIGURE 5.44

WALKER PARK  
IRWIN PARK

HONOLULU RAPID TRANSIT PROGRAM

For each historic site or parkland affected, this section includes a description of the relevant portion of the amended LPA; the property; the expected impact on the property; alternatives to avoid the Section 4(f) involvement and potential effects; and measures to mitigate the project-related impact.

Chapter 2.0 of this *FEIS* provides a history of the systematic process by which alternatives were developed, evaluated, and refined to become the alternatives remaining under consideration in the present studies. The avoidance of impact to historic and Section 4(f) resources was an important criterion in the alternative selection process. The alignments (street corridor locations) now being studied thus represent the previous efforts to minimize Section 4(f) impacts. During the AA/DEIS studies, each alignment was further refined, with site-specific shifts in alignment or station location to avoid, where feasible, Section 4(f) involvement. Through this process, the number of Section 4(f) properties affected by the fixed guideway alternatives was successfully reduced from more than 20 sites to the sites discussed in this *FEIS*. The amended LPA will affect four Section 4(f) properties: the Pearl Harbor Naval Base, Keehi Lagoon Beach Park, OR&L Station property, and *Aloha Stadium*. *Appendix A.4* includes correspondence from the Department of Interior, concluding the Section 4(f) review.

Selection of the No-Build or TSM Alternatives will avoid Section 4(f) involvement.

### **5.12.1 Pearl Harbor Naval Base**

#### **5.12.1.1 Proposed Action**

The amended LPA extends from the Waiawa Station Ewa of Leeward Community College through Downtown to the Koko Head terminus at the University/Quarry Station. The amended LPA has 22 stations. The guideway follows the median of Kamehameha Highway as it passes the Pearl Harbor Naval Base. The Arizona Memorial Station will have a touchdown inside the boundaries of the base where Kalaloa Street and Kamehameha Highway intersect at the entrance to the memorial. The Makalapa Gate Station will have a touchdown inside the boundaries of the base makai of Kamehameha Highway Ewa of Radford Drive.

#### **5.12.1.2 Description of the 4(f) Resource**

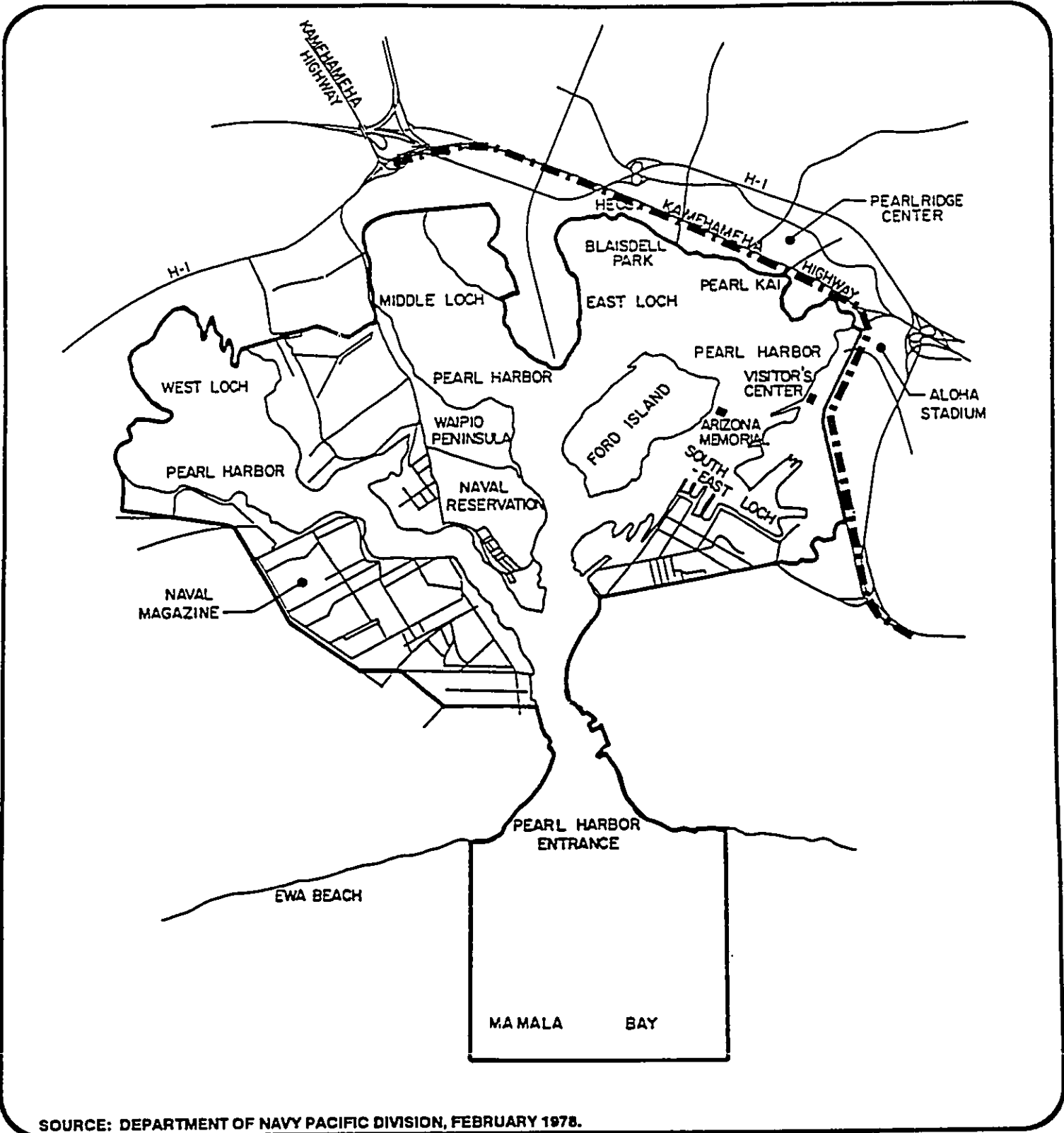
The Pearl Harbor Naval Base encompasses 5,100 acres of land and is located Ewa of Honolulu, in the Ewa District of Oahu (see Figure 5.45). The area of the base that is located makai of the highway is referred to as the fenced naval base area and encompasses the portion of the base on the National

Register of Historic Places. The primary features of the base that make it historic, including Ford Island, are generally located on the makai side of the *fenced naval base area*. The portion of the resource to be acquired for the Arizona Memorial Station currently serves as a portion of an unimproved bus parking area for visitors to the Memorial. The portion of the area to be acquired for Makalapa Gate Station is used for parking.

#### **5.12.1.3 Impact on the 4(f) Resource by the Proposed Action**

The Arizona Memorial Station will require an easement of approximately 10,000 square feet (0.23 acre) from the parking lot makai of Kamehameha Highway and its intersection with Kalaloa Street (see Figure 5.32). The property is approximately equivalent to four bus spaces; however, the lot is currently not marked and is in need of resurfacing. None of the features that placed the base on the National Register of Historic Places will be affected.

The Makalapa Gate Station will require an easement of approximately 7,500 square feet (0.17 acre) (see Figure 5.33) from a portion of the base adjacent to the border of Kamehameha Highway. This portion of



**FIGURE 5.45**

**PEARL HARBOR NAVAL BASE HISTORIC PROPERTY**

**HONOLULU RAPID TRANSIT PROGRAM**

**LEGEND**

- GUIDEWAY ALIGNMENT
- BOUNDARY

MAUKA  
EWA  
KOKO HEAD  
MAKA



the base includes approximately five parking stalls. No structures of historical significance are located on this portion of the base. The use of this small portion of the naval base will provide additional access for its employees. Such a use is advocated by the Navy. The use of the property will not affect the historically significant portions of the base located some distance from the touchdown site.

#### **5.12.1.4 Avoidance Alternatives**

The Salt Lake alignment would avoid the Section 4(f) property but was not selected as the amended LPA due to other environmental impacts.

Use of property on the mauka side of the Kamehameha Highway for the Arizona Memorial Station touchdown would not provide the same extent of pedestrian safety because it will require crossing the highway at grade to access the Memorial.

Provision for a touchdown at Makalapa Gate on the makai side of Kamehameha Highway would provide direct access to the makai side of the base for its employees and residents. A touchdown on the mauka side of Kamehameha Highway would provide access and increased pedestrian traffic in a residential portion of the base. Safety, with a direct pedestrian access for employees, will be improved by the makai access.

#### **5.12.1.5 Mitigation Measures**

The Arizona Memorial Station plans will include visual improvements to the parking area with landscaping. Resurfacing and restriping of parking stalls will provide more clearly delineated parking for the buses currently using the parking area and minimize the bus parking loss. There will be ongoing coordination with the Navy, the National Park Service, and the SHPO. The station itself is a long-term mitigation for a much-needed transportation facility to improve access to the Arizona Memorial.

The Makalapa Gate Station will provide a needed access to the base. The design of the facility will be coordinated with the Navy and the SHPO. No additional mitigation measures will be required.

### **5.12.2 Keehi Lagoon Beach Park**

#### **5.12.2.1 Proposed Action**

The amended LPA alignment follows Nimitz Highway as it fronts the airport industrial area. The guideway continues Koko Head along Nimitz Highway, following the periphery of Keehi Lagoon Beach Park prior to turning mauka to cross the H-1 Freeway and continuing onto Dillingham Boulevard.

#### **5.12.2.2 Description of the 4(f) Resource**

The Keehi Lagoon Beach Park, owned and maintained by the City as a park facility, comprises 71.97 acres. The makai side of the park fronts Keehi Lagoon. Koko Head of the park is the Pacific War Memorial and Disabled American Veterans facility. The park has tennis courts, playfields, and comfort stations. The park has undergone recent improvements to its facilities.

#### **5.12.2.3 Impact on the Resource by the Proposed Action**

One of the fixed guideway columns will be located at the periphery of the park adjacent to Nimitz Highway. The area required for the column and right-of-way of the aerial guideway, including its construction, will be approximately 5,250 square feet (0.12 acre) (see Figure 5.46). This area does not constitute a significant portion of the park nor does it contain any facilities such as tennis courts or playfields.

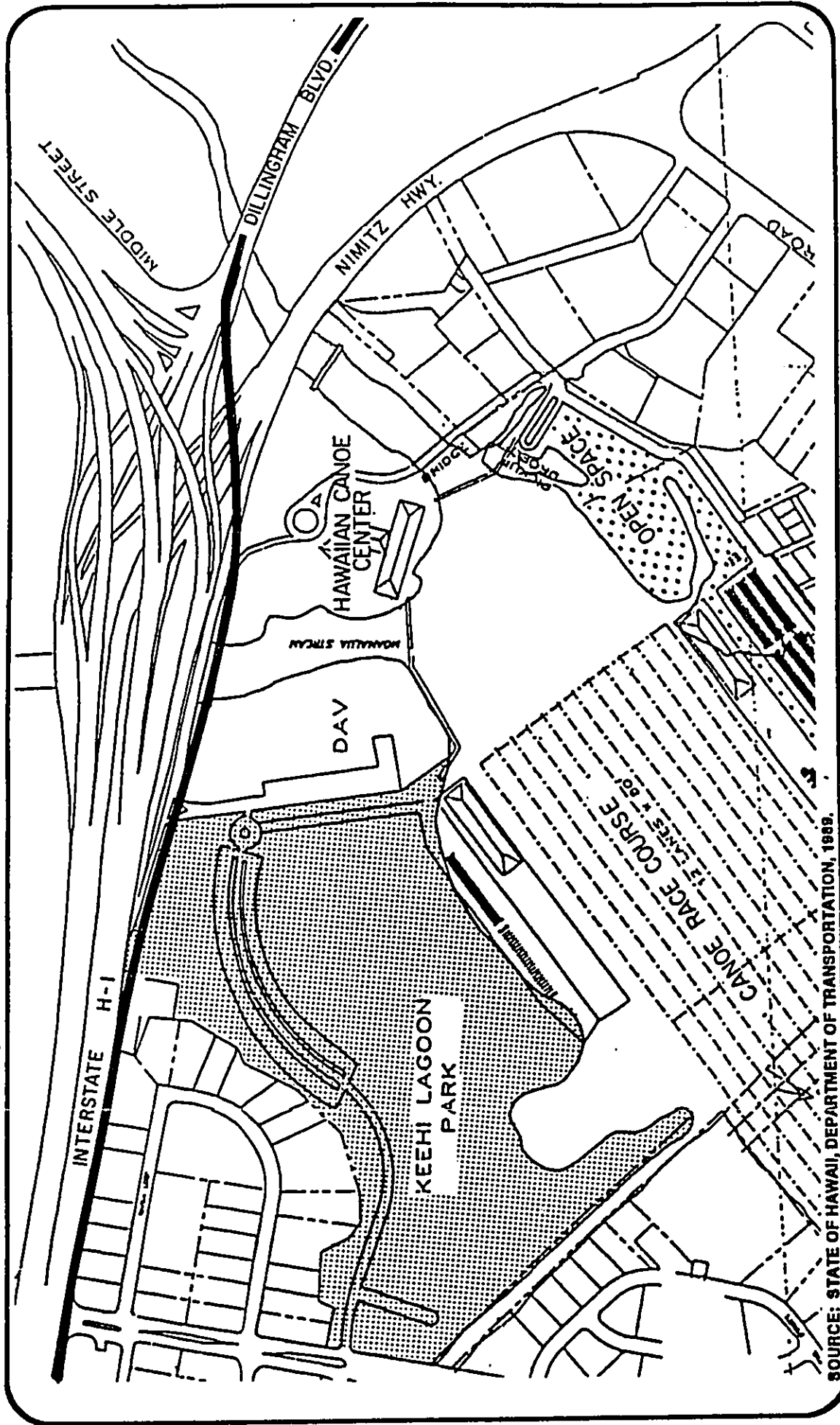


FIGURE 5.46

KEEKI LAGOON BEACH PARK

HONOLULU RAPID TRANSIT PROGRAM



LEGEND  
GUIDEWAY ALIGNMENT

#### **5.12.2.4 Avoidance Alternatives**

The Salt Lake alignment would provide an alternative, as discussed in Section 2.2 of the AA/DEIS; however, the Salt Lake alternative would have other environmental impacts.

The location of the H-1 Freeway constrains a successful relocation of the alignment mauka of the park that would still maintain the necessary clearance for its mauka turn over the freeway onto Dillingham Boulevard.

#### **5.12.2.5 Mitigation Measures**

The area will be put into pre-project condition after construction is complete with the exception of the area required by the column. Additional landscaping could serve as more of a buffer to the highway and the guideway. The proximity of the park to the aerial guideway (approximately 30 feet at this point) will not impair the use of the park. Because the area is already adjacent to major noise sources, Nimitz Highway and the H-1 Freeway, the project will not significantly increase noise levels. (See Section 5.6.)

#### **5.12.3 OR&L Station Property**

##### **5.12.3.1 Proposed Action**

The amended LPA will include a guideway location crossing a portion (9,800 square feet) of the makai side of the OR&L Station property (see Figure 5.38). The guideway, continuing Koko Head, crosses Iwilei Road approximately 300 feet makai of the OR&L Station building. The Kaaahi Station will be Ewa of the Liliha Civic Center. The OR&L Station building is mauka of the Civic Center.

##### **5.12.3.2 Description of the 4(f) Resource**

The OR&L Station building is historically significant because the station served as a transportation focal point for the surrounding industrial area.

##### **5.12.3.3 Impact on the Resource By the Proposed Action**

The amended LPA will require the acquisition of approximately 9,800 square feet of the OR&L Station property for placement of guideway columns. The guideway itself will only be visible from the OR&L Station building as the guideway crosses Iwilei Road approximately 300 feet makai.

##### **5.12.3.4 Avoidance Alternatives**

A fixed guideway location further makai (off the property) would avoid the use of the OR&L Station property but would displace several businesses. Shifting the alignment also would not accommodate the integration of the project with the Liliha Civic Center project.

The Hotel Street alternatives in the AA/DEIS would avoid this parcel but would have other Section 4(f) impacts as discussed in the AA/DEIS.

##### **5.12.3.5 Mitigation Measures**

There will be ongoing coordination with the SHPO and the State Department of Accounting and General Services. Since the Kaaahi Station is not visible from the OR&L Station building and the project will be integrated with the Liliha Civic Center, no additional mitigation measures will be required.

#### 5.12.4 Aloha Stadium

##### 5.12.4.1 *Proposed Action*

*The amended LPA continues Koko Head from the Pearlridge Station along Kamehameha Highway passing over the Moanalua and Aiea Access Roads. The Aloha Stadium Station will touchdown in the Aloha Stadium overflow parking lot makai of the stadium at the Salt Lake Boulevard/Kamehameha Highway intersection.*

##### 5.12.4.2 *Description of 4(f) Resource*

*The Aloha Stadium, owned and maintained by the State of Hawaii is, comprised of 97.44 acres (see Figure 5.47). A portion of the land (56.024 acres) encompassing Aloha Stadium was originally owned by the United States Department of Interior and was transferred to the City in 1967. The Quitclaim Deed of that transfer, dated June 30, 1967, contains certain use conditions and covenants which require the land be used and maintained for public recreational purposes. The Quitclaim Deed also states that "the property shall not be sold, leased, assigned, or otherwise disposed of except to another local governmental agency that the Secretary of Interior is satisfied can assure the continued use and maintenance of the property for the aforesaid purposes."*

*The Quitclaim Deed further states that if any condition or covenant is breached, regardless of cause, the property would revert back to the United States upon demand in writing by the Secretary of Interior.*

*In October 1970, with the approval by the Department of Interior, the property was transferred to the State of Hawaii with similar provisions as the Quitclaim Deed. The Aloha Stadium was then developed on the property along with other parcels of land the City had obtained from private sources and transferred to the State of Hawaii.*

*Aloha Stadium is primarily used for athletic competitions such as the Hula Bowl, Aloha Bowl, Pro Bowl, and University of Hawaii football games. Other recreational uses include the Great Aloha Run, music concerts, and family-oriented fairs. The stadium parking lot is also used for a flea market each week on Wednesday, Saturday, and Sunday. The stadium property consists of a stadium which seats approximately 50,000 people, an adjoining parking area and an overflow parking area across Salt Lake Boulevard from the stadium.*

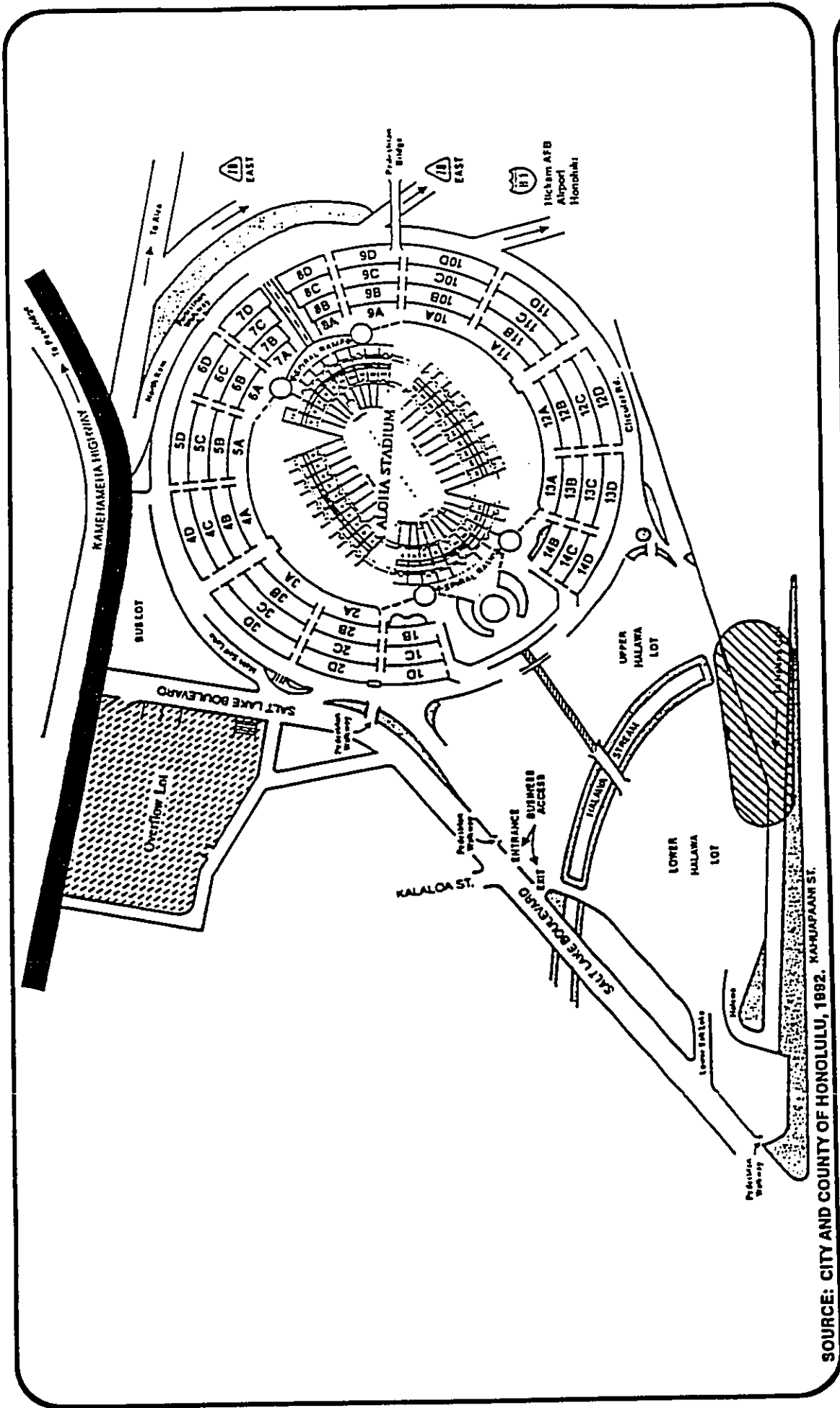
##### 5.12.4.3 *Impact on the Resource by the Proposed Action*

*The construction of the guideway along Kamehameha Highway fronting the Aloha Stadium and the Aloha Stadium Station will "use" an easement of approximately 181,000 square feet. The Aloha Stadium Station will touchdown in the existing overflow stadium parking area located across Salt Lake Boulevard from the stadium (see Figure 5.47). The overflow parking area presently contains approximately 1,000 parking stalls. After construction of the Aloha Stadium Station, the parking area will provide 750 parking stalls (see Figure 2.16) to be used by mass transit riders during the work week and for stadium patrons during non-work hours and weekends. An additional 80 parking stalls will be reserved at all times for rapid transit patrons. The net loss of 170 parking stalls at the overflow parking lot will be compensated for by the construction of 435 parking stalls under the H-1 viaduct near Kahuapalani Street.*

*The area to be used for guideway columns and the Aloha Stadium Station will not affect the stadium structure or areas around the exterior of the stadium used for fairs and other recreational activities.*

##### 5.12.4.4 *Avoidance Alternatives*

*Use of property on the makai side of Kamehameha Highway would have impacts on the Richardson Recreation Center, a military park used for Navy recreational activities. Locating the station on the makai side of Kamehameha Highway would also not provide the same extent of pedestrian safety because it would require crossing the eight-lane Kamehameha Highway to access Aloha Stadium and the park-and-ride lot.*



SOURCE: CITY AND COUNTY OF HONOLULU, 1992. KAHUAPANA ST.



- LEGEND
- GUIDEWAY ALIGNMENT
- PARKING REPLACEMENT
- PARK-AND-RIDE LOT

FIGURE 5.47

ALOHA STADIUM

HONOLULU RAPID TRANSIT PROGRAM

#### 5.12.4.5 Mitigation Measures

*Consultation between representatives of the City, the State of Hawaii, and the Stadium Authority are ongoing. All have agreed that the proposed rapid transit system and station at Aloha Stadium will not violate the use restrictions applicable to this property.*

*The fixed guideway and Aloha Stadium Station will enhance access to the stadium. Plans include the operation of special trains for Aloha Stadium events such as the Hula Bowl, Pro Bowl, and local football games. The park-and-ride facility will not reduce facilities available to Aloha Stadium patrons as it can be used by patrons for events at nights and on weekends. The location of the Aloha Stadium Station will also serve nearby communities.*

### 5.13 CONSTRUCTION IMPACTS

Construction of the Oahu Regional Transportation Plan recommended highway facilities are part of all alternatives, including the No-Build Alternative. The implementation of each improvement will entail preparation of environmental impact documents specific to each improvement, as required by the appropriate local, State or federal funding jurisdiction. Consideration of the impacts of construction of the Oahu Regional Transportation Plan recommended highway improvements is therefore not included in the AA/DEIS, SDEIS, or this FEIS.

Construction of a typical section of the amended LPA will involve a number of activities. The following construction sequence will likely be used for the majority of the construction activity within the study corridor. The analysis of construction impacts assumes this approach.

*Traffic management plan: An overall traffic management strategy to be used during the construction of the rapid transit guideway has been formulated and is summarily reviewed in Section 5.13.1. Detailed traffic control plans are to be developed in conjunction with final design of the system and are intended to provide for effective maintenance of traffic, including bus operations and pedestrian traffic. The construction activities will likely occur in segment lengths of a one and one-half mile construction area with one-half mile guideway construction to provide effective staging and work activity sites. These segment lengths lend themselves to minimal requirements of traffic lane changes and positive separation between roadway traffic and the work site.*

*Utility relocation: This will be one of the first activities and will involve localized excavation in the street to enable relocation of existing underground utilities and/or the burying of existing aerial utilities. The work will be undertaken by crews from the System Contractor and various private utilities.*

*Foundations: Once the work area has been delineated, excavation for foundations for column supports and station areas will begin. Columns will be cast-in-place. Drilled shaft foundations will generally be used. Driven concrete piles will be used at selected locations. Dewatering may be required in some locations.*

*Guideway: The guideway sections will be pre-cast off-site. They will be hauled to the site and lifted into place by a crane. They will be assembled using a launching truss method which will minimize traffic disruption.*

*Stations: Station construction will maximize the use of pre-cast elements to minimize disruption and accelerate on-site construction activity. Where necessary, additional construction work space will be established, in accordance with a traffic management plan to minimize disruption to traffic, pedestrian activity, and bus service.*

*Roadway Restoration: Upon completion of the guideway and station construction, the roadway will be restored.*

### 5.13.1 Traffic

*Because the guideway will be routed along urban streets and highways, motorists and pedestrians will at times experience delay and inconvenience during the construction period. These impacts will be greatest during pile/caisson foundation construction when the most extensive space requirements for operation of heavy equipment will occur.*

*The foundation activities will be carried out along half-mile segments of the alignment. Caisson work in each segment will be completed within six weeks. The degree of traffic disruption around areas of piling/caisson work will vary depending on the width of the roadway and the availability of alternate routes. In general, it is anticipated that caisson construction may reduce roadway capacities by as much as one traffic lane during a.m. and p.m. peak hours.*

*With the exception of piling/caisson work, sufficient peak hour roadway capacities will generally be provided to minimize disruption of traffic. Temporary lane closures will occur during non-peak hours, so that impacts on heavy commuter traffic are minimized. Curb parking will be temporarily eliminated.*

*Bus routes and stops will generally be maintained. Buses may be routed over localized, temporary detours. Bus stops may be temporarily relocated. Bus ridership could increase due to commuters choosing transit rather than driving in congested traffic.*

*Local access to residences and businesses will be maintained during all phases of the construction work. Pedestrian movements will be maintained, but may be temporarily relocated to provide safe passage through work areas.*

*The following measures will mitigate the disruptions to vehicular traffic and pedestrians during construction of the project:*

- *Construction activity on moving traffic lanes will be restricted to off-peak hours whenever feasible;*
- *Construction will be phased so that the duration of piling/caisson work, which has the largest impact on traffic, will be minimized;*
- *During final design, detailed Work Zone Traffic Control Plans, including detour plans, will be formulated in cooperation with all affected jurisdictions;*
- *Unless unforeseen circumstances dictate, no designated major or secondary highway will be closed to vehicular or pedestrian traffic. No local street or alley will be completely closed, preventing vehicular or pedestrian access to residences, businesses or other establishments;*
- *Existing bus routes and stops will be generally maintained; and*
- *An extensive public information program will be implemented to provide motorists with a thorough understanding of the location and duration of construction activities, and anticipated traffic conditions.*

### 5.13.2 Neighborhoods and Businesses

*Impact to overall accessibility within the study corridor during construction of the fixed guideway will be mitigated through careful design and implementation of a maintenance of traffic plan. Such a plan will include provisions to maintain existing bus service as well as vehicle mobility and trucking activities. Existing property access will be maintained or replaced throughout the construction period. Where necessary, short-term closures will be arranged with the affected property owner or tenant to minimize business disruption. These areas will be identified during final design and incorporated into the plan for traffic maintenance.*

Section I Construction through this section will have little impact on neighborhoods since construction activity will be concentrated in the median of Kamehameha Highway. Pedestrian access across and paralleling Kamehameha Highway will be maintained throughout the construction period. Since the highway is flanked by extensive commercial strip development, the businesses will experience moderate traffic disruption. A carefully planned and implemented maintenance of traffic plan maximizing available road space during peak periods will mitigate this impact.

Section II Construction of the amended LPA will have minimal neighborhood impacts through the Makalapa Gate and Arizona Memorial areas since construction will be largely confined to the roadway. This section of Kamehameha Highway lies on the periphery of both the military and residential uses. Construction activity makai of the H-1 Freeway adjacent to Honolulu International Airport and above the Nimitz Highway frontage road will have a substantial impact on businesses along that road. Since the construction envelope will occupy a 30-foot area between the H-1 Freeway structures and the businesses, encroachment into the businesses during construction will be unavoidable. Business access will be maintained, but construction activity will heavily affect frontage road operation.

Section III Construction through this section for the amended LPA will have a moderate impact on the adjacent Kalihi-Palama neighborhood through which the guideway system will pass. The construction of a median along Dillingham Boulevard to accommodate the guideway will require additional right-of-way. The taking of land from some businesses along Dillingham Boulevard will be a moderate impact. Left-turn restrictions will be in effect. Pedestrian activity across Dillingham Boulevard will be channelized to avoid active construction areas. A carefully planned and implemented maintenance of traffic plan and adequate public information and notification will mitigate these impacts.

Section IV The amended LPA will have minimal impact on businesses in the Iwilei industrial area and the Downtown. Construction will take place largely in the median of Nimitz Highway, through the Downtown section, with a minor impact on Walker Park and the waterfront area.

Koko Head of the Downtown area, the construction through this section will have minimal impact on the Kakaako area to Ward Avenue. Construction will be concentrated largely on the makai side of Halekauwila Street. Accessibility to this congested industrial/commercial area will be affected by right-of-way clearing, street widening, and guideway construction along Waimanu Street. To implement the Kakaako Master Plan infrastructure program, Kakaako is currently in the midst of considerable construction activity.

Section V Because the Kakaako infrastructure plans for this section are not likely to precede construction of a fixed guideway, disruption to businesses will occur. However, access to business will be maintained in accordance with the Maintenance of Traffic Plan. Reconstruction of Waimanu and Kona Streets will be required in accordance with the right-of-way requirements specified in the Kakaako plan. Loss of on-street parking and the informal parking now typifying this commercial/industrial area will have a significant impact on those businesses remaining after right-of-way acquisition. Some additional public parking is being added by the parking structure currently under construction near the Halekauwila/Ahuni Station.

Construction of a fixed guideway along Kona Street through the Ala Moana Center will have an impact on the State's center with some changes in traffic patterns. Construction will occur in a complicated physical environment, and one in which there is considerable vehicle, transit, and pedestrian activity. Close coordination with the Ala Moana Center will be necessary to develop an acceptable maintenance of traffic plan and construction schedule to minimize disruption to normal shopping center operations.

Section VII Construction through this section will have an overall minimal impact on the adjacent McCully/Moiliili neighborhood through which the fixed guideway will pass. Businesses along Kapiolani Boulevard and University Avenue, particularly at the intersection of King Street and University Avenue, will be affected by the construction of a median within both roadways to accommodate the guideway due to loss of on-street parking and limited access. Left-turn restrictions will be in effect to minimize construction



interference. Pedestrian activity across Kapiolani Boulevard to access the Marco Polo Apartments, Tokai University, and Ala Wai Park, and along University Avenue will be channelized to avoid active construction areas. A carefully planned and implemented Maintenance of Traffic Plan and adequate public information and notification will mitigate these impacts. *The Maintenance of Traffic Plan is required of the System Contractor and is in the process of being completed. The plan includes access to businesses.*

### 5.13.3 Air Quality

Construction vehicle activity and disruption of normal travel routes resulting from construction may result in increased motor vehicle emissions on a localized basis. This impact will be mitigated by thorough prior planning of alternative routing, traffic control, and public notices. *Specifics of the traffic plan are discussed in Section 5.13.1.*

*The System Contractor is required to comply with all applicable local, state and federal air quality laws to limit adverse effects on air quality from demolition, clearing, and construction activities as well as from construction vehicles. The Contract identifies specific measures that are required to limit adverse air quality impacts during construction. Measures include, but are not limited to, the following: (1) water or suitable chemicals will be used continuously to control dust; (2) burning of wastes is prohibited without appropriate permits; (3) trucks leaving the construction site and entering paved public streets shall be cleaned of mud and dirt; (4) construction materials and debris on trucks will be covered; (5) any sand blasting will be accomplished with waterborne sand or synthetic sand-blasting material to avoid sand fracture dust; (6) lime slurry, rather than dry lime, will be used to prepare those surfaces for construction that require lime; (7) construction equipment will conform to EPA, State and local air quality requirements; and (8) records of routine maintenance for internal-combustion-engine-powered vehicles and equipment will be maintained by the contractor.*

### 5.13.4 Noise and Vibration

Construction noise will present an adverse impact to nearby residences, office buildings, and other sensitive uses. Vibration impacts also may occur.

*A specification for noise and vibration limits from construction activities will be formulated and implemented to minimize adverse impacts to the surrounding community. The specification will be submitted to HDOH for their review. An industrial hygienist will monitor compliance with the specifications during construction. The HDOH also has Community Noise Control requirements which apply to construction noise. The project could not exceed the noise levels stipulated by these requirements unless a variance is granted by HDOH. The State may grant such a variance, upon application, if the granting of the variance is in the public interest and will not substantially endanger human health or safety and if compliance with the rules, regulations, or standards from which the variance is sought will produce serious hardship without equal or greater benefits to the public.*

### 5.13.5 Water

#### 5.13.5.1 Water Quality

Potential water quality impacts resulting from construction will *primarily be* associated with sediment loadings on the storm water and/or surface water systems. Sediment sources will include unstabilized, exposed soil at excavations, *drainage from stockpiles of excavated materials, and dewatering activities.*

*Short-term impacts during construction could result from accelerated erosion and sedimentation resulting from the exposure, stockpiling and transportation of excavated material. Erosion hazards will be site specific and depend upon the soil texture. Potentially highly erodible soils, as defined by the U.S. Soil Conservation Service, are found along most of Kamehameha Highway from the Ewa terminus to Lagoon Drive.*

*Turbidity in area streams is also possible from disturbances produced during installation of support piers for the fixed guideway system. Cofferdams will be placed around the pier sites, and the areas will be dewatered through pumping. Work will be confined to the area within the cofferdam, and pumped water will be filtered for sediment prior to discharge. Silt curtains and other methods to control turbidity may also be necessary. Construction activities in the water are highly regulated by the Coast Guard, the HDOH, the Corps of Engineers and local agencies. Agency coordination regarding all required permits will be conducted during subsequent engineering activities. During construction, proper turbidity controls and other appropriate mitigation measures will be implemented to ensure that water quality and aquatic life are not adversely affected.*

Sedimentation resulting from erosion and/or dewatering activities associated with the fixed guideway alternative will be mitigated by installing erosion control measures. Sediment control measures such as sediment control traps, straw bale filters, inlet sediment traps, and monitoring of sediment discharge are available technologies that, in combination, would effectively minimize the potential for water quality impacts. Details of mitigation measures will be developed during final design stages, including preparation of detailed erosion and sedimentation control plans as part of the final construction plans for the project. Through the agency reviews included in the permit process, the installation of proper sedimentation control techniques will be assured.

Because of the urban nature of the project area, *material to be excavated has the potential to contain oil, grease, and other urban contaminants. Exposure of this material during construction activities could increase the potential for transporting these contaminants to surface water bodies. The potential impacts will be identified further in additional hazardous wastes studies. These studies will be conducted during later design phases focusing on site-specific locations. Any required remediation plans will be implemented, including measures to prevent contamination of water resources, prior to construction.*

Potential spills associated with construction activities pose a potential threat to area surface water and groundwater resources. Maintenance of clean-up equipment on-site and a clean-up *response plan to be followed by the System Contractor will mitigate this type of impact, along with detailed spill prevention measures.*

#### **5.13.5.2 Groundwater**

The water table within the project area varies, but is near the surface in many locations. Excavations for pier footings and stations will intersect the water table in many locations. Groundwater, which could be high in suspended sediment, will be pumped from excavations, filtered to remove sediment, and discharged from the construction site to the storm water system. Such dewatering will be temporary and will be limited to the time required for excavation and construction. A dewatering permit will be required from the City Department of Public Works.

The method of dewatering will be decided at later stages of the project, but will likely consist of pumping from a sump in the coralline deposit areas. Suitable filter materials around the pump intake will mitigate the potential for migration of fine silt and clay-size materials during pumping. In the vicinity of the Nuuanu Stream, dewatering may require a well-point system or a deep-well system within the excavation to achieve satisfactory drawdown. Recharging the groundwater outside the excavation could be utilized to minimize effects of dewatering on groundwater level, flow characteristics, and adjacent structures. No impact on existing caprock wells is anticipated.

The discussion in the preceding section of potential chemical contamination to surface waters resulting from contaminated or hazardous material also applies to groundwater resources. Additional studies will be required to thoroughly assess the potential impact. Mitigation measures also will be developed in coordination with responsible agencies during final design activities, and could include test borings, if required.

From the proposed Waiawa facilities at the Navy Ewa Drum Storage Site to the H-1 Freeway crossing of Kamehameha Highway Koko Head of Pearl City, the project area is underlain by unconfined Southern Oahu Basal Aquifer SOBA. Mitigation measures will be implemented during construction to ensure that no sedimentation or chemical quality effects on the aquifer will occur. The area to be disturbed is not within the aquifer recharge area.

#### 5.13.5.3 Floodplains

Construction of the proposed fixed guideway alternative will occur within the designated base floodplain in the Keehi Interchange and Ala Moana areas. Storm sewer drainage will be maintained at all times during the construction period, and the project will not impact the efficiency of storm drainage systems.

Construction activities associated with the fixed guideway alternative also will involve construction of piers within area streams. During construction, cofferdams will be built around the pier sites and water will be pumped from the area within the cofferdams. The cofferdams will present an obstruction to passage of flood waters, should flooding events occur during the construction period.

Detailed hydraulic and hydrologic studies will be conducted during final design. These studies and coordination with the City Department of Land Utilization in compliance with the Flood Hazard District regulations will ensure all design elements incorporate appropriate measures to minimize flood risk *and bank scour* during construction.

#### 5.13.6 Solid Wastes

Construction of the amended LPA will require clearing land and excavating for the maintenance facility, park-and-ride lots, and for station foundations and column footings along the entire alignment. Resultant spoil will consist of asphalt, concrete, building materials, soil, vegetation, and other materials encountered during clearing and grubbing and excavation phases of the construction period. Spoil generated by these activities will be transported to approved spoil disposal sites. Areas to be used for spoil disposal will be identified during final design. Coordination will be conducted with the City Department of Public Works for a grubbing, grading, and stockpiling permit.

#### 5.13.7 Hazardous Wastes

The potential to uncover or disturb hazardous materials is present during any construction project, particularly within an urban area. Except for the maintenance facility *at the Navy Ewa Drum Storage site*, excavation for the fixed guideway alternative will be limited to placement of columns and clearing for parking lots and other station elements, within or adjacent to existing highway or street right-of-way. *The nature of these construction activities must be considered on a site-specific basis during subsequent studies.*

*The amended LPA is in proximity to 157 documented areas of hazardous waste concern. These sites consist of the following types: 70 Leaking Underground Storage Tank (LUST) sites, fifteen Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) or Superfund sites, 36 Resource Conservation and Recovery Information System (RCRIS) sites, five Toxic Release Inventory System (TRIS) sites, 26 emergency spill incident sites, and five locations where the alignment will cross or run above buried fuel pipelines. For more detail regarding the significance of the CERCLIS, RCRIS, TRIS and other environmental listings, see the Hazardous Waste Technical Memorandum (June 1992). In addition to the sites above, the alignment will cross areas with known groundwater contamination, and the Ewa terminus will be located at the Navy Ewa Drum Storage Site, a site of known petrochemical contamination.*

*The designation of a site as an area of concern does not necessarily mean that there is contamination at that site, or that the project will affect the site. The appearance of a site on one of the environmental registries does mean, however, that there is a potential of site contamination, and consequently further investigation is required.*

The types of contaminants that could exist in soil or groundwater include petroleum hydrocarbons, contaminants contained in landfill leachate, pesticides, herbicides, organic solvents, metals, PCBs, corrosives, organic lead, and other parameters.

For purposes of the hazardous waste study, the alignment has been divided into the same seven sections described in Chapter 2.0. Although more detailed investigations for some specific sites related to the project will be required, major findings by section are as follows.

Section I. There is potential hazardous waste involvement in this section because of historic uses of the Naval Reservation, nearby uses of pesticides and herbicides, and historic and current illegal landfill and salvage yard activities within 1/4 mile of the proposed alignment. Of the areas of concern identified in this section, five LUST sites, twelve RCRIS sites and two CERCLIS sites are located along the alignment.

In the 1970s, gasoline leakage occurred on the Navy Ewa Drum Storage Site proposed for the location of the maintenance facility. To confine the leakage and determine the extent of contamination of property, exploratory studies were conducted by the Navy and a report documenting the findings was prepared. Investigations recommended recovery of the "free gasoline product" in the groundwater by constructing an interceptor trench and recovery wells. The wells were pumped until most of the gasoline product was recovered. Supplemental investigations are now being conducted. The terms of the proposed land swap with the Navy require that the Navy carry out any necessary remedial actions on the site necessary to protect human health and the environment.

Section II. In this section, historic military uses may have resulted in the release of petroleum hydrocarbons and other hazardous materials. Historic and current light industrial and commercial land uses, and numerous reported fuel spills create the potential for contamination in this section. Fuel pipelines are present along the alignment and may pose a risk during intrusive construction. Five LUST sites, two CERCLIS sites, and seven RCRIS sites are located along this section of the proposed alignment.

Section III. Underground fuel pipelines also exist within this section of the alignment. One LUST site, one CERCLIS site, six RCRIS sites, and one TRIS site are located along Section III of the amended LPA alignment.

Section IV. Based on information from the Hazard Evaluation and Emergency Response Division of the Department of Health, the groundwater in this area (Kakaako) is known to be contaminated with petroleum hydrocarbons. Underground fuel pipelines are present and could be a hazard during construction. Two LUST sites, three CERCLIS sites, and nine RCRIS sites are located along this section of the proposed alignment.

Section V. Historic and current light industrial and commercial land uses have resulted in the potential for hazardous materials impacts from a variety of sources including organic solvents, petroleum hydrocarbons, metals, corrosives, and PCBs. One LUST site along the alignment is currently engaged in on-going remedial action. One CERCLIS and one RCRIS site are also located along the amended LPA alignment.

Section VII. In this section, one RCRIS site is located along the amended LPA alignment.

The studies reported above indicate that further work addressing hazardous waste issues is warranted, and such studies will be performed during final design. Required monitoring and remediation plans will be designed in coordination with the Department of Health and other agencies, and the plans will be implemented prior to construction. Both soil and ground water contamination will be addressed. In addition, the System Contractor will develop an Emergency Response Plan in coordination with the

Department of Health and other agencies to establish procedures should hazardous materials be encountered during construction. The handling, treatment, and disposal of any hazardous materials encountered will occur in full compliance with all appropriate requirements.

#### **5.13.8 Utilities**

*Because of the utility relocations required for this project, substantial planning must occur so that interruptions in utility service to customers do not occur or are minimized. Continued coordination with utility providers during preliminary engineering will identify problems and provide opportunities to resolve them prior to construction. Replacement and/or relocation of utilities will be closely coordinated with roadworks, guideway, and station construction to minimize disruption to adjacent properties and traffic.*

Disruptions to utility service, *if necessary*, will be restricted to short-term localized disruptions. Careful scheduling of these disruptions and prior notification of adjacent properties that will be affected by temporary service cut-offs will mitigate this construction impact.

#### **5.13.9 Summary of Committed Construction Mitigation**

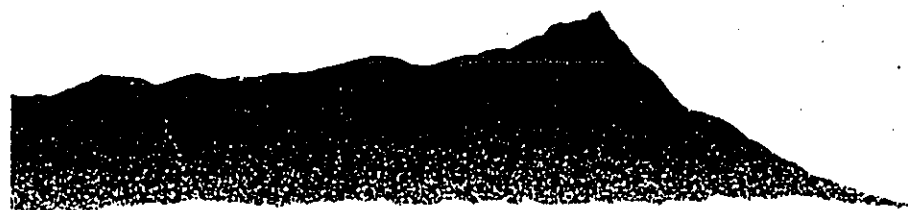
*To minimize access problems within the construction corridor, a traffic plan will be designed and implemented. This plan would include provisions to maintain existing bus service as well as vehicle and pedestrian mobility as discussed in Section 5.13.1.*

*Stipulations have been included in the System Contract which require the contractor to take specific measures to limit adverse air quality impacts during construction. A specification for allowable construction noise levels will be formulated and implemented. The HDOH also has community noise control requirements which apply to construction noise. The project will not exceed these limits unless a variance is granted by HDOH.*

*An erosion and sediment control plan will be developed during the final design stage to minimize adverse water quality impacts. Measures such as sediment control traps, straw bale filters, inlet sediment traps, and monitoring of sediment discharge would be some of the strategies considered in the design of this plan. Temporary cofferdams will need to be placed around the areas where columns will be installed within several streams. Work will be confined to the area within the cofferdam, and pumped water will be filtered for sediment prior to release to the waterways to mitigate possible turbidity effects. Measures will be taken if necessary so that the cofferdams do not cause bank scour. Construction staging areas will not be located within wetlands, and no construction debris will be disposed of within wetlands. Construction activities that occur adjacent to wetlands will be mitigated to prevent wetlands impacts. A plan to mitigate potential impacts to the Southern Oahu Basal Aquifer as a result of construction activities will be formulated during final design activities and coordinated with the U.S. Environmental Protection Agency, HDOH, and State Department of Land and Natural Resources.*

*Construction debris will be transported to approved spoil disposal sites. Hazardous waste studies will be performed prior to construction to clarify and mitigate on a site-specific basis potential impacts during construction. Any required remediation plans will be implemented prior to construction. An Emergency Response Plan will also be developed should unanticipated hazardous waste conditions be encountered in the field.*

*Coordination with all utility providers will continue during the planning, final design, and construction stages to identify any potential conflicts and to formulate strategies to overcome potential problems. Disruptions to utility service will be restricted to short-term localized disruptions. Careful scheduling of these disruptions and prior notification of adjacent properties that will be affected by temporary service cut-offs will mitigate this construction impact.*



**Chapter 6**  
**Financial and Cost**  
**Effectiveness Analysis**

## 6.0 FINANCIAL AND COST-EFFECTIVENESS ANALYSIS

Chapter 6.0 of the AA/DEIS presented a financial analysis of all alternatives under consideration at that time. It also included a summary of information used for evaluating the alternatives for the purpose of selecting the initial LPA. That information was used by local decision makers to select the LPA and by FTA to authorize the City to proceed with the preliminary engineering/final environmental impact statement (PE/FEIS) stage of project development.

This chapter of the Final Environmental Impact Statement (FEIS) provides updated information on the costs, effectiveness, impacts, and financial feasibility of the amended LPA, TSM, and No-Build Alternatives. The cost-effectiveness index (CEI) also has been updated, based on new cost and ridership information, since the Supplemental Draft Environmental Impact Statement (SDEIS) was issued in March 1992.

### 6.1 FINANCIAL ANALYSIS

This section summarizes the financial implications of the alternatives and presents *the City's capital and operating financial plans* for the amended LPA. *The financial plans have been prepared by the City using assumptions the City considers reasonable. It is subject to various risk factors as described in Section 6.1.5.4.* The financial plans are based on the cost information supplied by the System Contractor, *current working estimates prepared by the City and its General Engineering Consultant*, and additional financial analyses conducted in connection with preparation of the Development Agreement *between the City and State.* This section provides a description of the *assumed revenue sources*, the commitment of these sources, and a schedule of annual outlays planned. *This section also describes alternative funding sources which could be utilized.*

To determine the adequacy of *sources of funds* for the capital and operating requirements of the alternatives, the major existing and new sources of revenues were examined. Costs were then compared to the revenues projected to be available from these existing and new revenue sources.

It is important to conduct the financial analysis in terms of both current (or base year) dollars and year-of-expenditure dollars. The former provides a better understanding of the "value" of what is being purchased in real terms. The latter reflects the actual funds that would be expended. Year-of-expenditure dollar values are computed by multiplying 1991 dollar values by the compounded *escalation* factor for the relevant year. For example, in year-of-expenditure dollars, \$1.00 in FY 1991 is equivalent to \$1.98 in FY 2005, for the assumed baseline rate of inflation of 5%.

Construction costs are assumed to escalate at 3% per year. Other cost items *except right-of-way* are assumed to escalate at 5%. These rates are consistent with *recent* trends.

#### 6.1.1 Existing Revenue Sources

The City's financial plans assume that the existing revenue sources highlighted in the following subsections are applied.

##### 6.1.1.1 FTA Section 9 Apportionment Program

These are formula funds allocated to the Honolulu and Kailua-Kaneohe Urbanized Areas on the basis of the quantity of transit service provided and transit operating cost, as well as population and population density factors. The FY 1992 apportionment to these two urbanized areas is \$15.35 million. Based on the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the total apportionment to the City

and County of Honolulu is assumed to increase to \$21.81 million in FY 1993, to \$22.13 million in FY 1994 through FY 1996, and to \$31.33 million in FY 1997. *It is also assumed that Congress will appropriate the authorized apportionment level each year.* Section 9 funds can be used for either capital or operations and maintenance support. The extent to which these funds can be used for operations and maintenance support is legislatively "capped." The ISTEA modified the "cap" so that its annual increase is either the rate of inflation in the consumer price index (CPI) or the proportional increase in the total Section 9 funds to be apportioned, whichever is less. In FY 1992, the Section 9 operating cap for the two urbanized areas was \$3.53 million. In each forecast year the maximum allowable portion of the Section 9 apportionment was used for operating support with the balance applied to bus capital funding. Unused funds are carried over for a maximum of 3 years. During the period of fixed-guideway transit project construction, all funds are utilized to support the Bus Capital Program and there is no carryover. There is some carryover from year to year in the post-construction period because the magnitude of the Bus Capital Program will be relatively small in this period.

*Section 9 funds may be available as a result of implementing a bus leasing program. The FTA has given funding recipients the flexibility to use Section 9 in a lease financing program for bus purchases. This leasing program would allow the City to transfer some of the Section 9 funds to the rapid transit project.*

Beginning in FY 2000, it is assumed that additional Section 9 funds would be provided to the City and County of Honolulu because of the additional service provided by the fixed guideway transit project. These incremental Section 9 funds, about \$7.92 million per year, were included in the analysis. It is assumed, however, that the Section 9 operating cap remains unchanged with the introduction of rail service.

#### **6.1.1.2 City Funds**

*The City General and Highway Funds are used to support the bus operating program. These operating funds currently pay for about 74% of the bus operating budget, or about \$63 million. The City's Highway Improvement Bond Fund is used to match FTA Section 9 bus capital grants on an 80/20 federal/local match basis.*

#### **6.1.1.3 Fares**

Projected farebox operating revenues are described in Section 4.1.3 of this FEIS. For FY 2005, the total farebox revenues are 23%, 17%, and 20% of the total operating costs for the No-Build, TSM, and amended LPA Alternatives, respectively. This relatively low operating ratio is a result of the City's policy of maintaining fares at modest levels to encourage ridership and its willingness to support the transit program with non-operating revenues.

#### **6.1.2 New Revenue Sources**

New revenue sources include the FTA Section 3 Discretionary New Starts and Bus Programs and a 0.5% increase in the current 4.0% General Excise and Use Tax (GET) which will be used to secure bonds. *In addition, a State of Hawaii General Fund appropriation to the Transit Capital Development Fund is available in FY 1993. The City may also utilize funds from the Federal Highway Surface Transportation Program and revenues from joint development and real estate-related options.*

##### **6.1.2.1 FTA Section 3 Discretionary New Starts Program**

The ISTEA authorizes \$618 million for the Honolulu Rapid Transit Program. This is approximately 30% of the projected implementation cost of the project (in year-of-expenditure dollars). *The obligation of federal funds for final design and construction is subject to completion of this FEIS, a Record of Decision by FTA, and the City and FTA mutually executing a Full Funding Grant Agreement. The federal participation is also subject to an annual appropriation by the Congress. It should be noted that there are many projects nationwide competing for the available Section 3 New Starts funding. The demand for such funds exceeds the authorization and*



*appropriation levels for the program. Historically however, the FTA has always honored the financial obligations which it has entered into under a Full Funding Grant Agreement, but not always on the schedule assumed. If Section 3 funds do not become available at the level and on the schedule assumed, alternative financing strategies and/or funding levels and sources would be utilized as described below.*

#### **6.1.2.2 FTA Section 3 Discretionary Bus Program**

The ISTEA authorizes a Section 3 Discretionary Bus Program that will provide grants for bus projects on an 80% federal/20% local basis. In those years where the Honolulu bus program capital requirement exceeds the capital funds available from the FTA Section 9 Apportionment Capital Program, as described above, the City will endeavor to use capital funds from the FTA Section 3 Discretionary Bus Program. In recognition of the competitive nature of the FTA Section 3 Discretionary Bus Program, the City will utilize alternative strategies (i.e., rescheduling capital requirements or leasing vehicles) if these discretionary funds are not available when needed.

#### **6.1.2.3 General Excise and Use Tax (GET) Surcharge**

The 1990 Hawaii State Legislature found that "mass transportation, or more specifically the transportation of individuals by bus or fixed-rail rapid transit, is a viable means of decreasing the number of motor vehicles on our highways" and emphasized the need to financially assist the City and County of Honolulu in constructing a fixed guideway system. Acts 183 and 184, passed in that legislative session, provide the source of funding for the capital costs to implement a fixed guideway system on Oahu dependent on the level of private sector participation.

After a thorough review of the *System Contractor's Best and Final Offer (BAFO)*, the City determined that sufficient private sector and/or City funding was not available to utilize Act 183. Therefore, the City is proceeding per Act 184, assuming the 0.5% increase in the general excise and use tax. The development agreement that the City and the State have mutually entered into is based on the following funding plan:

- Thirty percent: FTA Section 3 New Starts funds, and
- Seventy percent: *Tax-exempt bonds secured by a 0.5% local GET surcharge (in addition to the current 4.0% GET) that would be assessed during the tax years beginning on January 1, 1993 and ending on December 31, 2002.* The financial plan is structured so as to allow borrowing against future tax revenues during the five-year period of construction in those years in which construction costs, less FTA funds, exceed annual GET surcharge revenues.

Final approval of the financial plan is subject to the City Council enactment of the 0.5% increase in the GET by October 1, 1992 and finalization of the Full Funding Grant Agreement with the FTA.

#### **6.1.2.4 Federal Highway Surface Transportation Program (ISTEA)**

The ISTEA established a Surface Transportation Program (STP) formula grant program that allocates funds to each state which may be used for highways, bridges, transit capital, bicycle programs, HOV projects, and other related uses. This provision enables the City to utilize funds available from Hawaii's allocation of STP funds for the project.

#### 6.1.2.5 Private Source Revenues and Value Capture

Act 184, Session Laws of Hawaii 1990, requires that private source contributions directly related to the transit project that are received prior to the completion of project construction be used to reduce the dependence upon GET funding. The City Council emphasized the use of potential private source revenues when it approved entering into the development agreement with the State. The privatization proposal provided by the System Contractor includes a very substantial joint development program which, if approved, may provide significant revenues to the City over the next several decades that may be available to support operation and maintenance of the system. However, it is unlikely that these revenues would be available in time to assist in *financing the* capital costs. The City's financial plan, as presently structured, does not include *the application of revenues from* any of the System Contractor proposed joint development projects. These require changes in either current zoning and land use policies or both. *The lack of* assurances that these changes could or would be made within the construction period prohibits their inclusion in the financial plan. Until these specific issues and the more comprehensive planning of joint development along the alignment are resolved, the exclusion of joint development revenues from the capital financing plan is responsible and prudent. All of the System Contractor proposed joint development projects are subject to the City and County of Honolulu's normal procedures for review of joint development projects, involving both the City Administration and City Council. As the first step in implementing any transit-related joint development project, the City plans to develop a comprehensive joint development master plan for the amended LPA.

As discussed above, any revenues from joint development projects which might be received during construction would be used to reduce the term of the *GET surcharge*. The environmental impacts of each project would be assessed as each is implemented. Because the impacts of such developments cannot be accurately discussed at this time and because of the probability that the proposed projects may not go forward, or if they do, may be subject to modifications, they are not included in this FEIS except as generally addressed in Section 5.0.

Several additional revenue sources have been identified *that could* assist the City in funding the local share of the non-operating revenues. These sources include: (1) parking reduction fees; (2) tax increment financing; and (3) property development by the City. *The City is considering implementation of a program that would* provide a partial relaxation in the City's zoning requirement for on-site parking for selected land uses in the vicinity of transit stations. The savings that the developer would obtain by providing less on-site parking would be shared between the developer and the City. The fact that property values rise more quickly for properties located proximate to transit stations has been demonstrated in a number of North American cities. *The City is considering implementation of a program* whereby the incremental tax revenues resulting from the collection of the City's normal property taxes on the incremental value of property in the vicinity of transit stations would be dedicated to a fund to support the operations and maintenance costs of the transit program. Finally, the City could dedicate revenues from joint developments to fund the operations and maintenance costs of the transit program. Preliminary studies are underway to identify the specific City projects which could be included in this program.

#### 6.1.3 Projected Capital Expenditures

The following are major applications of the capital funds:

Fixed-Guideway Transit Project. The fixed-guideway transit program will use funds for planning, design, construction, management, agency oversight, and capitalized start-up costs. The cost of the fixed guideway component of the Honolulu Rapid Transit Program is summarized in Table 6.1. *The costs shown are those included in the development agreement between the City and the State. They do not include the cost impacts of changes being examined in preliminary engineering, such as the estimated cost increase for including mezzanines at Dillingham Plaza and Honolulu Community College Stations or the estimated cost decrease due to locating the alignment on Halekauwila Street rather than Pohukaina Street.* This total consists of the following components:

- System Contract Price. This price is the Phase 2 Best and Final Offer (BAFO) price of the Oahu Transit Group (OTG) less any allowances for General Excise and Use Taxes that had been included in the BAFO price (these taxes are included below as an allowance). Unlike most FTA funded transit projects that must rely on an engineer's estimate for the cost estimate on which the Full Funding Grant Agreement is based, nearly 65% of the capital costs for the Honolulu program are included in the System Contractor's fixed price (in 1991 dollars) for a fixed scope, which is subject to an inflation adjustment based on already defined indices.
- Station Contracts. These costs are the engineer's estimate of the construction costs required to finish the stations over and above the work performed by the System Contractor.
- Other Project Costs. These costs are the engineer's estimate of the other costs to the City of completing the program, other than the system contract and the station contracts.
- Contingency Reserve. A contingency reserve has been established as 7-1/2% of the sum of the system contract price, the station contracts, and the other project costs.
- Allowance for General Excise and Use Taxes on Program Activities.

Table 6.1 AMENDED LOCALLY PREFERRED ALTERNATIVE FIXED GUIDEWAY CAPITAL COSTS		
	Millions of 1991 Dollars	Millions of Year-of-Expenditure Dollars
System Contract	\$1,099.38	\$1,237.90
Station Contracts	165.00	190.55
Other Costs	300.00	329.77
Contingency Reserve	120.00	126.74
Subtotal	\$1,684.38	1,884.96
Allowance for GET on Program Activities (4.5%)	75.00	82.18
TOTAL	\$1,759.38	\$1,967.14

Source: City and County of Honolulu, 1992.

Bus Capital Program. The bus capital program includes the costs for new buses to expand the fleet and to replace vehicles which have reached the end of their useful life, new or expanded maintenance facilities, and other bus-related projects (e.g., park-and-ride lots, passenger shelters). Table 6.2 shows the differences among the bus-related costs by alternative. The bus-related capital costs for the amended LPA are \$259 million as compared with *bus-related capital costs of \$406 million for the TSM Alternative*. The costs of State HOV/bus lane improvements are not included in the capital costs.

Alternative	Fixed Guideway	Bus Capital						Total <sup>1</sup> Capital
		Replacement Buses	New Buses	Maintenance Facilities	Park-and-Ride Facilities	Other Capital	Bus <sup>1</sup> Total	
No-Build <sup>2</sup>	\$0.00	\$133.96	\$0.00	\$ 0.46	\$0.00	\$31.06	\$165.48	\$165.48
TSM	\$0.00	\$133.96	\$139.27	\$89.47	\$12.31	\$31.06	\$406.07	\$406.07
Amended LPA	\$1,759.38	\$133.96	\$48.64	\$36.07	\$9.09	\$31.06	\$258.82	\$2,018.20

Source: Parsons Brinckerhoff Quade & Douglas, Inc., April 1992.

Notes: <sup>1</sup> Additional HOV/bus lanes facilities will be funded by the State of Hawaii.

<sup>2</sup> If the No-Build Alternative were designed to accommodate peak-load-point demand with the same vehicle load standards as the other alternatives, the No-Build total capital cost estimate would be \$256.73 million.

#### 6.1.4 Projected Operating Expenditures

The year 2005 annual operating and maintenance costs for the various alternatives, in 1991 dollars, are presented on Table 6.3. The year 2005 costs for the amended LPA include \$106.5 million for the bus system and \$42.7 million for the fixed guideway system, or a total of \$149.2 million.

Alternative	Bus O&M Cost	Fixed Guideway O&M Cost	Total O&M Cost
No-Build <sup>1</sup>	\$104.6	\$0	\$104.6
TSM	\$154.3	\$0	\$154.3
Amended LPA	\$106.5	\$42.7	\$149.2

Source: Parsons Brinckerhoff Quade & Douglas, Inc., April 1992.

Note: <sup>1</sup> If the No-Build Alternative were designed to accommodate peak-load-point demand with the same vehicle load standards as the other alternatives, the annual operating and maintenance cost would be \$122.2 million.

#### 6.1.5 Financial Plans

##### 6.1.5.1 Rapid Transit Capital Financial Plan

Table 6.4 presents the City's Rapid Transit Capital Financial Plan for the amended LPA in millions of year-of-expenditure dollars. Sources of funds include revenues from the 0.5% GET surcharge (\$1,584 million), FTA Section 3 Funds (\$618 million), State Transit Capital Development Funds (\$50 million), Excise Tax Surcharge Bond proceeds secured by the GET surcharge revenues (\$697 million), and interest earned on non-federal receipts (\$31 million).

**TABLE 6.4  
CITY AND COUNTY OF HONOLULU RAPID TRANSIT CAPITAL FINANCIAL PLAN<sup>1,2</sup> [Millions of Year-of-Expenditure Dollars] — Page 1**

	Assumptions	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
<b>CAPITAL FUNDING SOURCES</b>						
Federal - FTA Section 3, Rail		80.00	151.02	142.00	142.00	102.98
City Excise Tax Surcharge		57.59	119.71	123.98	132.24	143.51
State Transit Capital Dev. Funds		50.00				
Interest Income	4.25% <sup>3</sup>	5.20	5.22	3.34	3.34	1.71
Excise Tax Surcharge Bond Proceeds		196.86		271.74		228.50
<b>TOTAL SOURCES</b>		389.65	275.96	541.06	277.57	476.71
<b>CAPITAL COSTS</b>						
System Contract	3.00% <sup>4</sup>	79.59	328.25	257.75	274.92	218.56
Station Contracts	3.00% <sup>4</sup>	8.56	17.65	29.49	45.01	59.39
Other Project Costs	5.00% <sup>5</sup>	44.75	135.90	41.08	43.18	43.39
Contingency Reserve		2.88	10.69	26.31	28.99	32.46
<i>General Excise and Use Tax on Program Activities</i>		5.41	19.32	17.08	18.28	16.37
Capital Reserve Account Expenses	10.00% <sup>6</sup>	0.01	0.04	0.04	0.04	0.03
Excise Tax Surcharge Bonds Debt Service		3.80	7.60	14.65	21.69	28.41
<b>TOTAL COSTS</b>		145.00	519.45	386.39	432.10	398.61
<b>NET SURPLUS / (DEFICIT)</b>		244.65	<243.49>	154.67	<154.53>	78.10
Beginning Cash Balance			244.65	1.15	155.82	1.29
Additions to Cash		244.65	<243.49>	154.67	<154.53>	78.10
Ending Cash Balance		244.65	1.15	155.82	1.29	79.39
<b>Excise Tax Surcharge Bonds - Coverage Ratio</b>			15.74	8.47	6.10	5.05

Source: Public Financial Management, Inc., July 1992.

- Notes:
- <sup>1</sup> All figures shown are subject to revision by the City.
  - <sup>2</sup> FY = City Fiscal Year beginning July 1 of the previous year and ending June 30 of the year shown.
  - <sup>3</sup> Interest rate of 4.25% per year assumed.
  - <sup>4</sup> Escalation assumed at 3% per year.
  - <sup>5</sup> Escalation assumed at 5% per year, except for property acquisition which is estimated without escalation.
  - <sup>6</sup> Figures shown are the yearly expenses of maintaining a line of credit from a commercial bank equal to 10% of the equipment and construction contract expenditures assumed for the upcoming fiscal year.

**TABLE 6.4  
CITY AND COUNTY OF HONOLULU RAPID TRANSIT CAPITAL FINANCIAL PLAN<sup>1,2</sup> (Millions of Year-of-Expenditure Dollars) — Page 2**

	Assumptions	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	TOTAL
<b>CAPITAL FUNDING SOURCES</b>								
Federal - FTA Section 3, Rail								618.00
City Excise Tax Surcharge		154.20	165.82	178.32	191.76	206.21	110.88	1,584.22
State Transit Capital Dev. Funds								50.00
Interest Income	4.25% <sup>3</sup>	1.71	0.91	1.80	2.14	3.09	2.33	30.79
Excise Tax Surcharge Bond Proceeds								697.10
<b>TOTAL SOURCES</b>		155.90	166.73	180.12	193.90	209.30	113.21	2,980.11
<b>CAPITAL COSTS</b>								
System Contract	3.00% <sup>4</sup>	78.84						1,237.90
Station Contracts	3.00% <sup>4</sup>	30.45						190.55
Other Project Costs	5.00% <sup>5</sup>	21.48						329.77
Contingency Reserve		25.41						126.74
General Excise and Use Tax on Program Activities		5.72						82.18
Capital Reserve Account Expenses	10.00% <sup>6</sup>	0.01						0.18
Excise Tax Surcharge Bonds Debt Service		72.30	125.95	179.13	179.13	179.13	179.13	990.92
<b>TOTAL COSTS</b>		234.21	125.95	179.13	179.13	179.13	179.13	2,958.23
<b>NET SURPLUS / (DEFICIT)</b>		<78.31>	-40.78	0.99	14.77	30.18	<65.92>	
Beginning Cash Balance		79.39	1.08	41.86	42.85	57.62	87.80	
Additions to Cash		<78.31>	40.78	0.99	14.77	30.18	<65.92>	
Ending Cash Balance		1.08	41.86	42.85	57.62	87.80	21.88	
Excise Tax Surcharge Bonds - Coverage Ratio		2.13	1.32	1.00	1.07	1.15	0.62	

Source: Public Financial Management, Inc., July 1992.

- Notes:
- 1 All figures shown are subject to revision by the City.
  - 2 FY = City Fiscal Year beginning July 1 of the previous year and ending June 30 of the year shown.
  - 3 Interest rate of 4.25% per year assumed.
  - 4 Escalation assumed at 3% per year.
  - 5 Escalation assumed at 5% per year, except for property acquisition which is estimated without escalation.
  - 6 Figures shown are the yearly expenses of maintaining a line of credit from a commercial bank equal to 10% of the equipment and construction contract expenditures assumed for the upcoming fiscal year.

The City considers the rapid transit capital financial plan to be financially feasible. Further, it is generally conservative and *may prove to be a robust financial plan in several respects:*

- *Nearly 65% of the capital costs of the project are covered by the System Contractor's contract, which contains fixed prices (in 1991 dollars) for a fixed scope, subject only to an inflation adjustment according to specified indices.*
- The historical GET compounded growth rate over the decade from 1980 to 1990 has been 8.5% per year and the historical GET compounded growth rate from 1985 to 1990 has been 10.5% per year.
- Because GET surcharge revenues are projected to increase more rapidly than construction costs, any unforeseen delay in the construction schedule would not be detrimental to the feasibility of the financial plan, *insofar as the escalation effect is concerned. Depending on the cause of the delay, other delay costs, beyond escalation, might also accrue.*
- *The interest rate assumptions for the bonds and rates used in the financial plan are 0.45% to 1.50% higher than current interest rates.*

#### **6.1.5.2 Bus Capital Financial Plan**

The City's bus capital financial plan for the bus component of the Honolulu Rapid Transit Program is presented in Table 6.5 in year-of-expenditure dollars. In most years, the bus capital program will be funded from FTA Section 9 Formula Capital Grants matched by city General Fund appropriations. In FY 1995 and 1996 the plan assumes that the City will also request a relatively small grant from the FTA Section 3 Discretionary Bus Program. If Section 3 discretionary funds are not available for Honolulu, schedule modifications or leasing options may be utilized to tap the estimated excess of Section 9 grant monies, as compared to estimated expenditure requirements, in years beyond FY 1997. Bus capital expenditures are heaviest through FY 1999 because of the need to replace significant numbers of buses that will have reached their 12-year retirement age, and also to bring into service fully accessible buses to serve the mobility-impaired community.

#### **6.1.5.3 Operations and Maintenance Financial Plan**

*The City's operations and maintenance (O&M) financial plan for the integrated fixed guideway feeder bus system is presented in Table 6.6 in year-of-expenditure dollars. Implementation of the Honolulu Rapid Transit Program and the related bus system improvements will lead to a 49% increase (in constant dollars) in the annual locally funded operating subsidy of Honolulu's transit program by FY 1998. This locally funded operating subsidy in FY 1992 was paid by appropriations from the City's General and Highway Funds.*

In the Operations and Maintenance Financial Plan, which the City Administration presented to the City Council in connection with City Council hearings on the development agreement with the state, the City Administration proposed three additional sources of O&M funds: (1) parking reduction fees; (2) tax increment financing; and (3) revenues from development of City properties. The City Council has not yet begun to implement these supplemental revenue sources for the locally funded portion of the operating subsidy. *In the unlikely event that none of these measures were enacted by the City Council, the City has the financial capacity to fund the incremental O&M costs from its existing sources of revenue.*

**TABLE 6.5  
CITY AND COUNTY OF HONOLULU  
BUS CAPITAL FINANCIAL PLAN  
FOR BUSES AND FACILITIES TO BE IN PLACE BY 2005  
(Millions of Year-of-Expenditure Dollars)**

Fiscal Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>SOURCES</b>												
FTA Section 9	\$18.10	\$18.42	\$18.42	\$18.42	\$27.44	\$27.44	\$27.44	\$35.36	\$35.38	\$35.40	\$35.42	\$35.44
FTA Section 3 Discretionary	0.00	0.00	11.41	7.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
City Funds	6.78	4.78	14.42	9.66	4.99	2.15	8.77	7.78	3.18	3.80	3.49	10.61
FTA Section 9 Carryover	7.49	7.28	7.79	0.00	0.00	7.49	26.33	18.70	22.95	45.63	65.82	87.30
<b>TOTAL</b>	<b>\$32.37</b>	<b>\$30.48</b>	<b>\$52.03</b>	<b>\$35.41</b>	<b>\$32.43</b>	<b>\$37.08</b>	<b>\$62.53</b>	<b>\$61.84</b>	<b>\$61.51</b>	<b>\$84.83</b>	<b>\$104.73</b>	<b>\$133.36</b>
<b>EXPENDITURES</b>												
Bus Purchases	\$20.50	\$13.75	\$24.00	\$18.81	\$20.81	\$10.00	\$39.48	\$15.40	\$13.95	\$16.98	\$15.30	\$50.83
Bus Maintenance Facilities	0.50	2.50	20.52	0.00	0.00	0.00	2.60	21.65	0.00	0.00	0.00	0.00
Alapai Terminal	0.00	0.00	1.20	11.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Park-and-Ride Facilities	2.20	0.30	5.00	3.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Misc. Expenditures	1.89	6.15	1.32	1.73	4.14	0.75	1.75	1.84	1.93	2.03	2.13	2.23
<b>TOTAL</b>	<b>\$25.09</b>	<b>\$22.70</b>	<b>\$52.03</b>	<b>\$35.41</b>	<b>\$24.94</b>	<b>\$10.75</b>	<b>\$43.83</b>	<b>\$38.89</b>	<b>\$15.88</b>	<b>\$19.00</b>	<b>\$17.43</b>	<b>\$53.06</b>
<b>ENDING BALANCE</b>	<b>\$7.28</b>	<b>\$7.79</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$7.49</b>	<b>\$26.33</b>	<b>\$18.70</b>	<b>\$22.95</b>	<b>\$45.63</b>	<b>\$65.82</b>	<b>\$87.30</b>	<b>\$80.30</b>

Source: Parsons Brinckerhoff Quade & Douglas, Inc./KPMG Peat Marwick, April 1992.



**TABLE 6.6**  
**CITY AND COUNTY OF HONOLULU**  
**OPERATIONS AND MAINTENANCE FINANCIAL PLAN**  
(Millions of Year-of-Expenditure Dollars)

FISCAL YEAR	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
<b>REVENUES</b>													
Operating Revenues													
Farebox	\$19.30	\$19.50	\$19.54	\$19.57	\$19.77	\$27.07	\$35.71	\$38.70	\$41.93	\$45.44	\$49.24	\$53.35	\$57.81
Concessions & Advertising	0.00	0.00	0.00	0.00	0.00	1.57	3.23	3.44	3.65	3.89	4.13	4.39	4.67
FTA Section 9	3.71	3.71	3.71	3.71	3.89	3.89	3.89	3.89	3.89	3.89	3.89	3.89	3.89
Local Operating Assistance	72.29	80.14	86.32	91.78	101.04	126.82	149.09	157.01	168.41	184.84	196.92	207.84	220.78
<b>TOTAL</b>	<b>\$95.30</b>	<b>\$103.34</b>	<b>\$109.57</b>	<b>\$115.05</b>	<b>\$124.70</b>	<b>\$159.34</b>	<b>\$191.92</b>	<b>\$203.03</b>	<b>\$217.89</b>	<b>\$238.05</b>	<b>\$254.18</b>	<b>\$269.48</b>	<b>\$287.15</b>
<b>EXPENSES</b>													
Rail Program	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$28.63	\$59.72	\$63.73	\$66.92	\$71.11	\$75.14	\$78.55	\$82.48
Bus Program	95.30	103.34	109.57	115.05	124.70	130.71	132.21	139.31	150.96	166.95	179.04	190.93	204.67
<b>TOTAL</b>	<b>\$95.30</b>	<b>\$103.34</b>	<b>\$109.57</b>	<b>\$115.05</b>	<b>\$124.70</b>	<b>\$159.34</b>	<b>\$191.93</b>	<b>\$203.04</b>	<b>\$217.88</b>	<b>\$238.06</b>	<b>\$254.18</b>	<b>\$269.48</b>	<b>\$287.15</b>

Source: Parsons Brinckerhoff Quade & Douglas, Inc./KPMG Peat Marwick, 1992.

#### 6.1.5.4 Risk Factors

These financial projections have been prepared on the basis of the information and assumptions set forth in this section. The achievement of any financial projection may be affected by fluctuating economic conditions and is dependent on the occurrence of future events. Therefore, the actual results achieved may vary from the projections and such variations could be material. The major risk factors with regard to the *financial plans* for the Honolulu Rapid Transit Program are:

- Sources of funding for operating deficit: The Operations and Maintenance Financial Plan reflects a 49% increase (in constant dollars) in the annual locally funded operating deficit by FY 1998. As a general purpose local government, the City has the authority to raise the additional revenues required to pay for the incremental locally funded operating deficit from a variety of sources.
- Availability of federal funds: While \$618 million has been authorized by the ISTEA, these funds still must be appropriated by Congress. Also, Section 9 formula funds must be appropriated on a yearly basis. There is uncertainty in the amount and timing of the appropriation of the discretionary and formula funds for this project. The City's Rapid Transit Capital Financial Plan assumes that the \$618 earmark and formula will be appropriated within the five-year authorization period of ISTEA.
- Source of local share of project funding: The State Legislature has enabled the City Council to levy a 0.5% surcharge on the local General Excise and Use Tax. The City Council must enact this GET surcharge by October 1, 1992, to ensure the local share of funding for the project. City Council actions to this point have been favorable to implementation of the project.
- Magnitude of capital cost: Much uncertainty and unconsidered factors in the capital cost estimates have been lessened by the City's turnkey approach to procurement. Unlike most FTA funded transit projects that must rely on an engineer's estimate for the cost estimate on which the Full Funding Grant Agreement is based, nearly 65% of the capital costs for the Honolulu program are included in the System Contractor's fixed price (in 1991 dollars) for the currently defined scope of the project, which is only subject to an inflation adjustment based on already defined indices.
- Yield of dedicated excise tax: The economic factors which underlay the strong growth in GET revenue yields during the 1980s (particularly foreign investment in Hawaiian real estate and growth in both eastbound and westbound tourism) are projected to moderate during the early 1990s, and thus the rate of growth in GET collections may also moderate. The projected GET surcharge revenue stream assumes slow economic growth in FY 1992 and FY 1993, limited economic growth in FY 1994 and FY 1995, and a return to the baseline rate of 2% to 3% real growth (i.e., 7% to 8% growth in GET revenues assuming an annual 5% rate of inflation) in the late 1990s. The GET surcharge revenue forecast reflects the current economic cycle and is generally consistent with the projections of most forecasters of the Hawaii economy.
- Magnitude of operating deficit: The fare revenue projections result in no change in the historical recovery ratio (i.e., fare revenue divided by operating costs) for the transit system. If actual costs, in fact, are higher than the projections, or if actual fare revenues are lower, there still remain substantial opportunities for the overall subsidy level to be moderated. Changes in the fare structure could be made that would minimize impacts on transit dependents yet maintain or increase revenues. Further, the anticipated increase in the "cap" within which employers may fund employee transit expenses without these being considered "income" for Internal Revenue Service reporting purposes will also enhance transit's ability to earn operating revenue from the farebox. Thus, significant opportunities exist to "manage" the operating deficit at the levels assumed in this analysis.

- Financing costs: Financing costs are subject to market conditions. The financing cost assumptions used in this analysis are prudent relative to current market conditions.

## 6.2 EFFECTIVENESS

Within Section 1.1.3, several transportation problems were identified that are expected to further reduce the mobility of the island's residents and visitors in view of the anticipated future growth. The major concerns and related issues include the need to increase transit usage and to provide better and more reliable transit service.

The following specific objectives and associated measures for the corridor were used in evaluating an alternative's attainment of the area's transportation related goals and objectives presented in Section 1.1.2.

- Increase transit usage within the corridor as measured by total daily transit trips, the percentage of all weekday travel by transit (mode split), and daily transit trips to Downtown.
- Provide better transportation service to users as measured by reduced travel times, cost savings from improved travel times, percentage of trips with transfers, and improvement in service reliability.
- Minimize adverse environmental impacts by constructing and operating new or improved transit facilities so as to reduce detrimental effects on the natural and socioeconomic environments.
- Reduce traffic congestion within the corridor as measured by reduced number of auto trips and vehicle miles traveled.

Specific means of assessing the performance of each alternative in regard to how well it does (or does not) perform with respect to the identified problems and objectives must include a mix of both quantitative measures of effectiveness and qualitative assessments of environmental impacts. These have all been assessed with this study and are contained in this document or the supporting reports.

### 6.2.1 Transportation Effectiveness

Effectiveness measures the degree to which an alternative helps to solve the identified problems and achieves the goals and objectives discussed above and further described in Chapter 1.0. The effectiveness analysis also gauges the relative transportation benefits of the alternative regardless of costs. The measures are discussed below with respect to the related objective to be achieved.

#### ***Increase Transit Usage***

Transit ridership refers to the number of linked trips (transfers not counted) on the transit routes within the City and County of Honolulu. This measure of effectiveness is important because the major objective of improving the transit system is to increase the number of people using transit and decrease the number using individually-driven automobiles. A higher *transit* ridership indicates a *growing attractiveness of transit relative* to the automobile. Increased transit ridership is also a good indication of other potential benefits such as reduced energy consumption, enhanced air quality, and support for community development programs.

Table 6.7 compares total daily ridership among the alternatives. The daily forecast varies from a low of 249,200 with the No-Build Alternative to a high of 321,300 with the amended LPA. This increase for the amended LPA is a 29% increase in transit riders over the No-Build Alternative. The shift from a major increase in bus service (TSM Alternative) to the fixed guideway alternative shows a significant increase

in daily transit trips of 48,900 (18%). Of these, 18,800 will be work trips and 30,100 will be non-work trips. The TSM Alternative shows a 9% increase in daily transit trips (23,200) over the No-Build Alternative.

The transit-mode share is the proportion of the total daily trips in the area taken on the transit system. Transit-mode share or modal split is a highly quoted measure that indicates the contribution of a transit system to satisfying overall travel demands. The higher the modal split, the fewer automobiles on the streets and highways. While transit use increases 29%, the amended LPA's share of the total daily travel on Oahu increases from the No-Build Alternative's 8.0% to 10.3%, as shown in Table 6.7.

Another measure of effectiveness is how well the respective alternatives increase transit use to the downtown area. The number of transit riders going to Downtown would range from 62,500 daily riders with the No-Build Alternative to 75,800 with the amended LPA. The amended LPA will improve the transit trips to Downtown compared to the TSM Alternative by about 17 percent. The number of transit riders going to Downtown for the TSM Alternative will be 65,000 or 2,500 (4%) more than for the No-Build Alternative.

Alternative	2005 Daily Transit Trips -- All Purposes	Transit Modal Shares (%)	Downtown Trips
No-Build	249,200	8.0	62,500
TSM	272,400	8.7	65,000
Amended LPA	321,300	10.3	75,800

Source: Barton-Aschman Associates/Parsons Brinckerhoff Quade & Douglas, Inc., May 1992.

#### ***Provide Better Transportation Service***

Travel time is a measure of the effectiveness in serving the system user. Transit travel times reflect the ability of the transit system to move people to their destinations without unnecessary transfer or delays. The transit alternatives (No-Build and TSM) which operate in primarily mixed traffic are subject to the same delays and travel conditions as the automobile. Table 6.8 shows comparative peak-period transit travel times between selected origins and destinations for the various alternatives.

Travel-time savings represent the most important measure of providing better transit service. The increased transit ridership savings are shown in the estimates of travel-time savings to system users shown in Table 6.9. The TSM Alternative daily transit riders was used as the base to measure travel-time savings. Because transit use varies across alternatives, calculating the savings of a single set of riders serves to isolate travel-time savings from ridership changes.

Table 6.9 shows the savings assuming the ridership (272,400 daily trips) and travel time for the TSM Alternative as the base. The savings is 33,150 hours per day for the amended LPA. The average travel-time savings per trip is 7.3 minutes.

Alternative	West Loch-Downtown		Waikiki-Downtown		Milliani-Civic Center		Palolo Valley-Downtown		Pearl City-Aia Moana Center		Waipahu-UH	
	Travel Times	Change from No-Build	Travel Times	Change from No-Build	Travel Times	Change from No-Build	Travel Times	Change from No-Build	Travel Times	Change from No-Build	Travel Times	Change from No-Build
Existing	63	---	27	---	69	---	58	---	72	---	80	---
No-Build	63	---	31	---	83	---	71	---	86	---	103	---
TSM	59	-4	32	1	69	-14	66	-5	83	-3	93	-10
Amended LPA	54	-9	20	-11	57	-26	50	-21	52	-34	62	-41

Source: Barton-Aschman Associates, May 1992.

	Daily Total Hours Saved	Average Minutes Per Trip
Work	13,680	7.71
Non-Work	19,470	7.04
TOTAL	33,150	7.30

Source: Barton-Aschman Associates, May 1992.

Another measure of effectiveness is the number of transfers per transit trip. Table 6.10 shows the percentage of daily transit trips for each alternative with zero, one, or two transfers per transit trip. The all-bus alternatives will have the fewest transfers. The amended LPA will be expected to have more transfers than the all-bus alternatives with about half of all trips having one or more transfers.

Alternative	Percentage of Trips with:		
	0 Transfers	1 Transfer	2 Transfers
Existing (Surveyed)	85%	14%	1%
Existing (Simulated)	76%	23%	1%
No-Build	72%	27%	1%
TSM	71%	27%	2%
Amended LPA	48%	38%	14%

Source: Barton-Aschman Associates, May 1992.

Transit reliability is also a key factor in the evaluation of improved transit service. In general, transit operating on an exclusive right-of-way is less affected by traffic congestion, accidents, and other factors.

and as such, runs on a more reliable and dependable service schedule. Among the alternatives, the No-Build and TSM Alternatives will provide the least service on reserved facilities. The amended LPA will have the greatest percent of transit passenger miles on a reserved facility.

### ***Reduce Traffic Congestion***

Reduction of traffic congestion within the corridor is a prime objective of any proposed transit improvement. The implementation of the transit improvements will divert some people out of their private automobiles onto transit. The TSM Alternative will divert 16,500 automobile trips per day to transit in the Year 2005 compared to the No-Build Alternative. The amended LPA will reduce vehicle trips by 38,600 per day compared to the No-Build Alternative. Daily traffic volumes in the center of the corridor, from Kalauao Stream to Nuuanu Stream, will be reduced by more than 6%, up to 7.5%, compared to the No-Build Alternative. Peak hours reductions will be more than 14%.

The TSM Alternative is projected to decrease annual automobile vehicle miles traveled (VMT) by 33 million (-0.4%) and increase bus VMT by 9.1 million (+43%) in the Year 2005, as compared to the No-Build Alternative. The amended LPA will decrease annual automobile VMT by 90 million (-1.1%) and will increase bus VMT by less than one million (+1%) as compared to the No-Build Alternative.

### **6.2.2 Overall Environmental Assessment**

Federal, State, and local goals state that transportation improvements be aligned, designed, and constructed to enhance the natural and cultural richness of the area. During the AA/DEIS and PE/FEIS phases, a wide range of environmental issues was analyzed, including those related to the natural and socioeconomic environment. Chapter 5.0 described the likely environmental consequences of the alternatives in detail and only the more significant ones are discussed in this section.

The amended LPA is expected to enhance accessibility to neighborhoods and activity areas, when compared to the No-Build and TSM Alternatives. Because of this increase in transit mobility, the amended LPA is more consistent with land use and development plans within the corridor than the TSM or No-Build Alternatives.

The amended LPA will require relocation and displacement of approximately 55 businesses. The University area park-and-ride would require between 1 and 22 business displacements if a park-and-ride lot is developed. No residential relocations will be required.

The amended LPA will produce significant visual impacts.

The amended LPA will result in an adverse effect on four historic resources. The amended LPA also will have impacts on four Section 4(f) properties.

The amended LPA will produce adverse effects during the construction period including disruption of some business access, traffic flow impacts, erosion and sedimentation impacts, and a potential for groundwater impacts.

All noise impacts will be mitigated with the implementation of the selected fixed guideway technology.

Air quality will be slightly improved with the implementation of the amended LPA, as compared to the No-Build and TSM Alternatives. The improvement will be commensurate with reductions in auto VMT of 1.1% (amended LPA) and 0.4% (TSM Alternative) as compared to the No-Build Alternative.

## 6.3 COST-EFFECTIVENESS ANALYSIS

### 6.3.1 Introduction

Cost-effectiveness analysis provides a means of comparing the benefits of each alternative with its costs. This analysis has also become an important part of the FTA procedures for review of major transit projects. The FTA has established a cost-effectiveness index (CEI) for evaluating the relative merits of fixed guideway alternatives within a corridor. FTA also uses the index as an input into its rating system, which compares projects from throughout the nation and identifies those most worthy of federal funding.

The method for determining the cost-effectiveness is a formula *that measures the project's net cost per new passenger or rider attracted relative to the TSM Alternative*<sup>1</sup>. The TSM Alternative provides a baseline against which it is possible to isolate the added costs and added benefits resulting from a proposed major investment.

### 6.3.2 Comparative Analysis of Transit Alternatives

The CEI provides a measure of the costs, both capital and operating, for each new transit rider. Therefore, when two project alternatives are compared in terms of their cost-effectiveness indices, the one with the lower index represents the more cost-effective of the two. To be comparable with the CEI in the AA/DEIS, the calculations have been made in 1988 dollars, as well as in 1991 dollars. However, the indices shown in Table 6.11 are not directly comparable due to changes made in the travel forecasts subsequent to the AA/DEIS.

Calculating this index for the amended LPA yields the results shown in Table 6.11. The cost per new rider for the amended LPA is \$7.45, with costs expressed in 1988 dollars, or \$8.94, with costs expressed in 1991 dollars.

## 6.4 EQUITY

Equity can be defined as the fairness of the distribution of costs, benefits, and impacts across various population subgroups. Fairness can be determined by the extent to which the costs and impacts are distributed in a way that is consistent with the area's goals.

---

$$1/ \quad \text{CE Index} = \frac{\Delta\$CAP + \Delta\$O\&M - \Delta\$TT}{\Delta\text{RIDERS}}$$

where the  $\Delta$ 's represent changes in costs and benefits compared to the TSM Alternative, and

$\Delta\$CAP$  = change in total capital costs, annualized over the life of the project (Fixed Guideway vs. TSM);

$\Delta\$O\&M$  = change in annualized operating and maintenance costs (Fixed Guideway vs. TSM);

$\Delta\$TT$  = annualized value of travel savings for existing riders carried on TSM Alternative; and

$\Delta\text{RIDERS}$  = annual changes in transit riders, measured in "linked" trips (Fixed Guideway vs. TSM).

Table 6.11 FTA COST-EFFECTIVENESS INDEX		
Alternatives	TSM	Amended LPA
ANNUALIZED CAPITAL COST — 2005		
Bus		
Millions of 1988 Dollars	\$17.4	\$30.8
Millions of 1991 Dollars	\$55.0	\$35.7
Fixed Guideway		
Millions of 1988 Dollars		\$161.2
Millions of 1991 Dollars		\$187.0
ANNUAL OPERATIONS AND MAINTENANCE COST — 2005		
Bus		
Millions of 1988 Dollars	\$133.1	\$91.8
Millions of 1991 Dollars	\$154.3	\$106.5
Fixed Guideway		
Millions of 1988 Dollars		\$36.8
Millions of 1991 Dollars		\$42.7
ANNUAL TRAVEL TIME SAVINGS — 2005		
Millions of 1984 Dollars		\$28.0 <sup>1</sup>
ANNUAL TRANSIT RIDERS — 2005		
Millions	83.8	98.9
FTA COST-EFFECTIVENESS INDEX		
1988 Dollars		\$7.45
1991 Dollars		\$8.94

Source: Parsons Brinckerhoff Quade & Douglas, Inc., 1992.

Note: <sup>1</sup> Dollar savings are calculated on the basis of \$4 per hour saved for work trips and \$2 per hour saved for non-work trips, as specified by FTA guidelines.

#### 6.4.1 Impact on Low Income Areas

The primary indicator for the distribution of transit service is reflected in the increase in trip origins from areas generally considered low income areas. The low income areas include the following neighborhoods in the study corridor: Waikiki, Downtown, Kalihi, Iwilei, and Waianae. In Chapter 4.0, Table 4.7 shows the number of transit trips originating from each identified low income area. The conclusion is that the amended LPA will provide better transit service to these areas than the No-Build or TSM Alternatives.

#### 6.4.2 Environmental/Socioeconomic Equity and Benefit

The analysis of equity and benefit from an environmental and socioeconomic perspective was based on a relative balance between the extent or severity of environmental and/or socioeconomic impact relative



to change in transit accessibility. The fixed guideway alternative will result in improved transit accessibility relative to the TSM and the No-Build Alternatives. When compared to the No-Build Alternative, the amended LPA and TSM Alternatives will result in an increase of daily transit trips by 29% and 9%, respectively. The fixed guideway alternative will result in a 18% increase of daily transit trips over the TSM Alternative.

However, the environmental impacts of the amended LPA will be greater than the TSM or No-Build Alternatives. This is mainly due to the visual and relocation impacts involved with the construction of the amended LPA. However, if a fixed guideway is not built, this could result in the provision of poorer transit service at increased costs in the future and fewer mobility options for all persons, especially the mobility-impaired.

#### **6.4.3 Local Financing Options Equity and Burden**

In Section 6.1, the financing plan for the capital cost of the project was discussed. The proposed *principal* local financing source is a 0.5% increase in the current *General Excise and Use Tax (GET)*, from 4.0% to 4.5%. The excise tax is generally viewed as a regressive tax, with lower income groups paying a higher percentage of their income than higher income groups. The State tax credit for residents significantly reduces the regressive nature of the GET surcharge and makes it clearly progressive through the middle and upper family income ranges (i.e., above \$20,000 per year).

*The City has performed an assessment of the burden of the GET surcharge revenue which will be collected in FY 1994, and concluded that visitors and non-residents will bear 35.9 percent of the burden. The remaining 64.1 percent will be borne by Hawaii residents in their role as consumers and/or taxpayers. With the state providing a tax credit through the income tax, the incremental share of the GET surcharge borne directly by Honolulu residents declines to 26.1 percent of the surcharge. (The tax credit would be funded by the State utilizing existing State tax sources.) With the tax credit the average incremental burden of the GET surcharge, by itself, on Honolulu residents is about \$36 per person. While the average per capita incremental burden of the surcharge is \$36 per person per year, the incremental annual burden for residents with family incomes from \$10,000 to \$50,000 per year is substantially less —about \$20 per person per year.*

*The burden of the GET before and after the surcharge, as well as the burden of the surcharge itself, falls more heavily on low-income families than on high-income families as a percentage of income. This is because the GET is a broad-based tax on consumption expenditures, and low-income families spend a greater portion of their incomes on consumption than do higher-income families (in the lowest income classes, consumption exceeds income). As family income increases, families tend to save and invest greater proportions of their income, and to spend smaller proportions.*

#### **6.5 SIGNIFICANT TRADE-OFFS BETWEEN ALTERNATIVES**

Selection of an alternative by local decision makers involves a balancing of the advantages associated with each of the alternatives under consideration and the application of individual priorities and value judgments. Highlighted below are the factors considered to be of particular importance in making a comparative assessment of the alternatives presented in this FEIS. What is particularly important is the relative trade-offs between the costs of the alternatives and the benefits received for those costs or investments. Table 6.12 summarizes the most important evaluation measures from the previous sections of this chapter.

Based on the information in Table 6.12 and other sections of this chapter, and the previous chapters, certain observations can be made to distinguish between the merits of the alternatives being considered.

**Table 6.12  
SUMMARY OF KEY EVALUATION MEASURES**

Alternatives	No-Build	TSM	Amended LPA
<b>I. COSTS</b>			
Capital Cost (Millions of 1991 \$)	165.48	406.07	2,016.20
Operating and Maintenance Cost at Full System Operation (Millions of 1991 \$)	104.6	154.3	149.2
<b>II. TRANSPORTATION</b>			
Daily Transit Trips (2005)	249,300	272,400	321,300
Daily Transit Mode Share (2005)	8.0%	8.7%	10.3%
Daily Transit Trips to Downtown (2005)	62,500	65,000	75,800
Average Minutes Saved Per Transit Trip for TSM Transit Riders (2005)	---	---	7.3
Change in Projected Annual Auto VMT (Compared to the No-Build Alternative)	--	-33 million miles (-0.4%)	-90 million miles (-1.1%)
<b>III. ENVIRONMENTAL</b>			
Number of Receptor Structures Requiring Noise Mitigation	0	0	0 <sup>3</sup>
Number of Businesses Displaced	0	0	55 <sup>1</sup>
<i>Historic, Archaeological, and Cultural Sites Adversely Affected</i>	0	0	4
Section 4(f) Sites	0	0	4
<b>IV. COST-EFFECTIVENESS</b>			
Cost Per New Rider (compared to TSM Alternative)	N/A	N/A	\$7.45 <sup>2</sup>
<b>V. EQUITY</b>			
Service to Low-Income Areas (% improvement compared to No-Build)	--	2.9% - 21.7%	7.9% - 43.3%

Source: ICF Kaiser Engineers, Inc./Parsons Brinckerhoff Quade & Douglas, Inc., July 1992.

- Notes:
- <sup>1</sup> In addition, the options for the University area park-and-ride lot would result in between one and twenty-two additional business displacements. *The University area park-and-ride lot is not part of the amended LPA.*
  - <sup>2</sup> Costs expressed in 1988 dollars or \$8.94, with costs expressed in 1991 dollars.
  - <sup>3</sup> Crossovers and turnout will be located in three noise-sensitive areas. Consideration will be given to relocating this special trackwork to less noise-sensitive areas. If the technical adjustments cannot be accomplished, mitigation measures will be necessary to meet the specified criteria. The mitigation may involve strategies to modify the affected buildings, such as installation of noise insulation or double-pane windows.

The key comparison is to distinguish between the merits of an expanded bus system (TSM Alternative) compared with an investment in the amended LPA. It is apparent from the information provided in Chapter 4.0 that the TSM Alternative will improve transit travel times (Table 4.2) compared with the No-Build Alternative in areas where HOV/bus lane facilities are available to increase the bus operating speed. However, in the intense built-up area between Downtown, Ala Moana Center, and Waikiki, the TSM Alternative provides no improved travel times over the No-Build Alternative. The amended LPA will provide improvements in all cases. From the perspective of the annual operating cost, the TSM Alternative when compared to the amended LPA would cost approximately \$5 million more per year, while providing a lower level of service. Initial capital costs for the TSM Alternative would be far less, putting less demand on local resources. The TSM Alternative would avoid some adverse impacts of the fixed guideway alternative, such as the visual impact of the aerial structures, but would add the congestion, noise, and pollution of a substantially expanded bus fleet. The TSM Alternative also would have lower transit ridership and less travel-time benefits.



**Chapter 7**  
**Comments and**  
**Responses**

## 7.0 COMMENTS AND RESPONSES

This chapter presents a record of substantive comments received on the AA/DEIS and the SDEIS during the public comment period, and responses to those comments. Both written and oral comments provided at the public hearings have been included. Revisions have been made to the text and graphics of the FEIS as a result of these comments. These changes as well as other technical changes are indicated by the use of italics throughout the FEIS.

### 7.1 PUBLIC REVIEW PROCESS

Publication of the AA/DEIS and SDEIS was announced in the Federal Register on March 30, 1990 and March 20, 1992, respectively. A Notice of Availability of the AA/DEIS was published in the State Office of Environmental Quality Control Bulletin on April 8, 1990 and April 23, 1990, and copies of the AA/DEIS were distributed to those agencies and organizations included on the List of Recipients contained in the DEIS. A Notice of Availability of the SDEIS was published in the State Office of Environmental Quality Control Bulletin on March 23, 1992 and April 8, 1992, and copies of the SDEIS were also distributed to those included on the List of SDEIS Recipients contained in the SDEIS. In addition, copies of both the AA/DEIS and SDEIS were available from the Department of Transportation Services, Office of Rapid Transit, and could be reviewed at the State Main Library, all regional libraries, and all branch libraries on Oahu. More than 300 copies of the AA/DEIS and the SDEIS were distributed during the public review periods for each document.

Two public hearings were held on the AA/DEIS during the public review period. These hearings, held on May 8 and 9, 1990 were advertised on April 18 and May 1, 1990 in the Honolulu Advertiser and Honolulu Star-Bulletin. In addition, a direct mailing with the list of hearing dates, times and locations was sent to the approximately 600 entries on the Honolulu Rapid Transit Development Project mailing list. One public hearing was also held on the SDEIS during the public review period. The hearing was advertised in the Honolulu Advertiser and the Honolulu Star-Bulletin on March 30, 1992 and April 16, 1992 and was held on April 23, 1992. Approximately 450 people were also sent a notice of the hearing date, time, and location.

### 7.2 DESCRIPTION OF COMMENTS RECEIVED

For the AA/DEIS, 42 comment letters were received from Federal, State and local public agencies. Three agencies also provided oral testimony at the public hearing. Civic organizations, businesses, and neighborhood boards submitted 30 letters and 25 gave oral testimony. One hundred twenty-six citizens wrote letters and 22 presented oral testimony at the public hearing.

A total of 27 comment letters were received from agencies during the public comment period for the SDEIS. Thirteen comments, letters and statements, were received from civic organizations and businesses and neighborhood boards. Six comments, composed of letters and oral testimony, were received from area citizens. Ten people presented oral testimony at the public hearing on the SDEIS.

The Public and Agency Comments (July 1992), published as a separate document, presents copies of all written comments submitted during the public comment periods for the AA/DEIS and SDEIS. This document is available at the Office of Rapid Transit, Office of Environmental Quality Control, Legislative Reference Bureau Library, Municipal Reference and Records Center, University of Hawaii Hamilton Library, State Main and Regional Libraries.

Many of the comments expressed support or opposition to a particular fixed guideway alternative or to the construction of a rapid transit system in general. These comments have been noted. Numerous substantive comments were also received during the AA/DEIS and SDEIS public comment periods. The most frequently expressed concerns related to the following issues:

- (1) Costs and methods of financing the fixed guideway system;
- (2) Alternatives to the fixed guideway system;
- (3) Community and social concerns; and
- (4) Anticipated patronage.

In addition to written comments and oral testimony received during the circulation of the AA/DEIS, the Oahu Metropolitan Planning Organization (OMPO) submitted the results of their survey concerning the development of the rapid transit system. OMPO sent the survey to the 36 members of the OMPO Citizens Advisory Committee.

### 7.3 ORGANIZATION OF COMMENTS AND RESPONSES

The written and oral comments received during the public comment periods for both the AA/DEIS and the SDEIS are presented in Section 7.4 and in Section 7.5, respectively. Comments for each section have been classified into one of 18 categories, shown below. The comments are numbered consecutively within each category. Because many of the comments expressed similar concerns, comments were summarized and paraphrased. Consequently, the comments presented in this chapter may not represent direct quotations of the comments or testimony provided during the public review periods. The paraphrasing was done solely for the purpose of reducing redundancy, with no intent of obscuring the content of any comment or testimony received. Some comments regarding the SDEIS were also previously made on the AA/DEIS. In these instances, the response to the SDEIS comment in Section 7.5 refers the reader to the similar comment and response presented in Section 7.4. Original written testimony, public hearing transcripts, supporting documents, and additional public input regarding the local decision process can be reviewed at the Department of Transportation Services, Office of Rapid Transit. Public and Agency Comments (July 1992), a compilation of copies of all written comments submitted during the public comment periods for the AA/DEIS and SDEIS, is also available at the Office of Environmental Quality Control, Legislative Reference Bureau Library, Municipal Reference and Records Center, University of Hawaii Hamilton Library, State Main and Regional Libraries.

The categories into which comments have been grouped are:

Alternatives	Hydrology/Water Quality
Accessibility to the Fixed Guideway	Construction
Station Design	Financial Evaluation
Traffic and Parking	Public Participation
Land Use	Historic Sites and Parklands
Community and Social Concerns	Patronage and Cost Effectiveness
Aesthetics/Urban Design	Energy
Noise and Vibration	Economic Impacts
Ecosystems	Miscellaneous

Listings of those agencies, organizations, and individuals providing written or verbal comments on the AA/DEIS are at the end of Section 7.4 and of the SDEIS are at the end of Section 7.5. These lists are organized by Federal, State, and local agencies; civic organizations and businesses; and private citizens. Within each of these groups, the list of commenters is presented in alphabetical order. A reference is provided after each commenter indicating the associated comment numbers.

## 7.4 COMMENTS AND RESPONSES - AA/DEIS

### 7.4.1 Alternatives

#### 7.4.1.1 Comparison of Alternatives

Comment 1.1: Data on the following measures listed in the Evaluation Methodology Report (May 1989) would be desirable in assessing the alternatives: 1) Annual travel time cost savings to highway users; 2) Daily work trips by auto; 3) Annual unlinked transit trips; 4) Daily transit passengers on the fixed guideway; 5) Automobile travel time in AM peak; 6) Total miles of congested freeways and arterials in the peak hour. (City Council Member Gill)

Response: 1) The travel forecasting methodology structured for this analysis does not provide specific data on highway related statistics such as auto travel times, auto trips, and highway congestion. In general, it is assumed that highway travel times will remain unchanged from today. However, gross estimates can be made regarding auto travel time and vehicle miles travelled which reflect the impact of each new transit rider on the highway network based on the past studies such as Hali 2005.

2) Examination of the number of transit work trips by alternative provides a relative comparison of auto work trips by alternative, since an increase in transit work trips represents a decrease in auto trips.

3) The number of unlinked transit trips can be calculated by annualizing the number of daily boardings. This statistic could be misleading, however, as alternatives that require more transfers per trip could result in higher boardings but not necessarily more linked trips.

4) The numbers of daily transit passengers on the fixed-guideway alternatives are displayed in Tables 4.10 - 4.18 of the AA/DEIS.

5) See 1) above.

6) See 1) above.

Comment 1.2: The bus operating plans in Tables A-2 and A-3 of the Final Definition of Alternatives report (December 1989) should be provided, including information regarding service area; peak period headway; peak route time; route miles; and peak vehicles required. Maps showing the route of each bus line should also be included. (City Council Member Gill, League of Women Voters)

Response: Extensive specific narrative and graphical description of each proposed feeder bus route of each alternative was not included in the AA/DEIS document because of the size and volume required to present such information. The feeder bus route descriptions of the AA/DEIS alternatives were included in the Transportation Impacts Results Report (February 1990), and the Operations and Maintenance Cost Results Report (December 1989). Further, complete route descriptions and maps were presented at all

the public information meetings. Detailed service descriptions of the FEIS alternatives are included in the Transportation Impacts Results Report (July 1992).

Comment 1.3: "Fixed guideway system" should be defined. The horizontal and vertical alignments depicted in Appendix B of the AA/DEIS appear to limit the guideway options to light rail transit or a similar type of system. (U.S. Federal Highway Administration)

Response: The "fixed guideway" acceptable technologies were specifically defined in the detailed Honolulu Rapid Transit Development Project - Technical Provisions to the Contract for the Design, Supply, Construction and Operation and Maintenance (November 1990). Technologies had to be automated, electrified, and grade-separated. The competition was open to all technologies meeting the adopted performance specifications.

Comment 1.4: The design transit vehicle and the length of the train are the controlling factors for horizontal and vertical alignments, clearances, and station design. An early determination of the vehicle design criteria is necessary to permit decisions regarding alignment and station design to proceed. (U.S. Federal Highway Administration)

Response: A specific technology has been selected. The chosen vehicle's design criteria are a major consideration in the determination of the fixed guideway alignment and station design.

Comment 1.5: A comparison of travel time to Downtown for the rapid transit system under Alternatives 2, 3 and 4 and for the automobile would be useful. (City Council Member Gill)

Response: Figures 4.1 through 4.4 of the AA/DEIS graphically depict the comparison of travel time to Downtown from each of the other 22 districts on Oahu. As noted in response to Comment 1.1, auto travel time is assumed to remain unchanged in the modeling technique used in this study.

Comment 1.6: The average trip time projected to be saved with rail when compared with the TSM Alternative is about 8 minutes. Assuming this allows for walking, transfer, and waiting time, is it not still a flawed comparison since buses stop every block or two whereas rail stops every half or three-quarters of a mile? How would the respective travel times change if bus stops were at comparable distances to rail? Assuming rail times were based on two-minute intervals, how much would rail travel time's advantage have been lessened if the interval was based on a more realistic length of four to five minutes, especially if ridership is lower than projected, as in many other cities? (League of Women Voters)

Response: The projected travel time savings have been recomputed using the amended LPA and the new travel demand models. Section 4.1.1 of this FEIS presents the new estimates. For the trips shown in Table 4.2, the amended LPA is projected to save up to 38 minutes in travel time as compared to the TSM Alternative. The greatest savings in time would be for trips between Mililani and the University of Hawaii, between Waipahu and the University of Hawaii, and between Pearl City and Ala Moana Center.

The comparison between the travel times for bus and rail trips is a valid comparison for trips from a common origin to a common destination (door to door, instead of bus stops or stations). Rail trips do have the advantage on longer trips because of higher speeds and fewer stops. Even if buses made fewer stops, such as in a "limited mode," rail would still have an advantage because buses would be subject to traffic congestion, stop lights, etc. while the rail operates on an exclusive guideway.

If rail headways were increased to the suggested four to five minutes, the average travel time would increase only 1 to 1.5 minutes and rail would still have a travel time advantage over bus for many trips.



Comment 1.7: We recommend that additional documentation be provided regarding the rationale for determining the length of the alternate alignments and the elimination of certain types of technology not considered as suitable alternatives (e.g., busways, mixed traffic, light rail, etc.) A more detailed summary of the 20-year history of mass transit in Honolulu would help to clarify reasons for choosing various alternatives, how this effort builds on previous studies, and what changes have occurred since the previous DEIS was prepared. (Hawaii Office of State Planning)

Response: A preface, P.1, "Project History" has been added to this FEIS which summarizes this information. Limitations on the size of the FEIS preclude more than a summarization of the project history. The preface references previous studies which detail the project history. These studies are available for review at the Department of Transportation Services, Office of Rapid Transit. Section 2.2.1 of this FEIS also provides some additional information.

#### 7.4.1.2 TSM Alternative

Comment 1.8: The TSM Alternative described in the AA/DEIS should have considered one or more of the following strategies: carpooling, special lanes and/or guideways for buses, computerized traffic signals, staggered work hours, congestion pricing, road pricing, eliminate auto parking, prohibit government employees from using government-subsidized parking, build park-and-ride lots, changes in zoning to redistribute work sites and change traffic patterns, restrictions on highway use during commuting hours, force government employees to ride-share, increase government funding for the promotion of carpooling, dial-a-ride and jitney services, provide tax incentives for carpooling using an electronic eye for monitoring, provide tax incentives for home work stations, locate mini-cities outside Honolulu, remove the prohibitive cost and red tape to allow for private passenger van services, and/or private sector initiatives, such as paratransit. If a narrower context of the TSM Alternative is intended, it would be useful to more precisely define this alternative in the FEIS. (Hawaii Office of State Planning, Hawaii Pacific Engineers, Inc., Makiki Neighborhood Board, Ruby, Kawelo, City Council Member Gill, Miller, Nalbach, Committee on Sensible Transit, Goodhue, Hawaii's 1000 Friends, Downtown Neighborhood Board No. 13)

Response: The alternatives described in the AA/DEIS, SDEIS, and this FEIS were designed to facilitate a comparison among different levels of transit investment. To focus on this comparison, a consistent set of non-transit policies and facilities were assumed for each transit alternative. These were taken from the Oahu Regional Transportation Plan (RTP) (June 1991) and include the highway improvements defined in the Highway Element of the RTP and the actions included in the TSM Element of the RTP. Highway improvements and TSM measures such as HOV lanes, park-and-ride lots, traffic operation improvements, and incentive Transportation Demand Management (TDM) measures were assumed in the analysis, complementing each of the transit alternatives. Disincentive TDM measures such as congestion pricing, road pricing, and parking restrictions are not proposed as part of the RTP's TSM element and, therefore, were not included in the assumed policy base for each transit alternative. If TDM actions to discourage auto use had been included in the analysis, increases in forecast transit demand would have occurred for all alternatives, and traffic congestion would have been lower for all alternatives. In general, the relative attractiveness and advantages of the fixed guideway compared to the other transit alternatives studied would have been the same as or greater than those described in this FEIS.

Within this context, the transit TSM Alternative was designed to provide as high a level of bus service as could be supported by demand. It examined measures that provide for non-capital-intensive improvements in transit service, such as additional local and express routes, shortened bus headways, provision of sufficient bus capacity to accommodate demand at reasonable passenger loading standards, reserved bus and HOV lanes, and expanded park-and-ride services.

Comment 1.9: Why is the majority of the AA/DEIS analysis confined to rail alternatives, with only a cursory treatment of the TSM and No-Build Alternatives? (League of Women Voters)

Response: The AA/DEIS endeavored to address the effects, both positive and negative, of each of the eleven alternatives to a comparable level of detail. Those alternatives which involved the most changes, benefits and impacts to the physical and social environment, namely the fixed guideway alternatives, led the most effects to report. This FEIS provides a thorough discussion of the effects, positive or negative, of the TSM and No-Build Alternatives.

Comment 1.10: I support the TSM Alternative. Vehicle registration fees and gasoline taxes should be increased to pay for the system and encourage people to use mass transit. (Rodgers)

Response: Comment noted. No response necessary.

Comment 1.11: The top priority should be to increase and enhance the bus system with dedicated lanes and routes, more frequent schedules, and better riding conditions. Second priority would be a light rail system to move visitors back and forth from the airport and our proposed convention center. (Havre Securities)

Response: Comment noted. No response necessary.

Comment 1.12: Isn't the TSM Alternative structured to show an unrealistic increase in the number of buses and high capital and O&M costs needed? The TSM Alternative does not include some of the measures commonly mentioned for "rapid bus transit" systems, such as exclusive bus lanes, integration with para-transit modes like 12- or 15-passenger vans, road-pricing, or metering which are designed to reduce auto traffic and help buses move better? Use of quiet, efficient and economical electric buses should also have been considered. (League of Women Voters)

Response: (1st sentence) No, the TSM Alternative is structured to provide as high a level of bus service as could be supported by demand.  
(2nd sentence) See response to Comment 1.8.  
(3rd sentence) The development of a trolley bus system, either as part of a bus-only alternative or for bus services integrated with a fixed guideway alternative, was not identified as a viable alternative in the scoping process. Trolley buses would be expected to result in about the same transportation benefits as standard buses. However, there would be greater capital costs and the potential for visual impacts.

Comment 1.13: Neither the TSM or the No-Build Alternatives, as presented in the AA/DEIS, are viable transit options. The TSM Alternative requires a doubling of the bus fleet to 997 buses with a resulting ridership increase of only 23%. The Hali 2000 Report examined different size bus fleets and concluded that an 800 bus fleet when compared to 600 buses probably would not be cost effective because the additional 200 buses would generate only 5% more riders. (Kawelo)

Response: The opinion and information provided by the commenter are noted. However, as discussed in Section 2.2.1.1 of this FEIS, if the No-Build Alternative were designed to accommodate the peak-load point demand with the same vehicle load standards as the other alternatives, it would require a fleet of 694 buses, 30% less than the TSM Alternative.

Comment 1.14: The City did not invite input or solicitation from private carriers on the TSM Alternatives despite the fact that UMTA's (now FTA) policy is to have private carrier participation in public transit projects. Thus, innovative and cost-effective paratransit options have been excluded from consideration. What specific steps will be taken to change PUC procedures to encourage paratransit? (Charley's Taxi, Makiki Neighborhood Board)

Response: The rapid transit service will be operated by a private entity, at least for the first 5 years. Private participation in the supply of bus services, either for a bus-only alternative, or for bus services integrated with a fixed guideway alternative, will continue to be solicited consistent with the City's Private Enterprise Participation (PEP) policy. Any changes in Public Utilities Commission procedures will occur within that framework.

Comment 1.15: Bus routes for the TSM Alternative should have been mapped out and explained to show how service would be expanded to neighborhoods island-wide. (Charley's Taxi)

Response: See response to Comment 1.2.

Comment 1.16: The motor coach segment of our Passenger Carrier Conference believes that it can augment the City's transit fleet to reduce the City's overall estimated costs for purchasing, operating and maintaining buses, if the TSM Alternative were to be implemented. (Hawaii Transportation Association)

Response: The City is currently working under FTA guidelines and its own program policy on a Private Enterprise Participation (PEP) program. The PEP program intends to promote greater competition and increased opportunities for the private sector in the provision of mass transportation services and operations. Both the City and FTA anticipate that transit services will be improved and/or provided more cost effectively in a more competitive environment.

Comment 1.17: The TSM Alternative is needed in addition to rapid transit. What specific steps will be taken to increase ride sharing, paratransit, time-variable driving cost and other methods of reducing car traffic? When will these steps be taken? (Makiki Neighborhood Board)

Response: A study of implementation of TSM measures is currently being undertaken by the Oahu Metropolitan Planning Organization (OMPO).

Comment 1.18: Improving bus service is a much less costly proposition than building a rail line. This should be the City's first consideration before embarking on rail. (Kawelo, Monaco, Fergusons)

Response: An enhanced bus alternative, Alternative 2, was presented in the AA/DEIS. It was not chosen as the LPA. In selecting the LPA, the City Council concluded that an improved bus with a rail system will most effectively serve the transportation needs of Honolulu. Providing a larger number of buses to an area with already high traffic congestion will not increase the efficiency of the transit system nor the mobility of area residents. The City Council determined that the higher speed service, increased capacity, and reliability associated with a rail system, along with other benefits, more than offset the increased costs and other impacts.

Comment 1.19: A bus system with frequent stops is what is needed, and not a rail system. The service on some routes should be doubled, especially the routes that the tourists take to Arizona Memorial, Aloha Swap Meet and other places since these buses are always full. Every third country bus, i.e., Routes 50 through 52, etc., should be an express bus with no stops at places such as Arizona Memorial. These express buses should run seven days a week with the same frequency because it seems that they are now always crowded, no matter which day they are operating. (Ruby)

Response: Increasing the number and frequency of bus stops, increasing service by adding more buses to individual routes and adding express routes are all a part of the City's plans to provide an integrated transit system. However, simply introducing many more buses to already highly congested roads and highways will not provide efficient transportation for people on Oahu. The comments on the existing bus service are noted.

Comment 1.20: A better solution than rail would be to provide greatly improved bus service, which is more frequent and accessible. Use jitney buses on all non-major roads to feed the larger buses and/or use ferries to service the Downtown to Hawaii Kai and Downtown to Pearl City areas. (Kuntz, Parales, Marsh, Yohe, Perry)

Response: The opinions of the commenters are noted. See the responses to Comments 1.18 and 1.19.

#### 7.4.1.3 Section I Alternatives - Waiawa to Aloha Stadium

No comments were received on the AA/DEIS regarding this section of the rapid transit alignment.

#### 7.4.1.4 Section II Alternatives - Aloha Stadium to Keehi Interchange

Comment 1.21: The location of the transit station within the main stadium parking area under Alternatives 4, 5, 6 and 9 is undesirable because the lot is secured when the facility is not in use; it would adversely affect the operation of the flea market; and it would hinder vehicular traffic to the reserved parking area. (Hawaii State Comptroller)

Response: The amended LPA does not include a transit station in the main Stadium parking lot; it is located in the overflow parking area. This location will not interfere with the flea market's operation.

Comment 1.22: I am opposed to the Salt Lake Boulevard Alternative for one or more of the following reasons: four schools and a library are located there; construction impacts would disturb school activities; Foster Village residents already experience parking difficulties when there is a major event at the Aloha Stadium; there is no land to add parking or expand Salt Lake Boulevard; there would be an increase in noise and traffic congestion, property values would decrease, and pollution from the train cars would affect my pool. (Taibbi, Young, Stableys, Volberdings, Vines and 35 others, Schlapak, Stewart, Medeiros, Lavender and 308 others)

Response: The City Council voted to select a Locally Preferred Alternative (LPA) which does not include the Salt Lake Boulevard segment. The Locally Preferred Alternative Report (August 1990) and Sections P.1 and 2.2.1 of this FEIS provide additional information on the alternative selection process.

Comment 1.23: The Salt Lake Boulevard Alternative is preferable to the Kamehameha Highway Alternative for one or more of the following reasons: it would serve a highly populated area; the Kamehameha Highway Alternative is already served by an efficient bus and van system; Leeward Oahu residents working at Pearl Harbor do not have traffic problems getting to work by car on Kamehameha Highway; there are not enough military dependents living near Pearl Harbor who need to go Downtown to work everyday; Salt Lake Boulevard area commuters going downtown would have to travel Ewa on Salt Lake Boulevard to get to the park-and-ride lot, resulting in increased traffic congestion near schools along Salt Lake Boulevard; and, the Salt Lake Boulevard Alternative would have shorter routes and travel times. (Hawaii Transportation Association, Monaco, Aliamanu-Salt Lake-Foster Village Neighborhood Board No. 18, Welhouse)

Response: The Kamehameha Highway segment was selected as part of the amended LPA because the location of the guideway will have less adverse impacts on the residential community; will provide a direct interface with the airport; will provide more direct service to Pearl Harbor and Hickam Air Force Base; and the station location at the Aloha Stadium overflow lot provides a good opportunity for future development of the site.

Comment 1.24: The Kamehameha Highway Alternative should be implemented for one or more of the following reasons: the system must be conveniently located to shopping centers; it is mainly bordered

by commercial enterprises that would benefit from its location; the noise from the rail would not appreciably add to the current noise level on Kamehameha Highway; no impacts would occur to the schools along Salt Lake Boulevard; Kamehameha Highway is more convenient for military personnel at

Pearl Harbor and Hickam; it is more convenient for people going to and from the airport; and, there is less pedestrian traffic along Kamehameha Highway than Salt Lake Boulevard and, therefore, the potential for pedestrian/vehicle accidents would be reduced. The Kamehameha Highway Alternative should provide easy tourist access to the Honolulu International Airport, and the tourists should pay additional charges for use of the Airport Station. (Young, Schlapak, Cadwell, Callan)

**Response:** Refer to the response to Comment 1.22. With regard to Airport access, the City is coordinating with the Airports Division to provide an interface between the rapid transit system and the Airport.

#### 7.4.1.5 Section III Alternatives - Keehi Interchange to Iwilei

No comments were received on the AA/DEIS regarding this section of the rapid transit alignment.

#### 7.4.1.6 Section IV Alternatives - Downtown/West Kakaako

**Comment 1.25:** We are opposed to Alternatives 6, 8 and 11 since the aerial guideway would bisect the proposed Liliha Civic Center and interfere with the functions on the site. We are also opposed to those portions of Alternatives 3, 4, 9, and 10 which pass beneath the proposed Liliha Civic Center since the underground guideway will be located below a proposed high-rise office building and a proposed multi-level parking structure and would require surface structures on-site. We would favor Alternative Alignments 3, 4, 9, and 10 if they ran along King Street before going underground to Hotel Street. With regard to the Richards Street Parking Structure, we favor the underground route along Hotel Street in Alternative 3, 4, 9, and 10. (Hawaii State Comptroller)

**Response:** The feasibility of relocating the alignment along King Street was studied but found undesirable because of the geometric constraints of the system. The subway segment also has been eliminated from consideration. The amended LPA will not bisect the Liliha Civic Center. It will pass by the Liliha Civic Center on an aerial structure on the makai side. The City will continue to coordinate with the involved agencies to ensure that there are no adverse impacts on the Liliha Civic Center project as a result of rapid transit.

**Comment 1.26:** We support the underground alternative through the downtown area because it preserves the visual aspects of the historic buildings and sites along the route. (Historic Hawaii Foundation)

**Response:** The City Council originally voted to select Alternative 3 as the LPA, which would have included a subway under Hotel Street. However, based on the results of the AA/DEIS, preliminary engineering studies conducted to date, comments received during the public review process, determinations made in the RFP processes, and the high costs involved with constructing this subway segment, the City Council later amended the LPA to replace the Hotel Street Subway with an aerial alignment that generally follows Nimitz Highway, Halekauwila Street, and Ward Avenue. Coordination with the State Historic Preservation Officer (SHPO) has been initiated and will continue to ensure that impacts to historic areas are minimized. Measures to mitigate impacts are included in the Memorandum of Agreement (MOA) (see Appendix A in this FEIS).

**Comment 1.27:** The Hotel Street Alternative is the most practical to serve downtown workers. The additional costs seem to be worthwhile because, unless the system serves the downtown area, it will likely fail. The subway alignment would also be superior to an above-ground alignment in terms of noise and

visual impacts, particularly in the Chinatown area. (The Outdoor Circle, Callan, U.S. Department of Housing and Urban Development)

Response: See response to preceding comment. Two stations, Nimitz/Smith and Nimitz/Fort, will be located along Nimitz near the downtown area. The stations will be within easy walking distance of many downtown locations. Shuttle buses will be provided to those areas which would not be readily accessible. The amended LPA will be located at the edge of Chinatown, within an existing transportation corridor, and beyond the historic core precinct. Therefore, impacts to the Chinatown area will be minimal.

Comment 1.28: We understand that the Hotel Street Subway has been recommended for construction. By making that recommendation, we no longer have concerns about a possible elevated transit line on Nimitz Highway. (Downtown Improvement Association, Hawaii State Comptroller)

Response: Comment acknowledged. As discussed in the SDEIS and this FEIS, the amended LPA includes the elevated transit line on Nimitz Highway.

Comment 1.29: I do not see the sense in building a tunnel under Hotel Street, given the experiences in Waikiki with excavation and water problems. (City Council Member Abercrombie)

Response: The amended LPA does not include construction of a subway under Hotel Street.

#### **7.4.1.7 Section V Alternatives - East Kakaako to Kalakaua/Kapiolani**

Comment 1.30: If a fixed guideway is to be built through Kakaako, we prefer the Pohukaina Street route because it would be located in the area which could be best served. The Ward Avenue segment should be built underground because of adverse aesthetic impacts associated with an elevated guideway. (Kakaako Improvement Association)

Response: Alignments along both Pohukaina and Halekauwila Streets were assessed in the SDEIS. Because the Halekauwila Option will have lesser overall impacts, the Halekauwila Option has been selected to be incorporated into the amended LPA. The segment along Ward Avenue will be built on aerial structure. A subway in this area would not be financially feasible.

Comment 1.31: Two alignments were proposed in the Kakaako area in the AA/DEIS: a portion of one would follow Pohukaina Street, and a portion of the other would follow Kapiolani Boulevard. The Pohukaina Street alignment would generally be better than the Kapiolani Boulevard alignment because Pohukaina Street is more central to the Kakaako District and would also better serve the district makai of Ala Moana Boulevard as well as the Aloha Tower development project. The use of Halekauwila Street for the fixed guideway alignment was eliminated in the environmental process during the AA/DEIS apparently because of its impact on Mother Waldron Park. We intend to straighten this street through the upper portion of Mother Waldron Park through our Improvement District Program. Halekauwila Street could also be considered for a guideway route since it is designated as a local street in the Mauka Area Plan. Use of Halekauwila Street may have less adverse roadway impacts than use of Pohukaina Street. (Hawaii Community Development Authority)

Response: The original LPA would have followed Pohukaina Street. However, the facts provided in this comment contributed to the development of the amended LPA. The Halekauwila segment is one block mauka of Pohukaina Street and, similar to Pohukaina Street, will serve central Kakaako. The Halekauwila Street option was subsequently reviewed in the SDEIS and incorporated into the amended LPA in this FEIS.

Comment 1.32: A proposed alignment along Kapiolani Boulevard should have been considered since the Neal Blaisdell Center complex would be a major "generator" for mass transit and the natural locus of points between the civic center and Ala Moana Shopping Center is Kapiolani Boulevard. (Kakaako Improvement Association)

Response: Because of potential adverse traffic and environmental impacts, the amended LPA will avoid Kapiolani Boulevard and instead will follow Waimanu and Kona Streets one block makai of Kapiolani Boulevard. Stations will be provided to serve the areas adjacent to Neal Blaisdell Center, Piikoi/Kona, and Ala Moana Center.

#### **7.4.1.8 Section VI - Waikiki Branch**

Comment 1.33: A possible alternative to the Kuhio Avenue alignment would be the reconsideration of the Ala Wai Canal rapid transit spur. The willingness of pedestrians to walk a few blocks to the canal is underrated, especially when people in colder climates like New York City will regularly walk longer distances because other alternatives may be less attractive or unavailable. (Waikiki Neighborhood Board No. 9, Huddleston)

Response: The LPA originally selected by the City Council included a guideway along Kuhio Avenue. However, Resolution 91-241, later passed by the City Council, amended the LPA by eliminating the Waikiki line. The additional construction costs, coupled with the potential environmental and community concerns, made this portion of the rapid transit system infeasible at this time.

Comment 1.34: A loop system serving Kalakaua, Kapahulu, Kuhio, Kapiolani, Atkinson, and Ala Moana would better serve Waikiki than a dead end spur. (Welhouse)

Response: See response to preceding comment. Shuttle buses serving the areas mentioned will provide access to the fixed guideway at the Kalakaua/Kapiolani and Ala Moana Center Stations. Section 2.2.2.1 of this FEIS discusses this issue in more detail.

Comment 1.35: A subway should be considered for the Waikiki line or for the area from Downtown to Waikiki to reduce sound and visual impacts in the area. If the subway into Waikiki were not viable, the use of trams, trolleys, or an expanded bus system should be considered to tie into the transit station at the former Aloha Motors site. (The Queen Emma Foundation)

Response: See responses to the previous two comments.

Comment 1.36: The need to extend the system into Waikiki is questionable in view of the visual intrusion of the guideway system above-grade; the cost-effectiveness in providing an increased level of service to the area; and the additional front-end cost and inconvenience caused by construction. (U.S. Department of Housing and Urban Development)

Response: The Waikiki line has been eliminated from consideration.

#### **7.4.1.9 Section VII Alternatives - University Branch**

Comment 1.37: The rail line should extend beyond University Avenue to a park-and-ride facility near the Kapahulu/Waialae overpass area with a spur leading to a station in the University Quarry area. This would eliminate the significant impacts of the University Avenue route and provide better service to East Honolulu. (Huddleston, American Institute of Architects)

Response: Since the AA/DEIS the Koko Head terminus of the system has been relocated to the University Quarry area to provide service to the proposed arena and provide for a better extension Koko Head should an extension be considered in the future. Although not part of the amended LPA, three park-and-ride lot locations are still under consideration to serve the University area. Refer to a more detailed discussion in Section 2.2.2.2 of this FEIS.

#### 7.4.1.10 Station Alternatives

Comment 1.38: Consideration should be given to building a transit facility on the Ewa end at an alternate 23-acre site adjacent to Kamehameha Highway and below the Seaview subdivision. This site has been dedicated to the City for use as a park-and-ride lot or transportation facility, offers better access to the H-1 Freeway, the H-2 Freeway, Kamehameha Highway and could be less expensive to build. (Mililani Paratransit Services, Mililani/Waipio/Melemanu Neighborhood Board No. 25)

Response: The 23-acre site adjacent to Kamehameha Highway and below the Seaview subdivision had been considered as a possible site for a transit facility. However, due to its topography, the amount of usable land is not adequate to site a station, a park-and-ride and maintenance yard and shops. It is also too close to the Waiawa Station for the system to operate efficiently.

Comment 1.39: A station should be located at the UH/Quarry site instead of UH/Metcalf. (City Council Member Abercrombie)

Response: The City Council amended the LPA by Resolution 91-241. This resolution called for the replacement of the University terminus at Metcalf with a Lower Campus (Quarry) terminus.

#### 7.4.1.11 Transit Vehicle Alternatives

Comment 1.40: Why was the choice of the fixed guideway technology deferred until after the alignment was selected? Differences in noise and visual impacts exist between the various technologies so that it is possible that one technology may be acceptable for a given alignment, while another technology may be unacceptable. (The Queen Emma Foundation)

Response: A turnkey procurement process was used to get the most cost-effective rapid transit system for Honolulu. The differences in noise and visual impacts were carefully considered by the selection committee in choosing the recommended technology. The impacts of the adopted system, the amended LPA, are presented in this FEIS.

Comment 1.41: Selection of a route prior to a choice of technology creates a situation in which worst case assumptions must be made in evaluating the impact of route alignments. The visual, psychological, and acoustic impacts of the technologies vary considerably and should play a major role in determining the preferred route. (Huddleston, American Institute of Architects)

Response: The AA/DEIS evaluated the impacts of several technologies on a number of possible alignment alternatives. An important consideration in the selection of both the preferred technology and alignment was minimizing the potential adverse environmental impacts. The SDEIS and this FEIS focused on the impacts of the selected technology on the preferred route.

Comment 1.42: Magnetic levitation should be considered. This system would provide the smoothest, quietest ride. It would enable construction of high density housing near the transit line and would also minimize aerial mass. In addition, magnetic levitation has low noise impacts and the tunnel cross-sectional area needs for this technology is 20-30% less than others. (Callan, Lamberth, Wright)



Response: This technology was assessed in the AA/DEIS. The selection of the technology was made as part of the turnkey procurement process. Further information is provided in the Honolulu Rapid Transit Program, Selection Committee Report (October 1991).

Comment 1.43: Fixed guideway transit systems like monorail offer many advantages. These systems are non-polluting and include electric propulsion which is more energy efficient than any other form of transit. They also have the ability to travel over the traffic congestion without delay. (TGI)

Response: TGI submitted a proposal for a monorail system to serve Honolulu. Monorail was one of the technologies assessed in the AA/DEIS. The selected technology also uses electric propulsion and will travel above the highways on an aerial structure.

Comment 1.44: Use of the Von Roll Monorail and O-Bahn Busway Transit Systems should be considered. These systems would be less costly and more flexible than other technologies. (Honolulu Transit Corp., Grant Thornton)

Response: The procurement process was open to all systems meeting the technical requirements. No proposal was received that included either of these systems.

#### 7.4.1.12 Other Alternatives

Comment 1.45: Attacking the root of the problem by limiting the numbers of people on this island would eliminate the need for a rail system. We should consider measures to limit population influx from immigration, refugees, etc., and limit the numbers of cars by making it very expensive to own more than two cars. (Vines and 35 others)

Response: The limitation of Honolulu's population is beyond the scope of this study. The purpose of this study is to focus on transportation alternatives to serve projected future requirements.

Comment 1.46: The State/City and County should build more highways rather than waste money on a fixed rail system. (Monaco)

Response: Regional highway improvements are a component of each of the transit alternatives. To solve regional mobility problems, a multi-modal solution is required.

Comment 1.47: Instead of building a rail system, consider implementation of the following: give businesses tax incentives to move out of the central core to areas such as Mililani or Ewa Beach; decentralize state and city governments by using fax machines, cellular phones and computers so that people do not need to be in close proximity to each other; use feeder buses to deposit riders at express bus stops and institute dedicated traffic lanes and routes to the express buses; use tour buses to augment bus service during peak times; eliminate senior citizen bus pass usage during peak hours; legalize jitney or other small transportation services; limit the number of cars, including rental cars, allowed on Oahu; improve the public education system so that children attend school in their neighborhoods instead of traveling longer distances to private schools. (Pechauer)

Response: The proposed rapid transit system has been developed to support existing land use and adopted land use plans that will guide development patterns in the region for at least the next 15 - 20 years. These plans, which have been prepared with extensive public input, do not recommend disassembling the central core nor decentralizing state and City government. In fact, they are supportive of a continued strong Downtown area including a central government core. Delivery of some government services may be decentralized. Those comments that relate to the development of alternative

transportation measures are addressed in the response to Comment 1.8. The use of feeder buses is an integral part of the amended LPA.

Comment 1.48: Instead of rail, consider discouraging cars from entering the downtown area by requiring payment of a tax. (Fergusons)

Response: The use of disincentives to discourage auto trips to Downtown would increase the demand for transit and reduce traffic congestion. Under such a scenario, the capacity increases and travel time savings of a fixed guideway transit system would still offer benefits.

Comment 1.49: The City should increase taxes on multiple vehicle ownerships. (Fergusons)

Response: Consistent with the response to the comment above, disincentives to auto ownership on an island-wide basis would increase the demand for transit.

Comment 1.50: Instead of rail, the following alternative should be considered: establish a transportation master plan; create a transit-paratransit, taxi authority; retain the urban trunk routes as a solid base to build upon; add routes running mauka-makai (from Kinau to Ala Moana, on Punchbowl, Ward, Keeaumoku, from the University of Hawaii to Kapiolani, on University); double the express bus fleet using private contractors; route express buses to specific destinations such as Bishop, Punchbowl, Ala Moana, Waikiki, the University of Hawaii; implement other paratransit services, such as shuttles, from condominiums to work and from neighborhoods to express buses (the shuttles could serve downtown and shopping hubs, Waikiki hotel workers and Kapahulu residents and could run in a clockwise direction against traffic to serve Kapiolani-Date-Kapahulu-Kuhio-Kalakaua/Kapiolani); dedicate government employee parking garages to carpool and vanpool parking which are open to the public and provide frequent shuttle service between the garages and the workplace; assess parking tax fees to discourage private car usage; raise full fares to \$1.00; stop use of discounted senior bus passes during peak hours; develop an overhead fixed guideway on H-1 from Waiawa to Kahala Mall and target express feeder shuttles from the H-1 Freeway West, the H-2 Freeway, the H-3 Freeway and the H-1 Freeway East to attract ridership from Makaha-Ewa, Waiawa-Millilani, Kaneohe-Kailua, and Waialae-Hawaii Kai; develop fixed guideway gateways for off-loading/boarding at key intersections in between; maximize travel speed by having fewer stations such as Aloha Stadium, Pearl Ridge, Halawa/Pearl Harbor, Puuloa/Airport, Middle/King/Dillingham, Liliha, Nuuanu/Bishop, Punchbowl/Capitol, Ward/Pensacola, Keeaumoku/Ala Moana, Punahou/Kapiolani, University/Waikiki, Chaminade/Palolo, Koko Head and Kahala Mall; provide frequent shuttle loops and express buses as feeders from the freeway stations to key employment, shopping, school and medical centers; construct a bridge from University across Ala Wai Canal to Waikiki; and, free the use of taxis from current bureaucratic policies which stifle creative marketing and competition. (Charley's Taxi)

Response: The response to Comment 1.8 identified, in general, the scope of alternative improvements examined in the Alternatives Analysis and subsequent phases of the Transit Project Development Process. Most of the commenter's proposal that falls within the category of corridor transit improvement alternatives, e.g., retaining the urban trunk routes, adding mauka-makai routes, increasing the express buses and providing shuttle services, are incorporated in the fixed guideway alternatives. The commenter's proposed fixed guideway alignment on the H-1 Freeway from Waiawa to Kahala Mall was not included as an alternative. Such an alignment would be distant from key activity centers such as the central business district (CBD) and Ala Moana Center. Also, an aerial guideway along the freeway would cause interference with the existing overpasses across the freeway and would require widening of the freeway median in various locations.

Comment 1.51: Why not use synchronized traffic lights and well-placed overpasses in areas like Castle Junction on Pali Highway for Kaneohe traffic, Likelike, and School Streets which were considered in other traffic studies? Also, more express buses could be provided during peak hours. (Chun)

Response: Traffic operations improvements and new highway facilities are proposed as part of the Highway and TSM elements of the RTP. The use of enhanced express bus service is a component of each of the alternatives in this FEIS, except the No-Build.

Comment 1.52: The AA/DEIS fails to address the adequacy of transit service to the Aloha Tower area, the Kakaako Peninsula, and the Discovery Bay/Ililikai portion of Waikiki. Secondary light technology loops could improve service to these areas and permit the shifting of main lines to lower impact alignments, e.g., the main transit line could run along the H-1 Freeway through town with the downtown area served by low-impact elevated or surface transit systems. (Huddleston)

Response: The Aloha Tower area will be well served by the amended LPA alignment proposed along Nimitz Highway. Two stations, Nimitz/Smith and Nimitz/Fort, will provide access to Downtown and the Aloha Tower area. Service to areas not directly on the rapid transit line will be provided by an improved bus feeder system that closely coordinates with the rapid transit line. The City's plans for an expanded bus feeder system include enhanced service for the Kakaako area to meet the potential demand of proposed development in and around Kakaako. Both HCDA's Kakaako redevelopment plans and the State of Hawaii's waterfront master plan have been reviewed for possible impact on the Kakaako Peninsula. The Discovery Bay/Ililikai area of Waikiki will have increased transit service as a result of a proposed Waikiki shuttle service. The Waikiki shuttles will provide frequent service within Waikiki and to the transit stations at Kalakaua/Kapiolani and at Ala Moana Center. The impact and cost of additional light rail technology loops in these areas is not warranted as the demand for service can be met by the improved bus service.

Comment 1.53: Why hasn't an at-grade system been considered since it would be less costly? (Kawelo)

Response: An at-grade system would not be practical for Honolulu because in most areas, the existing road rights-of-way are too narrow to permit the construction of a rail system. Many homes and businesses would have to be relocated to widen the rights-of-way to the extent necessary to accommodate the at-grade system. If traffic lanes were to be eliminated for the at-grade rail, then the capacity of an already taxed roadway system would be reduced even further. All cross streets would also be adversely affected.

Comment 1.54: A fixed guideway alternative using surface routing on the freeway alignment should be considered. It would cost much less and the reduced capacity of the roadway for handling vehicular traffic would encourage more commuters to use the transit system. (Huddleston)

Response: See the preceding comment. Although more commuters would probably use the transit system if the roadway capacity were reduced, additional freeway congestion would also be likely. Therefore, the RTP does not include use of the existing freeway to provide rail service. In addition, the transit system serves destinations where patrons want to go. The freeway does not directly serve the final destinations.

Comment 1.55: Selecting Alternative 3 because of "least environmental impact" (giving up ridership from densely populated Salt Lake Boulevard) and "less maintenance cost" (undertaking high costs to tunnel underground on Hotel Street) discredits all fixed guideway alternatives. These arguments also raise a question about the political viability of running an overhead fixed guideway through Waikiki. Therefore, with Alternative 3, the prospect of tunneling underground for the Waikiki segment would lead to added costs and water table problems. A benefit of this route is to capture tourist traffic during off-peak periods. However, Alternative 3 takes business away from passenger carriers and car rental companies serving tourists. (Charley's Taxi)

Response: The amended LPA does not include a tunnel under Hotel Street. Based on additional environmental and financial considerations, the amended LPA generally follows the Alternative 8 alignment. The Waikiki segment has been dropped from the amended LPA. See also the response to Comment 1.23.

## **7.4.2 Accessibility to the Fixed Guideway**

### **7.4.2.1 Fixed Guideway Alignment Access**

Comment 2.1: Future extensions should be planned to serve one or more of the following: Hawaii Kai, Waianae, Mililani, Ewa, Windward Oahu, and/or Waiālae-Kahala. (Welhouse, Costes, Mililani/Waipio/Melemanu Neighborhood Board No. 25, Mililani Town, Corporate Concepts, Callan)

Response: The planned route has been designed to allow for future extensions. Separate alternatives analyses, accompanying environmental studies, and engineering would be required prior to construction of any future extension.

Comment 2.2: The system should be redesigned to serve the areas where people live or will have to live. The system should serve Makaha to Pearl City and Haleiwa to Pearl City. Efficient mini-van express service could be used to transport people to the center core. (Schieve)

Response: The planning process described in this FEIS led to the selection of the system termini in the amended LPA. Future extensions to Makaha and Haleiwa are possible. Bus feeder service to certain rail stations is included in the system design.

Comment 2.3: What extensions to the fixed guideway are being planned once the initial project is completed? What facilities and expenditures are now being proposed to accomplish the extensions? (City Council Member Leigh-Wai Doo)

Response: Once the initial project is implemented, it is anticipated that extensions to East Honolulu, Windward Oahu, Kapolei, and Mililani will be studied. The City has been working with the developers of new projects to set aside lands for park-and-ride lots and other transit facilities that could be components of future extensions.

Comment 2.4: To attract riders in the Ewa and Central Oahu region, the number of transfers to complete a trip must be minimized; direct accessibility should be provided to Waiawa Station from the H-1 Freeway, the H-2 Freeway and Kamehameha Highway; and feeder buses must effectively serve the area. (Mililani Paratransit Services)

Response: The City's plans for an integrated rail/bus transit system is aimed at making the system as attractive as possible for potential riders. This means considerable effort goes into the design of the bus/rail integration to provide a high level of service. One of the goals of this effort is to reduce the number of transfers necessary to complete a trip. Most trips from Ewa and Central Oahu to Downtown will require only one transfer, at the Waiawa Station. The Waiawa Station will have access from the major highways for local feeder buses, express buses, park-and-ride autos, and kiss-and-ride autos. New access ramps will be constructed from freeways/highways to station and park-and-ride lots as required.

Comment 2.5: The fixed guideway should provide access to the Honolulu International Airport and interface with the airport's new rail system. (Callan, U.S. Federal Highway Administration)

Response: The plans for the amended LPA include service to Honolulu International Airport. There has been coordination with the Airport on the issue of interface with the Airport's new people mover system. The two systems will be integrated directly or through a shuttle bus.

Comment 2.6: If it currently takes 30 minutes for a typical bus ride from Makiki to Downtown, how long will it generally take with an integrated bus/fixed rail system over the same distance? (Makiki Neighborhood Board)

Response: Transit riders travelling from Makiki to downtown Honolulu will not use the fixed guideway, since the rapid transit alignment is almost as far from Makiki as Downtown is. The best transit path from Makiki to Downtown will continue to be TheBus Route 4. Because of the assumed degradation of bus speeds due to increased traffic congestion in the future, this trip will take approximately five minutes longer than the current trip.

Comment 2.7: The rapid transit should meet the needs of our students who commute to and from school. This would alleviate traffic commute times. (Sprague)

Response: Wherever possible, students are encouraged to use the transit system. The system will be most beneficial to students of the University of Hawaii at Manoa, Leeward Community College, Honolulu Community College, and West Oahu College. In some areas, the system was routed away from schools to minimize possible disturbance to those schools.

#### 7.4.2.2 Station Access

Comment 2.8: How frequently would the trains stop at each station? (Makiki Neighborhood Board)

Response: The more heavily patronized stations will be served by one train every 99 seconds during the peak periods. All stations on the rapid transit alignment will be served by no less than one train every 3 minutes and 18 seconds.

Comment 2.9: Measures should be incorporated into the station design to provide easy access to everybody, including the elderly and handicapped. (Pearl City Neighborhood Board No. 21, Callan.)

Response: All stations will be designed to effect efficient transfer between surface access/egress modes (i.e., automobile, bus, pedestrian) and the transit vehicle. The stations will also be fully handicapped-accessible and will be designed in accordance with regulations implementing the Uniform Federal Accessibility Standards (UFAS) and the Americans with Disabilities Act (ADA), as promulgated by the U.S. Department of Transportation. Measures such as elevators, wide doors, and equivalent elevations of cars and platforms will be provided.

Comment 2.10: The AA/DEIS does not contain analysis of population densities for residential or employment centers. Stations should be located near high employment density areas and at points where park-and-ride facilities can be constructed to integrate the transit system with the automobile. (Huddleston)

Response: Tables 3.3 through 3.5 of this FEIS show existing and projected population and employment for the neighborhoods and transportation districts within the transit system study area. The locations of areas with existing and projected high density population and employment were considered in determining the siting of the stations and park-and-ride lots.

Comment 2.11: Will the Waiawa Station have direct access to Leeward College and the H-1 and H-2 Freeways? Transit system planners should coordinate with the College's administration and the University of Hawaii regarding access to Leeward College. (Mililani Paratransit Services, Leeward Community College)

Response: The Waiawa Station will have vehicular access from the H-1 Freeway, the H-2 Freeway, and Farrington Highway. Vehicular access is being coordinated with the State Department of Transportation (SDOT) and the U.S. Federal Highway Administration (FHWA), and new ramps will be constructed as required.

Similarly, the City is working with Leeward Community College to resolve issues of vehicular and pedestrian access/egress for the College as well as the station, the impacts on existing temporary classroom buildings, and realignment of existing internal roadways.

Comment 2.12: Regarding the Salt Lake Station, the AA/DEIS notes that a retaining wall would be located between the highway and residential areas. This wall could cause pedestrian access problems. (Honolulu Department of Land Utilization)

Response: The amended LPA will traverse Kamehameha Highway; therefore, the Salt Lake Station will not be built.

#### **7.4.2.3 Feeder Service**

Comment 2.13: The current bus system is inefficient, and there will continue to be an inefficient feeder service to the fixed guideway. Private paratransit services should be considered to provide effective access to the fixed guideway. (Tanaka, Hawaii Pacific Engineers, Inc., Charley's Taxi)

Response: The City has an ongoing Private Enterprise Participation (PEP) Program which seeks to provide public transportation at the least possible cost under a competitive atmosphere. As noted in the response to Comment 1.14, private participation in the provision of feeder service to rapid transit will be sought under the auspices of the PEP program. TheBus system is a very efficient mode of transportation by many standards. In addition, the City has initiated a new comprehensive operations analysis of TheBus and expects to implement service improvement recommendations.

Comment 2.14: The Passenger Carrier Conference believes that it could augment the feeder bus system, if the fixed guideway alternative is implemented. (Hawaii Transportation Association)

Response: See response to Comment 2.13.

Comment 2.15: The AA/DEIS should have contained a summary of supporting regional bus services and transit accessibility for the Ewa and Central Oahu area. (Mililani Paratransit Services)

Response: Supporting documents to the AA/DEIS Transportation Impacts Results Report (February 1990), and Operations and Maintenance Cost Results Report (December 1989), and the FEIS Transportation Impacts Results Report (July 1992) provide this information. These are available at the Department of Transportation Services, Office of Rapid Transit.

Comment 2.16: To properly evaluate the effectiveness of the proposed transit system for Honolulu, the AA/DEIS should have included more information about the proposed regular/feeder bus routes and the headways involved. (Mililani Paratransit Services)

Response: See response to Comment 2.15.

Comment 2.17: A sentence should be added to page 2-10 of the AA/DEIS to note that the Hawaii Kai express route terminates at Ala Moana Center, and not Downtown. (City Council Member Gill)

Response: The Hawaii Kai express route, as defined in this FEIS as "express buses from east Honolulu," will terminate at the University/King Station. See Section 2.2.2.1 in this FEIS.

Comment 2.18: Figure 2-4 denotes the fixed guideway alternatives' transit services areas for trips downtown. A brief justification should be provided for the busing directly to Downtown of residents from Palolo Valley and the area Koko Head of Halawa Heights Road. A brief justification should also be provided for busing residents of the following areas to a fixed guideway station, rather than directly to Downtown: Red Hill; the area of Moanalua mauka of Moanalua Freeway; Kalihi Valley and upper Kalihi; Liliha; and Nuuanu. Also, it would be desirable if Table 2.1 displayed the average numbers of buses arriving and departing transit analysis districts rather than service areas. (City Council Member Gill)

Response: The areas noted in AA/DEIS Figure 2-4 that show bus service to Downtown are generally perpendicular to the transit alignment, and will have more direct service to Downtown by bus service than by fixed guideway. They are located such that bus service is the most efficient transit mode for trips from those areas to Downtown. Generally, this would mean that the travel time for the trip by bus is less than the travel time for a trip that takes a bus to rail transit and transfers to the rail to Downtown. The trips from areas that are shown to use bus to rail service to Downtown would take less time, even with the transfer to fixed guideway, than if these trips were on bus service alone. Please note that Nuuanu is an area best served by direct bus service. The information in Table 2.1 of the AA/DEIS dealt with the number of buses arriving and departing various areas of the region. A decision was made to present the information by geographical subarea rather than by transit analysis district. The AA/DEIS is intended to be a general distribution document that should be easily readable by the general public. The geographic areas are much more recognizable to the general public than the transit analysis districts (areas defined for technical analysis purposes) would be.

Comment 2.19: The AA/DEIS did not consider the major deterrent to using public transportation which is the lack or infrequency of lateral transit service into the valley and up the hills of the island. (Huddleston, Corporate Concepts)

Response: On the contrary, the AA/DEIS, SDEIS, and this FEIS include improved mauka-makai transit service as part of all alternatives except the No-Build, which is the current bus system.

Comment 2.20: To be effective, the bus system needs to be successfully integrated with a frequent train service. (TGI)

Response: The overriding concept behind the amended LPA is a fully integrated bus and rail system.

Comment 2.21: When would the feeder bus system be completed? How many additional buses would be needed? Where would the feeder bus routes and stops be located? How frequently would feeder buses stop at each stop? A fixed guideway would be more inconvenient because there would be no more feeder buses than there are today. (McCully, Moiliili Neighborhood Board No. 8, Makiki Neighborhood Board, Slater)

Response: The feeder bus system is described in Sections 2.2.2.1 and 4.1.1 of this FEIS and in the Transportation Impacts Results Report (July 1992). A feeder bus system with expanded service as compared to today would be in place at the start of rail transit service.

Comment 2.22: Bus ramps should be provided to minimize the inconvenience of transfers. (Callan)

Response: The City's plans for the feeder bus system consider the ease and convenience of the bus-to-rail transfer to be very important in terms of making the transit system attractive to patrons. Significant effort has gone into bus routing and station design to accommodate the transfers between the bus system and the fixed guideway rail system.

Comment 2.23: How would the fixed guideway system affect the level of bus transit service within Waikiki if the line is extended there? (The Queen Emma Foundation)

Response: The alignment of the amended LPA is no longer proposed for Waikiki.

#### **7.4.2.4 Park-and-Ride Lot Access**

Comment 2.24: Additional park-and-ride lots should be added at other suburban stations, especially Pearl Ridge, and Pearl City, and one is needed to serve East Honolulu traffic. Besides the convenience, the lots would provide additional security to individuals traveling during "off hours". (Lamberth, Huddleston)

Response: An additional park-and-ride lot at Lagoon Station is included in this FEIS. In addition, three sites for a park-and-ride lot are under consideration in the University area. It should be noted that the University park-and-ride lot is not part of the amended LPA.

Comment 2.25: The proposed station at Bougainville Drive and Salt Lake Boulevard needs to have a park-and-ride lot. The Aloha Stadium Station has a lot and will be a better choice than the Salt Lake Boulevard Alternative. (Bongartz)

Response: The amended LPA will follow Kamehameha Highway and not Salt Lake Boulevard; therefore, a lot at Bougainville Drive and Salt Lake Boulevard is not needed. The station at Aloha Stadium is included in the amended LPA. A park-and-ride lot will be built within the existing overflow lot at the Stadium.

#### **7.4.2.5 Pedestrian and Bicycle Access**

Comment 2.26: Bicycle racks at stations and park-and-ride lots and bicycle lanes or paths should be provided to allow convenient access to bicyclists. Will bicycles be allowed on the trains? The trains should be designed with the capacity to carry luggage. (Callan, Hawaii Office of Environmental Quality Control, Makiki Neighborhood Board, Huddleston, Lee)

Response: Bicycle racks will be provided at park-and-ride lots. The City is receiving from the Community Advisory Committees input on the types of patron conveniences the communities desire at specific stations.

The City Administration will propose an ordinance to allow bicycles and luggage on the train. Bicycles will be allowed only during off-peak transit hours in consideration of passenger safety and convenience.

Comment 2.27: Convenient access to the transit system should be provided for pedestrians. (Hawaii Office of Environmental Quality Control)

Response: Convenient access is being provided for patrons of the rail transit system. For stations located over the median of streets with high traffic volumes, such as Honolulu Community College, entrances on both sides of the street are planned.



### 7.4.3 Station Design

Comment 3.1: The proposed stations appear to be appropriately located. However, the possibility of future stations should not be precluded, especially on the Pohukaina Street alignment between the South Street and Ward Avenue Stations. Significant development is expected in this area. (Hawaii Community Development Authority)

Response: The amended LPA alignment follows Halekauwila Street. Potential future development and its impact on station locations has been assessed, and four stations are planned within the Kakaako redevelopment area. These stations are Halekauwila/South, Halekauwila/Ahui, Neal Blaisdell Center, and Piikoi/Kona.

Comment 3.2: What facilities are proposed for each terminus and how will those stations (including the Isenberg and Kapahulu Stations) be integrated into the transportation network which will feed into them? (City Council Member Leigh-Wai Doo)

Response: The Waiawa Station, at the Ewa terminus, will have park-and-ride facilities for 800 cars. The station facilities include a bus loop which can accommodate 130 buses per hour. At the Koko Head terminus, there are three options for park-and-ride lots in the University area. These options, however, are not part of the amended LPA. Each lot would provide between 100 and 200 spaces as discussed in Section 2.2.2.2 of this FEIS. Buses from East Honolulu will interface with the rail system at the University/King Station. The Isenberg Station will have a relatively low bus/transit interface. The Kapahulu Station is not included in the amended LPA.

Comment 3.3: The Isenberg Station seems to be grossly underdesigned, and the Moiliili neighborhood and local traffic system could be adversely affected. Is the station underdesigned in order to keep capital expenditures down? (Pollock)

Response: The Isenberg Station has been redesigned to a standard side platform configuration with mezzanine with the ability to handle all anticipated demands. Provisions to expand the system capacity, including the station size, is designed into the system.

Comment 3.4: Please provide details for the design of the Pearlridge Station. (Pearl City Neighborhood Board No. 21)

Response: Pearlridge Station will be located above the median of the Kamehameha Highway. It is a side platform station with a mezzanine. Station access from both sides of the highway will be provided. Figure 2.10 of this FEIS presents a schematic drawing for this type of station. Additional detail can be found in Appendix B, Plan and Profile Drawings, of this FEIS.

Comment 3.5: For Alternatives 3, 7, and 8, a pedestrian bridge should be provided across Salt Lake Boulevard to access the station located in the overflow parking area on the opposite side of that street. (Hawaii State Comptroller)

Response: Alternatives 3 and 7 are no longer under consideration. A modified Alternative 8 has been selected as the amended LPA. Pedestrian access to Aloha Stadium from the overflow parking lot will be at-grade.

Comment 3.6: The AA/DEIS contains little information concerning station design. Future documents should contain information on the building design in relation to neighborhood character, compliance with zoning yard setbacks, signage, and integration with existing and future development. (Honolulu Department of Land Utilization)

Response: The SDEIS and this FEIS contain station site drawings that describe the preliminary station configuration (platforms, mezzanines, number and location of entrances, etc.), and the conceptual functional integration with the surrounding areas. The City's Land Use Ordinance guidelines regulate building heights, architectural controls, landscaping, and preservation of visual resources and historic structures. Community Advisory Committees were formed to provide input on details of station design for each neighborhood.

Comment 3.7: Stations should be sensitively designed on an individual basis in relation to the history of the neighborhoods in which they are to be located. (Historic Hawaii Foundation)

Response: The station design efforts have included studies of the historical and cultural issues that have influenced Honolulu's architectural development. These studies will have an impact on the image and architectural character of the stations. The Community Advisory Committees also are providing input to the station designs. The station designs in areas relating to historic districts and/or structures are subject to review by the SHPO and the ACHP per the MOA (see Appendix A in this FEIS).

Comment 3.8: The transit stations should be clean, safe and controlled by appropriate security personnel. (Lamberth)

Response: Section 5.3.3 discusses this concern.

Comment 3.9: The Nimitz/Fort Station needs to be redesigned or relocated so that it is not a heavy dominant feature in comparison to the low-scale Aloha Tower redevelopment. (American Institute of Architects)

Response: The Nimitz/Fort Station has been redesigned since the AA/DEIS. Continuing coordination with the Aloha Tower Development Corporation is occurring so that the station will not be a dominant feature.

Comment 3.10: A station in Waikiki should be located at the proposed Waikiki Convention Center since the Center will be the major destination for Waikiki. Visitors would be forced to walk three blocks from the two station locations proposed in the AA/DEIS. (Waikiki Convention Center Authority)

Response: The amended LPA does not include a Waikiki segment.

#### **7.4.4 Traffic and Parking**

##### **7.4.4.1 Traffic**

Comment 4.1: Will feeder buses and automobiles coming to the stations to drop off passengers cause traffic congestion? How will buses turning around affect traffic congestion? Will the already busy Isenberg Street or the less congested Hausten Street be used? (Koshi)

Response: Traffic impacts are addressed in Section 4.2 of this FEIS. As noted in the text, some areas will experience a decrease in the levels of bus traffic. Those areas that are proposed to have passenger drop-off locations have "pull-in" lanes incorporated in their design. Buses terminating at Isenberg Station follow a loop from University Avenue to Date Street to Citron Street to McCully Street to Kapiolani Boulevard to University Avenue.

Comment 4.2: To comprehend better the traffic impact of feeder buses, information should be provided on whether buses will load and unload passengers from a street stop or in an off-street bus bay at each location. (City Council Member Gill)

Response: Depending on the site, feeder buses will service stations from street stops or from off-street bus bays. The following stations will have off-street bus areas: Waiawa, Aloha Stadium, and Lagoon. The Ala Moana Center Station will continue to use the bus stops on Kona Street.

Comment 4.3: What mitigation measures will be taken to alleviate increased congestion at stations along Kamehameha Highway when feeder bus service is combined with peak hour traffic? (Pearl City Neighborhood Board No. 21)

Response: As noted in Section 4.2.2 of this FEIS, there will not be any adverse impacts on Kamehameha Highway resulting from feeder bus service.

Comment 4.4: What will be the traffic impact on the Waiawa interchange as a result of the construction of the Waiawa Station? (Souza)

Response: A maintenance of traffic plan, as required by the System Contract, will be prepared to minimize the traffic impacts during the construction phase of the project. The plan will be coordinated with affected agencies and businesses. Any interchange modifications would be part of a separate study.

Comment 4.5: Proposed roadway modifications, as discussed in the AA/DEIS, include the restriping of traffic lanes to 11-feet. Kamehameha Highway (Federal-aid Primary Route 99) is on the National Network (See 23 CFR Part 658). The designated route must consist of lanes designed with a width of 12 feet or more, or as otherwise consistent with highway safety. (U.S. Federal Highway Administration)

Response: All applicable standards will followed.

Comment 4.6: Will street width be changed by the fixed guideway system? (McCully/Moiliili Neighborhood Board No. 8)

Response: In general, lane widths will not be affected. In some locations, curb-to-curb widths will increase, and these widenings have been taken into account in the right-of-way acquisition planning. In the few locations where lane widths may narrow, applicable roadway safety standards will still be satisfied.

Comment 4.7: Technical appendices discussing the project's impact on existing and planned improvements on the Federal-aid highway/street infrastructure should be provided to interested agencies when the FEIS becomes available. (U.S. Federal Highway Administration)

Response: Close coordination with FHWA and other involved agencies (SDOT, for example) will continue as the project's design details become more refined. Technical memoranda on the project's impacts on Federal-aid highway/street infrastructure are not planned for the near future. Additional traffic information can be found in the Transportation Impacts Results Report (July 1992).

Comment 4.8: Any operational improvements or right-of-way encroachments/modifications within the access control limits of the H-1 Freeway will need to be coordinated with SDOT and submitted through SDOT to FHWA for review and approval. The AA/DEIS should reflect this required FHWA approval. (U.S. Federal Highway Administration)

Response: The requirement to obtain FHWA approval for modifications to the interstate highways has been added to the list of "Required Permits and Approvals" in the SDEIS and this FEIS.

Comment 4.9: More extensive design coordination must be pursued with the SDOT to ensure that the selected system and alignment will not infringe on or take lanes from our State Highways. (Hawaii Office of State Planning)

Response: The elimination of highway lanes is not proposed. Close coordination will continue during subsequent design phases.

Comment 4.10: Where Federal-aid Highway System Routes are affected by the proposed fixed guideway system, we recommend that roadway cross-sections showing the guideway in relation to the existing and/or reconstructed highway facilities be provided in the FEIS. (U.S. Federal Highway Administration)

Response: Roadway cross-section drawings are available in the System Contract reference drawings. Ongoing coordination is occurring with SDOT.

Comment 4.11: Pages S-8 and 2-5 of the AA/DEIS discuss the proposed Makai Viaduct between Keehi Interchange and Pacific Street. The viaduct has not been developed beyond the TSM improvements recommended in the Makai Boulevard Concept FEIS. Since that FEIS had not discussed an alternative which includes an exclusive, 24-hour HOV facility, a FEIS reevaluation, and possibly a Supplemental EIS, would be required if Federal-aid Highway Program funds are used for the HOV viaduct. We recommend the use of a design year 2010 for any highway improvements that are discussed in the FEIS. (U.S. Federal Highway Administration)

Response: The project referenced in the comment is separate project from the Honolulu Rapid Transit Project and is subject to a different environmental process and environmental documentation. Project coordination meetings between the City and SDOT staff have occurred.

Comment 4.12: The DEIS for Proposed Developments at Naval Base Pearl Harbor proposes grade-separated interchanges for Kamehameha Highway and Salt Lake Boulevard in the vicinity of the Aloha Stadium and the entrance to the Arizona Memorial. The FEIS for the Rapid Transit Development Program should be coordinated with the Navy's FEIS for Pearl Harbor. (U.S. Federal Highway Administration)

Response: The FEIS for Pearl Harbor recommends improvements to Salt Lake Boulevard and the intersection with Kamehameha Highway. That FEIS discusses the potential need for future traffic interchanges. If an interchange is eventually constructed, it will need to be coordinated with the transit facility. This transit project is being coordinated with the U.S. Navy, and they are a cooperating agency on this FEIS.

Comment 4.13: The Moanalua and Kalauao screenlines (Figure 1.5 of the AA/DEIS) should be added to Table 1.1, SDOT 24-hour Screenline Traffic Volumes, to show traffic growth between the leeward terminus at the Navy Ewa Drum Storage Area and the Primary Urban Center. The latest SDOT Traffic Summary should also be incorporated into the FEIS. (U.S. Federal Highway Administration)

Response: The additional screenlines and later data are included in Table 1.3 of this FEIS.

Comment 4.14: Table 1.3 of the AA/DEIS should be expanded to give the public a better understanding of the impact of the rapid transit system. Specifically, the data on all screenlines in the Hali 2000 Study and the preliminary projections for 2005 from the draft Hali 2005 Study should be included. (City Council Member Gill)

Response: Tables 1.2, 4.12, and 4.13 of this FEIS provide additional screenline comparisons.

Comment 4.15: Please provide additional information related to the projected reduction in auto vehicle trips during the peak hours, and the potential reduction in traffic congestion during the peak hours, including statements on expected level of service determinations on the major highway corridors based on the different alternative scenarios. Statements on reduction of auto trips per day is insufficient to make traffic impact determinations. (Hawaii Pacific Engineers)

Response: Additional information is provided in this FEIS Section 4.2.1 and in the Transportation Impacts Results Report (July 1992).

Comment 4.16: Table 4.23 of the AA/DEIS lists the traffic impacts at intersections near proposed rail stations. Are the data based on peak period impacts? (City Council Member Gill)

Response: Yes; also refer to Section 4.2.1.2 of this FEIS.

Comment 4.17: To understand better the traffic reduction effect of the alternatives, data on amount, period, and location of traffic reduction should be included in Figure 4-6 of the FEIS. (City Council Member Gill)

Response: Additional information on traffic reduction has been added to Section 4.2.1 of this FEIS.

Comment 4.18: The total daily auto vehicle trips should be provided in Section 4.2.1 to place the auto trip reduction data in perspective. Table 4.22 of the AA/DEIS should provide data on auto and bus vehicle miles traveled in the entire county. A map of the corridor between Barbers Point and Koko Head should also be provided. (City Council Member Gill)

Response: Section 4.2.1 of this FEIS addresses these comments. Data is provided for the entire county, so reference to a corridor between Barbers Point and Koko Head is no longer relevant.

Comment 4.19: Pages 4-15 through 4-23 of the AA/DEIS discusses the reduction in vehicle trips expected with operation of the fixed guideway. The AA/DEIS states that "This could amount to decreases in traffic on the order of five percent at key locations." The locations should be identified. (City Council Member Gill)

Response: Please refer to Section 4.2.1.1 of this FEIS.

Comment 4.20: Section 5.6.5 of the AA/DEIS discusses road traffic noise impacts and states that "Because there is only a slight difference in traffic volumes for the No-Build, TSM, and fixed guideway alternatives, the traffic noise impact during the Year 2005 for all the alternatives is expected to be similar... The traffic noise impact analysis indicates that, in the Year 2005, the differences in traffic volumes and the noise environment for the No-Build, TSM and fixed guideway alternatives would be insignificant." Similar statements concerning traffic volumes should be included in Chapters 4.0 and 6.0. (City Council Member Gill)

Response: Chapters 4.0 and 6.0 of this FEIS have been revised appropriately. Note that the term "insignificant" varies in the discussion of traffic volumes relative to noise impacts and to traffic impacts. For example, a doubling of traffic volume normally results in only about a 3 dBA increase in noise levels. However, a doubling of the traffic volume can result in significant traffic impacts.

Comment 4.21: A discussion of the trip numbers and distribution differences between Alternative 2 and others should be provided. Certain data in the Transportation Impacts Results Report (February 1990) are unexpected and should be disseminated for a better understanding of the transportation impacts. (City Council Member Gill)

Response: For some origin and destination pairs, there will be a net loss of transit trips when comparing the TSM to the fixed guideway alternatives. For example, in the TSM Alternative, express buses carry transit riders directly into Downtown from areas such as Ewa, Central Oahu, Windward Oahu and East Honolulu, whereas in the fixed guideway alternatives, transit riders need to transfer from bus to rail during

their trip. In some cases, this transfer is enough to make the fixed guideway less attractive to transit riders than the all-bus alternative. For the purposes of this FEIS, the feeder bus network has been optimized to the point that the fixed guideway alternatives perform better than the TSM Alternative between most district-to-district pairs.

Comment 4.22: The implementation of rail transit will have only a small impact on the reduction in automobile traffic, pollution, and energy as compared to the TSM Alternative. What is the justification for building a high cost rail system? (Kawelo, Slater, League of Women Voters)

Response: As noted in Section 4.2.1.1 of this FEIS, the reduction in auto traffic would be more than 5% at key locations. During peak periods, reductions of more than 11% are forecast. This FEIS shows a small, but positive, reduction in emissions and fuel consumption as compared with the TSM Alternative. Rail systems are also constructed for other reasons. They provide increased mobility, the opportunity to focus development, increased reliability, and higher levels of service and convenience. See also Section 1.1.1.1 of this FEIS.

Comment 4.23: Figure 2-1 of the AA/DEIS shows exclusive transit lanes on Beretania, King, and Alakea Streets, and on Kapiolani Boulevard and on Kalakaua Avenue. An explanation of the manner of operation of the exclusive transit lanes should be added to the narrative. (City Council Member Gill)

Response: Figure 2.1 showed several arterial facilities which currently have peak-hour bus volumes of such a magnitude that the curb lane operates as a de-facto bus lane, with traffic limited mostly to buses and right-turning vehicles. It was suggested early in the Honolulu Rapid Transit planning process that these de-facto bus lanes be institutionalized as signed peak-hour bus lanes. However, the Oahu Regional Transportation Plan (Hali 2005) prepared by OMPO in June 1991 does not include exclusive transit lanes on Beretania, King, and Alakea Streets or on Kapiolani Boulevard and Kalakaua Avenue. Figure 2.1 in this FEIS has been modified accordingly.

Comment 4.24: The placement of a guideway on Pohukaina Street would result in the loss of one travel lane. Since it is one leg of the Queen-Pohukaina-Auahi Street couplet, this may have a more significant impact on Kakaako vehicular traffic than placement of the guideway on Halekauwila Street. (Hawaii Community Development Authority)

Response: The Pohukaina Street alignment is not included in the amended LPA. The guideway will be located on Halekauwila Street and is now part of the amended LPA.

Comment 4.25: Given our opposition to any proposed University Avenue bridge connection between Waikiki and the H-1 Freeway, will rapid transit end any attempts to place a bridge there? (McCully/Moiliili Neighborhood Board No. 8)

Response: The amended LPA will not affect the decision on the bridge.

Comment 4.26: Won't the feeder buses and "kiss-and-ride" riders converging on the Isenberg Station have a serious impact on Moiliili? (Pollock)

Response: The Isenberg Station is not envisioned as a major bus-to-rail interface or kiss-and-ride facility. Most East Honolulu buses will be routed to the University/King Station, and there are no plans to provide kiss-and-ride amenities at the Isenberg Station.

Comment 4.27: With the Salt Lake Boulevard Alternative, the proposed station would be located close to my front door causing security problems and increasing traffic in my neighborhood. There would be no facilities for buses to turn around and no kiss-and-ride area. (Medeiros, Kilian)

Response: The amended LPA does not include the Salt Lake Boulevard segment.

Comment 4.28: For Alternatives 10 and 11, how would traffic be handled in the area of the Puuhale Station since it has been projected that 50,200 bus riders would be using this station? (Charley's Taxi)

Response: The Puuhale Station is not included in the amended LPA.

Comment 4.29: Does the Transportation Impacts Results Report (February 1990) identify traffic impacts on local streets in the vicinity of the proposed park-and-ride lots and fixed guideway station sites? (U.S. Federal Highway Administration)

Response: See Section 4.2.1.2 of this FEIS and the Transportation Impacts Results Report (July 1992). The traffic study has been sent to FHWA.

#### 7.4.4.2 Parking

Comment 4.30: Will on-street parking be affected by the fixed guideway system? Will restrictions be placed on parking along University Avenue? (McCully/Moiliili Neighborhood Board No. 8)

Response: On-street parking will be affected by the fixed guideway system in certain locations. This subject is addressed in Section 4.2.2 of this FEIS.

Comment 4.31: What mitigation measures will be implemented for potential impacts to private off-street parking located on commercial and industrial properties and on-street parking adjacent to the transit stations in the Pearl City-Aiea area? (Pearl City Neighborhood Board No. 21)

Response: In areas where off-street parking is displaced by the project, mitigation, such as financial compensation for replacement parking, will be negotiated with each property owner as part of the right-of-way acquisition. No on-street parking will be lost in the Pearl City-Aiea area resulting from the transit project.

Comment 4.32: The parking impacts to Pearlridge Shopping Center as a result of construction of the Pearlridge Station need to be discussed. (Souza)

Response: For a discussion of the loss of parking at the Pearlridge Shopping Center please refer to Section 5.2 of this FEIS. The shopping center will lose approximately 15 parking spaces.

Comment 4.33: Will free parking be included in the cost of the round trip fare to the Leeward Community College (LCC) park-and-ride facility? (Pearl City Neighborhood Board No. 21)

Response: All park-and-ride lots will have free parking.

Comment 4.34: With the Salt Lake Boulevard alignment, how will private off-street lots, on-street parking, and nearby schools be affected? (Cadwell, Stewart, Medeiros, Padua)

Response: Under the amended LPA, the Salt Lake Boulevard segment will not be built.

Comment 4.35: Building parking lots for people to park their cars to ride on fixed rail for only a few miles does not make sense. (Yohe)

Response: Parking facilities in many areas of Honolulu are already at capacity and command high parking rates. The provision of several parking lots along the alignment, which will be free of charge, will

help to alleviate the parking problem which already exists and will further deteriorate in the future. In addition, a convenient transit system will encourage some to walk or take the bus to the fixed guideway, thus reducing the demand for parking spaces.

#### **7.4.5 Land Use**

**Comment 5.1:** Please address how the implementation of the fixed rail system will be integrated into Honolulu's overall planning and development objectives. Specifically address how it can encourage the full development of the Primary Urban Center (PUC) and the redevelopment of Kakaako and major corridors in Kalihi. (City Council Member Leigh-Wai Doo)

**Response:** The fixed rail system alternatives, which include the amended LPA, fully support the City's General Plan and are the only alternatives that do so. Implementation of the fixed rail system will be integrated into Honolulu's overall planning and development objectives by complementing the existing mass transportation system to serve people living in the Pearl City-Hawaii Kai corridor. The new transit system, coupled with the bus system, will provide a safe and efficient means of travel for all, including the physically handicapped and the elderly, at a reasonable cost.

A rapid transit system could encourage fuller development of the PUC and redevelopment of the Kakaako and Kalihi areas by establishing a new and efficient transportation link for conducting business. The service offered by the fixed guideway alternative makes these areas more attractive for redevelopment. Also, refer to Section 5.1.2.3 in this FEIS.

**Comment 5.2:** How will each of the transit stations stimulate the positive redevelopment of its surrounding area to help implement our city plans and policies? Will the proposed alignment (away from the stations) contribute to the degradation of our neighborhoods in contravention to our plans and policies? (City Council Member Leigh-Wai Doo)

**Response:** Station area impacts are discussed in Section 5.1.3 in this FEIS. There should be no degradation of neighborhoods "away from the stations." It is realized that development "away from the stations" along the proposed alignment will be affected; those establishments located near a station will benefit by having greater access and exposure, and those further away relatively less. The businesses between the stations will still be accessible by automobiles and bus.

**Comment 5.3:** In the design of the proposed alignment, greater consideration should be given to both existing and planned activity centers. Areas that are either current activity centers or those targeted for growth, such as the Airport, Honolulu Waterfront, and Kakaako can be both enhanced by and contribute to the rapid transit system. (Hawaii Office of State Planning)

**Response:** The system has been designed to service major activity centers in order to provide the maximum benefits to the maximum number of patrons. Station locations have been selected with such activity centers in mind.

**Comment 5.4:** We recommend closer coordination with respective State agencies to assure that the project does not detract from and is effectively integrated with planned improvements. (Hawaii Office Of State Planning)

**Response:** Coordination with State agencies is addressed in Section S.3.3 and Appendix A of this FEIS. The impact of the project on existing plans is addressed in Section 5.1.2.3 of this FEIS.

**Comment 5.5:** The desired land use impacts may not be realized unless stations and their surrounding land uses are carefully integrated. We are anxious to review attendant land use measures and policies



(e.g. parking standards) anticipated to be pursued by the City for regulating growth and development in these affected areas. (Hawaii Office of State Planning)

Response: A joint development master plan is being prepared. The City will develop other appropriate land use measures and policies under its statutory authority. Where state jurisdiction is involved, appropriate coordination will be undertaken.

Comment 5.6: Will there be economic development around each station, including Isenberg and University/King Stations? If so, what types are planned? Will the types be permitted by current zoning or will they be implemented through a "zoning change" or "government waiver" process? (McCully/Moiliili Neighborhood Board No. 8)

Response: Economic development(s) around some stations can be expected. However, there are no current proposals near the Isenberg and University/King Stations. Uses will be consistent with the specified listing sited in the Land Use Ordinance (zoning code), under the respective zoning of the area, and if necessary, projects would be subject to the Development Plan land use and zone change processes. See also Section 5.1.3 of this FEIS.

Comment 5.7: It seems that both the City and State are committed to a policy of selling zoning and other privileges to private developers, using the pretext that Honolulu will get a "free" benefit that cannot be paid for as a municipality. Will this be used for private development in the vicinity of the fixed guideway? (Gasper)

Response: No, neither the City nor the State is committed to a policy of "selling zoning and other privileges" to private developers. With appropriate consideration for some zoning flexibilities, Joint Development Agreements could effectively provide for overall improvements within the respective neighborhoods/station areas as well as be a benefit for the rail transit system.

Comment 5.8: How far is the City willing to go regarding land and development rights in the area adjacent to the system while still paying attention to environmental and aesthetic concerns? (Building Industry Association)

Response: Wherever possible, the City will not take away land and development rights in the area adjacent to the system. The proposed alignment is generally within the public right-of-way; for example, from Pearl City to Aiea the line extends along the Kamehameha Highway median.

All work on the system shall be attentive to environmental concerns. Regarding aesthetics, the City will take into consideration design appearance. However, factors such as structural integrity and cost will also be considered. While the stations would be designed with consideration given to the character of the respective neighborhood, the columns and railway spans will be typical (straight C-piers and straddle-bents, where necessary). To soften the visual impacts of structures close to existing buildings or wherever deemed appropriate, suitable mitigation will be provided. The City is holding community meetings to assist in developing the station designs.

Comment 5.9: What will be the land use impacts within a quarter-mile of the portals in Iwilei and Kakaako? (Honolulu Department of Land Utilization)

Response: The amended LPA does not include portals. As discussed in Section 5.1.3 of this FEIS, the construction of the Kaaahi Station will be compatible with and likely reinforce redevelopment trends in the Iwilei area. The Halekauwila/South and Halekauwila/Ahui Stations are unlikely to have a significant impact on land use since the existing Kakaako redevelopment trend is already well-established and supported

by an infrastructure improvement program. The rail project may help alleviate an existing parking problem, thereby influencing development.

Comment 5.10: The AA/DEIS classifies land use impacts for each transit station and indicates that some stations were sited to serve high activity centers while others were sited to stimulate redevelopment in traditional areas. This same analysis should be a significant factor in the selection of a preferred system alignment. (Hawaii Office of State Planning)

Response: The evaluation process in alternative definition and selection considered such issues.

Comment 5.11: Section 1.1.2.1, "City and County of Honolulu" should be updated to indicate that the General Plan for the City and County of Honolulu has also been amended in 1989 and 1990. (Honolulu Department of General Planning)

Response: Sections 1.1.2.1 and 5.1.2.3 of this FEIS have been updated. It has also been noted that the General Plan for the City and County of Honolulu (1991) has also been amended in 1991.

Comment 5.12: Section 3.1.2.1, "The Primary Urban Center," should be updated with the current development priorities. (Honolulu Department of General Planning)

Response: Section 3.1.2.1 has been updated since the AA/DEIS.

Comment 5.13: References to the Hotel/Bethel underground station in the AA/DEIS should be revised to indicate that this section is likely to reinforce existing development trends and straddles the boundary of the Historic Core Precinct of the Chinatown District. This proposed station is near two other sites in the Financial District with redevelopment potential. (Honolulu Department of General Planning)

Response: The amended LPA discussed in this FEIS does not include an underground station at Hotel/Bethel.

#### **7.4.6 Community and Social Concerns**

Comment 6.1: Since a Locally Preferred Alternative (LPA) has been identified, how and under what circumstances could an applicant, landowner or developer seek an alignment modification or a station siting modification to either minimize the project's adverse impact or to maximize its utility? How will those applications be processed, and when will they be reviewed by the City Council? (City Council Member Leigh-Wai Doo)

Response: Any property owner or developer affected by the proposed rail system alignment may submit to the City a request to modify the alignment and/or resite a station to minimize any adverse project impacts or maximize its utility. Realignment may also be warranted because of unusual physical constraints (the proposal should also note how such adjustment would affect neighboring properties).

A letter request, accompanied by supportive documentation, such as maps, plans and photographs, would be evaluated by the project planners and engineers for consideration. Should a realignment be warranted, necessary adjustments would be made to mitigate any adverse impacts. For any substantive realignment work, the matter would be referred to the City Council for consideration.

Comment 6.2: We suggest that a more thorough discussion and analysis of the relocation impacts be included in the FEIS. (Hawaii Office of Environmental Quality Control)

Response: Relocation impacts have been reviewed and modified since the AA/DEIS. A more detailed discussion is included in this FEIS and the supporting Displacement and Relocations Technical Memorandum (July 1992). The latter is available at the Department of Transportation Services, Office of Rapid Transit.

Comment 6.3: We recommend that all efforts be made to minimize displacement of businesses. (Honolulu Department of Housing and Community Development)

Response: Careful planning has been performed to minimize business displacements.

Comment 6.4: We are concerned about the relocation of a large number of businesses. We want to know what the time frame for the relocations of businesses would be. (Small Business Hawaii)

Response: For a project of this size, the number of relocations is not great, and the City is attempting to decrease the number. The majority of relocations will occur in 1993 with the remainder occurring in 1994. Businesses will generally relocate soon after notification since it is in their best interest to find a new location as soon as possible. The actual time frame to relocate a business varies greatly depending on how large the business is, the type of equipment, machinery, or furniture required to be relocated, and many other factors. There are dates set for different areas of the project when the City needs to turn over these areas to the Contractor. A general time frame to relocate a business physically may be around three months, and prior to that another three months to plan the relocation.

Comment 6.5: Section 5.2.2 of the AA/DEIS, "Relocation Assistance Program", needs to be corrected in the discussion of Federal relocation assistance to nonprofit organizations. Under Federal law, nonprofit organizations are entitled to reimbursement for actual moving expenses, or a fixed payment equal to the average net income after expenses for two years, not to exceed \$20,000, but at a minimum of \$2,500. The FEIS should also note that the displacing agency is required to assist the displace in locating a suitable new location. This requirement does not require the displacing agency to locate a new location for the displace but to assist the displace as best it can. (Honolulu Department of Housing and Community Development)

Response: The minimum according to federal regulations (March 16, 1992) is \$1,000, not \$2,500. The text has been corrected regarding assistance from the displacing agency.

Comment 6.6: Pursuant to Chapter 111, HRS, the Hawaii Housing Finance and Development Corporation (HFDC) has oversight responsibility for ensuring the proper relocation assistance is provided to displaced persons and businesses. As provided in Section 111-6, HRS, we will await receipt of a copy of the draft relocation assistance plan for review. (Hawaii Housing Finance and Development Corporation)

Response: Relocation for this project will comply with the Federal Rules and Regulations, 49 CFR 24, since federal funding is involved. It does not appear that Chapter 111 requires the City to submit a relocation assistance plan to HFDC; however, a copy will be forwarded.

Comment 6.7: Development around stations and adjacent to the guideway route, particularly if encouraged by the kinds of height and zoning concessions proposed for the privately financed Convention Center (and often mentioned in connection with the proposed rail system), could have serious impacts on the adjacent neighborhoods. The increased car and bus traffic and pedestrians could cause problems because park-and-ride facilities and bus loading areas may not be possible in many areas. (League of Women Voters, Huddleston)

Response: No such proposals are part of the project at this time. Zoning concessions for development around stations and adjacent to the guideway route may be made by Joint Development Agreement

approved by the City Council; however, projects would be evaluated in terms of current City requirements/standards, such as height limits. Reasonable allowances, to include necessary mitigation measures for adverse impacts, would then be considered for new and/or renovation projects.

Factors including, but not limited to, availability/non-availability of parking, and car, bus and pedestrian traffic, were taken into consideration in station site selection. The sites selected are the most suitable within the local area. Where park-and-ride facilities are not available, the bus system will complement the area transportation system. The project and its component parts are part of an integrated planning process.

Comment 6.8: The fixed guideway system could shift growth and create even more pressure on our overloaded environment or it could contribute to crime, degradation and devastation of the neighborhoods. (Life of the Land, Yohe)

Response: The proposed transit system runs through the urban corridor. It may shift growth, as desired and expressed in the City's Development Plan and in accord with adopted zoning throughout the City, from Waiawa to the University of Hawaii. There is no evidence from other cities that introduction of a new rapid transit system will contribute to crime.

Comment 6.9: The plans for the Aloha Tower redevelopment and the psychological barrier of having a fixed guideway located between the downtown business district and the harbor need to be addressed. (Huddleston)

Response: The plans for the Aloha Tower redevelopment have been considered and coordination with the Aloha Tower Development Corporation (ATDC) has occurred. Impacts are addressed in Section 5.1.2.3 of this FEIS.

Comment 6.10: We understand that a maintenance facility may be considered for the Kakaako District. This facility would reduce the amount of space available for existing Kakaako businesses. (Hawaii Community Development Authority)

Response: No such maintenance facility was considered.

Comment 6.11: The AA/DEIS ignores the redevelopment of Kakaako. The aerial photo used in the AA/DEIS for analyzing the routing through this area is so old that it shows the old ironworks on the site of the Waterfront Plaza/Restaurant Row Complex. The transit project should be coordinated with planned development in the Kakaako area. (Huddleston)

Response: The project is being coordinated with HCDA's Kakaako plans. The Kakaako area, approximately 660 acres in size, is currently in a redevelopment phase. Several new projects have been completed or are under construction in the mauka area; and on the makai side of the peninsula, the park extending from Point Panic to Fort Armstrong is being improved. Other projects have also been approved by the HCDA. The aerial photograph was used only to provide the general alignment information; land use information was not taken from the photograph.

Comment 6.12: The AA/DEIS indicates that business relocations will be necessary in Kakaako for the fixed guideway. We would like specific information on the required relocations and land acquisition. (Hawaii Community Development Authority)

Response: In the Kakaako district, land acquisition will be required on the makai side of Halekauwila Street between South Street and Ward Avenue behind the guideway columns (spaced approximately 180 feet apart) for a sidewalk area. Land acquisition is also needed on the mauka-Ewa corner of Halekauwila

Street and Ward Avenue. Between Ward Avenue and Kamakee Street on Waimanu Street and between Kamakee Street and Piikoi Street on Kona Street, a 10-foot strip will be required on the mauka side. At the transit station locations, additional right-of-way will be required for the station entrances. These stations are located on Halekauwila Street, Ewa of South Street; on Halekauwila Street Ewa of Ahui Street; on Waimanu Street, Koko Head of Ward Avenue; and on Kona Street, Ewa of Piikoi Street. Approximately 21 businesses will need to be relocated.

Comment 6.13: How many businesses will be displaced in Iwilei and Kakaako? (Honolulu Department of Land Utilization)

Response: Approximately 21 businesses will need to be relocated in the Kakaako district and five businesses will require relocation in the Iwilei district.

Comment 6.14: I lease property in the vicinity of Kapiolani Boulevard and Dreier Street (TMK 2-1-49:66) and have plans for major redevelopment of that site. The fixed guideway would have a negative impact on my redevelopment plans. I request that there be a reconsideration of the location of the fixed guideway. (Reynolds and Shidler)

Response: The fixed guideway is no longer proposed for the vicinity of Kapiolani Boulevard and Dreier Street.

Comment 6.15: How is the Isenberg Station going to be 'shoe-horned' into such an inadequate congested space without condemning and tearing down residences and/or having an adverse effect on the adjacent neighborhood? We are concerned that the station will block the entire front of the Marco Polo Condominiums and reduce privacy for the residents. (Pollock, Marco Polo Condominiums, Koshi)

Response: To overcome some of these problems, the design of this station has been shifted in the Koko Head direction. Because of space limitations on the mauka side of Kapiolani Boulevard, a stair-only entrance will be provided initially, with provisions for an entrance with escalator in the future. The station location will not block the Marco Polo Condominiums.

Comment 6.16: We are concerned about the fixed guideway's location relative to the Prince Kuhio Federal Building. The project will limit the potential for future site development; will result in the loss of security and privacy for tenants housed on the lower floors; and will result in the loss of parking, which is currently inadequate. (General Services Administration)

Response: The Halekauwila option has been selected as part of the amended LPA through Kakaako from Richards Street to Ward Avenue to replace the Pohukaina Street alignment segment. The amended LPA will minimize the impacts to the Federal Building property since the alignment is now located mauka of the Federal Building and a minimal amount of right-of-way taking is required. As discussed in Section 4.2 of this FEIS, the project will lessen the need for additional parking in the CBD.

Comment 6.17: We understand that the Cultural Plaza may be used as a site for a station. We have concerns that this would affect the proposed usage of the remaining parts of our land. (Longevity International Enterprises Corp.)

Response: The amended LPA will not follow the Beretania Street segment; therefore, the Cultural Plaza will not be affected.

Comment 6.18: We request that the proposed guideway alignment adjacent to our Pearl City Junction property, as shown on sheets 3 and 4 of the Plan and Profile Drawings, provide enough clearance so as not to have an impact upon the Navy's property. (U.S. Department of the Navy)

Response: As shown in Appendix B, the alignment has been shifted mauka to minimize the impact to the Navy property.

Comment 6.19: Will condemnation of abutting property be required in the vicinity of the McCully/Moiliili Neighborhood? (McCully/Moiliili Neighborhood No. 8)

Response: In the McCully/Moiliili area, acquisition of small parcels will be required on the makai-Koko Head corner and mauka-Ewa corner of Kapiolani Boulevard and Kalakaua Avenue, on the mauka-Ewa corner of University Avenue and Kapiolani Boulevard and on the mauka-Koko Head corner of University Avenue and Kuilei Street for station entrances i.e., stairs, elevators and escalators to station platforms.

Comment 6.20: I have concerns about the impact to Foster Village and the Aliamanu if the rail system is built on the Salt Lake Boulevard alignment. (Kilian)

Response: The amended LPA does not include the Salt Lake Boulevard alignment.

Comment 6.21: We have concerns that the project would have an impact on Iolani Palace because there may be a need to encroach beyond the perimeter fence and to redesign the adjacent pedestrian mall. (Hawaii Department of Land and Natural Resources)

Response: The amended LPA does not include the Hotel Street subway. The fixed guideway will be built along Nimitz Highway; therefore, this alignment will not have an adverse impact on Iolani Palace.

Comment 6.22: If the Hotel/Alakea Street Station is selected, it should be designed so as not to displace the State's basement parking in the City's new parking structure. (Hawaii State Comptroller)

Response: The amended LPA does not include a Hotel/Alakea Street Station.

#### **7.4.7 Aesthetics/Urban Design**

Comment 7.1: Additional sets of visual descriptions of streetscapes, with and without the proposed transit project, should be provided in the FEIS. The integration of stations with existing structures, where possible, will help to mitigate the adverse visual impacts of stations located in the middle of a street. Instead of drawings such as those provided in the AA/DEIS, shadow studies and photo montage and retouching techniques should be used. (Hawaii Office of State Planning, Downtown Neighborhood Board No. 13, Huddleston)

Response: Both the SDEIS and this FEIS include computer photo images and drawings. Additional information on visual analyses, including an additional computer images and drawings, has been provided in Sections 5.4 and 5.10 of this FEIS. The City's Request for Proposals (RFP) to select the Technology/System Contractor assigned the design of the rapid transit stations as a separate procurement process to enable architects to integrate the architecture of the rapid transit stations into their specific community contexts. In keeping with this plan, the City in January 1992, formed eight Community Advisory Committees made up of neighborhood residents, business representatives, and the selected station architects to provide the City with input on the final location of stations and station entrances, architectural character, patron amenities, landscaping and transportation interfaces. The City in turn is providing the station architects with not only system-wide technical information, but also environmental and aesthetic criteria.

The integration of stations with existing structures has been a consideration in station location and design. However, the result has been that there is little opportunity for such integration. Rather than integrating

stations into existing buildings, the focus has shifted to integrating the stations into the surrounding urban context.

Comment 7.2: We are concerned that the rapid transit project could detract from the beauty, scenery and serenity of island living. (Parales, Marsh, Yohe, Downtown Neighborhood Board No. 13, Nalbach, Small Business Hawaii, The Outdoor Circle, League of Women Voters)

Response: The opinions of the commenters are noted. The TSM and No-Build Alternatives would result in increased traffic congestion in comparison to the amended LPA. This congestion would result in detracting from the serenity of island living in comparison to the amended LPA. The visual impacts of the amended LPA are discussed in Section 5.4 of this FEIS.

Comment 7.3: All technologies considered in the AA/DEIS, except for the monorail, have a cross-section 23 feet wide and 5 feet high. An added four feet of height would be required in areas where sound barriers are necessary. I am concerned that structures of this magnitude are not amenable to aesthetic cover-up approaches. (Huddleston, American Institute of Architects)

Response: The commenters appear to be considering the monorail beam only and do not realize that a dual-track monorail must also include an emergency walkway and noise barriers similar to the selected technology. Therefore, little difference exists between the appearance of the monorail guideway and the other technologies considered. The overall width of the monorail dual-guideway, including the noise barriers, is about 22 feet. The emergency walkway was proposed to be a steel structure nestled in between the two guide beams. The monorail also had another aesthetic concern which did not exist with the other technologies. In the crossover areas, it was required that the entire guideway and switch structures be shrouded. The shrouds for a double crossover would have been 75-feet wide by 180-feet long.

Comment 7.4: What specific steps will be taken to mitigate the visual impacts of stations? (Makiki Neighborhood Board)

Response: Measures to mitigate visual impacts will include modifications to station locations to preserve view corridors, shifting stations to avoid visual intrusion on residential buildings, and the development of architectural concepts for the stations that are sensitive to the adjacent community. Each station and access is being evaluated individually to assess its impact, i.e. noise, privacy, fire separation, light, etc., at each location. Specific mitigation measures, if required, will be responded through the design process. See also the response to Comment 7.1.

Comment 7.5: The center platform type station should be favored over the side platform type because of the much greater mass and shadows of the latter type. (American Institute of Architects)

Response: Generally, a side platform station is narrower than a center platform station except where vertical circulation is located. The overall mass of a center platform station can be greater than a side platform station, particularly if the guideway and supporting pier elements that extend several hundred feet beyond the station are considered.

Comment 7.6: The AA/DEIS should give specific examples of landscaping which might mitigate visual impacts. What additional landscaping, if any, would be included in the sketches appearing on pages 5-37 through 5-39 of the AA/DEIS? How will landscaping be incorporated into an above-ground design? How will shading caused by the elevated guideway affect mitigation landscaping? How will shading affect existing landscaping around the guideway? (Honolulu Department of Land Utilization)

Response: The areas shown in AA/DEIS Figure 5.42 (Kuhio Avenue) and Figure 5.46 (Metcalf) are no longer included in the amended LPA.

AA/DEIS Figure 5.44 (Isenberg Station) is no longer applicable, as it shows a stacked platform station with the guideway running along the makai side of the street. The alignment will be a dual guideway on Kapiolani Boulevard, with a side platform station with mezzanine at Isenberg Street.

The median will be landscaped in accordance with the RFP drawings with Singapore Plumeria and Dwarf Hibiscus, with Wedelia as ground cover below. Fiddlewood trees will be planted 25 feet on center on both sides of Kapiolani Boulevard. Landscaping material that will soften the visual appearance of the guideway and its support columns has been selected that can thrive in conditions both under and along side the guideway.

Each station will be landscaped. Exact landscape plant material will be determined by the station designers. Aerial planters with Miss Manila Bougainvillea will extend 200 linear feet beyond the platform ends at each station. The Maintenance and Storage Facility will also be landscaped.

Selection of plant materials and the maintenance program is being reviewed by the City Department of Parks and Recreation.

Comment 7.7: The Waiawa facility should be designed and constructed to be aesthetically pleasing and should have suitable landscaping to preserve the pleasant atmosphere of the LCC campus. (Leeward Community College)

Response: The facility will be designed to minimize visual impacts. Extensive landscaping of the site and parking structure, will create a pleasant environment between the Leeward Community College Campus and Waiawa Station.

Comment 7.8: We are concerned about the visual impacts to the Iolani Palace. (Hawaii Department of Land and Natural Resources)

Response: The amended LPA will follow Nimitz Highway; therefore, no adverse visual impacts to Iolani Palace as a result of the project will occur.

Comment 7.9: The portion of the fixed guideway traversing Kakaako should be tunneled to avoid unsightly and deleterious impacts. (Kakaako Improvement Association)

Response: A subway was not considered due to the high costs associated with construction. The aerial structure has been designed to minimize adverse impacts. Section 5.4 of this FEIS discusses potential visual impacts in greater detail.

Comment 7.10: I have concerns about construction of the Waikiki line because of the adverse visual impacts. (Denton, Huddleston, Waikiki Neighborhood Board No. 9)

Response: The Waikiki line has been eliminated in the amended LPA.

Comment 7.11: The view of the Arizona Memorial from the upper concourse level of the Stadium should be considered when the route alignment and elevators are finalized. (Hawaii State Comptroller)

Response: The view of Arizona Memorial from the upper concourse level will not be affected as a result of the placement of the guideway and station.



Comment 7.12: More details on the design of the three-story transit/terminal structure at Pearl City Shopping Center should be provided since view planes may have serious impacts. (Pearl City Neighborhood Board No. 21)

Response: Section 2.2.2.2 of this FEIS contains this information for all stations. Pearl City is not the terminus of the amended LPA.

Comment 7.13: We are concerned about the visual impacts on the Prince Kuhio Federal Building. Our concerns relate to the visibility of the railway and passing trains up to the third floor level; the aesthetic impact on the building's design; and the loss of landscaping because mature trees that now shade the parking area are taller than the proposed rail height. (General Services Administration)

Response: Visual impacts are addressed in Section 5.4 of this FEIS. See also the response to Comment 6.16. The amended LPA on Halekauwila Street is mauka of the Federal Building; therefore, the trees that shade the parking area are unaffected.

Comment 7.14: With regard to the Aloha Tower Development, the two stations proposed at Piers 13-15 and Irwin Park would provide good service and visibility to the project area. However, we are concerned about the visual impacts of the alignment, and, in particular, the Irwin Park Station. We prefer that the station be moved to the mauka side of Nimitz Highway or relocated between Bishop and Alakea Streets. If the Nimitz alignment is selected, the system with the least visual impact should be utilized. The station proposed for the Beretania-Alakea Alignment would have reasonably good access and would have less visual impact on the Aloha Tower project than the Nimitz Alignment. The two stations associated with the Hotel Street Alignment will be too far away and neither station has direct access to Fort or Bishop Streets, which will be the primary mauka-makai pedestrian accesses to the project. (Aloha Tower Development Corporation)

Response: The environmental impacts of the Nimitz/Fort Station, the station closest to Aloha Tower, are addressed in Section 5.0 of this FEIS. With respect to technology, the 180-foot guideway column spacing of the selected proposal will have far less visual impact compared to more typical guideway spans of 100 feet used in other systems.

Comment 7.15: The Nimitz Highway Alternative is the least attractive of the alternatives because it would create a visual barrier between the Honolulu waterfront (including Irwin Park and Aloha Tower) and the rest of the City. (Honolulu Department of Parks and Recreation, Huddleston)

Response: The opinions of the commenters are noted. A variety of factors were balanced in the selection of the Nimitz Highway alignment.

Comment 7.16: The AA/DEIS should state that the above-grade Nimitz Highway alternatives would have adverse impacts on the Chinatown Special District since these alternatives would not preserve views of the harbor. (Honolulu Department of Land Utilization)

Response: The station location in Chinatown has been relocated to minimize impacts. Impacts to Chinatown are addressed in Section 5.10 of this FEIS.

Comment 7.17: Section 6.2.6 of the AA/DEIS states that the Nimitz route has less visual impact. How is it that obstruction of rider views with the underground Hotel Street Alternative is considered a more adverse impact than the impact of aerial structures? (American Institute of Architects)

Response: A distinction must be made between the visual impact to the transit riders and the visual impact on neighborhoods. The Hotel Street Alternative has an adverse visual impact on riders because

they have no view while underground. The Nimitz route has more of a visual impact on neighborhoods than the Hotel Street alternative. Visual impacts of the Nimitz Alternative, now part of the amended LPA, are discussed in Section 5.4 of this FEIS.

Comment 7.18: The visual impacts of the system on the Nimitz Highway route are severely understated. (Huddleston)

Response: Additional information has been provided in Section 5.4 of the SDEIS and in this FEIS.

Comment 7.19: We are concerned about the aesthetic impacts of the stacked or double-decked station to be built at the intersection of Kapiolani Boulevard and Kalakaua Avenue. How will the design of the rail system affect the aesthetic quality in the vicinity of the Marco Polo condominiums? (The Outdoor Circle, Koshi)

Response: The addition of the guideway and stations will add a significant visual element to the streetscape. The guideway along Kapiolani Boulevard and throughout a major portion of the alignment will be located over medians within existing rights-of-way, and therefore away from residential properties. At stations, the platform heights will be typically 43 feet above grade. This is well below the height of the uppermost parking level of most high-rise commercial and residential towers, and will help mitigate concerns over loss of privacy.

The architectural design of each station will reflect both the *aesthetic character of the communities* in which they are located, and will also be responsive to impacts such as noise and privacy on immediate adjacent structures. The City has formed eight Community Advisory Committees composed of representatives from each affected neighborhood to provide input on the community's concerns, station architectural character and function. The Isenberg Station (in the vicinity of the Marco Polo condominium) has been redesigned from a stacked platform to a side platform with mezzanine configuration to mitigate the visual impact. Station entrances will be provided via mezzanine, on the mauka and makai sides of Kapiolani Boulevard.

The Kalakaua/Kapiolani Station will be located on the former Aloha Motors site on the makai side of Kapiolani Boulevard. There is ongoing coordination with the proposed convention center representatives to integrate the station into the site, to minimize the visual impacts.

Comment 7.20: The AA/DEIS indicates that the impact of an elevated line along University Avenue would have minimal impact on mauka views, and the proposed station is not expected to significantly affect the expansive views from the University. These comments contradict the findings of an earlier City-funded study by Spencer Mason Architects. (Huddleston)

Response: The amended LPA on University Avenue is in keeping with the study prepared by Spencer Mason Architects in 1988. First, the University/King Station will be makai of King Street. The study assumed the station would span King Street and therefore obstruct views of the two existing large banyan trees. Secondly, the study suggests that in order to avoid major negative impact on the view of Round Top and impact on Founder's Gate (original UH/Metcalf alignment termination), the guideway "leave University Avenue just past Varsity Place." The amended LPA leaves University Avenue just past the H-1 Freeway and turns into the University Quarry. While this alignment does not completely retain total view of Round Top, view obstruction is minimized and localized. The current alignment has no impact on the Founder's Gate.

Comment 7.21: I have concern about the visual impacts of the Salt Lake Boulevard alignment. (Medeiros, Cadwell)

Response: The amended LPA does not include the Salt Lake Boulevard segment.

#### **7.4.8 Noise and Vibration**

Comment 8.1: Will the noise of the passing trains be annoying? (Koshi)

Response: Table 3.15 of this FEIS shows maximum passby noise criteria. Section 5.6.2 of this FEIS discusses train noise levels. Exceedances of the noise criteria are possible at three locations due to crossovers and other special trackwork. Either the trackwork will be relocated to less noise-sensitive areas or mitigation will be provided so that these areas will not be exposed to noise levels exceeding the criteria.

Comment 8.2: The effect of loud, heavy traffic rushing by at 25 to 45 feet above your head is fundamentally different and more psychologically threatening than the effect of the same traffic at street level. (Huddleston, American Institute of Architects)

Response: Modern technologies do not support the comment. The selected vehicle and fixed guideway system are designed to minimize noise generation. The proposed guideway incorporates sound barrier walls for the full length of the guideway which will reduce noise levels. Use of resilient wheels, rubber bushings and rubber spring systems in the design of the wheel systems, and modern AC propulsion motors on the vehicle also will contribute to the overall noise reduction.

Comment 8.3: The noise impacts of trains operating at different times of the day, (i.e., day vs. night) have not been discussed in the AA/DEIS. (Huddleston, American Institute of Architects)

Response: Approximately 395 trains will operate on a typical weekday between the hours of 7 a.m. to 10 p.m. About 90 trains would operate nightly between 10 p.m. and 7 a.m. No trains would operate between the hours of 1:35 a.m. and 4:25 a.m. on weekdays. Operations on a typical weekend day or holiday would be about 305 trains during the day (7 a.m. to 10 p.m.) and about 55 trains at night (10 p.m. to 7 a.m.). No operations would occur between 1:35 a.m. and 5:25 a.m. The noise criteria cited in Section 3.6.3 of this FEIS generally apply to annoyance levels of each individual train operation and may or may not be indicative of anticipated nighttime sleep disruptions. No widely accepted criteria exist to determine what nighttime noise levels constitute a significant impact. However, as noted before, the system will include a sound barrier as an integral part of the fixed guideway. Therefore, the overall noise impacts are expected to be minimal.

Comment 8.4: The noise impacts on planned development projects have been ignored. (Huddleston)

Response: Section 5.6.2 of this FEIS discusses this issue.

Comment 8.5: Further noise mitigation measures will be necessary to reduce noise levels adjacent to those structures where impacts would be "possibly significant" if a steel wheel/steel rail technology is selected. (Hawaii Office of State Planning)

Response: Section 5.6.8 discusses mitigation to be incorporated into the project to reduce noise levels.

Comment 8.6: Noise control/abatement concerns should be resolved before final approval is obtained. (McCully/Moiliili Neighborhood Board No. 8)

Response: As noted before, Section 5.6 of this FEIS discusses noise impacts and mitigation.

**Comment 8.7:** We urge that the least noisy technology assessed in the AA/DEIS be the preferred technology. (Aliamanu-Salt Lake-Foster Village Neighborhood Board No. 18)

**Response:** The selected system (with the integrated noise wall) is quieter than any of the technologies assessed in the AA/DEIS for reasons discussed in Section 5.6.1 of this FEIS.

**Comment 8.8:** Further assessment should be done of the noise impacts caused by ricocheting and megaphone effects along high-rise corridors and those associated with station arrivals and departures, warning bells or claxons, and surrounding traffic. (Hawaii Office of State Planning)

**Response:** The system will not include any warning bells or claxons. There will be a chime and public address (PA) announcement when the train arrives in the station. The difference in traffic activity is not expected to be great enough to result in any significant changes in noise levels. Unlike diesel buses or automobiles, the selected technology does not have increased noise levels associated with acceleration or deceleration; therefore, no significant differences in noise levels are anticipated due to station arrivals and departures. Note also that the proposed alignment has few, if any, areas of high-rise buildings located on both sides of the fixed guideway which could potentially produce ricocheting or megaphone effects. Even if the alignment contained such corridors, it would be difficult to accurately predict impacts due to these factors. However, it should also be noted that once the system is built, the contractor is required by the City to measure the actual noise levels generated by the system. Mitigation will be provided to areas exceeding the noise criteria levels defined in Table 3.15 of this FEIS.

**Comment 8.9:** Please provide additional information on the sound barrier wall design, location of the walls in relation to the guideway, visual impacts, and possible complementary landscaping alternatives. (Honolulu Department of Land Utilization, American Institute of Architects)

**Response:** Figure 2.3 of this FEIS shows the proposed transit vehicle and guideway. The barrier wall will be located along the entire length and on both sides of the guideway. The wall is completely integrated into each fixed guideway section. The entire section will be built of pre-cast concrete. The guideway, although visible, has been designed to minimize visual impacts through the following measures: the support columns will typically be four by six feet; the curved guideway shape will be characterized by a uniform color and texture; typical guideway units are designed to span lengths of 180 feet; and span lengths will be maximized to reduce intrusion of support piers along the alignment. Landscaping will also be incorporated into the design of the fixed guideway to minimize visual impacts. Section 5.4 of this FEIS provides additional information about the visual impacts and landscaping plans.

**Comment 8.10:** We have concerns about the noise impacts of the proposed rapid transit system since many of the alternatives would affect densely populated areas, mitigation is often not effective, and baffles can be unsightly. (League of Women Voters)

**Response:** The selected transit system has been designed to minimize noise impacts as discussed in Section 5.6.1 of this FEIS. Because the barrier walls will be fully integrated into the system, the visual impacts will be minimized.

**Comment 8.11:** If the Hotel Street subway alternative is selected, we recommend that additional vibration propagation tests be performed. (Hawaii Office of State Planning)

**Response:** As a result of additional studies, the amended LPA does not include the Hotel Street subway alignment.

**Comment 8.12:** I am told that noise should not be a problem at the maintenance facility, but it is also important that a careful analysis of the activities there be made so that maintenance noise does not affect the campus environment. (Leeward Community College)

**Response:** Section 5.6.7 of this FEIS presents the assessment of noise impacts from the maintenance facility.

**Comment 8.13:** We are concerned about the potential effects of the project on the Prince Kuhio Federal Building. Specifically, we are concerned about intrusive noise levels, disturbance to the Federal Building's child care center, and vibration and potential damage to the structure. (General Services Administration)

**Response:** The Halekauwila Option, adopted as part of the amended LPA, avoids any use of the Prince Kuhio Federal Building and no longer passes on the makai portion of the site. There will not be any noise or vibration impacts to the Federal Building.

**Comment 8.14:** We are concerned about the noise impacts of the project on six public schools: Makaiapa Elementary, Radford High, Aliamanu Elementary, Aliamanu Intermediate, Kalihi-Kai Elementary, and Jefferson Elementary. We are especially concerned about how the noise could affect learning at these schools. If the noise exceeds the Department of Health's acceptable level, we request that sound-proofing be provided to the schools. (Hawaii Department of Education, Padua)

**Response:** Five of the six schools mentioned are located along either the Salt Lake Boulevard or Waikiki segments, which have been eliminated from the amended LPA. Only the Kalihi-Kai Elementary School is located in the vicinity of the amended LPA. However, the closest school building is located over 40 feet from the centerline of the nearest track resulting in a maximum passby noise level of less than 75 dBA. It is unlikely that the operation of the trains would exceed the Department of Health's acceptable level. If it is found that the noise levels do exceed the standards, then mitigation will be provided to meet the criteria. See also the response to Comment 7.2 in Section 7.5 of this FEIS.

**Comment 8.15:** Will there be any additional noise impacts from the portals in Iwilei and Kakaako? (Honolulu Department of Land Utilization)

**Response:** The amended LPA would be built on aerial structure through Iwilei and Kakaako. As discussed in Section 5.6 of this FEIS, no significant noise impacts are expected in these areas.

**Comment 8.16:** If the Salt Lake Boulevard alignment is built, the noise at my residence would be intolerable. Any wall built to control the noise would alter the cool trade winds and adversely alter the open-space view we enjoy. (Cadwell, Stewart, Medeiros, Takatas)

**Response:** The amended LPA does not include the Salt Lake Boulevard segment.

**Comment 8.17:** If either Alternatives 3, 4, 9, or 10 is selected, how would noise and vibration affect the State Capitol, Kekauluohi, and Kalanimoku Buildings? (Hawaii State Comptroller)

**Response:** The amended LPA will follow the Nimitz alignment; therefore, the alignment will not have an adverse impact on these buildings. See Section 5.6 of this FEIS for a discussion of noise and vibration impacts.

#### **7.4.9 Ecosystems**

**Comment 9.1:** Where is the rail located in relationship to the trees in the median strip along Kapiolani Boulevard from McCully to University Avenue? The Neighborhood Board has designated the median

strips with its trees a "community visual resource". What type of landscaping will be provided to mitigate impacts from any tree removal? We would like to review plans for replacement landscaping prior to tree removal. (McCully/Moiliili Neighborhood Board No. 8, The Outdoor Circle)

Response: The underside of the guideway structure will be 22 to 25 feet above the median of Kapiolani Boulevard. The existing trees in the median will have to be removed as they would interfere with the structure. A commitment to mitigate impacts by replacing lost landscaping is included in the project, and appropriate funding has been allocated in the budget. The system contract requires the contractor to transplant these trees elsewhere on the project, such as nearby parcels where the entire parcel is acquired but not needed for right-of-way. Some trees can be transplanted to other locations within the local area. The transplant locations will be determined during final design activities. Landscape plans will be submitted to the appropriate government agencies for approval prior to construction, and Community Advisory Committees have been established to review landscaping plans.

Comment 9.2: The proposed convention center at Kapiolani Boulevard and Kalakaua Avenue would remove many monkeypod trees. Any plans to transplant the trees within the site would conflict with the proposed transit station. We recommend that all trees scheduled for removal be incorporated in the design. (The Outdoor Circle)

Response: The impacts of the proposed convention center are not a subject of this FEIS.

Comment 9.3: We are concerned about the effects to mahogany trees in the median along Kalakaua Avenue if the Waikiki line is built. These trees were planted in 1912 by the Outdoor Circle. (The Outdoor Circle)

Response: The Waikiki segment has been deleted from the project.

Comment 9.4: The design of the rapid transit system must preserve the plantings of True Kamani trees on both sides of the street along Dillingham Boulevard. (The Outdoor Circle)

Response: The system contract's technical provisions require the contractor to trim these trees to avoid contact with the main structure. The trees will be otherwise protected from damage.

Comment 9.5: The Indian Banyan on Iolani Palace grounds is on the Exceptional Tree list and should be carefully protected. (The Outdoor Circle)

Response: The Hotel Street Subway alignment is no longer under consideration, and so this tree will not be affected.

#### **7.4.10 Hydrology/Water Quality**

Comment 10.1: Section 5.13.4.2 of the AA/DEIS discusses dewatering of a large excavation such as would be needed for the proposed subsurface alignment. Problems that would be associated with the dewatering should be adequately addressed. Section 5.13.5.2 discusses dewatering of excavations, including that necessary for the construction of temporary cofferdams. Besides sediment, other contaminants should be removed prior to discharging the water from the excavation if they are judged to have a significant impact on the receiving waters. (U.S. Department of the Interior - Geological Survey)

Response: As a result of amending the LPA, the subsurface alignment along Hotel Street will not be built. Substantially less dewatering will now be required. Groundwater discharges will be treated to meet discharge standards, and measures such as groundwater reinjection will be employed so that dewatering will not affect adjacent structures. Construction of temporary cofferdams within streams necessary for the

installation of the guideway columns will require a permit from the U.S. Army Corps of Engineers (Corps). Section 401 water quality certification will be required from the HDOH prior to issuance of the Corps permit. The HDOH will require monitoring of the waterbodies to be affected to determine whether contaminants are present. If present, HDOH will require the City to prepare a plan specifying measures to be implemented to minimize impacts to receiving waters.

Comment 10.2: Relevant information on nearby waterbodies which is contained in the Non-point Source Assessment Report (SAR), prepared by HDOH, should be included in Section 3.8. Federal programs and activities are also required to be consistent with State Nonpoint Source Management Programs (SMP). Federal agencies are required to submit specific assistance programs and development projects to HDOH for review for consistency with the SMP. (U.S. Environmental Protection Agency)

Response: Section 3.8.1 of this FEIS has been revised to include the information from the SAR. The project will be coordinated with the HDOH regarding the SMP during the final design stages.

Comment 10.3: The AA/DEIS does not fully identify mitigating measures to reduce secondary impacts to coastal water quality from increased run-off from transit parking and maintenance facilities. We recommend that mitigation measures, including oil/water separators installed in parking lot drains and at maintenance facilities and interception or diversion ditches around paved areas be used to reduce the impacts on surface water quality. (U.S. Environmental Protection Agency, U.S. Department of the Interior - Office of the Secretary)

Response: Sections 5.8.1, 5.13.5.1, and 5.13.9 of this FEIS discuss possible mitigation measures which include the suggested strategies. Detailed mitigation plans will be developed during the final design stage when the specifics of the design and construction of the system are better known. An erosion and sedimentation control plan will be prepared as part of the final construction plans for the project. Through the agency review required in the permit processes, the installation of proper sedimentation control techniques will be assured.

Comment 10.4: Once final groundwater impact mitigation measures are chosen during the detailed design stage, the project design must be reviewed and approved through the process pursuant to Section 1424(e) of the Clean Water Act. (U.S. Environmental Protection Agency)

Response: Comment is noted. The project design will be submitted once the final groundwater impact mitigation measures are selected.

Comment 10.5: The temporary cofferdams that will be placed in waters of the U.S. for the construction of support piers and a subsurface tunnel will require permits from the Corps pursuant to Section 404 of the Clean Water Act. Support piers placed in navigable waters will require Corps Section 10 permits. (U.S. Environmental Protection Agency)

Response: The amended LPA does not include construction of a tunnel. However, placement of support piers within streams and drainage ditches will be necessary. The City is coordinating with the Corps with regard to these permits. An application for the permits will be prepared during the final design phase.

Comment 10.6: We recommend consideration of an alternative with no cofferdams across Nuuanu Stream. (U.S. Department of the Interior - Office of the Secretary)

Response: Due to the width of the stream at the proposed guideway location (about 200 feet) and the necessity to preserve left turn movements at intersections on both sides of the stream, two columns will need to be installed within Nuuanu Stream. The spans between the columns cannot feasibly be extended to longer lengths to avoid this waterbody. The guideway structure will be located parallel to the existing

bridge to minimize impacts. It should be noted that the piers in the existing bridge are spaced about 20 feet apart. Measures, as discussed in Section 5.13.5, will be taken to minimize water quality impacts. The appropriate permits and approvals will be obtained from the Corps and Coast Guard prior to construction.

#### **7.4.11 Construction**

**Comment 11.1:** We recommend that appropriate mitigation measures to reduce sediment loads to surface waters be implemented during construction. (U.S. Environmental Protection Agency)

**Response:** Sections 5.8.1, 5.13.5.1, and 5.13.9 of this FEIS discuss mitigation measures.

**Comment 11.2:** The FEIS should contain discussion on monitoring needs to gage the short and long term impacts of the proposed construction on the environment. (U.S. Department of the Interior - Geological Survey)

**Response:** The system contract with the City includes stipulations that the contractor must monitor any waste and water discharges to ensure that they meet standards set by the applicable laws, codes, regulations, ordinances, and permits. Records of measurements will be retained for inspection by the City.

**Comment 11.3:** UMTA (now FTA) should consult with HDOH in the design of a program to monitor sediment discharge. Any data collected should be entered into the STORET data base to facilitate sharing data with other water quality management agencies. (U.S. Environmental Protection Agency)

**Response:** The City is continuing to coordinate with the HDOH regarding their required permits. Permit application will be accomplished during final design activities. If a mitigation monitoring plan is required, any data collected and submitted to HDOH could be entered by HDOH into the STORET data base if that agency so chooses.

**Comment 11.4:** I am concerned that the construction will cause streets to be torn up and would have an adverse impact on traffic flow. (Parales)

**Response:** Construction-phase impacts are addressed in Section 5.13 of this FEIS. A maintenance of traffic plan is being developed for implementation during construction. The main objective of this plan is to keep traffic disruptions to a minimum during project construction. The plan will incorporate the requirements of and be developed in coordination with adjacent property owners and users.

**Comment 11.5:** I am concerned that the foreign aspect of construction could cause adverse impacts if, for example, a foreign construction company goes bankrupt. The City would have no recourse or alternative source. (Souza)

**Response:** The System Contract is secured by a performance bond of \$250 million and contract guarantee agreements signed by the parent companies of the joint venture partners. The contractor is a United States corporation.

**Comment 11.6:** Disruptions during construction need to be discussed. (Small Business Hawaii)



Response: Construction-phase impacts are addressed in Section 5.13 of the SDEIS and this FEIS.

Comment 11.7: The fixed guideway structure would have a major impact on HECO's 138 KV transmission facilities. Approximately 15-20 steel poles may need to be relocated at an estimated cost of \$2 million. The Iwilei-Archer 138 KV underground line may also need to be relocated at an approximate cost of \$1 million. The FEIS should mention whether substations will be required. (Hawaiian Electric Company, Inc.)

Response: Since the location-specific loads on HECO facilities will not be known until the final design stages, it is not possible to determine if additional HECO substations will be required. The Technical Provisions of the contract require the contractor to coordinate with all utility owners during the design process.

Comment 11.8: Once the final alternative is chosen, the construction plans should be coordinated with the Board of Water Supply's Planning and Engineering Division and with the Department of Public Works to minimize potential conflicts with water, sewer and storm drain facilities. (Honolulu Board of Water Supply, Honolulu Department of Public Works)

Response: This coordination will occur.

Comment 11.9: To avoid impacts to aviation, a Notice of Proposed Construction, FAA Form 7460-1, must be filed for our review and coordination prior to construction of the proposed system. (U.S. Federal Aviation Administration)

Response: The amended LPA alignment and Airport Station will be located on the makai side of the H-1 viaduct fronting the Honolulu International Airport. This project is being closely coordinated with the Airports Division of SDOT. A Notice of Proposed Construction, FAA Form 7460-1, will be filed for FAA's review and coordination prior to construction of the proposed system.

Comment 11.10: With regard to the Kakaako District, construction of Improvement District 3 (ID-3) was to begin in October of 1990 and will continue for approximately two years. If Alternatives 3, 4 or 10 are selected, major coordination would be necessary between the ID-3 work along Kapiolani Boulevard and the proposed rapid transit project. (Hawaii Community Development Authority)

Response: None of these alternatives are included in the amended LPA. There will be no construction activity on Kapiolani Boulevard in the Kakaako District as a result of this prospect.

Comment 11.11: How will the subway excavations affect the foundations of the State Capitol, Kekauluohi and Kalanimoku and Library Buildings? A discussion on settlement effects should be included. (Hawaii State Comptroller)

Response: The amended LPA does not include a subway segment through these areas; therefore, no impacts will occur.

Comment 11.12: We have concerns regarding construction impacts on the following six schools: Makalapa Elementary, Radford High, Aliamanu Elementary, Aliamanu Intermediate, Kalihi-Kai Elementary, and Jefferson Elementary. Construction in the vicinity of these schools should be scheduled during the summer months as much as possible since construction noise and dust would be a major problem. Also, traffic flow during construction would need to be maintained to ensure adequate access to the schools. (Hawaii Department of Education)

Response: Of the schools mentioned, only the Kalihi-Kai Elementary School is located in proximity to the amended LPA. The City intends to closely coordinate with the Hawaii Department of Education (HDE) to minimize any impact on this school.

Comment 11.13: If the Nimitz Highway alignment is selected, then rapid transit's traffic impact on Nimitz Highway during construction should be closely reviewed particularly if the construction occurs at the same time that the Aloha Tower redevelopment occurs. (Aloha Tower Development Corporation)

Response: See Section 5.13.1 of this FEIS. A maintenance of traffic plan is being developed for implementation during construction. There will be continued coordination with the Aloha Tower Development Corporation throughout the development and implementation of the traffic maintenance plan.

#### **7.4.12 Financial Evaluation**

##### **7.4.12.1 Capital Costs**

Comment 12.1: The effects of inflation could significantly affect estimated costs, which are based on 1988 dollars. (Hawaii Office of State Planning)

Response: Chapter 6.0 of this FEIS presents a new financial plan which has been updated to 1991 dollars. This financial plan and the financial plan in the AA/DEIS have been prepared to reflect year of expenditure dollars which takes into account the expected effects of inflation.

Comment 12.2: Costs for acquiring rights-of-way should be scrutinized, especially in terms of partial versus full takings and rising trends in real estate values. (Hawaii Office of State Planning)

Response: Partial and full takings and current real estate values are taken into account in the costs of land acquisition.

Comment 12.3: Costs of construction difficulties, utilities relocations, traffic management problems, and other such problems need to be taken into consideration. (Hawaii Office of State Planning)

Response: For many items, the City has a firm fixed price from the System Contractor, thereby reducing the cost risk to the City. For other items, the costs include an appropriate contingency to cover unforeseen difficulties.

Comment 12.4: We are concerned that the actual project costs will be much more than currently estimated by the time that the project is completed. Will there be any caps on costs and guarantees that the project will be done within an established timeframe? (Marsh, Small Business Hawaii, Committee on Sensible Transit)

Response: The City has entered into a binding fixed price turnkey contract with the Oahu Transit Group (OTG) for the system. This Contract includes a very detailed Pricing Structure and Catalog of Prices which shows exactly how the fixed price was determined. The purpose of Preliminary Engineering (PE), during Phase 1, is to carry out refinements to the design. As a result of any changes or refinements directed by the City which affect costs, the price may be adjusted using the detailed Pricing Structure and Catalog of Prices. No adjustments may be made in the price for any error or omissions by OTG, the Contractor. This Contract also includes guarantees that the project will be completed within the established time frame, backed up by liquidated damages assessed against the Contractor for delays. See Section 6.1.5.4 of this FEIS.

Comment 12.5: Public pressure for the Waikiki and University segments to be built underground would result in cost overruns. (Committee on Sensible Transit)

Response: See responses to the previous two comments. The project no longer includes a Waikiki line, and the University segment will be built on an aerial structure.

Comment 12.6: The costs of a rail system need to be looked at not only in absolute terms but also in relation to who and how many will benefit and who and how many will pay for it. Our analysis shows that the projected capital costs of rail, even when combined with its slightly lower operating costs, cannot be justified by the limited increase in total transit ridership when compared with the TSM Alternative. A full-length rail system would have to attract 47.1% more riders than projected to bring its average cost per ride down to that of the TSM Alternative. (League of Women Voters)

Response: Both the AA/DEIS and this FEIS contain a section on Equity (see Section 6.4). This evaluation measure addresses the question of who benefits and who pays. Average cost per rider is only one measure. Total ridership is also important. The TSM Alternative can accommodate a limited increase in ridership. It is constrained by the number of buses that can operate effectively and efficiently on city streets. Service can be expanded to the point that the roadway can accommodate no more buses, a point rapidly being approached today. As more and more buses are added and traffic congestion continues to increase, a point of diminishing return is quickly reached. On the other hand, the integrated bus and rail system is projected to carry more total passengers. It has the capacity to expand to meet growing demand in the future that the TSM Alternative would not have.

Comment 12.7: Table 6.18 of the AA/DEIS shows the Cost Effectiveness Index (CEI) only for the rail alternatives compared with the TSM Alternative. The CEI for the TSM Alternative should also be compared with the No-Build Alternative. (League of Women Voters)

Response: As noted in Section 6.2.3.2 of the AA/DEIS, the CEI for the TSM Alternative versus the No-Build Alternative was \$4.07 per new rider.

Comment 12.8: Cost comparisons between the various alternatives are implausible. The 475-bus fleet of Alternative 1 and Alternatives 3 to 11 is understated, while the 997-bus fleet for Alternative 2 is overstated. Potential savings from using private carriers to supplement TheBus fleet were excluded so that the cost of Alternative 2 is inflated. (Charley's Taxi)

Response: The estimation of fleet size and resulting capital cost is described in Sections 2.2 and 2.3, respectively, of this FEIS. For Alternatives 3 to 11, the increased patronage would be accommodated by the fixed system and would not require a tremendous increase in the numbers of buses. Under Alternative 2, an increase in the bus fleet would be necessary to accommodate the increased patronage and to eliminate overcrowding of buses that would occur with the No-Build Alternative. With respect to private carriers, see the response to Comment 2.13.

Comment 12.9: Other transit systems seem less expensive and should be explored. The City has stated that the cost per new rider will be \$9.19 assuming the Kamehameha/Hotel alignment is built. Assuming that new commuters make an average of six round trips per week, this would result in a cost per commuter of \$458 per month if the \$15 monthly bus pass is deducted from the cost. If six people commuted daily by sharing a chauffeured limousine, the cost would still be 25% less than the proposed rail transit. Using local private transportation services could result in a cost of less than \$100 per month per person. The City should consider using a small part of the proposed rail subsidy to fund private sector options since it seems to be less expensive. (Committee on Sensible Transit, Small Business Hawaii)

Response: A wide variety of transit options have been considered. All the benefits and costs of the alternatives have been evaluated. The selection of the LPA constituted a local policy decision that the benefits of a rapid transit system outweigh the costs.

Comment 12.10: The operation of the current bus system now results in lost revenue for each rider. For every dollar you get from the fare box, it takes three to subsidize the rider. I am concerned that when you apply this type of economics to a rapid transit system that the losses will be even greater. (Souza)

Response: The estimated annual farebox revenue in the year 2005 for the No-Build, TSM, and amended LPA is expected to be 23%, 17%, and 20%, respectively, of the system operating costs. These relatively low ratios are the result of the City's policy of maintaining fares at modest levels to encourage ridership and its willingness to support the transit system program with non-operating revenues. Although the No-Build Alternative would have the highest recovery ratio, the level of service provided would be the least desirable. Note that the ratios for each of the three alternatives do not differ tremendously. Both the amended LPA and the TSM Alternative would carry larger numbers of passengers than the No-Build Alternative and provide an improved level of service. In absolute terms, the total operating deficit for the amended LPA will be less than the deficit projected for the TSM Alternative, but more than for the No-Build Alternative.

Comment 12.11: Why doesn't the government sell off the rights to build the system to a private conglomerate who would build most of the development around the stations and, in the process, pay for most of the system? (Callan)

Response: The City is investigating joint development opportunities. While the joint development would not pay for most of the system, it could generate substantial funds for either capital development or long term operations and maintenance.

Comment 12.12: As technology is developed, the cost of a future fixed rail system is likely to be less than the one presently being proposed. Although we may lose the presently available Federal funds if we wait, it does not make sense to waste money, no matter what the source is. (Goodhue)

Response: Experience has shown that the costs of building a rapid transit system will not be lower in the future, and it is more likely that the costs will be higher.

Comment 12.13: The AA/DEIS states, "Other technologies are available, and may possibly be implemented at a lower cost than the conventional steel-wheel/steel-rail technology." Is it possible that other technologies may be more expensive than the steel-on-steel technology? (City Council Member Gill)

Response: The procurement process was open to proposals by suppliers of various technologies. The selected technology is a steel-wheel/steel-rail system. There were other technologies proposed that were more costly than the selected technology.

Comment 12.14: Table 6.9 of the AA/DEIS summarizes the costs of alternatives. The Capital Cost Results Report (December 1989) states that the cost for replacement buses are excluded from the annualized capital cost. Please provide a brief explanation for this. (City Council Member Gill)

Response: The annualized cost includes those capital facilities and equipment necessary to implement each alternative. Costs are annualized to reflect service life and ultimate need for replacement. The approach does not account for the replacement cost of existing system, but these costs would be the same for all alternatives.

Comment 12.15: The difference between the option that goes to Middle Street and the option that goes to Waiawa is only a 3% increase in ridership at a cost of nearly \$500 million. How is this justified? (Makiki Neighborhood Board)

Response: These figures are based on a comparison of the original LPA and the MOS Alternatives discussed in the AA/DEIS. The City felt that the Waiawa terminus has a number of advantages over a terminus at Middle Street. The Waiawa site provides a much better location for a maintenance facility. The extension to Waiawa provides convenient access to the rail system for a number of communities on the Ewa end of the island.

#### 7.4.12.2 Excise Tax Surcharge as a Revenue Source

Comment 12.16: The local share of project costs, as discussed in the AA/DEIS, will come from the imposition of an excise tax for six years or in perpetuity. It seems unlikely that the legislature would pass such a tax. (Tax Foundation of Hawaii)

Response: The 1990 Hawaii State Legislature passed Act 184 which provides for a 0.5% increase in the excise and use tax for a ten year period to provide a local source of funding. However, for this increase to take effect, the City Council must enact it by October 1, 1992.

Comment 12.17: The legislation imposing an excise tax should make it clear that it is only a temporary and not a permanent tax. (Purnell)

Response: See response to preceding comment.

Comment 12.18: If the temporary 4.5% tax is imposed, how will this pay for the system, especially when the AA/DEIS indicates that a temporary tax would result in significant operational requirements not being met? (Gasper, League of Women Voters)

Response: Section 6.1 of this FEIS provides revised financial plans for the amended LPA which address the capital and the operation and maintenance revenues and expenditures. Operating and maintenance costs will be met by City sources other than the GET increase.

Comment 12.19: Section 6.1.3 of the AA/DEIS discusses a 0.5% excise tax in perpetuity and 30% FTA (formerly UMTA) funding. The impact of the difference between that scenario and the State legislation authorizing a limited term, 0.5% excise tax should be discussed. (City Council Member Gill)

Response: The proposed rapid transit capital financial plan is based on the City Council's adoption of a ten year tax increase authorized by the State legislature. The plan could not be accomplished by a perpetual tax because there is no authorization to implement this type of tax. Section 6.1 of this FEIS discusses the plan in detail.

Comment 12.20: There is no equity in the proposed local funding program. We have estimated that by the year 2005, only 7.1% of the total Oahu residents would use rail on any given day. That percentage is even lower with implementation of the MOS Alternatives. The capital costs for a rail system would be about \$5,000 per average Oahu household, and there would be an annual deficit, above fare-box revenues, for debt service and O&M, of about \$750 per household. The 0.5% excise tax surcharge would raise about \$275 per household per year, of which perhaps \$75 could be extracted from tourists. The surcharge credit would return an average of \$170 per average household, ranging from \$18 for very low-income families to \$400 or more for those with incomes of \$100,000 or more. Excise taxes are regressive, in that a far larger proportion of the income of poor families would be subject to this tax than would wealthy families. Also, many kinds of businesses pay little or no excise tax and would not be subject to the 1/2% surcharge levied on the kinds of consumption goods poorer families must buy. The questions

of whether it is right for poor families to pay a disproportionate share and if the small percentage of Oahu residents that will use the system justifies its construction needs to be addressed. (League of Women Voters)

Response: Section 5.1.5 of the FEIS discusses the economic impacts and Section 6.4 discusses the equity implications of the proposed project. The analyses presented in these sections reach different conclusions than those presented by the commenter.

Comment 12.21: The City of Honolulu, with just over 800,000 residents, does not have the taxpayer base over which to spread the costs of a transit system. (Kawelo, Nalbach, Goodhue)

Response: As indicated in the capital and O&M financial plans in Section 6.1 of this FEIS, the cost of the transit system will be funded through a combination of revenue sources including passenger fares, Federal discretionary funds, Federal formula funds, proceeds from the tax surcharge, and various other sources. The costs will not be borne by Oahu residents alone. Highway users who pay Federal gas taxes will help to pay for 30% of the system's capital costs. A significant portion of the system's capital costs (over 24%) will be paid for by tourists and nonresidents. The operating deficit will be paid for locally.

Comment 12.22: Items to include for consideration in the legislation imposing an excise tax include: incentives for solar automobiles, including money collected for the system being directed into encouraging solar research and technology; tax and fee disincentives should not be allowed for independent vehicles which are disproportionately aimed at middle and lower income earners; a specific stop date should be substituted for the phrase for a "reasonable time"; the system cannot be run at a deficit, ultimately dependent on further government taxes or funding; each feeder system should have the potential to serve as a test ground for new technology; and, an annual Honolulu-based Transit-Fair should be held to bring proposals, competition, industry commitment and media attention we would otherwise lose. (Purnell)

Response: The 1990 Hawaii State Legislature passed Acts 183 and 184 which deal with the funding for the proposed system. The legislation does not include any of the suggested provisions. It does, however, specify a 10-year period for the increase in the GET from 4.0 % to 4.5 %.

#### **7.4.12.3 Other Revenue Sources for Capital Costs**

Comment 12.23: An extensive examination of potential revenue sources should be undertaken. Such sources might include: fuel taxes, parking taxes, motor vehicle weight excise tax, property tax, income taxes, tourist taxes, private participation, establishment of betterment or improvement districts, tax-increment financing, and other value capture techniques. (Hawaii Office of State Planning, Ruby, Tax Foundation of Hawaii)

Response: An extensive examination has occurred, and the selected new revenue sources are described in Section 6.1.2 of this FEIS.

Comment 12.24: Joint development between the public and private sectors has been discussed as a possible funding mechanism. The specifics of possible implementation need to be worked out. Any negotiation process cannot ignore the legislative mandate contained in Chapter 206E of the Hawaii Revised Statutes or the Kakaako Mauka and Makai Area Plans and Rules. (Hawaii Community Development Authority)

Response: Revenues from joint development are not part of the financial plan for this project.

Comment 12.25: The AA/DEIS does not mention the possibility of using state tax surpluses to finance the system. Also, no consideration is given to the impact of committing huge sums of public funds to a

transit system. In addition, there is no mention of the heavy tax burdens already imposed on Hawaii's citizens or of the impacts of additional taxes. (Huddleston)

Response: State Act 184 does not authorize the use of state tax surpluses to finance the system. A discussion on the fairness of the distribution of costs, benefits, and impacts across various population subgroups is provided in Section 6.4 of this FEIS. The economic impacts of the project, including the impact of additional taxes, are discussed in Section 5.1.5.

Comment 12.26: Policy decisions on the value capture options should be established prior to the completion of the FEIS. These options have significant effects on project financing alternatives. They may also cause social, economic and environmental impacts and traffic circulation impacts near stations where these options are implemented. If value capture is implemented, the increased property values created by this system should flow back to the government to help pay for the rapid transit system. A special assessment is a key factor in making this happen, and this should be emphasized. (U.S. Federal Highway Administration, Callan)

Response: Value capture financing techniques are not part of the capital financial plan.

Comment 12.27: Revenue sources should be analyzed in terms of efficiency, equity, revenue yield, stability, administrative ease, and the effect they may have on patronage. (Hawaii Office of State Planning)

Response: Revenue sources have been analyzed in terms of the factors listed above. See Sections 6.1.1 and 6.1.2 of this FEIS.

Comment 12.28: The purpose of this system is to serve tourists going from the Honolulu International Airport to Waikiki. Why should residents have to pay for this system? (Perry, Nalbach)

Response: The purpose of the system never was to primarily serve tourists from the Honolulu International Airport to Waikiki. The purpose is primarily to serve the local population. It will also serve tourists. The system will provide access to the Airport as well as numerous other destinations for tourists and residents. The amended LPA eliminates the Waikiki segment; therefore, the rapid transit system will not provide direct service between the Airport and Waikiki. The proposed excise tax that will be used to help finance the local share of the project costs will be charged to both residents and tourists alike for the purchase of goods and services. Residents will receive an income tax credit which should reduce the impact of the excise tax on local citizens.

Comment 12.29: I live on the windward side. Why should I have to pay for a rapid transit system that will not serve me? (Chang)

Response: The rail system is part of the regional transportation plan for Oahu. All Oahu residents share the benefits of the regional transportation system and share the costs. Areas not served by the rail system are served by other components of the regional transportation plan.

Comment 12.30: We have reservations about the cash financing of the capital costs with less than one-fourth of the total capital budget being underwritten by debt financing. This imposes a heavy burden on current taxpayers for the benefit of future taxpayers, creates distortions in the current picture, and utilizes funds which should be used for current operations and programs. (Tax Foundation of Hawaii)

Response: The City will issue self-supporting Excise Tax Surcharge (ETS) Bonds secured by the revenues from the General Excise Tax (GET) surcharge. The ETS Bonds are self-supporting because the revenues from the GET are used to pay debt service on these bonds. No long-term debt will be issued. Only short-term construction financing will be provided until revenues from the GET catch up.

Comment 12.31: There are numerous revenue shortfalls associated with the proposed project. If existing or augmented public revenue sources would be used to fund the shortfalls, especially if debt service on bonds is involved, City and perhaps State budgets may require retrenchment in virtually all other public services and facilities, including schools, health care, housing, infrastructure, etc. (League of Women Voters)

Response: The City does not concur with the statement regarding the revenue shortfalls. With regards to capital costs, if a shortfall were to occur, a number of strategies have been developed without recourse to the City issuing bonds.

Comment 12.32: Bonds should be made available to state businesses and residents as a way of providing private sector financing. It would also be a good idea to provide community co-op shares to give regular riders a strong interest and incentive in the profit and loss of the rail system. (Purnell)

Response: We concur that it would be highly desirable for the securities issued for the rapid transit program be made available for purchase by state businesses and residents. The final decision on the marketing and placement of the securities will be made by the underwriters engaged by the City.

Comment 12.33: With regard to bond proceeds, there appears to be discrepancies between the various tables in the AA/DEIS outlining the capital costs and the potential additional revenue sources, given the funding variations for Federal assistance and the amount and duration of the additional general excise tax levy. It is also not clear whether the cost of debt service is included since it is not shown as an element of operating costs as would be the case in most financial statements. (Tax Foundation of Hawaii)

Response: Debt will not be serviced from operating revenues. A single rapid transit capital financial plan is presented in Section 6.1.5.1 of this FEIS and it identifies the debt service.

Comment 12.34: Table 6.7 of the AA/DEIS provides data on potential additional capital funding sources. Are bond proceeds the amount of cash which must be borrowed? If so, the narrative should state that the bonds, with interest, will need to be repaid. Also data on total debt service payments required to amortize the bonds should be provided. The data should include the debt service paid after 2005. (City Council Member Gill)

Response: The cost of the funds associated with the securities issued to finance the rapid transit system may be determined by using the totals in Table 6.4 of this FEIS. This cost may be determined by subtracting the total bond proceeds from the total bonds debt service for each of the respective securities. See also response to Comment 12.31.

#### **7.4.12.4 Operation and Maintenance Costs and Revenue Sources**

Comment 12.35: The cost estimates did not include projections for replacing the rails and other metal structures. This is important information to know because metal structures are prone to rapid rusting on Oahu. (Gasper)

Response: The design of the facilities and the materials employed take into account this factor. The financial plan includes funds for maintenance for the expected life of the system. All guideway running surfaces and guidance equipment, including guideway switches, are to have a design life of 30 years.

Comment 12.36: How will the operating costs be funded? (Tax Foundation of Hawaii)

Response: Operating costs will be funded through a combination of fare box revenues, concessions and advertising revenues, local operating funds, and Section 9 assistance from FTA. See Section 6.1.5.3 of this FEIS.



Comment 12.37: There should be discussion regarding how much each source (general fund and fuel and motor vehicle weight taxes) is expected to contribute to the O&M costs. With regard to the taxes, they are currently dedicated to the county highway program. Is it plausible that no tax increase would be anticipated? (Tax Foundation of Hawaii)

Response: The amounts of operating transfers for O&M costs are determined through the budgetary process by the City Council. The fuel and motor vehicle weight taxes are not dedicated solely to the City's highway program, but also include related activities such as mass transit.

Comment 12.38: Page 3-20 discusses TheBus and states that "The low cost per trip results from the high density, lineal development patterns, high ridership, lean administrative and management structure and improvements in operating efficiencies." Should "shorter trips" be included as a factor for the low cost per trip? (City Council Member Gill)

Response: It is true that shorter trips are also a component, but to a lesser degree than the other factors stated. This FEIS has been changed to reflect your comment. (Section 3.2.2.3)

#### 7.4.12.5 Fare Structure

Comment 12.39: The fare policy discussed in the AA/DEIS should be re-examined. Alternate fare policies should be examined in terms of fare elasticities and their impact on farebox revenues. (Hawaii Office of State Planning)

Response: The fare policy for the project has been established by the City Council and is discussed in Section 6.1.1.3 of this FEIS. The effect of fares on patronage and therefore farebox revenues (elasticity) was addressed in a methodology report and the results presented in the Transportation Impacts Results Report (February 1990).

Comment 12.40: Social considerations, such as subsidization of the poor and elderly may need to be examined in determining fare policy. (Hawaii Office of State Planning)

Response: Social considerations were examined prior to the establishment of the fare policy set by the City Council. See also the response to Comment 12.39.

Comment 12.41: A statement should be added to page 2-3 of the AA/DEIS stating that fares are adjusted for inflation for the analysis of future revenues. Section 4.1.3 discusses fare box revenue in 2005. The year 2005 fares, after adjustment for inflation, should be set forth in the discussion. (City Council Member Gill)

Response: Section 2.2 in this FEIS indicates that fares are assumed to grow at an assumed inflation rate of 5%. At that growth rate, the adult cash fare in 2005 will be \$1.20 in year 2005 dollars. In 2005, the adult monthly pass will be \$30 in 2005 dollars.

Comment 12.42: The present fare structure, on which ridership projections were based, produces an average fare per ride of \$.25 to \$.30. If the costs of building rail result in fares typical of other cities (\$1.00 to \$1.50), how will this affect ridership? Since increases are more likely with rail than without it, wouldn't ridership be more adversely affected under the rail alternatives than under TSM or No-Build, assuming a constant revenue-to-cost ratio? (League of Women Voters)

Response: The ratio of fares to total revenues does not in itself affect ridership. Fare increases are no more likely or unlikely when comparing rail and bus transit systems. In terms of the relationship between fares and patronage, see the response to Comment 12.39.

Comment 12.43: Will the train fare be excessive, and will it include bus fare? (Lavender + 308 others)

Response: The train fare will not be excessive. Honolulu's transit fares are among the lowest in the country, and revenue estimates are based on the assumption that fares will increase at a slower rate than inflation. Therefore, in current dollars, the fares for transit service in the future will be even lower than they are today. The fare on the rapid transit system will include a free transfer to TheBus, and vice versa.

#### **7.4.13 Public Participation**

Comment 13.1: Why has there been so little publicity regarding public meetings? They never seem to be advertised in the newspapers? (Sult)

Response: The public meetings held have been publicized by announcements at neighborhood boards, direct mailings to all persons and organizations on our extensive mailing list, through press releases and, in the case of public hearings, by legal notices in the two daily newspapers.

Comment 13.2: I suggest that a citizens advisory panel be formed to work with City and State planners on current improvements and transition plans for rapid transit. It should include both users and operators. The panel could be publicized and created through the monthly Bus Pass program, with vendor's support. (Corporate Concepts)

Response: While the City has decided not to have a panel for this specific purpose, many opportunities have been and will continue to be provided for the community to participate in the process. For example, Community Advisory Committees have been established to provide input to station location and design.

Comment 13.3: A publicity campaign geared to upgrading public perception of riding present and future mass transit would be a good idea. (Corporate Concepts)

Response: A public information program will be implemented.

#### **7.4.14 Historic Sites and Parklands**

Comment 14.1: We recommend that monitoring and mitigation be done for any tunneling to prevent damage to historic buildings and sites. (Historic Hawaii Foundation)

Response: The amended LPA does not include any tunneling. The Memorandum of Agreement (MOA), executed as a part of the Section 106 process (see Appendix A), provides for protection of historic resources.

Comment 14.2: Since Federal, State and local government funds are involved, we encourage support at all levels of government to protect and preserve historic buildings, objects, sites and districts. Further in-depth studies should be made of historic properties and park areas once the system and alignment have been selected. (Historic Hawaii Foundation, U.S. Department of Housing and Urban Development)

Response: Section 106 of the National Historic Preservation Act of 1966 requires that a federal agency consider the effect of a federally assisted project on any district, site, building, structure or object listed on, or eligible for, the National Register of Historic Places and give the Advisory Council on Historic Preservation an opportunity to comment on the effects. Criteria of adverse effects are established in 36 CFR 800.9. This project, as evidenced by Section 5.10 of this FEIS and supporting documentation, complies with the provisions of Section 106 and responds to your concerns.

Comment 14.3: The AA/DEIS indicated that no field work on archaeological resources was done even though there is potential for these resources to be located throughout the downtown area. I am concerned that these resources are being overlooked. (Souza)

Response: A report, Archaeological Study of Alternative Corridors (November 1988), was completed as part of the background studies for the AA/DEIS. The purpose of the report was to determine the probability of archaeological resources along the alternative alignments, and the report indicated that some archaeological resources were expected to be encountered. Field work was not conducted as part of the study. Subsequent to the AA/DEIS and the SDEIS, a MOA was negotiated and signed (see Appendix A of this FEIS). One of the primary purposes of the MOA was to establish a commitment to perform additional work to protect archaeological resources. The MOA specifically provides that field work will be accomplished prior to construction.

Comment 14.4: The Kapahulu Station would end at Kapahulu Avenue. We oppose the taking of any part of Kapiolani Park for a transit station. (The Outdoor Circle)

Response: The Waikiki portion of the alignment is no longer under consideration as part of the amended LPA. Therefore, there will not be any impacts to Kapiolani Park as part of this project. The Kapahulu Station, as proposed, did not take any part of Kapiolani Park.

Comment 14.5: We are concerned about potential conflicts between the proposed project and access to and use of the park at Aiea Bay. (Hawaii Department of Land and Natural Resources)

Response: The location of the line will not affect the access or use of the park.

Comment 14.6: The same concerns expressed in Section 5.10.4, "Finding of Adverse Effect and Proposed Mitigation," of the AA/DEIS for the Mission Memorial Annex Building should also be discussed for the State Capitol, Kekauluohi and Kalanimoku Buildings. (Hawaii State Comptroller)

Response: The amended LPA will not pass within close proximity to these buildings; therefore, there will be no adverse effects on the State Capitol, Kekauluohi, Kalanimoku or Mission Memorial Annex Buildings. See revised Section 5.10 in this FEIS for a discussion of impacts on historic and archaeological resources.

#### **7.4.15 Patronage and Cost Effectiveness**

##### **7.4.15.1 Forecasting Methodology**

Comment 15.1: Although the ridership forecasts are acceptable for predicting start-up ridership, we recommend that alternate forecasting procedures be considered prior to system design and development. The methodology for predicting long-term patronage levels should consider other land use and transportation policies which influence travel demand. (Hawaii Office of State Planning)

Response: The forecasting procedure used in the AA/DEIS has been improved in two areas for this FEIS. First, the baseline transit ridership has been re-surveyed, with the new survey structured to ensure that the responses could be used for forecasting purposes (trip purposes and modes of access and egress are specifically identified). Second, a survey and analysis of visitor travel characteristics has made it possible to identify the potential effect of tourists on transit ridership in the future. The forecasting method includes land use and transportation policies, as appropriate.

Comment 15.2: For a better understanding of how the forecasts were derived, we recommend that more detailed descriptions of the input be included as an appendix to the FEIS. This could include bus routes and coded lines, headways and speeds for both fixed headway and bus routes, centroid connectors and the transit paths that were developed, and a map of feeder bus routes. (Hawaii Office of State Planning)

Response: A detailed summary of the individual bus routes, including headways, route lengths, run times and areas served can be found in Section 5 of the Transportation Impacts Results Report (July 1992). The methodology used to create centroid connectors can be found in Section 3.4.4 of the Service and Patronage Forecasting Methodology (March 1992).

Comment 15.3: The discussion in Section 4.1.2 of the AA/DEIS should summarize the forecasting methodology and address the following items: 1) The relationship of the OMPO person trip forecast for 2005 and the AA/DEIS transit trip forecast; 2) The recoding of trip purpose for the transit trip tables; 3) The use of the "origin/destination format" rather than "traditional production/attraction format" for trip table development and the significance, if any, of the difference for forecasting purposes; 4) The use of proxy zones for trip table development; and, 5) the use of the combined population and employment growth factor, rather than the distinct factor appropriate to trip purpose, for trip projection and the significance, if any, of the difference for forecasting purposes. (City Council Member Gill)

Response: 1) OMPO uses a synthetic model to produce year 2005 person trip tables, whereas this project uses a two-step approach. First, the Fratar technique is applied to expand the base year trip tables to the future year, and then a pivot-point technique (the incremental logit model, as described in the Service and Patronage Forecasting Methodology (March 1992) is used to produce the year 2005 transit trip tables that are assigned to each alternative.

2 and 3) The 1991 On-Board Bus Survey Report (March 1992) discusses the identification of trip purpose and production and attraction zones for each transit trip surveyed, so that this information could be used in the FEIS forecasts.

4) The use of proxy zones is summarized in Chapter 6 of the Service and Patronage Forecasting Methodology (March 1992).

5) The revised methodology utilizes separate growth factors for population and employment instead of the combined growth factor.

Comment 15.4: Previous methods to estimate ridership have always produced overestimates. The current method is called "conservative", but has not yet proved itself with systems that are actually running. What is the difference between the ridership estimate using the current methodology and the previous methodologies? (Makiki Neighborhood Board)

Response: The key factor that would support the ridership estimates produced by this model is that they use as a baseline a system (TheBus) that has a substantial existing ridership. Unlike certain other studies, which anticipated a huge shift in the mode choice from private automobile to transit, Table 4.8 in this FEIS shows that this model is predicting only a relatively small difference in the modal share between alternatives.

The incremental logit technique used in this study and in other cities successfully, such as Pittsburg and San Francisco, would produce reasonable forecasts identical to those produced by a synthetic model, assuming the synthetic model has been properly calibrated. The existing OMPO models are not currently calibrated to the point where they can be used to produce reasonable forecasts of transit ridership.

Comment 15.5: We have questions about the validity of the patronage forecasts. The AA/DEIS does not adequately discuss the methodology or data used. A letter to the Honolulu Advertiser from Mr. Flannelly indicated that the population and employment variables used in the AA/DEIS evaluation were such poor indicators of transit that they did not even predict 1986 ridership accurately. (Flannelly, Downtown Neighborhood No.13)

Response: A report produced for the Office of State Planning by the University of Hawaii at Manoa, "An Evaluation of the Honolulu Rapid Transit Development Project's Alternative Analysis and Draft Environmental Impact Statement," states in the conclusion:

The overall structure of the ridership forecasting methodology is reasonable. Given the assumptions made and the state of the art in forecasting transit ridership, the City's forecasts appear to be reasonable and certainly are in the "ball park" for the alternative analysis phase of the planning process.

The report goes on to recommend six steps which the authors felt would help to reduce errors in subsequent forecasts, all of which have been incorporated into the revised methodology.

It is impossible to quantify the magnitude of error because the forecasts are dependent upon the accuracy of the demographic data input. Unless the error associated with the input data can be quantified, neither can the error for the patronage forecasts be quantified.

The Service and Patronage Forecasting Methodology (March 1992), contains more precise information on the methodology and data used in this study. The absolute values of the population and employment variables cited in the letter to the Honolulu Advertiser are not used to predict ridership, per se. The gist of Mr. Flannely's argument is that there is no linear relationship between population and employment and transit ridership. This is true. Some zones have 10 transit riders per 1000 population and other zones have 100 riders per 1000 population. However, the effects of all the other variables that affect ridership are canceled out of the equation when the Fratar technique is used to build the future year baseline trip tables. The assumption that is made in this model is that a zone to zone movement that produces 100 transit riders per 1000 person trips today will also produce 100 transit riders per 1000 person trips in the future year baseline trip tables. The effects of the level of service variables such as transfers are taken into consideration when the incremental logit model is applied to the future year baseline trip tables.

Comment 15.6: The methodology used to estimate the transit ridership increase by the year 2000 uses an extrapolation based on population and employment figures and assumes that the more population and more jobs there are, the higher will be the transit ridership. This assumption is unsubstantiated by TheBus performance which showed a decline in transit ridership between 1985 and 1989 while both population and employment increased, and the City's fleet of buses also increased. If this same formula were used to estimate 1990 bus ridership using 1980 figures, the results would be higher. What steps are being taken to correct this? (Makiki Neighborhood Board, Charley's Taxi, Committee on Sensible Transit)

Response: The forecasting methodology used to produce ridership estimates is much more sophisticated than a simple extrapolation using existing and predicted future population and employment. This study used a combination of the Fratar expansion of base year transit trips followed by the application of a pivot point analysis of the level of service between alternatives. Ridership is not predicted to have a linear relationship with population and employment. Other factors important to the process of estimating ridership are travel times and the availability of transit service. Additional information about the methodology can be found in the Service and Patronage Forecasting Methodology (March 1992).

Many improvements were made in travel forecasting procedures subsequent to the AA/DEIS to which the commenter refers. The patronage estimates in the AA/DEIS were based upon information from the 1986 on-board bus survey. The estimates in this document use the information from a new on-board survey conducted in 1991 (which showed an increase in ridership compared to 1986, not a decline). The results of the patronage forecasting process were reviewed by a national panel of experts. The finding of the panel was that the results were a reasonable estimate of expected future ridership.

Comment 15.7: Page 1-7 of the AA/DEIS discusses the decline in bus operating speeds. To place the discussion in better perspective, the manner in which operating speeds are calculated should be noted, as is done for Table 1.2. (City Council Member Gill)

Response: The method of calculating bus speeds is noted on Table 1.4 of the FEIS.

#### 7.4.15.2 Patronage

Comment 15.8: How will the positive redevelopment surrounding the proposed transit stations favorably affect the projected ridership? (City Council Member Leigh-Wai Doo)

Response: The patronage forecasting model assumes a certain level of population and employment for each station area. To the extent that positive redevelopment would increase either or both population or employment above those levels, there would be a net positive impact on ridership; however, this ridership impact is not reflected in the forecast described in this FEIS.

Comment 15.9: Getting people out of their cars will be a formidable challenge. To encourage ridership, consideration should be given to one or more of the following: reduce rates for weekly or monthly passes; provide snacks/refreshments on the train; hold raffles offering free one-week transit passes; provide efficient and frequent bus service, including express routes; prohibit State and City employees from parking in government garages downtown; establish public use transit incentives; establish private vehicle use disincentives; change the age to 18 for a person to be able to obtain a driver's license; prohibit high school students from parking at their schools; declare a moratorium on construction of public parking garages; ensure that everyone pays for automobile insurance; control the number of registered vehicles; charge the military their fair share to register vehicles; increase car registration costs for multiple car ownership; disallow the ownership of more than one car per registered driver in a family; check driver registration and licenses for validity; provide stricter vehicle inspections to discourage operation of "junk cars"; ensure that drunk drivers automatically lose their driver's licenses; prohibit military personnel from selling their used cars to local residents; restrict the number of new and used auto dealerships; remove one vehicle from the island for every new car shipped to the island; privatize mass transit by use of car pools and van transit; pass ordinances affecting zoning, land use densities, and parking; provide free parking at the park-and-ride lots; and control automobile entry into downtown Honolulu since this would add another traffic lane if the parking lane was no longer used. (Building Industry Association, Life of the Land, Hawaii Office of State Planning, Vines and 35 others, Ruby, Pacific Construction Co., Corporate Concepts, Charley's Taxi, Hawaii Pacific Engineers, Waikiki Neighborhood Board No. 9, Huddleston)

Response: A wide variety of policies could be implemented to enhance transit ridership. A number, including some of those mentioned, are being examined in OMPO's current TSM Study.

Comment 15.10: The AA/DEIS ignores a measure, proposed in the Hali 2000 Study, to double all-day parking charges to discourage private car use and encourage use of public transportation. (Charley's Taxi)

Response: A discussion of policy assumptions is included in response to Comment 1.8. An analysis of the sensitivity of transit ridership to changes in parking cost is included in the Transportation Impacts Results Report (July 1992). This analysis indicates a parking cost elasticity of about 0.7. Thus, a doubling of parking costs would result in a daily transit demand of about 500,000.

Comment 15.11: The transit system should also support employees who work hours other than the normal 8:00 a.m. to 5:00 p.m. workday. Vehicle schedules should be fast and often to encourage usage. (Lamberth)

Response: The fixed guideway will provide regular service each weekday between 5:00 a.m. and 1:00 a.m. and between 6:00 a.m. and 1:00 a.m. each weekend day. During peak times, there will be an approximate 1.5 minute spacing between trains. At other times, the train spacing will be between 2.5 and 5.5 minutes.

Comment 15.12: Transit's ability to attract riders is a key factor in determining the reasonableness of the ridership forecasts. However, the AA/DEIS lacks adequate information to provide meaningful comparisons between transit and the private automobile. (Hawaii Pacific Engineers, Inc.)

Response: The forecasting methodology uses the assumption that there will be no further deterioration of the highway level of service. The change in ridership between alternatives is a function of the respective levels of transit services between those alternatives. Any actual decrease in the highway level of service would result in an increase in transit ridership for all transit alternatives.

Comment 15.13: What methods are being used to allow for the fact that increasing affluence will lead to more car use rather than bus/transit use? (Makiki Neighborhood Board)

Response: It is not at all certain that, in real terms, affluence is increasing. The assumption made in this FEIS, given the absence of household income and auto ownership projections, is that the relative proportion of households by auto ownership level will remain constant. The model uses the proportion of riders in each auto-ownership level (i.e., 0, 1, and 2+) to reflect differential behavioral response to service level and cost changes. The Transportation Impacts Results Report (July 1992) describes a sensitivity analysis of transit ridership to changes in auto ownership. This analysis found that the elasticity of the auto ownership variable ranges from 0.2 to 0.9, depending on the distribution of the growth in auto ownership across socio-economic strata.

Comment 15.14: Automobile drivers will continue to drive their cars and will not use the transit system no matter what is done to try to attract them. The independence and convenience the automobile provides are reasons enough to see that people will not readily give up driving. (Marsh, Hamilton)

Response: Honolulu already has a high per capita use of transit. There is every indication that implementation of a rapid transit system with efficient service, frequent headways, and reasonable fares will make transit even more competitive with the automobile in the future.

Comment 15.15: Inadequate consideration is being given to the detrimental effects of changing the existing bus system into a feeder bus system. The changes, as projected in the bus system for Alternative 3, will gut the existing urban trunk routes and severely impact existing bus ridership. This attempt to force riders onto the rail system could lead to a net loss in transit ridership as has happened in other rail cities. (Committee on Sensible Transit, Nalbach, Charley's Taxi)

Response: This is an inaccurate depiction of the bus service plan that is proposed to support the fixed guideway alternatives. Many of the existing urban trunk routes will remain intact under the current plan, which is intended to make the entire transit system, bus and rail, as attractive to the rider and as efficient as possible.

Comment 15.16: How many households will have impacts as a result of removing established trunk routes in order to provide feeder buses to the fixed guideway? The Hali 2000 Study indicates that 95% of the population in urbanized areas reside within one quarter-mile of the system. (Charley's Taxi)

Response: Most households in the urban area will have impacts one way or another. Some will find that transit is less attractive for certain trips but most will find that the average transit trips to the most popular destinations will take less time than they would given the all bus TSM Alternative. Table 4.4 in this FEIS shows that work trips will be an average of 7.7 minutes quicker than with the TSM Alternative, and non-

work trips will average 7.0 minutes quicker per trip. Coverage of the transit system will be expanded as compared to today.

Comment 15.17: If ridership occurs as projected, what is the City's justification for not planning to increase the bus fleet to 600 vehicles, as the Hali 2000 Study contemplated? The City has yet "...to expand the fleet to 500 coaches by FY 1987," as planned and stated on page 4-7 of Hali 2000 Study. (Charley's Taxi)

Response: The City's plan includes a bus fleet of 670 vehicles to provide an expanded feeder bus system for the amended LPA fixed guideway facility. The current fleet size is 495 buses including the latest order of 20 buses. The City's expansion plan exceeds the Hali 2000 schedule of 600 buses in the year 2001.

Comment 15.18: How can the Honolulu Rapid Transit System have ridership that is 80% that of San Francisco's entire BART system and is 50% greater per line mile than any other system in the United States? (Committee on Sensible Transit)

Response: Unlike the San Francisco Bay Area, which is comprised primarily of suburban sprawl, the geography and urban density of the Honolulu urban area create a corridor which is ideally suited for fixed guideway transit. These facts can help explain why Honolulu's current transit system, which currently has only one component — TheBus, carries 97 annual transit trips per capita. This figure is comparable to Chicago and Washington, D.C., which have rail rapid transit systems currently in place. Meanwhile, the Bay Area's transit system, which includes three rail components (commuter rail, rail rapid transit, and light rail) has a combined transit ridership of only 46 transit passengers trips per capita.

Passengers per mile is a misleading indicator; however, if a comparison is made, the Year 2005 patronage forecasts for the fixed guideway in Honolulu represent a daily rail ridership of 12,000 passengers per line mile, which is reasonable compared to data from New York City (15,600), Washington, D.C. (10,500), and Atlanta (10,100).

Comment 15.19: We question both the rail and total transit ridership projections in the AA/DEIS. Rail ridership on Oahu will result in 16.7 daily rail trips per 100 population in the year 2005. This compares to ratios ranging between 1.2 and 5.0 in Baltimore, Miami, Sacramento, Pittsburgh, Portland, and Vancouver. Regarding total transit ridership, the No-Build Alternative for 2005 shows a 2.6% increase although the General Plan projects an 18% increase in population. This small transit growth would be in spite of planned highway improvements costing over \$150 million. The AA/DEIS indicates that during peak periods "...the buses would be traveling at lower speeds on increasingly congested streets...and thus providing poorer service." How would people benefit by abandoning the bus and driving their cars through these same congested streets? (League of Women Voters)

Response: Because of its geography, the proposed rail corridor in Honolulu accommodates a much higher portion of total regional travel than do the rail corridors in most other cities. Thus a comparison of rail trips per capita is misleading. The commenter appears to be confused regarding the definition of the No-Build Alternative. The No-Build Alternative would allow only for the existing number of buses to be redistributed in such a fashion as to attract the greatest possible number of bus riders in the future year. However, growth in ridership will be slower than population growth because much of the population growth will occur in areas less well served by transit.

Comment 15.20: I question the ridership projections since transit usage in the United States has been in tremendous decline. A 30% decline occurred between 1970 to 1980. (Slater)

Response: The transit ridership forecasts are based on a survey conducted in 1991. The data collected in this survey, when compared with the results of previous ridership counts, shows that transit usage on



the Island of Oahu has not exhibited such a loss in transit ridership, and increased 10% from 1986 to 1991.

Comment 15.21: Although page 4-12 of the AA/DEIS discusses peak and off-peak transit trips, a table should be included which displays the number of transit trips in the peak period and peak hour for each alternative. (City Council Member Gill)

Response: The number of transit trips, by time of day, is provided in Section 4.1.2 of this FEIS.

Comment 15.22: Section 4.1.2 and the accompanying tables in the AA/DEIS are based primarily on all transit trips. Data should be provided for each alternative showing the number of transit trips which include an unlinked trip on the fixed guideway. (City Council Member Gill)

Response: See Section 4.1.2 of this FEIS.

Comment 15.23: Do the visitor ridership projections between Waikiki and the Arizona Memorial Stations account for visitor demand expected because that alternative would provide a connection between the Waikiki hotel area and the Arizona Memorial Station? I note that the daily volume of arrivals and departures at the Arizona Memorial Station would be only 800, which is significantly below that of any other station on any other alignment. Please check these figures and, if confirmed, please reanalyze Alternative 3 without the proposed Arizona Memorial Station since it would save \$10.7 million and over 30 seconds of transit travel time. (City Council Member Leigh-Wai Doo)

Response: The projections take this factor into account. The station volume projections have been revised for this FEIS. For Arizona Memorial, the expected daily volume would be about 2,000. It should be noted that Waikiki will be served by buses which will shuttle passengers to the rapid transit system.

Comment 15.24: It seems that the Isenberg Station has either been underdesigned or else the ridership projected for this area has been exaggerated. (Pollock)

Response: Isenberg Station has been redesigned, as shown in Figure 2.28 of this FEIS, to a standard side platform configuration with mezzanine. Access from both sides of Kapiolani Boulevard will be provided.

Comment 15.25: The AA/DEIS states that Honolulu has fewer business travellers to the airport than mainland cities and that vacation travelers do not take rapid transit because they carry baggage. So who and how many will the Airport Station really serve? (Aliamanu-Salt Lake-Foster Village Neighborhood Board No. 18)

Response: The Airport Station will serve airport area employees and certain types of airport passengers.

#### 7.4.15.3 Cost Effectiveness

Comment 15.26: Page 4-3 of the AA/DEIS discusses the components of transit travel times. Each component and its weight should be listed. To provide an opportunity for determining cost-effectiveness, the numbers of daily and annual hours of both weighted and unweighted transit travel time for all trips, work trips, and non-work trips should be provided for each alternative. (City Council Member Gill)

Response: The number of daily hours of unweighted travel time saved by each alternative is listed in Tables 6.12 and 6.13 in the AA/DEIS since unweighted travel time is used in computing FTA's cost effectiveness index. Weighted travel time comparisons among alternatives are provided in the Transportation Impacts Results Report (July 1992).

Comment 15.27: To provide alternate cost-effectiveness evaluation, it would be desirable to add the following information to Section 6.2.3 of the AA/DEIS: 1) Cost-effectiveness, in comparison to Alternative 1, per new transit rider based on both weighted and unweighted travel time savings; and, 2) Cost-effectiveness, in comparison to Alternative 2, per new transit rider based on weighted travel time savings. (City Council Member Gill)

Response: See preceding response above. Many alternative measures can be calculated. At this date, the production of the suggested information would not add to the process of evaluation of alternatives.

Comment 15.28: Table 6.19 of the AA/DEIS compares the cost-effectiveness of capital and operations and maintenance costs per transit rider. The costs should be totaled. (City Council Member Gill)

Response: Table 6.19 was titled in a vague manner. It presents a comparison of the annualized capital cost and operations and maintenance costs per transit rider.

Comment 15.29: Because of reliance on general revenues to subsidize the alternatives, a cost-effectiveness based on benefits to all residents or person-trips is desirable. Ideally, the cost-effectiveness of the system should be determined on the travel time savings of all person-trips, rather than only transit trips. (City Council Member Gill)

Response: Sections 6.2 and 6.4 of this FEIS address the benefits that will accrue to all local residents. Travel time savings for non-transit travellers cannot be reliably estimated due to limitations in the currently available highway travel forecasting methodology.

#### **7.4.16 Energy**

Comment 16.1: Estimates of the electrical energy requirements for the fixed guideway system should be given. Information on the system's hours of operations, system's peak, and the impact on the utility's peak and daily demand should be addressed. (Hawaii Office of State Planning, Hawaii Office of Environmental Quality Control, Hawaii Department of Business and Economic Development, Honolulu Department of Land Utilization)

Response: Section 5.9 of this FEIS has been revised to contain this information.

Comment 16.2: Energy use on a per passenger-mile basis should be compared for each alternative. (Hawaii Office of State Planning, Hawaii Department of Business and Economic Development)

Response: Auto fuel usage per passenger mile would be similar for the amended LPA, TSM and No-Build Alternatives since all three alternatives would result in similar fuel efficiencies and the average occupancy of each car would be expected to be about the same. Auto fuel use per passenger mile would, however, be slightly higher for the No-Build Alternative because of somewhat lower fuel efficiencies resulting from increased traffic congestion. Because the bus load factors would be about the same for both the amended LPA and TSM Alternatives, bus fuel usage would be similar for both alternatives. The No-Build Alternative would result in higher bus fuel efficiency because the buses would be more overcrowded, especially during peak periods. The Clean Air Act Amendments of 1990 require the gradual replacement of diesel-fueled buses by less-polluting technologies. Because at this time it is not known how future buses would be propelled, bus energy usage cannot be predicted with any degree of accuracy. The amended LPA will also require electrical energy to operate the trains. Electrical energy use is estimated at about 6 passenger miles per kilowatt hour.

Comment 16.3: The petroleum fuel requirements and costs of each alternative should be compared. (Hawaii Department of Business and Economic Development, Honolulu Department of Land Utilization)

Response: Section 5.9 of this FEIS provides general information on this issue. There are too many variables to accurately predict specific fuel usage and cost requirements for each alternative. As discussed in the response to the preceding comment, future bus fuel mileage is unknown due to expected changes in bus technology. Automobile fuel mileage will likely continue to improve in the future; however, a specific fuel usage per gallon figure for the entire fleet of automobiles in the year 2005 would be difficult to forecast. In addition, fuel prices have been subject to constant changes in the past. Future fuel prices will continue to be difficult to predict; therefore, the fuel costs for each alternative could not be estimated with any degree of certainty.

#### **7.4.17 Economic Impacts**

Comment 17.1: A more thorough discussion of the economic impacts along the proposed corridors should be included in this FEIS. (Hawaii Office of Environmental Quality Control)

Response: Economic impacts are discussed in Section 5.1.5 of this FEIS.

Comment 17.2: We are concerned that the proposed project would result in a loss in market value for the Prince Kuhio Federal Building and site. (General Services Administration)

Response: The amended LPA is no longer on Pohukaina Street. It is one block mauka on Halekauwila Street. The Halekauwila Option, part of the amended LPA, avoids any use of the Prince Kuhio Federal Building and its makai parking lot. The rapid transit project will enhance accessibility to the area, resulting in a likely increase in market value if GSA is seeking to sell the site.

Comment 17.3: We are concerned that both residential and commercial property values along the selected route will rise, as will the assessments and taxes owed by adjacent property owners or renters. (Small Business Hawaii)

Response: As residential and commercial property values rise, it is expected that assessments and taxes will also rise.

Comment 17.4: Why should the taxpayers build a system to benefit a few rich landowners? For example, the Campbell Estate has vast holdings in Ewa. Also, the Ala Moana Shopping Center and Central Oahu landowners will gain financially from a rail system which provides good access. The landowners should be made to pay their fair share, not only after the system is completed, but now during the planning phase. (Callan)

Response: The taxpayers are building the proposed rapid transit system to benefit the general public and not "a few rich landowners." It must be noted, for the example given, that while the Campbell Estate does indeed have a large landholding in Ewa, the line does not extend across Waipahu to service the Ewa plains. It is quite apparent, however, that the line could reasonably extend to Ewa since the City's plan involves directing growth to this leeward area which includes Campbell Estate's land as well as the State of Hawaii's development of Kapolei City. This would be applicable to Central Oahu also, since the area currently under development extends from the Village Park-Waialeale area to Mililani Town, including Mililani Mauka.

The alignment along Ala Moana Center, and similarly, fronting Pearlridge Center, is also warranted since these facilities are major activity centers for many people residing within and along the transit corridor. The system will also accommodate people from East Honolulu, Windward Oahu, Central and Leeward areas.

To implement the fixed guideway transit system, the City has adopted a financial plan for the project. The rail system will benefit residents, tourists, and businesses. It is not targeted to benefit the rich. While

landowners may be situated with "good access" and will benefit financially, some may need to also forego land to allow for station platforms and escalator/stairway space. The landowners are not involved with financing the project at this time.

Comment 17.5: I am concerned that once the proposal is approved, properties adjacent to the transit stations would either be bought or unloaded. In the future, when the City needs the land, it would be prohibitively expensive. Land speculators stand to gain, while others would be ruined. (Souza)

Response: It can be expected that properties adjacent to the stations may be bought and sold, and in nearly all cases, the seller and buyer would benefit.

Comment 17.6: The Queen Emma Foundation leasehold, Foster Heights Villas property, would be adversely changed by the rail system if it is built down Salt Lake Boulevard because property values would likely increase; our lease fees would also likely increase or the leaseholder may refuse to renew our lease. (Stewart)

Response: The amended LPA does not include the Salt Lake Boulevard segment.

Comment 17.7: The carriers who service the Free Independent Travelers (FIT) market oppose Alternative 3 which serves the Airport. It is anticipated that over 2,000 PUC vehicles and taxicabs would be economically displaced by implementation of this alternative. (Hawaii Transportation Association)

Response: Although Alternative 3 was not selected, the amended LPA will serve the Airport. Taxicabs and PUC vehicles will still be needed to serve the airport since vehicle capacity constraints will preclude passengers from carrying luggage on the rapid transit system. Therefore, the claim that over 2,000 PUC vehicles and taxicabs would be displaced is not true.

Comment 17.8: In determining the merits of a rapid transit system, the need for other important projects (such as new highways and waterlines to replace deteriorating infrastructure) should also be considered. (Marsh)

Response: The rapid transit will not foreclose future options but will provide a backbone of transit that will focus future options on serving other than the main line-haul market in the study corridor. The excise tax revenues are not available to the City to upgrade sewer lines and treatment facilities or implement parks and recreation projects. The purpose of the EIS is to assess the impacts of the proposed project and not to discuss its merits relative to other projects. However, the EIS is a tool for decision-makers to use to determine whether the project should be built.

Comment 17.9: Section 5.13 should discuss available or planned financial assistance to mitigate the construction impacts on affected businesses. (City Council Member Gill)

Response: The City will work closely with local businesses to minimize the impacts of construction. Owners will be informed about construction in the vicinity of their businesses. Access will be maintained, and construction will be scheduled to minimize disruption of business. There will, however, be some impacts during construction, and some businesses may suffer financially for a relatively short time. As stated in Section 5.2 of this FEIS, there is financial assistance available to businesses that would be displaced and businesses which would lose part of their property. However, at the present time there is no direct financial assistance available to businesses that experience adverse financial impacts during construction. See also the response to Comment 6.1.

#### 7.4.18 Miscellaneous

Comment 18.1: We recommend that a FEIS be prepared when the preferred alignment and fixed rail technology are determined. (Honolulu Department of General Planning)

Response: This FEIS has been prepared to assess the preferred alignment and fixed rail technology.

Comment 18.2: The FEIS should contain information in the bibliography about where the various technical report documents are available for public review. (U.S. Federal Highway Administration)

Response: This information has been included in the bibliography of this FEIS.

Comment 18.3: The organization of the AA/DEIS is such that the public cannot readily find much of the basic information needed to understand and weigh the differences between alternatives. The summary should provide more of this basic information. For example, rail ridership projections in earlier drafts of the project proposal were deleted from the Summary Table on page S-31 and can only be found in various sections of the body of the text. A basic cost comparison showing the total annualized capital and annual O&M costs for each alternative should also be included in the summary. (League of Women Voters)

Response: The Executive Summary has been structured in this FEIS to facilitate comparisons among alternatives for key evaluation parameters.

Comment 18.4: Because of the bulk of information in the AA/DEIS, it is difficult to find the important material needed to evaluate the alternatives. It would be helpful to have an index. Also, the Executive Summary should include comparative data for each alternative such as projected numbers of rail users or the total annualized costs for both capital and maintenance and operations. (League of Women Voters)

Response: The comment is appreciated but an index is not provided in this FEIS. Please refer to the "Executive Summary" of this document and the Table of Contents for guidance. A summary of key evaluation measures is included in this FEIS as Table S.10.

Comment 18.5: A 6% grade may be difficult for steel wheel/steel rail operation. The vertical alignment should be reviewed to minimize the "roller coaster" effect. The 200-foot radius for the horizontal curves at Ward Avenue will provide less than a 25 mile-per-hour operation. (Federal Highway Administration)

Response: Refinements to both the vertical and horizontal alignment will occur during final design to provide the most efficient system given existing land use constraints. The curve at Ward Avenue will require that the trains slow in this area. However, the curve is necessary to minimize impacts on adjacent businesses.

Comment 18.6: What is the useful life of the planned fixed rail system? (Makiki Neighborhood Board)

Response: The system is expected to have at least a 50-year minimum useful life, extendable with rehabilitation and reconstruction as needed.

Comment 18.7: Section 1.2 of the AA/DEIS describes the FTA (formerly UMTA) "new start" planning and development process. A brief discussion on the relationship of the FTA process with the City administration's plan to issue a request for proposals for the rapid transit system should be included. (City Council Member Gill)

Response: The FTA process and the City's plans have been closely integrated. Section 1.2 of this FEIS describes the FTA process.

Comment 18.8: What is the need for this project, given the expense involved? The train would only travel an average of 20-35 miles per hour, and people will probably have to take the bus to gain access to the train. Some current express bus riders will probably revert to using their cars because the train will be slow and will involve the use of transfers. Others will continue to use their cars. (Miller)

Response: The train's operating speed over most of the segments of the guideway will be between 35 and 55 miles per hour. The average bus speed would be less than 12 miles per hour. Section 4.1.1 of this FEIS presents estimated travel time savings over the No-Build and TSM Alternatives. An efficient bus feeder system will provide convenient access to train passengers not located near the fixed guideway. Without the rail project, bus service will continue to deteriorate in the future as traffic congestion increases.

Comment 18.9: What security measures will be taken at the park-and-ride facility at Leeward Community College to protect vehicles from being vandalized or burglarized? (Pearl City Neighborhood Board No. 21)

Response: The park-and-ride facilities will be patrolled by roving security personnel and continuously monitored by closed-circuit television cameras.

Comment 18.10: The AA/DEIS does not address an implementation program. The program should cover strategies and methods to be used from now until the rail system is completed. What steps will be taken to promote transit ridership during this period to relieve current traffic congestion? We should not wait until the completion of the rail project to alleviate problems that already exist. (Hawaii Pacific Engineers, Inc.)

Response: From now until the implementation of the rapid transit system, the City will continue to promote transit ridership, and the City recognizes that an implementation program is a prerequisite to the success of the rail project. The City presently has plans for programs to promote the continued use of TheBus.

Comment 18.11: Any underground storage tanks (UST) to be installed will be regulated pursuant to the 1984 amendments to the Federal Resource Conservation and Recovery Act (RCRA). New USTs must meet requirements concerning installation, spill and overfill prevention, corrosion protection, and leak protection. (U.S. Environmental Protection Agency)

Response: Any new USTs will be installed according to the applicable regulations.

Comment 18.12: There is not adequate discussion of the monitoring and maintenance programs for USTs. We recommend coordination of monitoring and maintenance programs with the EPA. (U.S. Department of the Interior - Office of the Secretary)

Response: The UST regulations have varying requirements for monitoring depending upon the type of tank installed. The type of UST to be installed at the maintenance yard will be determined during final design. It should be noted that monitoring and coordination will be done in accordance with the UST regulations. Maintenance will be performed at regularly scheduled intervals to minimize the potential for leaks.

Comment 18.13: The 1984 amendments to RCRA also require hazardous waste generators to certify that they have taken steps to reduce the volume of hazardous waste generated. Waste reduction measures could include: source separation, recycling, substitution of raw materials, manufacturing process changes, and substitution of products. These methods could be applied to minimize the quantity of degreasing solvents, metals and sludges to be produced by the proposed maintenance facility. (U.S. Environmental Protection Agency)

Response: Efforts will be made to minimize hazardous waste to the maximum possible extent. Measures, such as those listed above, will be considered in the plan for operating the maintenance facility. For example, waste oil will be collected in dedicated storage tanks and sent to a re-refiner for processing; oily rags will be segregated from general office and food waste; and solvents will be reused as much as possible prior to collection in segregated vessels for disposal.

Comment 18.14: Will air pollution from buses increase in the area of the Marco Polo Condominiums with implementation of the rail system? (Koshi)

Response: The air pollution from buses should not increase. Under existing conditions, 33 buses now pass by the Marco Polo Condominiums each day. The rail system will increase this number by one to a total of 34 daily buses by the year 2005. The additional bus will result in no significant increase in emissions. Under the TSM Alternative an additional 30 buses, for a total of 63 buses, would pass this location daily in that year. Thus, the rail system will result in less air pollution than the TSM Alternative.

Comment 18.15: Section 5.5.3 of the AA/DEIS, which discusses air quality impacts of electrical generation, should be expanded to include the finding in the Air Quality Impact Report (September 1989) concerning the allowable PSD increments for the Kahe Point/Campbell Industrial Park area. (City Council Member Gill)

Response: Section 5.5.3 of this FEIS includes this information.

Comment 18.16: Given that there are insignificant differences in auto usage between the rail and TSM Alternatives, the overall decrease in air pollution would be expected to be insignificant. Use of electric buses could cut road pollution, though if dependent upon fossil fuel for power generation, may not reduce island-wide pollution. (League of Women Voters)

Response: The rail system is expected to result in a small, but positive, improvement in air quality. The replacement of diesel buses with electric buses would reduce the amount of bus pollutant emissions but would do nothing to decrease auto emissions. Nitrous oxides and particulates are the major pollutant in bus emissions while hydrocarbons and carbon monoxide are the major auto pollutants. The rail system will decrease the use of automobiles and buses over the TSM Alternative. Thus, the rail system will decrease hydrocarbon, carbon monoxide, nitrous oxide and particulate emissions.

## LIST OF COMMENTERS ON THE AA/DEIS

Comments were written unless noted as oral testimony in the following list.

### FEDERAL AGENCIES

Department of the Army, Army Engineer District, Kisuk Cheung, Director of Engineering - No comment.

Department of Housing and Urban Development, Calvin Lew, Director, Community Planning and Development Division - Alternatives 1.27, 1.36; Historic Sites and Parklands 14.2.

Department of the Interior, Geological Survey, William Meyer, District Chief - Hydrology/Water Quality 10.1; Construction 11.2.

Department of the Interior, Office of the Secretary, Jonathon Deason, Director, Office of Environmental Affairs - Hydrology/Water Quality 10.3, 10.6; Miscellaneous 18.12.

Department of the Navy, W.K. Liu, Assistant Base Civil Engineer - Community and Social Concerns 6.18.

Department of Transportation, Office of the Secretary, Eugene Lehr, Chief, Environmental Division - No comment.

Department of Transportation, Federal Aviation Administration, David Welhouse, Airport Engineer/Planner - Construction 11.9.

Department of Transportation, Federal Highway Administration, Region IX, John Bates, Acting Director, Office of Planning and Program Development - Alternatives 1.3, 1.4; Accessibility 2.5; Traffic and Parking 4.5, 4.7, 4.8, 4.10-4.13, 4.29; Financial 12.26; Miscellaneous 18.3, 18.5.

Environmental Protection Agency, Region IX, Deanna Wieman, Director, Office of External Affairs - Hydrology/Water Quality 10.2-10.5; Construction 11.1, 11.3; Miscellaneous 18.11, 18.13.

General Services Administration, Richard Welsh, Assistant Regional Administrator, Public Buildings Service - Community and Social Concerns 6.16; Aesthetics/Urban Design 7.13; Noise and Vibration 8.13; Economic 17.2.

### STATE AGENCIES (HAWAII)

Aloha Tower Development Corporation, Randall Iwase, Executive Officer - Aesthetics/Urban Design 7.14; Construction 11.13.

Hawaii Community Development Authority, Rex Johnson - Alternatives 1.31; Station Design 3.1; Traffic and Parking 4.24; Community and Social Concerns 6.10, 6.12; Construction 11.10; Financial 12.24.

Department of Accounting and General Services, Russel Nagata, State Comptroller - Alternatives 1.21, 1.25, 1.28; Station Design 3.5; Community and Social Concerns 6.22; Aesthetics/Urban Design 7.11; Noise 8.17; Construction 11.11; Historic 14.6.

Department of Agriculture, Yukio Kitagawa, Chairperson, Board of Agriculture - No comment.



Department of Business and Economic Development, Land Use Commission, Esther Ueda, Executive Officer - No comment.

Department of Business and Economic Development, Roger Ulveling - Energy 16.1, 16.2, 16.3.

Department of Defense, Office of Adjutant General, Lt. Colonel Jerry Matsuda, Hawaii Air National Guard - No comment.

Department of Education, Charles Toguchi, Superintendent - Noise and Vibration 8.14; Construction 11.12.

Department of Health, John Lewin, M.D., Director - No comment.

Department of Human Services, Winona Rubin, Director and Mitsuo Shito, Executive Director, Hawaii Housing Authority - Commented that the No-Build Alternative is infeasible.

Department of Land and Natural Resources, William Paty, Chairperson, Board of Land and Natural Resources - Community and Social Concerns 6.21; Aesthetics/Urban Design 7.8; Historic Sites and Parklands 14.5.

Department of Transportation, Ed Hirata, Director (oral testimony) - Supports rapid transit.

Executive Chambers, John Waihee, Governor - No comment.

House of Representatives, Wayne Metcalf, State Representative, 3rd District - No comment.

Housing Finance and Development Corporation, Joseph Conant, Executive Director - Community and Social Concerns 6.6.

Office of Environmental Quality Control, Marvin T. Miura, Ph.D., Director - Accessibility 2.26, 2.27; Community and Social Concerns 6.2; Energy 16.1; Economic 17.1.

Office of State Planning, Harold S. Masumoto, Director and Edward Hirata, Director, Department of Transportation - Alternatives 1.7, 1.8; Traffic and Parking 4.9; Land Use 5.3, 5.4, 5.5, 5.10; Aesthetics/Urban Design 7.1; Noise and Vibration 8.5, 8.8, 8.11; Financial 12.1-12.3, 12.23, 12.27, 12.39, 12.40; Patronage and Cost Effectiveness 15.1, 15.2, 15.9; Energy 16.1, 16.2.

University of Hawaii at Manoa, Environmental Center, John Harrison, Environmental Coordinator - No comment.

University of Hawaii, Leeward Community College, Barbara Polk, Provost - Accessibility 2.11; Aesthetics/Urban Design 7.7; Noise and Vibration 8.12.

Waikiki Convention Center Authority, Alan S. Hayashi, Executive Director - Stations 3.10.

#### LOCAL AGENCIES

Board of Water Supply, Kazu Hayashida, Manager and Chief Engineer - Construction 11.8.

Building Department, Herbert Muraoka, Director and Building Superintendent - No comment.

City Council, Leigh-Wai Doo, Member - Accessibility 2.3; Station Design 3.2; Land Use 5.1, 5.2; Community and Social Concerns 6.1, Patronage and Cost Effectiveness 15.8, 15.23.

City Council, Neil Abercrombie, Member (oral testimony) - Alternatives 1.29, 1.39.

City Council, Gary Gill, Chair, Committee on Economic Development and Transportation - Alternatives 1.1-1.2, 1.5, 1.8; Accessibility 2.17, 2.18; Traffic and Parking 4.2, 4.14, 4.16-4.21, 4.23; Financial 12.13, 12.14, 12.19, 12.34, 12.38, 12.41; Patronage and Cost Effectiveness 15.3, 15.7, 15.21, 15.22, 15.26, 15.27, 15.28, 15.29; Economics 17.9; Miscellaneous 18.7, 18.15.

Department of Corporation Counsel, David Laxson, Deputy Corporation Counsel - No comment.

Department of General Planning, Roland Libby, Jr., Acting Chief Planning Officer - Land Use 5.11-5.13; Miscellaneous 18.1.

Department of Housing and Community Development, Michael Scarfone, Director - Community and Social Concerns 6.3, 6.5.

Department of Land Utilization, Donald Clegg, Director - Accessibility 2.12; Station Design 3.6; Land Use 5.9; Community and Social Concerns 6.13; Aesthetics/Urban Design 7.6, 7.16; Noise and Vibration 8.9, 8.15; Energy 16.1, 16.3.

Department of Parks and Recreation, Walter M. Ozawa, Director - Aesthetics/Urban Design 7.15.

Department of Public Works, Sam Callejo, Director and Chief Engineer - Construction 11.8.

Fire Department, Donald Chang, Acting Chief - No comment.

Police Department, Harold Kawasaki, Chief - No comment.

#### **CIVIC ORGANIZATIONS AND BUSINESSES**

Aliamanu-Salt Lake-Foster Village Neighborhood Board #18, Reynaldo Gaulty, Chairman - Alternatives 1.23; Noise and Vibration 8.7; Patronage and Cost Effectiveness 15.25.

American Institute of Architects, Theodore Garduque, President, Honolulu Chapter - Supports Alternative 3. - Alternatives 1.37, 1.41; Station Design 3.9; Aesthetics/Urban Design 7.3, 7.5, 7.17; Noise and Vibration 8.2, 8.3, 8.9

American Society of Civil Engineers, Hawaii Section, Masanobu Fujioka, President - Supports rapid transit - No comment.

Arapata and Friends, Arapata McKay - Supports rapid transit - No comment.

Building Industry Association of Hawaii, Elroy Chun (oral testimony) - Land Use 5.8; Patronage and Cost Effectiveness 15.9.

Chamber of Commerce, Bill Paul (oral testimony) - Supports rapid transit.

Chamber of Commerce, Robert Robinson, President (oral and written testimony) - Supports rapid transit.

Charley's Taxi, Dale Evans, Executive Vice President - Alternatives 1.14, 1.15, 1.50, 1.55; Accessibility 2.13; Traffic and Parking 4.28; Financial 12.8; Patronage and Cost Effectiveness 15.6, 15.9, 15.10, 15.15, 15.16, 15.17.

Committee on Sensible Transit, Cliff Slater, Chairman - Alternatives 1.8; Financial 12.4, 12.5, 12.9; Patronage and Cost Effectiveness 15.6, 15.15, 15.18.

Corporate Concepts, Paula Helfrich, General Manager (oral and written testimony) - Supports rapid transit; Accessibility 2.1, 2.19; Public Participation 13.2, 13.3; Patronage and Cost Effectiveness 15.9.

Downtown Improvement Association, Bill Grant, Executive Director (oral testimony) - Alternatives 1.28.

Downtown Neighborhood Board No. 13, Andrew Rothstein, Chairman - Alternatives 1.8; Aesthetics/Urban Design 7.1, 7.2; Patronage and Cost Effectiveness 15.5.

East Foster Village Community Association, Joe Cabrinha, President (oral testimony) - Supports rapid transit.

Foster Village Community Association, Marjorie Padua, President (oral and written testimony) - Traffic and Parking 4.34; Noise and Vibration 8.14.

Grant Thornton Consultants, Thomas Ueno, Partner (oral and written testimony) - Alternatives 1.44.

Havre Securities, Randy Havre, President (oral and written testimony) - Alternatives 1.11.

Hawaii AFL-CIO, Gary Rodrigues (oral testimony) - Supports rapid transit.

Hawaii Pacific Engineers, Inc., Benjamin Tanaka, P.E. and Ronald Tanaka - Alternatives 1.8; Accessibility 2.13; Traffic and Parking 4.15; Patronage and Cost Effectiveness 15.9, 15.12; Miscellaneous 18.10.

Hawaii Transportation Association, Gareth Sakakida, Managing Director - Alternatives 1.16, 1.23; Accessibility 2.14; Economic 17.7.

Hawaiian Dredging and Construction Company, James Perry, President and CEO - Supports rapid transit.

Hawaiian Electric Company, Inc., William Bonnet, Manager, Environmental Department - Construction 11.7.

Hawaii's 1000 Friends, Fred Madlener, President (oral testimony) - Alternatives 1.8.

Hilton Hotels Corp., Dieter Huckestein, Senior Vice President, Hawaiian Region - Supports rapid transit, especially Alternative 3.

Historic Hawaii Foundation, Phyllis Fox, President - Alternatives 1.26; Station Design 3.7; Historic Sites and Parklands 14.1, 14.2.

Honolulu Mass Transit Coalition and Waikiki Improvement Association, Larry Clapp (oral testimony) - Supports rapid transit.

Honolulu Transit Corporation, John Hill, President (oral testimony) - Alternatives 1.44.

Kakaako Improvement Association, Donald Bremner, President - Alternatives 1.30, 1.32; Aesthetics/Urban Design 7.9.

League of Women Voters of Honolulu, Arlene Kim Ellis, President; Astrid Monson, Chair, Planning and Zoning Committee; Patricia Tummons, Chair, Transit Task Force - Alternatives 1.2, 1.6, 1.9, 1.12; Traffic and Parking 4.22; Community and Social Concerns 6.7; Aesthetics/Urban Design 7.2; Noise and Vibration

8.10; Financial 12.6, 12.7, 12.18, 12.20, 12.31, 12.42; Patronage and Cost Effectiveness 15.19; Miscellaneous 18.3, 18.16.

Life of the Land, Art Mori (oral testimony) - Community and Social Concerns 6.8; Patronage and Cost Effectiveness 15.9.

Longevity International Enterprises Corporation, Chang-Jung Tuan, General Manager - Community and Social Concerns 6.17.

Makiki Neighborhood Board, (unsigned) - Alternatives 1.8, 1.14, 1.17; Accessibility 2.6, 2.8, 2.21, 2.26; Aesthetics/Urban Design 7.4; Financial 12.15; Patronage and Cost Effectiveness 15.4, 15.6, 15.13; Miscellaneous 18.6.

McCully/Moiliili Neighborhood Board No. 8, Michael Shiroma, Chair - Accessibility 2.21; Traffic and Parking 4.6, 4.25, 4.30; Land Use 5.6, Community and Social Concerns 6.19; Noise and Vibration 8.6; Ecosystems 9.1.

Mililani Paratransit Services, Darryn Bunda, Paratransit Coordinator and President, Leeward Oahu Transportation Management Association - Alternatives 1.38; Accessibility 2.4, 2.11, 2.15, 2.16.

Mililani Town, Inc., Julian Ng, Manager, Planning and Engineering - Accessibility 2.1.

Mililani/Waipio/Melemanu Neighborhood Board No. 25, Linda McKenzie, Chairman - Alternatives 1.38; Accessibility 2.1.

Outrigger Hotels, Richard Kelley, Chairman and CEO - Supports rapid transit.

Outrigger Hotels, Max Sword (oral testimony) - Supports rapid transit.

Pacific Construction Company, Ltd., Murray Bawden, President - Patronage and Cost Effectiveness 15.9.

Pearl City Neighborhood Board No. 21, Albert Fukushima, Vice Chairman - Accessibility 2.9; Station Design 3.4; Traffic and Parking 4.3, 4.31, 4.33; Aesthetics/Urban Design 7.12; Miscellaneous 18.9.

Reynolds and Shidler, James Reynolds - Community and Social Concerns 6.14.

Small Business Hawaii, Sam Slom, President/Executive Director - Community and Social Concerns 6.4; Aesthetics/Urban Design 7.2; Construction 11.6; Financial 12.4, 12.9; Economic 17.3.

Tax Foundation of Hawaii, Lowell Kalapa, Director - Financial 12.16, 12.23, 12.30, 12.33, 12.36, 12.37.

The Outdoor Circle, Betty Crocker, President; Sally Youngblood, Public Affairs Chair; Susan Fristoe, Landscape and Planting Chair - Alternatives 1.27; Aesthetics/Urban Design 7.2, 7.19; Ecosystems 9.1, 9.2-9.5; Historic Sites and Parklands 14.4.

The Queen Emma Foundation, Gary Furuta, Vice President - Alternatives 1.35, 1.40; Accessibility 2.23.

The Transportation Group, Inc., Ron Watson, Director, Project Development (oral testimony) - Supports rapid transit; Alternatives 1.43; Accessibility 2.20.

Waikiki Improvement Association, Christina Kemmer, President (oral and written testimony) - Supports rapid transit.

Waikiki Neighborhood Board No. 9 - Anita Benfatti, Chair - Alternatives 1.33; Aesthetics 7.10; Patronage 15.9.

Waipahu Neighborhood Board, Annette Yamaguchi, Chair (oral testimony) - Supports rapid transit.

#### **CITIZENS**

Bill Adelstein - Opposes the Salt Lake Boulevard Alternatives.

Larry Anderson - Opposes the Salt Lake Boulevard Alternatives.

Al Andrews - Supports rapid transit.

Emily Apel - Supports rapid transit.

Rene Baldori - Supports rapid transit.

F.F. and Eva M. Beattie - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Mary Bell - Supports the Kamehameha Highway Alternatives.

Delfinita Benitez - Supports rapid transit.

Maria Bermundo - Supports rapid transit.

Marlene Bird - Supports rapid transit.

T.R. Bongartz - Accessibility 2.25.

Ruth Boyette - Opposes the Salt Lake Boulevard Alternatives.

Ralph Brown - Supports rapid transit.

Klaylan Burchett - Supports rapid transit.

John Buysent - Supports rapid transit.

Joseph Cabrinha - Supports rapid transit.

Sherry Cadwell (oral and written testimony) - Alternatives 1.24; Traffic and Parking 4.34; Aesthetics/Urban Design 7.21; Noise and Vibration 8.16.

Terry and Sherry Cadwell - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Dennis Callan - Alternatives 1.24, 1.27, 1.42; Accessibility 2.1, 2.5, 2.9, 2.22, 2.26; Financial 12.11, 12.26; Economic 17.4.

Cheryl Campbell - Supports rapid transit.

Emilio Canencia - Supports rapid transit.

Allyn Carreira - Supports rapid transit.  
Ken Chang (oral testimony) - Financial 12.29.  
Daniel Chock - Supports rapid transit.  
Elsie Choy - Supports rapid transit.  
Anneliese Chun - Alternatives 1.51.  
Gayle Cimdins - Supports rapid transit.  
Michael Coad (oral testimony) - Supports rapid transit.  
Maureen Colby - Opposes rapid transit.  
Charles Cole - Opposes the Salt Lake Boulevard Alternatives.  
Lisa Costa - Supports rapid transit.  
W. Costa - Supports rapid transit.  
Buddy Costes - Accessibility 2.1.  
Alipio Cristobal - Supports rapid transit  
Winifred Curran - Community and Social Concerns 6.15.  
Michael Dauk - Supports the Kamehameha Highway Alternatives; Opposes the Salt Lake Boulevard Alternatives.  
Karen DeMello - Supports rapid transit.  
Robert DeMello - Supports rapid transit.  
Fay deNeeve - Supports rapid transit.  
Bernard (Jack) Denton - Aesthetics/Urban Design 7.10.  
Kurt Doane - Supports rapid transit.  
Gillian Dobb (oral testimony) - Supports rapid transit.  
Bert and Gale Dowdy - Support the Kamehameha Highway Alternatives.  
Cathy Espero - Supports rapid transit.  
Thomas and Doris Ferguson - Alternatives 1.18, 1.48, 1.49.  
Kevin Flannelly, Ph.D. - Patronage and Cost Effectiveness 15.5.  
Paul Francisco - Supports rapid transit.

Paul Franke - Supports the Kamehameha Highway Alternatives; Opposes the Salt Lake Boulevard Alternatives.

Mary Gasper - Land Use 5.7; Financial 12.18, 12.35.

D.E. Gately - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Orville Gilkerson - Opposes the Salt Lake Boulevard Alternatives.

Stratford Goodhue - Alternatives 1.8; Financial 12.12, 12.21.

Fredrick Grace - Supports rapid transit.

Roderick Graham - Supports rapid transit.

George Halles - Supports rapid transit.

Scott Hamilton - Patronage and Cost Effectiveness 15.14.

Alex Ho - Supports rapid transit.

Christopher and Audrey Hong - Supports rapid transit.

Nick Huddleston, AIA - Alternatives 1.33, 1.37, 1.41, 1.52, 1.54; Accessibility 2.10, 2.19, 2.24, 2.26; Community and Social Concerns 6.7, 6.9, 6.11; Aesthetics/Urban Design 7.1, 7.3, 7.10, 7.15, 7.18, 7.20; Noise and Vibration 8.2-8.4; Financial 12.25; Patronage 15.9

John Hughes - Supports rapid transit.

Keith Ishida - Supports rapid transit.

Steven Iversen - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Audrey Izumoto - Supports rapid transit.

Patricia Jagielski - Opposes Waikiki line.

Vicky Johnson - Supports the Kamehameha Highway Alternatives; Opposes the Salt Lake Boulevard Alternatives.

Jerry Kahookele - Supports rapid transit.

Alexander Kam and 23 others - Supports rapid transit.

Janet Kawelo - Alternatives 1.8, 1.13, 1.18, 1.53; Traffic and Parking 4.22; Financial 12.22.

George Kekuna, Jr. - Supports rapid transit.

Florence Kemp - Prefers Salt Lake Boulevard Alternative.

Willard Kemp - Prefers Salt Lake Boulevard Alternative.

Michael and Judy Kiczek - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Mike Kilian (oral testimony) - Traffic and Parking 4.27; Community and Social Concerns 6.20.

Robert Kithau (oral testimony) - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Jerry Kim - Supports rapid transit.

Denise Kimura - Supports rapid transit.

Phil and Pam Koehler - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Jim Koshi - Traffic and Parking 4.1; Community and Social Concerns 6.15; Aesthetics/Urban Design 7.19; Noise and Vibration 8.1; Miscellaneous 18.14.

Barbara Kuntz - Alternatives 1.20.

Larry Lamberth - Alternatives 1.42; Accessibility 2.24; Station Design 3.8; Patronage and Cost Effectiveness 15.11.

Dorothy Lavender and 308 others - Alternatives 1.22, Financial 12.43.

Rick Lee (oral testimony) - Accessibility 2.26.

Jim and Pat LeRoux - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Ron Lim - Supports rapid transit.

Ellery Limpahan - Supports rapid transit.

Janie Manning - Supports the Kamehameha Highway Alternatives; Opposes the Salt Lake Boulevard Alternatives.

Gimo Manuel - Supports rapid transit.

Cliff Marsh - Alternatives 1.20; Aesthetics/Urban Design 7.2; Financial 12.4; Patronage and Cost Effectiveness 15.14; Economics 17.8.

Pat Medeiros - Alternatives 1.22; Traffic and Parking 4.27, 4.34; Aesthetics/Urban Design 7.21; Noise and Vibration 8.17.

Anne Miller - Alternatives 1.8; Miscellaneous 18.8.

Joseph Monaco - Alternatives 1.18, 1.23, 1.46.

Clifford Morikawa - Supports rapid transit.



Kendrick Mun - Supports rapid transit.

Ronald Mun - Supports rapid transit.

Patrick Murata - Supports rapid transit.

Lyn Nakama - Supports rapid transit.

Francis Nalbach - Alternatives 1.8; Aesthetics/Urban Design 7.2; Financial 12.21, 12.28; Patronage and Cost Effectiveness 15.15.

Neighborhood Board No. 18, Resident (unsigned) - Supports rapid transit.

Philip Nixon - Supports rapid transit.

Mitsue Nouchi - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Jerry Numazu - Supports rapid transit.

Rob Oldnall - Supports rapid transit.

Richard and Tamiko Olson - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Mark Ono - Opposes the Salt Lake Boulevard Alternatives; Supports the Kamehameha Highway Alternatives.

Hanako Ozawa - Supports rapid transit.

Rosa Parales - Alternatives 1.20; Aesthetics/Urban Design 7.2; Construction 11.4.

Elaine Park - Supports rapid transit.

Rossi Peralta Patton - Supports rapid transit.

Janice Pechauer - Opposes the Salt Lake Boulevard Alternatives. Supports the Kamehameha Highway Alternatives - Alternatives 1.47.

Ronalyn Peralta - Supports rapid transit.

Sherry Perry - Alternatives 1.20; Financial 12.28.

Richard Pollock - Station Design 3.3; Traffic and Parking 4.26; Community and Social Concerns 6.15; Patronage and Cost Effectiveness 15.24.

J. Stephen Purnell (written and oral testimony) - Financial 12.17, 12.22, 12.32.

Martha Racoma-Lee - Supports rapid transit.

Sandra Ramos - Supports rapid transit.

Ursula Retherford (oral testimony) - Opposed to rapid transit; Supports TSM Alternative.

Earl Rodgers (oral testimony) - Alternatives 1.10.

Patricia Rodalich - Supports rapid transit.

Alice Ross - Supports rapid transit.

Ann Ruby - Alternatives 1.8, 1.19; Financial 12.23; Patronage and Cost Effectiveness 15.9.

Robert Schieve - Accessibility 2.2.

Helen Schlapak - Alternatives 1.22, 1.24.

Cliff Slater (oral testimony) - Accessibility 2.21; Traffic and Parking 4.22; Patronage and Cost Effectiveness 15.20.

Lois Slayter - Opposes the Salt Lake Boulevard Alternatives.

Jerry Souza (oral testimony) - Traffic and Parking 4.4, 4.32; Construction 11.5; Financial 12.10; Historic Sites and Parklands 14.3; Economic 17.5.

Ken Sprague (oral and written testimony) - Supports rapid transit - Accessibility 2.7.

Stewart and Nancy Stabley - Alternatives 1.22.

Edward Stewart - Alternatives 1.22; Traffic and Parking 4.34; Noise and Vibration 8.16; Economic 17.6.

Alfred Streck - Supports rapid transit.

Joseph Strona - Supports rapid transit.

Cecil Sult - Public Participation 13.1.

R.V. Taibbi - Alternatives 1.22.

Masa Taira - Supports rapid transit.

Jane Takara - Supports rapid transit.

Thomas and Shirley Takata - Noise 8.16.

Alice Takehara (oral testimony) - Supports rapid transit.

George Tamashiro - Supports rapid transit.

Ronald M. Tanaka - Accessibility 2.13.

Helen Tanigawa - Supports rapid transit.

Leanne Tanouye - Supports rapid transit.

Clarence Tsuzuki - Supports rapid transit.

Thomas Vines and 35 others - Alternatives 1.22, 1.45; Patronage and Cost Effectiveness 15.9.

Bob Vogland - Supports rapid transit.

Ted and Patricia Volberding - Opposes the Salt Lake Boulevard Alternatives - Alternatives 1.22.

Wallace Watanabe - Supports rapid transit.

James Watson (oral testimony) - Supports rapid transit.

David Welhouse - Alternatives 1.23, 1.34; Accessibility 2.1.

E. Alvey Wright - Alternatives 1.42.

Ronald Yamamoto - Supports rapid transit.

Sioux Yohe - Alternatives 1.20; Traffic and Parking 4.35; Community and Social Concerns 6.8; Aesthetics/Urban Design 7.2.

Judd Young - Supports the Kamehameha Highway Alternatives; Opposes the Salt Lake Boulevard Alternatives.

Ronald Young - Alternatives 1.22, 1.24.

In addition to the above commenters, the Oahu Metropolitan Planning Organization submitted the results of a survey they conducted and comments received. These comments have been responded to and are listed above according to the commenter.

## 7.5 COMMENTS AND RESPONSES - SDEIS

Note that a number of comments have previously been addressed in Section 7.4 which responds to public comments on the AA/DEIS. Where this occurs, the reader is referred in the response to a specific comment number within Section 7.4.

### 7.5.1 Alternatives

#### 7.5.1.1 TSM Alternative

Comment 1.1: The Hali 2000 report compares TSM, bus expansion, and heavy rail, fixed guideway alternatives using different assumptions than in the SDEIS. That report concludes that the TSM Alternative would be the best for increasing auto occupancy and transit ridership and decreasing traffic. The TSM Alternative assumed an expanded bus fleet and HOV lane improvements. Other measures such as doubling daily parking rates, increasing the efficiency of the existing transportation system, and ride sharing should be used to make the TSM Alternative in the AA/DEIS and SDEIS more objective. (City Council Member Morgado)

Response: As discussed in response to Comment 1.8 in Section 7.4, a consistent set of policy assumptions among alternatives was used to permit an objective comparison of different levels of transit investment. See also response to Comment 15.10 in Section 7.4 of this FEIS.

Comment 1.2: City Council Resolution 90-284, CD-1 states that the PE/FEIS phase will include a review and refinement of viable TSM options which will serve as the benchmark for the FEIS and the overall study. The FEIS should explain why this has not been done. (City Council Member Morgado)

Response: This FEIS includes a TSM Alternative with a refined examination of measures that provide for non-capital-intensive improvements in transit service, such as additional local and express routes and shortened bus headways. Other non-transit TSM measures are included as consistent with the Oahu Regional Transportation Plan (June 1991). An OMPO study of other TSM measures, including Transportation Demand Management measures, is also currently underway.

Comment 1.3: Increased bus transit productivity may not necessarily require the development of facilities as discussed on page 1-14. The operation of existing facilities may be changed to improve productivity. (City Council Member Morgado)

Response: The statement in this FEIS, Section 1.1.3, has been modified to reflect this comment.

Comment 1.4: The TSM Alternative does not seem to include the full costs of roadway improvements and facilities costs in the analysis. (Office of State Planning, Hawaii Department of Transportation)

Response: As noted in Section 2.3 of this FEIS, the costs of highway improvements in the Oahu Regional Transportation Plan (June 1991), including HOV improvements, are assumed constant for each alternative and are not included in the capital costs of any alternative.

#### 7.5.1.2 Amended LPA

Comment 1.5: The legend for Figure 2.9 should read "Waikiki Shuttle". (City Council Member Morgado)

Response: The figure has been modified accordingly. It should be noted that Figure 2.9 in the SDEIS is now Figure 2.8 in this FEIS.

Comment 1.6: The headways for all operating periods, not just peak periods, should be provided on page 2-23. Page 2-23 (third paragraph) appears to describe a "skip-stop mode". If so, this should be explicitly stated, and the stations to be skipped should be listed. The RFP for the System Contractor indicates that all trains should stop at each station on the route. The reasons for departing from the "normal operating mode" should be provided. The compliance of the skip-stop mode with other specifications in Section 5.0 of the RFP also should be addressed. (City Council Member Morgado)

Response: This FEIS has been modified to include headways for all operating periods. The operation described in Section 2.2.2.1 is referred to in technical jargon as a "skip-stop" operation, as noted in the comment. The "all stop" stations are listed; as noted in the text, the remaining stations are "skip-stop" stations. The RFP and Technical Provisions, as amended by Addendum No. 12, allow the System Contractor to propose skip-stop service; this was proposed by OTG. The use of an express skip-stop service mode has been incorporated in the patronage modelling efforts as the mode of operation during the peak period. The peak periods are defined as 6:00-8:00 a.m. and 3:00-6:00 p.m. The reason for the proposal to use the skip-stop service mode is to increase the average transit vehicle speed over the route. This reduces both the round trip time for the trains and the travel time for the passengers. By decreasing the round trip time for the trains, the efficiency of the fleet is increased, allowing the capacity of the line and system to be increased without increasing the fleet. This procedure benefits the passengers by providing a faster and higher capacity service without an increase in fleet costs.

Comment 1.7: Section 2.2.2.2 should include descriptions of the height of the guideway throughout the system and stations in each section. (City Council Member Morgado)

Response: This information can be found on the Plan and Profile Drawings in Appendix B to this FEIS.

Comment 1.8: We support the Nimitz Alternative for one or more of the following reasons: the guideway and station could be successfully integrated into the design of the Aloha Tower redevelopment; the system will provide better access to the waterfront; traffic along Nimitz Highway (the busiest downtown highway) will be reduced once people become accustomed to riding rapid transit; retailers in the Nimitz Highway area will benefit from the increased transit traffic; passengers using a Hotel Street alignment will overcrowd the sidewalks in that area; and, passengers will have a more scenic view of the waterfront with the Nimitz alignment than if they traveled in a Hotel Street subway alignment. (Byers, Nye, Honolulu Taxpayers for Traffic Solutions, Yokota, Stryker Weiner Associates)

Response: The Nimitz Highway alignment is included in the amended LPA.

Comment 1.9: What incremental improvement is provided by fixed rail relative to the next best alternative? (Environmental Center)

Response: Chapters 4.0, 5.0, and 6.0 of this FEIS present detailed information on the incremental differences between the amended LPA and the TSM Alternative. Information is presented on the differences in cost, ridership, and environmental impacts. The results are summarized in the Executive Summary in this FEIS.

Comment 1.10: An expansion of the discussion of benefits of the amended LPA in comparison to the other alternatives would be helpful. A more thorough discussion of land use, social, and system life benefits is essential. (Office of State Planning, Hawaii Department of Transportation)

Response: The entire document presents the comparison of the impacts of the amended LPA with the No-Build and TSM Alternatives. Land use and social impacts are thoroughly detailed in Sections 5.1 and 5.3 of this FEIS. A comparison of the amended LPA and TSM Alternatives which reflects the differing life

cycles of the alternatives is included in Section 6.3, Cost Effectiveness Analysis. Table 3.1 of the Capital Cost Results Report (December 1989) defines the assumed lifetimes for the various components.

#### 7.5.1.3 Other Alternatives

Comment 1.11: Carpooling, ridesharing and use of HOV lanes would be more effective in reducing traffic congestion than a rapid transit system. (Cowan, Waikiki Residents Association)

Response: Opinion noted.

Comment 1.12: The SDEIS indicates that the Hotel Street alignment was dropped because engineering studies showed that subway construction would be unaffordable. A statement should be included in the upcoming FEIS as to why the geotechnical conditions were unknown since the 1982 Federal EIS for the previous HART alignment selected the Hotel Street subway. (City Council Member Morgado)

Response: It should be recognized that the HART alignment proposed a shallower alignment which would have required more property acquisition than the alignment in the AA/DEIS. The geotechnical borings taken for HART were not sufficiently deep to reveal all the conditions discovered more recently.

Comment 1.13: What would be the economic impacts of subsidizing private operators by \$1 per passenger trip for non-fixed rail alternatives during rush hour? This option may incur only a small fraction of the cost of fixed rail. Financing the subsidy with a user-charge on use of congested arteries during rush hours would further reduce the net public expenditure to zero. Is it feasible to stop the present subsidy system for parking? How do proposals to provide computerized coordination for mini-vans and small (e.g. \$40 per passenger month) subsidies for mini-buses compare to the proposed project? Is the idea of implementing rush hour user fees administered by remote sensor devices and monthly statements sent for collection a practicable option? How is the proposed rapid transit system more effective than the many privatized programs that have already been suggested? How do the costs and benefits (environmental included) of rapid transit compare with a combination of existing programs and those suggested above? (Environmental Center)

Response: The comment addresses many possibilities for strategies for getting people out of their automobiles and into transit or other shared-ride modes. All of the measures would be supportive of rapid transit but unless they are done to a very substantial (and politically difficult) degree, they would not be replacements for it. If people are to leave their cars they must have an alternative that is convenient and fast. In all likelihood, more buses, mini-vans, or other such vehicles would continue to be subject to ever increasing traffic congestion. Many of the suggested policies will be considered as supporting measures to a rapid transit system. See also the response to Comment 1.8 in Section 7.4 of this FEIS.

#### 7.5.2 Station Design

Comment 2.1: Figure 5.31 of the SDEIS shows an elevated mezzanine at the Makalapa Gate Station leading to an at-grade access structure inside the existing Naval Station security fence. Design drawings for the Makalapa Gate and Arizona Memorial Stations must be reviewed and approved by the Navy to assure compliance with physical security requirements. (U.S. Department of the Navy)

Response: Design drawings for the Makalapa Gate and Arizona Memorial Stations will continue to be reviewed with the Navy to assure that they comply with physical security requirements.

Comment 2.2: Will the Makalapa Gate and Arizona Memorial Stations be landscaped? If so, the landscape irrigation water requirements, the anticipated source of irrigation water, and the effect of these demands on the local area water system need to be addressed in the EIS. What are the anticipated water

and sewer sources and quantities needed for the restrooms/maintenance rooms of these two stations? (U.S. Department of the Navy)

Response: The stations will be landscaped. Landscaping at the Makalapa Gate Station will be maintained using a 24-inch water supply main on the makai side, and parallel to, Kamehameha Highway. There is also an 18-inch sewer line near the centerline of Kamehameha Highway. At the Arizona Memorial Station, there is a 24-inch water supply main on the makai side of, and parallel to, Kamehameha Highway. There is also a 24-inch sewer line on Kalaloa Street perpendicular to Kamehameha Highway. These will serve as sources for the two stations. The actual quantities of water and sewer requirements have not been calculated at this stage of design; however these requirements for both stations will be relatively low. Landscaping at the Makalapa Gate will be minimal, given site constraints. The landscaping materials at both stations will be selected to minimize irrigation requirements. Both stations will have a janitor closet and an employee restroom containing one toilet. These facilities will not be accessible to the general public except in cases of emergency.

Comment 2.3: The design of the Arizona Memorial Station should take into account the location of the nearby fuel pipelines owned by Chevron and Hawaii Independent Refinery Inc. (U.S. Department of the Navy)

Response: The most recent utility drawings show that a 10-inch fuel line beneath the center of, and parallel to, Kamehameha Highway has been abandoned.

Comment 2.4: Grade-separated pedestrian access from both sides of the highway must be provided at the Makalapa Gate, Nimitz/Smith, and Nimitz/Fort Stations. (Office of State Planning, Hawaii Department of Transportation)

Response: The Makalapa Gate, Nimitz/Smith, and Nimitz/Fort Stations are designed to accommodate station access from both sides of Kamehameha and Nimitz Highways. For the Nimitz/Smith and Nimitz/Fort Stations, future makai station entrances will need to be located and designed in conjunction with planned waterside redevelopments. At the Makalapa Gate Station, any future mauka station entrance will need to be coordinated with the Navy's future plans for the lands on the mauka side of Kamehameha Highway.

Comment 2.5: Waiawa Station access needs to be improved by implementing freeway and local road improvements. (Office of State Planning, Hawaii Department of Transportation)

Response: Access improvements, including new ramps to the H-1 Freeway and Kamehameha Highway and local access roadways are being planned as part of the Waiawa Station and maintenance and storage facility.

### **7.5.3 Traffic and Parking**

#### **7.5.3.1 Traffic**

Comment 3.1: Data in the AA/DEIS clearly shows that the fixed guideway alternative will not produce substantially greater transit ridership and traffic reduction benefits than the TSM Alternative. Even though the TSM Alternative is given harsher treatment in the SDEIS, this conclusion remains evident. Fixed rail will not significantly reduce auto traffic congestion when compared to the TSM Alternative. Why build an expensive rail system that does not offer a significant reduction in traffic impacts? (City Council Member Morgado, Committee on Sensible Transit, Souza)

Response: The amended LPA would attract 48,900 more daily transit trips in 2005 than the TSM Alternative. This increase represents an 18% increase above the TSM Alternative. The amended LPA would also lead to reductions of more than 11% in peak hour, peak direction traffic volumes at key screenlines as compared to the TSM Alternative.

In addition, reducing traffic congestion is just one of many transportation-related goals and objectives of the City, State of Hawaii, Oahu Metropolitan Planning Organization, and Federal Transit Administration which are supported by the proposed rapid transit alternative. These goals are described in Section 1.1.2 of this FEIS.

Comment 3.2: The highway noise analysis indicates that because there are only slight differences in traffic volumes among the three alternatives being considered, the traffic noise impact is expected to be insignificant. The statements on traffic volumes should be included in Section 4.2.1 concerning highway congestion impacts. (City Council Member Morgado).

Response: Sections 4.2.1 and 5.6 of this FEIS have been revised appropriately. Note that the term "insignificant" varies in the discussion of traffic volumes relative to noise impacts and to traffic impacts. For example, a doubling of traffic volume normally results in only about a 3 dBA increase in noise levels. However, a doubling of the traffic volume can result in significant traffic impacts.

Comment 3.3: The City should publish projected screenline traffic impacts for 2005 with and without rail transit. These have already been calculated as part of the Hali 2005 study. (Committee on Sensible Transit)

Response: Tables 4.12 and 4.13 in this FEIS include this information.

Comment 3.4: The EIS should include an analysis of the benefit of the rail project to auto travelers who will also pay for the project. (City Council Member Morgado)

Response: This information is contained in Sections 1.1.2, 4.2.1, and 5.1.5 of this FEIS.

Comment 3.5: The Service and Patronage Impacts and Results Report has not been completed. Without this report, the public is unable to adequately comment on the SDEIS. (City Council Member Morgado)

Response: Opinion noted. The original draft of the Transportation Impacts Results Report (July 1992) was prepared in February of 1992 and reviewed in detail with the FTA Peer Group Review Panel on February 10-12, 1992. Following this meeting, revisions were made to the document as a result of recommendations made by the panel and in response to modifications in the engineering design of the system (i.e., changes in alignment, station location, etc.). All of the key findings and conclusions included in this draft report were presented in Chapter 4.0 of the SDEIS. The final report was completed in July 1992 and the key findings and conclusions have been presented in Chapter 4.0 of this FEIS. Copies have been furnished to the City Council.

Comment 3.6: The FEIS should assess the impacts of the traffic generated in the area of Ala Moana Center as a result of the rapid transit project. A specific evaluation of the traffic and its impact on Kona Street should be assessed. (Ala Moana Center)

Response: Traffic impacts near the station locations are included in Section 4.2.1.2 of this FEIS. More detailed discussion on this subject, including the street capacity analysis of Kona Street, is in the Transportation Impacts Results Report (July 1992).



Comment 3.7: Auto travel times under all alternatives should be provided for the following trips during the a.m. peak in 2005: Ewa (Kapolei) to Downtown; Waikiki to Downtown; Pearl City to Downtown; Ewa (Kapolei) to Waikiki; Pearl City to Ala Moana Center; Hawaii Kai to Downtown; Milliani to Downtown; and Windward Oahu to Downtown. (City Council Member Morgado)

Response: Additional information on traffic reduction has been added to Section 4.2.1.1 of this FEIS. As noted in the response to Comment 1.1 in Section 7.4, geographically specific details on traffic reductions are not generated by the travel forecasting methodology used in this study. Some information is available from OMPO's Hali 2005 study. However, this study used population, employment, and transit forecasts that are now outdated.

Comment 3.8: Traffic volume data and volume to capacity ratios across all screenlines in The Oahu Regional Transportation Plan (June 1991) should be presented for the amended LPA and the TSM Alternative. (City Council Member Morgado)

Response: Screenline volume forecasts are presented in Tables 4.12 and 4.13 of this FEIS. As the highway system assumed for all of the alternatives remains constant, the capacity at screenlines remains constant also. Therefore, it is possible to compare screenline traffic conditions between the amended LPA and TSM by analyzing the traffic volume only.

Comment 3.9: The discussion on page 4-14 of the SDEIS should be revised to state that the amended LPA reduces vehicle trips by only 1.1% as compared to the TSM Alternative and by 2.0% as compared to the No-Build Alternative. (City Council Member Morgado)

Response: Section 4.2.1.1 in this FEIS is sufficiently clear as written.

Comment 3.10: The expected reduction in traffic in the order of 5% should be substantiated or the statement should be deleted from the FEIS. (City Council Member Morgado)

Response: Please refer to Section 4.2.1.1 of this FEIS.

Comment 3.11: Table 4.13 of the SDEIS presents the change in annual vehicle miles traveled for the TSM Alternative and amended LPA. The method of calculation should be described. (City Council Member Morgado)

Response: The method of calculation is as follows: the number of passenger trips for the alternative is subtracted from the number of trips for the No-Build Alternative; the result is then divided by a 1.4 average daily auto occupancy rate to convert the number of passenger trips to auto equivalents. The result is then multiplied by the average trip distance for that alternative and the result is vehicle miles.

Comment 3.12: Table 4.14 of the SDEIS summarizes traffic impacts at certain intersections near rail stations. Traffic impacts should be included for intersections near the Downtown and Kakaako stations of the amended LPA. (City Council Member Morgado)

Response: Section 4.2.1.2 in this FEIS and Section 7.0 of the Transportation Impacts Results Report (July 1992) include the information requested.

Comment 3.13: Tables 6.10 and 4.4 in the SDEIS show different figures for average travel time savings. This discrepancy should be corrected. (City Council Member Morgado)

Response: The tables have been corrected in this FEIS.

Comment 3.14: Comparing the TSM Alternative to the amended LPA shows that the amended LPA will produce annual travel time savings of 8.5 million hours. However, in daily terms, this is not a significant amount. In addition, transit travel time alone is not sufficient to judge the time saving benefit of the amended LPA. No data are provided on the impact of the amended LPA on auto travel time. (City Council Member Morgado)

Response: On a daily basis transit travel time savings of 33,150 hours, or 7.3 minutes per trip, are estimated. Travel time savings for non-transit travelers cannot be reliably estimated due to limitations in the currently available highway travel forecasting methodology. The Council member's comments on significance of the travel time savings is noted.

Comment 3.15: Is light rail expected to reduce the traffic burden on side streets and trunk capacity? If so, will there be a concurrent reduction in noise and air pollution? (Environmental Center)

Response: As indicated in Sections 4.1.1.1 and 5.5.2 of this FEIS, the amended LPA will result in a small decrease in traffic congestion on both side streets and major arteries with the resultant improvement in air quality. The reduction in traffic will not cause a noticeable change in noise levels.

Comment 3.16: Section 4.2.2 should assess the traffic impacts of planned roadway access to the Waiawa Station through the Waiawa Interchange, i.e., movements to and from the H-1 and H-2 Freeways, Kamehameha and Farrington Highways, and Ala Ike Road. Present travel demands on the Waiawa Interchange already exceed original design capabilities. We urge a comprehensive and coordinated City/State/Federal effort to link all rapid transit and interchange/highway improvements for a functionally effective and balanced transportation system. (Leeward Oahu Transportation Management Association)

Response: Access to the Waiawa Station has been the subject of a separate traffic analysis. The major interchange improvements are not a part of this project. Adequate access is available without the improvements. The City will continue to coordinate with the State and Federal agencies about future traffic flow improvements in the vicinity.

Comment 3.17: Table 4.13 presents the expected change in annual vehicle miles for both the TSM Alternative and the amended LPA. Does the table consider the possible feedback effects of shifting from car to rail, such as the fact that off-peak hour drivers may switch back to peak hours due to the expected decrease in congestion? (Environmental Center)

Response: The table presents annual VMT. It does not present changes in peak hour VMT. It may be that if traffic congestion in the peak period is reduced, drivers now traveling in the off-peak times will go back to the peak hour.

Comment 3.18: The traffic flows in the SDEIS and the Waikiki Master Plan need to be coordinated and traffic impacts at key locations need to be evaluated. (Office of State Planning, Hawaii Department of Transportation)

Response: Additional traffic studies have been conducted as a component of the preliminary engineering efforts. The results of the studies are available in the Transportation Impacts Results Report (July 1992), available at the Department of Transportation Services, Office of Rapid Transit. The study has made use of the information in the Waikiki Master Plan. Key findings of the traffic analysis have been incorporated into this FEIS.

Comment 3.19: Additional explanation of Table 4.10, such as how auto trips are diverted to transit and vice versa, would assist in understanding transit's effect. (Office of State Planning, Hawaii Department of Transportation)

Response: A discussion of the diversion of auto trips to transit in the aggregate is contained in Section 4.2.1.1 of this FEIS. In general, trips are diverted to transit when the time and cost of the trip by transit is preferable to the time and cost of the trip by auto. Table 4.10 refers only to transit trips' mode of access to the fixed guideway station.

Comment 3.20: Vehicular traffic will not decrease in the neighborhood because bus traffic will increase, traffic to the park-and-ride facilities will be generated, and traffic associated with drivers not using the transit facility will continue. (McCully/Moiliili Neighborhood Board No. 8)

Response: Section 4.2.1.2 of this FEIS addresses vehicular traffic impacts.

Comment 3.21: Guideway supports in the highway median can affect traffic safety by obstructing sight lines to traffic signals and signs. Sight distance analyses are necessary to properly locate guideway columns and relocate median openings, signals, and signs. (Office of State Planning, Hawaii Department of Transportation)

Response: Comment noted. The above factors have been taken into consideration in the design of the fixed guideway. Support columns have been located considering provision of adequate sight distances along the alignment, preservation of access to properties, and minimizing other potential impacts. The typical column spacing of 180 feet results in fewer columns and, therefore, fewer impacts than are usually associated with aerial guideways.

Comment 3.22: If Kuilei and Kahuna Streets are used as accesses to the park-and-ride (entrance shown on Kuilei Street), significant traffic impacts on small, residential streets would result. Parking for local residents would be disrupted by on-street parking by park-and-ride users wishing to avoid paying parking fees or dealing with the traffic congestion at the park-and-rides. (McCully/Moiliili Neighborhood Board No. 8)

Response: Traffic to the 100-space lot would not cause an adverse impact on neighborhood streets. The park-and-ride lot would be free. The City would closely monitor the parking situation if this alternative location is selected for the University area park-and-ride lot. The University area park-and-ride lot is not part of the amended LPA. If rapid transit users are found to be parking in the surrounding area, mitigation measures such as residential permits would be adopted to eliminate the problem.

Comment 3.23: Widening at all of the Kamehameha Highway intersections appears necessary. Have the land acquisitions associated with these intersection widenings been considered? (Office of State Planning, Hawaii Department of Transportation)

Response: Minimal right-of-way is required along Kamehameha Highway. All right-of-way required, including any right-of-way for street widening has been identified and considered in the land acquisition costs. Section 5.2.1 presents the impacts of the amended LPA along this section of the route.

#### **7.5.3.2 HOV Lanes**

Comment 3.24: Section 2.2 should include the assumed bus speeds on HOV lanes as was done for the AA/DEIS. (City Council Member Morgado)

Response: This FEIS has been modified to include these data. Refer to Section 2.2.

Comment 3.25: Figure 2.1, showing the HOV network, appears to incorrectly designate a short segment of King Street, rather than Hotel Street, as a "transit mall". The figure should also designate a transit lane on Kalakaua Avenue through Waikiki. A description of the exclusive traffic lanes shown on this figure

should be included. If the exclusive traffic lanes are not substantially different from mixed traffic lanes, then this designation should be removed. (City Council Member Morgado)

Response: Figure 2.1 has been modified. See response to Comment 4.23 in Section 7.4.

### 7.5.3.3 Parking

Comment 3.26: The FEIS should discuss the rationale for adding the park-and-ride lot at the Lagoon Station since this was not included as part of the original LPA. The need for and the size of the facility should also be discussed. (U.S. Environmental Protection Agency)

Response: With the amended LPA choice of a Kamehameha Highway alignment rather than a Salt Lake Boulevard alignment, the park-and-ride lot at the Lagoon Station was added to facilitate access to the system for Salt Lake residents. Expected demand is discussed in Section 4.1.2 of this FEIS.

Comment 3.27: The FEIS needs to clarify which of the three University area park-and-ride lots would displace one business. The anticipated need for the parking spaces should also be discussed. The FEIS should indicate the preferred option and discuss the basis for the preference. We would discourage the location of the lot at the Oasis site because it would require the use of buses to shuttle passengers between the lot and stations. (U.S. Environmental Protection Agency)

Response: The Oasis Club site and the Varsity Theater site would each displace one business. Since the City has not concluded its study on the various sites and the University area park-and-ride lot is not included in the amended LPA, this FEIS does not indicate a preference; the City takes the EPA comment under advisement.

Comment 3.28: The number of spaces in each University area park-and-ride lot is few relative to those in the Waiawa, Aloha Stadium, and Lagoon lots. Each University area lot appears inadequate to serve the East Honolulu population. The Oasis property appears to be of questionable use since it is more than one-half mile from the station. (City Council Member Morgado)

Response: Comment noted. Regarding the Oasis Club property, a shuttle bus service would be provided. This is discussed in Section 2.2.2.2 of this FEIS. The University area park-and-ride lot is not part of the amended LPA.

Comment 3.29: Table 3.1 lists proposed commercial and high density residential projects. Changes to the parking requirements for the proposed projects should be addressed to complement the availability of and maximize use of the fixed guideway. (City Council Member Morgado)

Response: The City's parking requirements are established in the Comprehensive Zoning Code (CZC) which is established by Ordinance. The City Administration is eager to work with the City Council in reviewing the parking requirements for projects adjacent to rapid transit stations. It is agreed that changes to the parking requirements would complement the rapid transit system and be a positive impetus for desired development.

Comment 3.30: The FEIS should assess the impacts of mass transit on parking at Ala Moana Center, including the possibility of the parking area of the shopping center being used as a park-and-ride lot. (Ala Moana Center)

Response: The City and its System Contractor are working with the Ala Moana Center to minimize impacts to the Center's parking. The System Contractor will coordinate its construction schedule to maximize parking availability during heavy retail periods. Alternative construction access will be

addressed with the Center once all construction phases and consequences are known. During normal operations, the transit operator will be required to work with the Center security to develop parking management measures to discourage the use of parking at the Center for park-and-ride.

Comment 3.31: We disagree that there will be no adverse impacts from the proposed park-and-ride lots. Impacts will include noise, air pollution, and traffic congestion and interruption of flow. (McCully/Moiliili Neighborhood Board No. 8)

Response: The potential impacts of the park-and-ride lots are fairly reported in the SDEIS and in this FEIS. The proposed lots are small. There will be little noise or air quality impacts at the facilities. Some short-term traffic congestion could occur at the lots as patrons enter in the mornings and leave in the evenings. Access and egress, however, generally occurs before the morning peak traffic hours and after the evening peak. Therefore, impacts are minimized. See also response to Comment 3.22 above.

Comment 3.32: The taking of ten parking spaces along University Avenue will have a significant effect in the neighborhood, which is already known for problems caused by inadequate parking. (McCully/Moiliili Neighborhood Board No. 8)

Response: As noted in the SDEIS and this FEIS, the taking of the parking is an impact. This FEIS now reflects a loss of thirty parking spaces, as noted in Sections 4.2.3 and 5.1.2.6. The taking of the thirty spaces will be partially mitigated by the fact that the implementation of the rapid transit system, including a station in the vicinity, will provide an alternative to travel by personal automobile.

Comment 3.33: The proposed park-and-ride facility behind Varsity Theater would result in the creation of more parking demand than the area can provide. (McCully/Moiliili Neighborhood Board No. 8)

Response: This is one of three alternative locations under consideration for a University area park-and-ride. A lot at the Varsity Theater would have approximately 100 parking spaces. If this location is selected, the City will closely monitor usage at the lot. If the demand is greater than the supply at that location, alternative solutions will be developed. See also responses to Comments 3.22 and 3.31 in this section.

Comment 3.34: Approximately 400 public parking spaces will be developed near the Halekauwila/South Station for the Waterpark Towers project and about 500 public spaces will be developed near the Halekauwila/Ahui Station for the Kauhale Kakaako project. (Hawaii Community Development Authority)

Response: Comment noted.

#### **7.5.4 Land Use**

Comment 4.1: A convention center is being planned in or near Waikiki at a yet-to-be-determined location. The transit program should be designed to incorporate the convention center and the center's need to move large masses of people over a short time period (i.e., up to 15,000 persons over a two-hour period). (Waikiki Convention Center Authority)

Response: Extension of the fixed-guideway transit system into Waikiki has been removed from consideration.

Comment 4.2: Section 5.1.2.3 of the FEIS should include a discussion of the project's consistency with the State Land Use Law, Chapter 205, HRS, as amended. We recommend that the FEIS include maps which reflect the proposed project in relation to the State Land Use District Boundaries. (Hawaii Land Use Commission)

Response: Since the Hawaii State Plan encompasses the land use decision-making processes of state agencies, which includes the Administrative Rules governing the practices and procedures before the Land Use Commission, no direct reference is made to Chapter 205, HRS. As stated in Section 3.1.5.1, the rules and district regulations are consistent with the State Plan. And since the entire project is wholly within the urban land use district, and because the Development Map, which is adopted by the City, is consistent with the former, a State Land Use District Map is not provided.

Comment 4.3: Figures 3.3b, 3.8b, 3.10b and 5.29 should be revised by deleting the words "Naval Reservation" for the land located makai of the H-1 Interstate and between Rodgers Boulevard and Elliot Street. The State of Hawaii owns this land. (U.S. Department of the Navy)

Response: The figures have been revised appropriately. It should be noted that Figure 5.29 is now Figure 5.31b in this FEIS. The other figure numbers remain the same.

Comment 4.4: Why is the Makalapa Gate Station area impact circle "off-centered" while the other stations' impact circles appear to be "centered"? (U.S. Department of the Navy)

Response: The station circle has been adjusted for this FEIS.

Comment 4.5: The word "planned" should be deleted from the first sentence in the fourth paragraph on page 5-21 of the SDEIS. (U.S. Department of the Navy)

Response: The sentence has been revised.

Comment 4.6: Revise the easement land requirements needed for the Arizona Memorial and Makalapa Gate Stations, shown on pages S-28 and 5-21 of the SDEIS, to match those displayed on page 5-80. The information on page 5-80 more closely approximates the land required. The acreage of right-of-way/easement required for Pearl Harbor Naval Base, as shown in Table 5-8, should also be changed to 0.40 to match the requirement shown in Section 5.12.1.3. (U.S. Department of the Navy)

Response: These changes have been made in this FEIS.

Comment 4.7: Table 3.1 lists a second University of Hawaii parking structure proposed for development. The FEIS should discuss the parking structure's impact on transit patronage, and the wisdom of the State in constructing a parking structure so near a transit station. (City Council Member Morgado)

Response: The development of a University parking structure is not a subject of this FEIS, although this project is being coordinated with the University.

Comment 4.8: Desirable land use impacts along the alignment will not occur without careful integration of the project with existing and proposed developments. Measures to enhance benefits of proposed developments should be discussed. (Office of State Planning, Hawaii Department of Transportation)

Response: The system has been designed to service major existing and proposed activity centers to provide the maximum benefits to the maximum number of patrons. Station locations have been selected with such activity centers in mind. The Executive Summary addresses ongoing coordination with agencies and others responsible for existing and proposed developments. Section 5.1 of this FEIS discusses measures to enhance benefits of proposed developments.

Comment 4.9: The following State agencies should be included on the list on page S-29: Aloha Tower Development Corporation (Aloha Tower), Department of Accounting and General Services (Aloha Stadium, Pearl City Health Center, and Liliha Civic Center), Department of Land and Natural Resources (Keehi

Lagoon), University of Hawaii (Leeward and Honolulu Community Colleges). (Office of State Planning, Hawaii Department of Transportation)

Response: This FEIS has been revised to reflect this comment.

Comment No. 4.10: The amended LPA would require various amendments of the Kakaako Mauka Area Plan. In particular, the transportation plan would need an amendment to reflect the rail alignment. Other amendments may be required to integrate the rail structures and stations with local and view corridor streets and to establish design criteria to minimize potential incompatibilities with adjacent development. (Hawaii Community Development Authority)

Response: The City will coordinate with the Hawaii Community Development Authority to ensure that the appropriate amendments are procured in a timely manner.

#### **7.5.5 Community and Social Concerns**

Comment 5.1: Victoria Ward Ltd. and other small property owners would be devastated by the taking of their property for the proposed Concert Galleria development. The EIS should assess the impacts of this development. (Tim Chow, Planning Consultant)

Response: The City has not chosen to exercise the Concert Galleria proposal from the System Contractor at this time, and thus the proposal is not part of this FEIS.

Comment 5.2: Some proponents of the fixed guideway contend that the system will prevent "urban sprawl" and others contend that it would induce additional development in urban Honolulu. These contentions are not supported by statements in the SDEIS which indicate that the system would be unlikely to result in changes in the amount of or overall trend of existing or planned development in the region. Section 5.1.1 of the FEIS should include a statement that the fixed guideway will not prevent urban sprawl and will not induce additional development in urban Honolulu. (City Council Member Morgado)

Response: The regional land use impacts of the amended LPA are adequately and explicitly described in Section 5.1.1 of this FEIS. This FEIS makes no claim regarding "urban sprawl".

Comment 5.3: Some rapid transit system proponents contend that the stations will promote new development. This is not supported by statements in the SDEIS in Section 5.1.3. Likewise, certain proponents contend that the system will have a beneficial impact on socioeconomic trends and distribution. Section 5.1.2.5 refutes this. The FEIS should include statements explicitly indicating that the stations would not promote new development and that the system would not have a beneficial impact on socioeconomic trends and distribution. (City Council Member Morgado)

Response: The station area impacts of the amended LPA are adequately and explicitly described in Section 5.1.3 of this FEIS. Section 5.1.2.5 of this FEIS reiterates that the system will not have a substantive long-term impact on socio-economic trends and distribution. Further discussion of economic impacts also is included in Section 5.1.5 of this FEIS.

Comment 5.4: Page 5-3 of the SDEIS discusses purchases of land (including acquisition of small businesses) for the aerial guideway in areas where it would remove one or more constraints to development. Land not required for the fixed guideway and stations would be sold or leased at the current market value and thus available for development. The legal and ethical propriety of acquiring by condemnation more land than necessary for public transit use and then reselling the excess for private development should be assessed. (City Council Member Morgado)

Response: Where acquisition of a portion of a parcel as project right-of-way destroys the viability of an existing business on the parcel, the entire parcel must be acquired. Remnants of parcels acquired in this fashion are typically resold if they can be packaged into usable sizes.

Comment 5.5: Section 5.3.2 discusses impacts on bike lanes and trails. Contradictory statements occur because the SDEIS states that there would be no impacts. However, the SDEIS also discusses reductions in roadway lane widths along Dillingham Boulevard and University Avenue and states that the bike lane along Nimitz Highway would either be relocated to the makai side of that street or rerouted. (City Council Member Morgado)

Response: Section 5.3.2 in this FEIS has been modified appropriately.

Comment 5.6: Our agency has oversight responsibility for ensuring that proper relocation assistance is provided to displaced persons and businesses. We request a copy of the relocation assistance plan for our review. (Hawaii Housing Finance and Development Corporation)

Response: A copy of the relocation assistance plan will be sent to the Office of Hawaii Housing Finance and Development Corporation for your review.

Comment 5.7: The park-and-ride lots to be provided in Alternatives 1 and 2 should be verified with the affected landowners. These facilities are an integral component and should be confirmed as viable options/locations. (Hawaii Housing Finance and Development Corp.)

Response: The park-and-ride lots provided in Alternative 1 (No-Build) are only those either existing or under construction at the time of the AA/DEIS. The park-and-ride lots provided in Alternative 2 (TSM) are identified in the FY 1992 Short Range Transit Plan as the future planned bus related facilities to be available prior to 2005.

Comment 5.8: The FEIS should discuss the liability of the D/E Hawaii Joint Venture (owners of Ala Moana Center and adjacent properties) with relation to the fixed guideway system. Also, how and to what extent will ownership be compensated for losses resulting from the construction and impact of the Ala Moana Center Station? How and to what extent will ownership be required to contribute toward the system's development through additional taxes and assessment fees? (Ala Moana Center)

Response: The reference to liability is unclear. Ala Moana Center will not be liable for the rapid transit system. The City is working with the Ala Moana Center to develop a plan that will minimize impacts to the Center during construction. The plan for maintenance of traffic during construction will be coordinated with Ala Moana Center and other affected businesses. At the present time, the only additional tax would be the 0.5% GET surcharge.

Comment 5.9: The FEIS should indicate whether or not, and to what extent, Ala Moana Center ownership would be required to pay assessment fees for the rail station development. How, if any, financial consideration will be given to D/E (owners of Ala Moana Center) for losses resulting from disruption of operations, infrastructure damages, restrictions on immediate and future development plans arising from imposed limitations on our property development and easement rights, and encumbrances on our parking facilities. Failure to give notice to Ala Moana Center property ownership of the intent and impact of the mass transit to use private property on Kona Street for right-of-way and the restrictions and impact of that right-of-way on the use of private property should be discussed. (Ala Moana Center)

Response: No assessment fee has been enacted. Any such fee would have to be implemented by the City Council with appropriate public input. The City is in the process of negotiating with Ala Moana Center relative to the property needs in the vicinity of the shopping center. Any taking of property will be



accomplished following the provisions of 49 CFR, Part 24, Uniform Relocation and Real Property Acquisition for Federal and Federally Assisted Programs. The first step in that process is negotiating a fair price for the acquisition. Also refer to the response to Comment 5.8.

Comment 5.10: The FEIS should assess the impacts of the project on the number of shopper trips generated to and from Ala Moana Center. (Ala Moana Center)

Response: The number of daily arrivals and departures at the Ala Moana Center Station is shown in Table 4.10 of this FEIS. These include travelers directly destined for the Ala Moana Center as well as other travelers through the station who may be attracted as walk-by shoppers.

Comment 5.11: The FEIS should assess the impact on the number of buses that terminate at the shopping center on Kona Street and the transfer of the people to and from the businesses and the mass transit center and the transfer between the two. The number, frequency and amount of space required for people and buses should also be assessed. The impact on the use of property between Kona and Kapiolani for high-rise office buildings as currently zoned should also be examined. (Ala Moana Center)

Response: See response to the preceding comment. The rapid transit project may help reduce traffic due to the planned expansion of the Ala Moana Center. Rapid transit will provide an alternative to the automobile for many residents and visitors. The changes in bus traffic are discussed in Sections 2.2.2.1 of this FEIS. Table 2.5 of this FEIS shows the number of peak hour buses approaching the Ala Moana station site in comparison to the existing service. The reduction in buses using Kona Street bus stops, as well as a reduction in the number and duration of buses laying over is a positive impact on Ala Moana Center. The reduction in the number of buses can be expected to decrease the amount of space necessary for bus facilities such as stops, passenger waiting and loading areas and bus layover areas.

The Ala Moana Center Station is being designed to facilitate integration with the proposed mall expansion across Kona Street. Station entrances are being planned at both Kona Street Level and at the future mall level, thereby providing direct access to the shopping mall and any future developments mauka of Kona Street. Zoning of the site will not be affected.

Comment 5.12: The FEIS should assess the impact of the transit system on the current use of both the ground level of Kona Street and the air rights in Kona Street, as privately owned property. It is our understanding that D/E (owners of Ala Moana Center) retains grandfathered rights to build over the street. We would need clarification on this point, as we are presently being denied permission to utilize our property fully by building over Kona Street. The impact of the project on Ala Moana Center and adjacent properties, should the City plan to acquire Kona Street by eminent domain, should also be assessed. (Ala Moana Center)

Response: The City will continue to work with the owners to reach an equitable solution for the acquisition of all properties required for the project construction. The City will comply with all city, state, and federal requirements applicable to the acquisitions.

Comment 5.13: The FEIS should assess the impact of the transit system on both the above and below ground utilities on Kona Street. (Ala Moana Center)

Response: The construction of the amended LPA will affect both above and below ground utilities. The City and its System Contractor are presently working with all public and private utility agencies to mitigate these impacts and to determine appropriate measures for both temporary and permanent relocation. The City also is working with the Ala Moana Center expansion project architects to coordinate utility relocation.

Comment 5.14: The FEIS should assess the impact of the project on the Keeaumoku Street ramp which serves both Ala Moana Center and the Ala Moana Office Building. (Ala Moana Center)

Response: The current design of the proposed transit system will not affect the ramp.

Comment 5.15: The impact of development at station sites along the route should be addressed in more detail. (McCully/Moiliili Neighborhood Board No. 8)

Response: The discussion found in Section 5.1.3 of this FEIS provides an overview of the impacts in the areas of station development and additional detail can be found in the technical supporting document titled Environmental Impacts Interim Report (July 1989) as referenced in the Bibliography of this FEIS.

Comment 5.16: What is the basis for the assertion on page 5-4 of the SDEIS that "the proposed TSM Alternative or amended LPA would produce no substantive impact on the distribution or trends related to population, employment, housing or income characteristics of the Honolulu area or within the study corridor?" We recommend that Section 5.1.2.5 be expanded to include better descriptions of the environmental elements it describes and the basis of the determination of no substantial impacts. (Environmental Center)

Response: The statement on page 5-4 of the SDEIS is based upon the experience of many cities around the country that have implemented new rail systems. In and of themselves, transit investments in bus and rail systems have not been shown to have a significant impact in inducing changes in regional socioeconomic characteristics. Within the corridor, transit is only a part of the equation that could lead to a redistribution of population, employment, and other socioeconomic characteristics. The primary factor is the land use planning and controls established by the local government.

Comment 5.17: The park-and-ride facility at University Avenue and King Street would displace all of University Square and parking on South King Street and Kahuna Lane. Displacement impacts have been understated. (McCully/Moiliili Neighborhood Board No. 8)

Response: The displacement of the businesses at University Square has been included in the SDEIS and this FEIS. There will be some loss of on-street parking on both King Street and Kahuna Lane as discussed in Section 4.2.4 of this FEIS. It should be noted that the University area park-and-ride lot is not part of the amended LPA.

Comment 5.18: What is the legality of locating the Koko Head terminus station at the University of Hawaii Quarry? Hawaii Revised Statutes Section 304-4(a) states, "All lands, buildings, appliances, and other property so purchased or acquired shall be and remain the property of the University to be used in perpetuity for the benefit of the university." Our Board has been informed by the University administration that the "university purpose" restriction prohibits the University Board of Regents from permitting use of some vacant land (previously proposed for other uses) for any non-university purpose no matter how worthy the proposed purpose. The University obtained a legal opinion from the Attorney General several years ago that no elderly housing could be permitted on the vacant land without at least first having a concurrent resolution adopted by the Legislature. (Manoa Neighborhood Board No. 7)

Response: The location of the Koko Head terminus station at the University Quarry is consistent with the provisions of Section 304-4(a), Hawaii Revised Statutes. In a June 5, 1992 memorandum, City and County of Honolulu Deputy Corporation Counsel Gregory J. Swartz opined that Article X, Section 5 of the Hawaii State Constitution does not prohibit the placement of a rapid transit station on property owned by the University of Hawaii. The main purpose of such a rapid transit station would be to serve the students, faculty, and staff of the University and members of the community wishing to visit the University. Ridership projections for this station anticipate that virtually all riders disembarking at the station will do so for the

purpose of utilizing the University of Hawaii campus and facilities. In addition to providing better access to the Manoa campus, the rapid transit system will also directly link the Manoa campus with Leeward Community College, West Oahu College, and Honolulu Community College.

Comment 5.19: How is "Socioeconomic Trends and Distribution" defined in the context of this SDEIS? (Environmental Center)

Response: "Socioeconomic Trends and Distribution" as used in Section 5.1.2.5 of the SDEIS refers to, as further stated in the text, changes in the amount or pattern of population, employment, housing, or income. The current trends and distribution of these characteristics are discussed in Section 3.1 of this FEIS. The conclusion drawn regarding the relationship of the TSM Alternative or amended LPA to these "socioeconomic" areas is that there will be no significant change. This conclusion is based on the fact that, as stated in Section 5.1.2.2 of the SDEIS, "the impact of either the TSM Alternative or the amended LPA on land use at the corridor level would be to focus and reinforce existing land use development trends rather than promote new development or produce substantial land use changes. The location and rate of development and/or redevelopment within the study corridor is a function of the existing strong economy, market forces, and local planning policies and practices; these factors are and would remain, independent of the TSM Alternative or the amended LPA."

Comment 5.20: We do not want the University Avenue/King Street area to be merely a traffic corridor and location for major public facilities which are unsightly, dangerous, and of little benefit to its residents. We do not want the overall impact of the rail transit project to be more harmful than helpful to the community. (McCully/Moiliili Neighborhood Board No. 8)

Response: The City agrees. A rapid transit system that is unsightly, dangerous, and of little benefit is not desirable. The project will be none of the above. It is being designed to be an integrated part of the urban fabric of the community. Station locations have been selected to minimize impacts on the neighborhood and to provide convenient access to area residents. The system will be safe.

Comment 5.21: Residences next to the stations and the park-and-rides will be affected, including apartments on University Avenue fronting the station, the Moiliili Hongwanji Mission (which includes a pre-school as well as religious services), the KCCA Mother Rice Preschool, and the Moiliili Community Center. Impacts include traffic congestion, removal of on-street parking, and views. (McCully/Moiliili Neighborhood Board No. 8)

Response: This FEIS provides additional information regarding the impacts in the University area. A discussion of the impacts as a result of traffic can be found in Section 4.2.1.2. There will not be any noise impacts in this area that would affect noise sensitive receptors such as schools (with the possible exception of a ROTC classroom building) and churches as discussed in Section 5.6.2. The distinct views of the mountains will be partially obscured from certain vantage points along University Avenue. Also refer to the response to Comment 6.7 in this section.

Comment 5.22: We prefer the park-and-ride lot to be located at the Oasis nightclub site. (McCully/Moiliili Neighborhood Board No. 8)

Response: Comment noted. The University area park-and-ride lots are not part of the amended LPA.

Comment 5.23: The impacts associated with the electrical substation in the vicinity of University Avenue, mauka of King Street have not been addressed. (McCully/Moiliili Neighborhood Board No. 8)

Response: Section 5.6.7 of this FEIS discusses traction power substations (TPSS). The TPSS in the vicinity of University Avenue and King Street will be located makai of King Street near Kuilei Street.

Comment 5.24: The Halekauwila Option may be preferable to the Pohukaina Alignment because it could have less adverse business and cost impacts. We also support the side-of-the-street rail and transit station configurations proposed for the makai side of Halekauwila Street. (Hawaii Community Development Authority)

Response: Comment noted. The Halekauwila Option is now a part of the amended LPA.

Comment 5.25: The planning and design of the transit system should minimize potential impacts to the following development projects which have been issued development permits by our Agency: Waterpark Towers, Servco Commercial, Na Lei Hulu Kapuna Senior Housing, Kauhale Kakaako Mixed-Use Family, and the Majestic Plaza. Potential developments along the route, which have not been permitted, include the Pohukaina School and the HECO Kewalo Substation site. Development may also occur at the HECO power plant site. We will continue to work with the Office of Rapid Transit in the mitigation of adverse impacts of existing and future developments in Kakaako. (Hawaii Community Development Authority)

Response: Potential impacts to the proposed development in the Kakaako area have been assessed in the SDEIS and Section 5.1 in this FEIS. The City also intends to continue working with HCDA regarding the rapid transit program and its potential impacts to this area.

Comment 5.26: The amended LPA will affect an Air Force easement along Kamehameha Highway between Lehua Avenue and Radford Drive. The easement is for a portion of buried POL pipeline that runs from Waikakalaua POL Storage Annex to Hickam Air Force Base. (U.S. Department of the Air Force)

Response: Comment noted. The City intends to continue coordinating the plans for the rapid transit development with the Air Force regarding this issue.

#### **7.5.6      Aesthetics/Urban Design**

Comment 6.1: The photos of areas of Honolulu before and after rail construction, as shown on pages 5-73 and 5-74, understate the visual impacts of rail. These photos should be reconciled with those of the American Institute of Architects. (Committee on Sensible Transit)

Response: Depictions of the transit system in the SDEIS and this FEIS represent the actual scale of the proposed facilities. This FEIS offers no comment on the reliability of depictions prepared by others.

Comment 6.2: The fixed guideway aerial structure would block views of the mountains from many areas. The 70-foot elevation guideway crossing the H-1 Freeway near the University of Hawaii would mar the view of the mountains surrounding Manoa Valley. (The Outdoor Circle)

Response: A small portion of the views will be affected. Visual impacts are discussed in Section 5.4 of this FEIS.

Comment 6.3: Section 5.4 should address near and far view impacts, with emphasis on mauka to makai views. More renderings are also necessary, especially in areas where the guideway crosses over freeway interchanges. (City Council Member Morgado)

Response: Visual impacts are discussed in Section 5.4 of this FEIS. Additional renderings have been included in this FEIS.

Comment 6.4: Some rapid transit proponents incorrectly contend that the Makai Viaduct will have adverse visual and aesthetic impacts similar to the amended LPA. The Makai Viaduct will not block views of the waterfront since it goes through industrial areas. The Nimitz alignment would have more adverse impacts.

According to the Oahu Regional Transportation Plan (June 1991), the Makai Viaduct will be constructed even if the amended LPA is approved; therefore, no argument can be made that the amended LPA will result in elimination of the Makai Viaduct and its negative visual impact. (City Council Member Morgado)

Response: This FEIS offers no assessment of the possible visual impacts of the proposed Makai Viaduct. It is not a part of this project.

Comment 6.5: The fixed guideway will adversely impact the visual quality of the Downtown area. Measures should be taken to minimize this impact. (Hawaii Dept. of Land and Natural Resources)

Response: To minimize visual intrusion and proximity effects, appropriate urban design elements will be incorporated into the station design. The guideway, although visible, has been designed to minimize visual impacts. The support columns will typically be 4 by 6 feet. The curved guideway shape, 25 feet in width, will be characterized by a uniform color and texture. Typical guideway units are designed to span lengths of 180 feet. Maximizing span lengths reduces intrusion of support piers along the alignment. Landscaping will be incorporated into the design of the amended LPA. Landscaping has been included in the cost estimate for the project. Interested City agencies and the public have been and will continue to be encouraged to review the proposed landscaping plans and provide input.

Comment 6.6: The FEIS should include photographic or computer generated montages for the significant views surrounding each station to better describe the visual impacts. The stations and their visual impacts should be described in more detail. (Environmental Center, Office of State Planning, Hawaii Department of Transportation)

Response: The stations are still in the design process with input from Community Advisory Committees. As a result of additional citizen input and input from other agencies as appropriate, such as the State Historic Preservation Office, the stations will be designed to be responsive to the aesthetic concerns of each neighborhood. From the narrative and the photographs in this FEIS, the visual impacts as the result of stations can be interpolated. For more detail refer to Sections 5.4 and 5.10 in this FEIS.

Comment 6.7: Visual impacts on views of the Koolau Mountain range, and views out the windows of apartment buildings fronting on University Avenue and Kapiolani Boulevard will be significant. The overpass at Isenberg Street and Kapiolani Boulevard will have adverse visual impacts on the view plane up Kapiolani Boulevard. The financial impact on condominium owners whose views will be adversely affected should be addressed. (McCully/Moiliili Neighborhood Board No. 8)

Response: Comment acknowledged. The guideway and stations will introduce a significant visual element to the streetscape in all areas. The areas adjacent to residences are more sensitive to change. Although the financial impact to individual property values is speculative, the condominiums along Kapiolani Boulevard because of the height and location of most units should experience little change in value. A consideration is the possibility that transit accessibility to this area will increase values.

Comment 6.8: The effects of lighting along the guideway should be assessed. (McCully/Moiliili Neighborhood Board No. 8)

Response: There will be no general lighting along the guideway structure. Lighting will be installed along the emergency walkway in the center of the guideway. The lighting being considered consists of surface-mounted strip lighting that will be used only in an emergency. Lighting within stations and station sites will be designed to satisfy lighting requirements for patron safety and security and shielded to minimize light spill into adjacent areas.

### 7.5.7 Noise and Vibration

Comment 7.1: The 70 dBA maximum passby noise limit applied to the rapid transit project is too loud. (Kuliouou-Aina Haina Neighborhood Board No. 2)

Response: The 70 dBA criteria noted applies to single-family homes in residential areas and to multi-family homes in residential areas with low to average densities. The criteria used is based on widely accepted guidelines from the American Public Transit Association (APTA) and takes into consideration the "open-window" lifestyle of Honolulu.

Comment 7.2: We disagree with the SDEIS conclusion that the Kalihi-Kai Elementary School would experience no adverse noise impacts. The FEIS should assess the impacts of the fixed-guideway on Pearl City Elementary School. We request that noise abatement measures be required for both schools if decibel levels exceed the allowable Department of Health standards. (Hawaii Department of Education)

Response: Pearl City Elementary School will be located about 50 feet from the nearest fixed guideway centerline, resulting in an anticipated noise level of 70 dBA. At a distance of 44 feet from the track centerline, Kalihi-Kai Elementary School will be exposed to a noise level of about 71 dBA. APTA criteria, which have been widely accepted throughout the transit industry, recommend a maximum passby noise level of 75 dBA for schools. The Department of Health noise standards for schools, cited in Title 11 Chapter 43, apply to noise levels from highways or freeways and do not refer to noise levels from rapid transit sources. It should also be noted that it is unlikely the operation of the trains would exceed the State's noise standards for any of the zoning districts cited in that chapter. If it is found that noise levels at the schools do exceed the noise standards specified for their zoning districts, then mitigation will be provided to meet the criteria. See also the response to Comment 8.14 in Section 7.4 of this FEIS.

### 7.5.8 Ecosystems

Comment 8.1: It would be desirable to design a transit structure along Kapiolani Boulevard which requires minimum pruning to preserve the integrity and basic character of the monkeypod trees. (Honolulu Department of Parks and Recreation)

Response: See response to Comment 9.1 in Section 7.4 of this FEIS.

Comment 8.2: We are concerned about the loss of many mature trees along Kapiolani Boulevard, Kalakaua Avenue, and Dillingham Boulevard. (The Outdoor Circle)

Response: See responses to Comments 9.1 through 9.5 in Section 7.4 of this FEIS.

### 7.5.9 Hydrology/Water Quality

Comment 9.1: The proposed portion of the alignment traversing Moanalua Stream is located within the State Land Use Conservation District. We recommend contacting the Department of Land and Natural Resources (DLNR) regarding the proposed development. (Hawaii Land Use Commission)

Response: The DLNR has received copies of both the AA/DEIS and SDEIS for review. The DLNR has provided comments regarding the proposed development. Their comments are summarized in this Chapter 7.0. Continuing coordination with the DLNR will occur as the project develops. See response to Comment 9.3 in this section.

Comment 9.2: Note that any bridge or other construction that will entail activity in stream bottoms or banks will require a Stream Channel Alteration Permit. (Hawaii Department of Land and Natural Resources)

Response: Comment noted.

Comment 9.3: The amended LPA appears to be within the boundaries of the State Land Use Urban District. However, we are unable to confirm the exact location of the alignment relative to Conservation District land because a State Land Use Zoning map was not included in the SDEIS. Any new, greater or different land use activity proposed in the Conservation District will require a Conservation District Use Application. (Hawaii Department of Land and Natural Resources)

Response: Comment noted.

Comment 9.4: The third sentence in the first paragraph of Section 3.8.2 (Groundwater) needs to be clarified. (U.S. Department of the Navy)

Response: A portion of this sentence was inadvertently omitted in the SDEIS. This sentence has been revised for this FEIS.

Comment 9.5: Please omit the word "supplemental" from the last sentence of the last paragraph of Section 3.8.2 (Groundwater). (U.S. Department of the Navy)

Response: This FEIS has been revised to omit the word "supplemental."

Comment 9.6: Please revise the paragraph in Section 5.13.4.1 (Water Quality) which discusses the gasoline spill at the Navy Ewa Drum Storage Site. (U.S. Department of the Navy)

Response: The paragraph has been revised in this FEIS and now appears in Section 5.8.1.

Comment 9.7: We recommend the FEIS identify preliminary mitigation measures being considered to prevent contamination of the sole-source aquifer. (U.S. Environmental Protection Agency)

Response: As noted in the comment, the project is located within the area designated as the Southern Oahu Basal Aquifer (SOBA). Potential impacts are addressed in Section 5.8.2 of this FEIS. The primary area of concern is the Navy Ewa Drum Storage Site. Potential sources of contamination are run-off from paved surfaces (vehicle washing, solvents, grease, oils) and new underground storage tanks for fueling ancillary vehicles. While the final mitigation measures will be developed during final design, the following are under consideration: retention of stormwater run-off; on-site treatment of run-off prior to discharge; use of oil/water separators; RCRA compliance for the new USTs; and installation of impervious linings beneath the USTs. Mitigation will be coordinated with the EPA. Section 1424 (e) approval will be obtained prior to construction.

Comment 9.8: Implementation of EPA's Proposed Guidance for Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters pursuant to Section 6217(g) of the Coastal Zone Re-authorization Amendments of 1990 should be considered for this project. (U.S. Environmental Protection Agency)

Response: Section 5.8.6 of the FEIS has been revised accordingly.

Comment 9.9: The list of Required Permits and Approvals on page S-35 of the SDEIS should be modified so that the reference to the Corps permit reads, "U.S. Army Corps of Engineers Permit for activities in waters of the United States". (U.S. Army Corps of Engineers)

Response: The text has been revised in this FEIS.

Comment 9.10: Page 3-45 of the SDEIS discusses wetlands. For jurisdictional purposes, the Corps of Engineers does not use the U.S. Fish and Wildlife Service National Wetland Inventory (NWI) shown in the SDEIS. Streams are not considered wetlands, but are considered waters of the United States, and a Corps permit would be required for work in these waters. This section of the SDEIS should reference the botanical surveys performed in undeveloped areas along the route. The survey identified only one underdeveloped area between Waiawa and Keehi Lagoon. This survey was coordinated with the Corps and, by letter dated July 19, 1989, confirmed that no wetland areas under Corps jurisdiction are found within the area to be affected by the alignment. As the project alignment and design are finalized, the applicant should continue to coordinate with the Corps to update jurisdictional determinations. The SDEIS should cite the coordination with the Corps of Engineers regarding the identification of wetlands subject to Corps regulatory jurisdiction. Discussions are ongoing between the Corps, Coast Guard and Federal Transit Administration regarding the possible designation of the Corps and Coast Guard as cooperating agencies in the FEIS, in accordance with CEQ procedures. (U.S. Army Corps of Engineers)

Response: The comment is noted, and the text has been revised in this FEIS. The City understands that the National Wetland Inventory maps provide general, corridor-level screening guidance only. As stated in this FEIS, the final position of guideway support columns will be determined during final engineering. However, at this time, it appears that there will be one wetland, subject to Corps regulatory jurisdiction, which cannot be avoided. The wetland area is associated with the Halawa Stream, and about 400 square feet would be affected. Any other stream involvement will occur within waters of the United States. As stated in this FEIS, additional field investigations have confirmed that Corps jurisdictional wetlands in the vicinity of the amended LPA alignment are present only at the Halawa and Waiawa Streams. However, at this time, there will be no direct involvement of the Waiawa Stream wetlands as a result of the project. The City intends to continue working with both the Corps and the Coast Guard regarding the rapid transit system construction and its potential impacts on these streams and wetlands. As guideway support placements are being finalized, jurisdictional wetlands determinations will be coordinated with the Corps.

Comment 9.11: Section 5.8.4 concludes that the alignment and station near the University of Hawaii, as well as the Halekauwila Option, were examined for presence of wetlands. None of the field surveys for these sites have been coordinated with the Operations Division for jurisdictional determinations. We recommend that the findings be confirmed with Operations Division, and the results be reflected in the FEIS. (U.S. Army Corps of Engineers)

Response: Jurisdictional determinations will be coordinated with the Corps.

Comment 9.12: The project will require a Department of the Army permit for the crossing of 12 streams. Discharges of dredged or fill material incidental to the construction of bridges across navigable waters, including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills may be considered permitted under the Corps nationwide permit program, provided such discharges have been authorized by the U.S. Coast Guard as part of their bridge permit, and provided that the applicant obtains a Section 401 Water Quality Certification from the State Department of Health. To the extent that plans are available at the time of finalization of the FEIS, the actual construction work in each stream should be described, its impacts identified, and the mitigative measures to be taken to minimize impacts on waters of the United States should be described. (U.S. Army Corps of Engineers)



Response: Comment noted. The actual construction work in each stream will be described, its impacts identified, and mitigation measures developed in coordination with the Coast Guard, Corps of Engineers, and the State Department of Health. These activities will occur as soon as subsequent, more detailed engineering has occurred so that stream-specific issues can be resolved.

Comment 9.13: The impacts on the stream that runs behind Hausten and Coolidge Streets and crosses Kapiolani Boulevard by Isenberg Street should be discussed. (McCully/Moiliili Neighborhood Board No. 8)

Response: Sections 5.8.1 and 5.13.5 of this FEIS discuss anticipated water quality impacts and mitigation measures. No impacts on the stream noted above are anticipated.

Comment 9.14: The flood hazard information presented on pages 3-45 and 5-52 is correct. (U.S. Army Corps of Engineers)

Response: Comment noted.

#### **7.5.10 Construction**

Comment 10.1: The FTA should consult with the Hawaii Department of Health (HDOH) in the design of a sediment discharge monitoring system, and the data collected should be entered into the STORET data base. (U.S. Environmental Protection Agency)

Response: See response to Comment 11.3 in Section 7.4 of this FEIS.

Comment 10.2: The FEIS should indicate whether the project sponsor has contacted HDOH to obtain a stormwater permit for the construction period. (U.S. Environmental Protection Agency)

Response: The City has contacted HDOH with regard to this requirement. See Sections 5.8 and 5.13.5 of this FEIS for additional information.

Comment 10.3: The FEIS should indicate what measures will be taken to minimize fugitive dust and runoff pollutants during construction. (U.S. Environmental Protection Agency)

Response: Sections 5.13.3 and 5.13.4 of this FEIS discusses measures to be taken.

Comment 10.4: Construction drawings should be submitted for our review and approval. The availability of water to the transit system's facilities will be determined when the building permits are submitted for our review and approval. When water is made available, the applicant will be required to pay our Water System Facilities Charges for source-transmission and daily storage. The 8-inch water main from Waipahu Street to the Leeward Community College was installed by the College; therefore, any proposed use of this main for the Waiawa maintenance and storage facility will also require approval from the College. The proposed facilities will be subject to our cross-connection control requirements prior to the issuance of building permits. Also, the on-site fire protection requirements for the transit system facilities should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department. (Honolulu Board of Water Supply)

Response: Comments noted. The drawings will be submitted. The City has established a Fire/Life Safety Committee, and the Honolulu Fire Department is a member of this committee. Coordination with the committee will continue as the project develops.

Comment 10.5: The FEIS should present the foundation requirements for the transit system and assess their impacts on the foundation strata used for supporting the Ala Moana Center and its currently planned expansion, as well as future expansion, and the impact on the other properties along Kapiolani Boulevard, including the Ala Moana Office Building and the Ala Moana Pacific Center. (Ala Moana Center)

Response: The supporting strata and foundation structures of the existing Ala Moana Center and neighboring properties will not be affected by the foundation requirements for the transit system. Preliminary design has considered, and is accommodating, the planned shopping center expansion. However, future undefined expansion projects will be restricted by the physical presence of the transit system foundation elements.

Comment 10.6: The FEIS should assess the vibration and noise impacts from construction activity on the Ala Moana Center. (Ala Moana Center)

Response: Construction noise and vibration impacts are discussed in Section 5.13.4 of this FEIS.

Comment 10.7: The impacts of the relocation of overhead power lines along University Avenue were not discussed. (McCully/Moiliili Neighborhood Board No. 8)

Response: Specific utility impacts and possible mitigation will be fully defined in the final engineering phase. Early coordination with all utility agencies has identified key conflicts, including overhead powerlines adjacent and crossing the elevated transit guideway. Relocation or replacement of these electric power distribution lines and service entries will be necessary by the construction of the transit system. The City and its Contractor will coordinate with each utility to minimize service disruption and will provide prior notification to adjacent properties.

Comment 10.8: The effect of the adverse geotechnical conditions in the University Avenue/King Street area on project costs should be provided. (McCully/Moiliili Neighborhood Board No. 8)

Response: A geotechnical engineering exploration report was prepared and supplied to the prospective system contractors to be used as a basis for the requested system design, supply, construction, and operation and maintenance proposals. This geotechnical engineering exploration report includes information pertaining to the geotechnical conditions in the vicinity of University Avenue and King Street. The selected system contractor has established a fixed price to build the entire guideway facility, based on the subsurface information presented in the geotechnical report.

## **7.5.11 Financial Evaluation**

### **7.5.11.1 Capital Costs**

Comment 11.1: The capital costs, including land acquisition, of each University area park-and-ride lot should be specified. Clarification should be provided on whether the capital cost of at least one of the lots is included in Tables 2.6 and 2.7 on page 2-57. (City Council Member Morgado)

Response: Tables 2.6 and 2.7 in this FEIS do not include the cost of a University area lot as none are a part of the amended LPA.

Comment 11.2: The FEIS should indicate the relocation costs for the University Quarry site buildings needed for the station and guideway and who will be responsible for the relocation costs. If the City is responsible, then it should be clarified whether these costs are included as "other project costs" in Table 6.5. (City Council Member Morgado)

Response: The cost is included as an "other project cost". Also see Section 5.2.1, Section VII in this FEIS.

Comment 11.3: The capital costs, discussed in Section 2.3, should include the additional \$6 million for station mezzanines (at Dillingham Plaza and Honolulu Community College Stations). A statement should also be included that the amended LPA's capital costs does not reflect change orders under the System Contract. (City Council Member Morgado)

Response: The capital cost estimate, discussed in Section 2.3, does not include the impacts of changes being examined in preliminary engineering, such as the estimated \$6 million cost increase for mezzanines or the estimated \$16 million cost decrease due to locating the alignment on Halekauwila Street rather than Pohukaina Street. The \$120 million contingency reserve, included in the cost estimate, is anticipated to be adequate to cover change orders occurring during PE, final design, and construction.

Comment 11.4: The cost to reconstruct, renovate, or replace fixed guideway components upon exhaustion of their useful lives should be discussed, even if such costs would occur after 2005. (City Council Member Morgado)

Response: It is recognized that there would be replacement costs for fixed guideway components after 2005 just as there would be the replacement costs for buses and bus facilities. Many of the components of the rail system have very long useful lives, in excess of 30 years. Rehabilitation and replacement costs, for the 40-year period 1998-2037 are estimated to be approximately \$74 million, in 1991 dollars.

Comment 11.5: Page 6-1 of the SDEIS indicates that other cost items are assumed to follow a 5% rate of inflation; however, Table 6.5 is based on a 4% inflation rate. This discrepancy should be clarified. (City Council Member Morgado)

Response: Table 6.5 in this FEIS has the correct footnote.

Comment 11.6: Page 6-4 indicates that the System Contractor's fixed price is "only subject to an inflation adjustment based on already defined indices". This is incorrect since the price is adjustable for change orders. (City Council Member Morgado)

Response: The statement in question refers to the System Contractor's fixed price for a fixed scope. If the scope is changed by change order, then the fixed price may be adjusted.

Comment 11.7: Table 6.1 should explicitly specify the amount of interest on bonds, the proceeds of which will be used to fund the capital cost. (City Council Member Morgado)

Response: The interest on bonds is not part of the capital costs. It is, however, included in the financing plan which is presented in Table 6.5 of this FEIS.

Comment 11.8: Tables 6.3 and 6.4 of the SDEIS present the capital costs and O&M costs of all alternatives in 1991 dollars. These tables should also present year-of-expenditure dollars. (City Council Member Morgado)

Response: For clarity, this FEIS presents comparisons among alternatives in terms of constant (1991) dollars and multi-year financial plans in terms of year-of-expenditure dollars.

Comment 11.9: Table 6.5 shows an ending cash balance of \$10.5 million. That amount is 0.51% of the fixed guideway's capital cost of \$2,066.67 million, inclusive of contingency reserve; or 0.55% of the fixed guideway's capital cost of \$1,925.62 million, exclusive of contingency reserve. The FEIS should indicate

whether the FTA considers that negligible cash balance sufficient for the amended LPA to qualify for a full funding agreement and advancement to final design and construction. (City Council Member Morgado)

Response: An updated capital financial plan is presented in Table 6.5 of this FEIS, which shows a larger ending cash balance.

Comment 11.10: Page 6-12 of the SDEIS discusses the magnitude of capital cost as a risk factor. The discussion should state that the system contract permits change orders and economic price adjustment, with no maximum percentage. Both may increase the capital cost. (City Council Member Morgado)

Response: See response to Comment 11.6 in this section.

Comment 11.11: Table 6.12 of the SDEIS should include similar data as provided in Table 6.19 of the AA/DEIS. Table 6.19 compares the capital and operating and maintenance cost per transit rider. (City Council Member Morgado)

Response: Similar computations may be made using the data in Table 6.11 of this FEIS.

Comment 11.12: The capital cost differences between the amended LPA and the TSM Alternative should be included in the FEIS. (City Council Member Morgado)

Response: Table 6.12 in this FEIS presents both capital and operating costs differences.

Comment 11.13: Section 5.2.1 of the FEIS should include the following information on the acquisition of the Navy Ewa Drum Storage Site at Waiawa and the exchange of the City's Sewage Treatment Plant (STP) site: the estimated payment by the City for the demolition and removal of facilities from the STP site; the estimated payment by the City for the construction of road access improvements and the Waiawa Stream bridge at the STP site; the estimated fair market value of the STP site after demolition and removal of facilities and completion of the road access improvements and Waiawa Stream bridge; the estimated cost to the City of removal and treatment of hazardous waste from the STP site, if necessary; and the estimated excess value of the Navy Ewa Drum Storage site in comparison to the sum of the value of the STP site and payments for demolition, removal, and improvements. The FEIS should also indicate whether the full cost to the City incurred by the transfer is included as "other project costs" in the amended LPA's capital financial plan set forth in Table 6.5. (City Council Member Morgado)

Response: At this time, an estimated cost to the City to be incurred by the transfer is included as an "other project cost". Many of the individual elements of the cost are not available at the present time. For example, the road and bridge improvements have not been designed yet. Appraisal work and the determination of the cost of remedial action is on-going. When available, the City Administration will present the information to the City Council. Note also that the Navy is responsible for removal and treatment of hazardous materials, regardless of the timing.

Comment 11.14: We question the operating cost projections. The comparison of buses to fixed rail fails to sufficiently factor in amortization and depreciation. The 10-year analysis failed to account for the fact that buses are typically replaced every 10-12 years while rapid transit components are replaced every 30-50 years. The rapid transit benefits are therefore understated in this context. (Environmental Center)

Response: Table 6.11 of this FEIS presents a comparison of annualized capital costs which reflects differing lifetimes for various transit components.

Comment 11.15: The financial analyses should be extended over a longer period than the 10-year capital cost recovery period because the system will have a much longer useful life than 10 years. (Office of State Planning, Hawaii Department of Transportation)

Response: Over the long term, financial requirements for operation and maintenance and bus capital expenditures can be expected to be a continuation of the patterns shown in Tables 6.5 and 6.6, although the mix of local and federal sources may change. In addition, as noted in the response to Comment 11.4 in this section, rapid transit rehabilitation and replacement costs, for the 40-year period 1998-2037 are estimated to be approximately \$74 million, in 1991 dollars.

Comment 11.16: The system's operating and maintenance costs should be included in the capital cost analysis so that the life cycle costs of the amended LPA can be compared to the life cycle costs of the other alternatives. (Office of State Planning, Hawaii Department of Transportation)

Response: O&M costs and financing are discussed in Sections 6.1.4 and 6.1.5.3 of this FEIS.

#### 7.5.11.2 Excise Tax Surcharge as a Revenue Source

Comment 11.17: The City Administration's general excise and use tax surcharge growth rates are projected to be much higher than the State Council of Revenues' growth rates. If the Council on Revenues' projections are applied to the financial plan presented in the SDEIS, the plan will fail. The FEIS needs to provide supporting documentation for using the high projected growth rates. The City Council has requested this information be provided so that the Council can review the soundness of the updated financial plan and provide timely comments on the SDEIS and FEIS. (City Council Member Morgado, Committee on Sensible Transit, Office of State Planning, Hawaii Department of Transportation)

Response: Section 6.1.5 of this FEIS presents a financial plan with a projected GET surcharge revenue stream which assumes slow economic growth in FY 1992 and FY 1993, limited economic growth in FY 1994 and FY 1995, and a return to a rate of 2% to 3% real growth in the late 1990s. The GET surcharge revenue forecast reflects the current economic cycle and is generally consistent with the projections of most forecasters of the Hawaii economy.

Comment 11.18: The Financial Plan in the SDEIS assumes an average annual yield from the one-half percent excise tax of \$172 million. Of this, Oahu residents would pay an average of about \$120 million per year, which would have to be based on the purchase of total goods and services amounting to \$24 billion - an average of some \$80,000 in taxable goods and services for each Oahu household. This seems unreasonable. (League of Women Voters)

Response: The City's revised Financial Plan, described in Section 6.1.5.1, assumes an average annual yield from the excise tax of about \$158 million, of which Oahu residents would pay an average of about \$102 million per year. In the first year of the tax, Oahu residents would pay about \$75 million. The City's analysis indicates that due to pyramiding of the GET the effective burden rate is 38% higher than the nominal rate. Thus, a nominal GET surcharge rate of 0.5% is an effective rate of 0.69%. Therefore, \$75 million in tax collections are generated by purchases of about \$10.8 billion in goods and services - an average of about \$32,000 per Oahu family in 1993 compared to estimated 1990 average family income of about \$47,000.

Comment 11.19: The FEIS should provide an analysis of the net cost of the GET surcharge, as offset by the tax credit, for various income levels. Our calculations show that the average Oahu household will pay \$408 annually for the rail system, not \$4 to \$15 as reported. The reasons for the differences in our calculations vs. the City's calculations are as follows. An increased excise tax applies to all businesses, not just retailers. Without a State tax credit to businesses, additional costs will pass to the consumer.

Tourists will pay between one-fourth and one-third of the added tax. By paying the balance, residents will pay more than tourists. As the State Legislature's 1990 Joint Conference committee Report No. 163 says, "The county government establishing the surcharge will receive the revenue, while the State will pay out the credit from State revenues." Whether the monies come from the General Fund, a borrowed source, or result in reduced public resources, they will ultimately be paid by the resident. (League of Women Voters)

Response: The comment refers to a \$4 to \$15 annual cost per Oahu household for the rail system. No such value is reported in the SDEIS. As discussed Section 6.4.3 of this FEIS, the additional tax burden per Oahu resident, for FY 1994, is estimated to be \$36, or about \$110 for the average household.

Comment 11.20: Table 6.5 includes a note indicating that the general excise tax surcharge growth rate averages 6.9%. That should be changed to 7.0% to more precisely reflect the rate of increase used by the City Administration. This table should also enumerate the interest on bonds, the proceeds of which are necessary to fund the guideway. (City Council Member Morgado)

Response: The footnote on SDEIS Table 6.5 was correct. The financial plan presented in this FEIS (Table 6.4) reflects different growth assumptions and identifies the total bond debt service which includes interest.

Comment 11.21: Page 6-12 discusses the "yield of dedicated excise tax" as a risk factor. The discussion should be revised to reflect the Council on Revenues' projections of March 16, 1992. (City Council Member Morgado)

Response: The March 16, 1992 projections are outdated. The financial plan has been developed making use of the most recent available projections. See response to Comment 11.17 in this section.

Comment 11.22: Amortizing the \$2 billion (\$1.7 billion in local costs converted to 1993 dollars) over a 10-year period, say at 8%, taxes would have to increase by about \$300 million per year to pay for local construction costs. Increasing the excise tax to 4.5% would provide only about one-third to one-half of this amount. Does this present a potential problem of insufficient revenue? If yes, how might this problem be solved? Maximum flexibility should be maintained (up to initial construction) so that the project can be terminated if it becomes apparent that costs will be higher than benefits. (Environmental Center)

Response: The rapid transit capital financial plan is presented in Section 6.1.5 of this FEIS (Table 6.4). The total capital cost of the rapid transit project (not just local cost) is approximately \$1.76 billion in 1991 dollars (see Table 6.1) and would be approximately \$1.9 billion in 1993 dollars and \$2.1 billion in year-of-expenditure dollars. With \$618 million from federal funds, this leaves a local capital cost of about \$1.5 billion. The half-cent excise tax increase is expected to generate about \$1.6 billion over its life. The costs versus benefits of the rapid transit system is one of the factors the City Council will consider in their deliberations when determining whether the project should proceed.

### **7.5.11.3 Other Revenue Sources for Capital Costs**

Comment 11.23: The discussion on page 6-2 regarding Section 3 Federal funds indicates that the Federal participation is also subject to an annual appropriation by the Congress. The following information should be added: the type, extent, and enforceability of any guaranty concerning the Section 3 funds which will be part of the full funding agreement with the FTA; the FTA's liability to the City should Congress fail to appropriate the funds; and the City's liability to the System Contractor should Congress fail to appropriate the funds. (City Council Member Morgado)

Response: The uncertainty of Federal appropriations is discussed in Section 6.1.5.4 of this FEIS. The Full Funding Grant Agreement represents a pledge on the part of the Federal Transit Administration to provide funding for the project and a pledge on the part of the City to complete the project. Nevertheless, funding under the grant agreement will be subject to the availability of appropriations. With regard to the FTA's liability outside the provisions of the grant agreement, FTA has no liability to the City. If the project proceeds even with Congress' failure to appropriate funds, the City's liability to the System Contractor will be payment for the work performed. If Congress' failure to appropriate funds results in the termination of an ongoing phase of the project, the City's liability to the System Contractor consists of the termination costs described in Special Provisions Section 14.0 of the System Contract.

Comment 11.24: Section 3035(w) of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) indicates that the Secretary of Transportation shall negotiate and sign a multi-year grant agreement with the City no later than April 30, 1992. A discussion should be included in the FEIS on the ramifications of the absence of the agreement. (City Council Member Morgado)

Response: In accordance with Section 1506.1(a) of the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA, the US Secretary of Transportation cannot make a grant for final and design construction until FTA issues a Record of Decision on the FEIS. Therefore, by law an agreement cannot be signed until the Federal environmental process has been completed. The failure to sign the agreement by April 30, 1992, will have no impact on the project.

Comment 11.25: The amended LPA is 16 miles in length. A discussion should be included in the FEIS on whether the ISTEA permits a fixed guideway of less than the 17.3 miles which is stipulated in Section 3035(w) of the legislation. (City Council Member Morgado)

Response: FTA's Record of Decision (ROD) will be based on the amended LPA contained in this document. The change in length is not an issue.

Comment 11.26: Discussion is not provided on benefit assessment districts to fund either capital cost or operating and maintenance cost. The City Administration's position should be specified on benefit assessment districts as a funding source for the fixed guideway's capital cost or operating and maintenance cost. (City Council Member Morgado)

Response: The various financing plans are discussed in Section 6.1.5 of this FEIS.

Comment 11.27: The City Administration's position should be specified with regard to increasing vehicle registration fees and fuel taxes to fund the fixed guideway's capital cost or operating and maintenance cost. (City Council Member Morgado)

Response: Section 6.1.1.2 of the SDEIS has been revised to also identify the Highway Fund revenues as a source to support O&M costs. See also the response to Comment 11.26.

Comment 11.28: The discussion on page 6-12 should specify that revenues from development of City properties are generally designated for deposit into the housing assistance fund pursuant to Section 6-31.3, Revised Ordinances of Honolulu 1990, as amended. That special fund is intended to provide affordable housing for low- and moderate-income families. As evident by the proposed use of the joint development revenues, a statement should be added that the City Administration considers the fixed guideway a higher priority than affordable housing. (City Council Member Morgado)

Response: Section 6.1.2.4 of this FEIS discusses several possible additional funding sources that the City Council may choose to use to pay for transit operations and maintenance. None of the candidate sources

is identified as committed to use for O&M. The amended LPA can be expected to benefit affordable housing by improving the accessibility of lower land cost areas to the urban core.

Comment 11.29: Page 6-12 indicates that \$68 million has been authorized by the ISTEA. The amount should read "\$618 million". (City Council Member Morgado)

Response: The FEIS section has been corrected.

#### 7.5.11.4 Operation and Maintenance Costs and Revenue Sources

Comment 11.30: A statement should be added to page 2-58 to the effect that, "In comparison to the No-Build Alternative, the operating and maintenance cost of the amended LPA would increase significantly, to about \$144.5 million. (City Council Member Morgado)

Response: The cost difference is clearly stated in Table 2.8 in this FEIS.

Comment 11.31: The TSM Alternative's operating and maintenance costs would be approximately \$4 million more per year than the fixed guideway alternative, according to the SDEIS. The "\$4 million" should be changed to "\$3.8 million" to more precisely reflect the operating and maintenance cost difference. (City Council Member Morgado)

Response: The appropriate number in this FEIS is \$5.1 million.

Comment 11.32: A 1987 UMTA (now FTA) publication indicates that, with regard to new start rail projects, after the system is built, agencies have found that their optimistic forecasts for costs could not be achieved. Faced with limited budgets, agencies have reduced service on feeder buses and bus routes. The results were reduced costs, but also reduced ridership. The FEIS should assess the impact which reduced bus service may have on transit ridership and operating and maintenance costs under the amended LPA. (City Council Member Morgado)

Response: Reduced bus service would result in lower transit ridership and lower O&M costs. The City is committed to providing the level of bus service, with attendant costs, as described in the FEIS. The amounts of reduction will depend on the amount of service cut and which routes were affected.

#### 7.5.11.5 Fare Structure

Comment 11.33: The farebox revenues are overstated. The fares would increase at 4% per year, and there would be no increase in the level of service. This conflicts with past experience because fare collections have declined despite a 13% increase in buses. Section 4.1.3 discusses farebox revenues. Based on the transit patronage and inflation assumptions, the adult and student single cash fares and monthly bus pass fares in 2005 should be specified. (Committee on Sensible Transit, City Council Member Morgado)

Response: From FY 1987 to FY 1991 farebox revenues increased 1.1%, while the number of buses increased 4.6% and the number of transit trips increased by 22.3%. This was mainly due to a decrease in the percentage of riders paying full adult fare, from about 29% to about 20% and an increase in the percentage of riders using a free elderly and handicapped pass from about 16% to about 20%. Recent fare policy changes are expected to change this trend and to reduce the use of elderly and handicapped passes by short-term visitors. If, however, there is a further decline in the percentage of full fare paying passengers, then proposed farebox revenues may be overstated. Similarly, if fare levels do not increase with inflation, as assumed, the proposed farebox revenues may be overstated. See also the response to Comment 12.42 in Section 7.4.



Comment 11.34: An explicit statement should be included on page 2-4 that the fares are assumed to rise with inflation. (City Council Member Morgado)

Response: The section in the FEIS has been amended to reflect that the fares are assumed to rise with inflation. Also see response to Comment 11.33.

Comment 11.35: The possibility of an increased fare of \$1.50 has been mentioned by the City. This would cause an additional burden to residents. (League of Women Voters)

Response: The FEIS assumes that fares will not increase as a burden to residents but that they will remain at the current level in constant dollars, rising only at the rate of inflation. See response to Comment 12.42 in Section 7.4.

#### **7.5.12 Historic Sites and Parklands**

Comment 12.1: Aloha Tower, Dillingham Transportation Building, and Mother Waldron Park are the historic properties having the most potential to be affected by the construction of the proposed guideway. We look forward to working with FTA to create a Memorandum of Agreement (MOA) to minimize impacts to these and other such properties. (Advisory Council on Historic Preservation)

Response: Comment noted. The MOA between the FTA, the Advisory Council on Historic Preservation, and the State Historic Preservation officer is included in Appendix A.3 of this FEIS.

Comment 12.2: The narrative on page 5-80 (Paragraph 5.12.1.3) should be changed to reference Figure 5-31 instead of Figure 5-40. (U.S. Department of the Navy)

Response: The reference has been changed to the correct one.

Comment 12.3: It appears that the picture descriptions displayed in Figures 5-42 and 5-43 have been inadvertently switched. (U.S. Department of the Navy, City Council Member Morgado)

Response: The graphics have been corrected for this FEIS.

Comment 12.4: The Executive Summary of the SDEIS omits the determinations of adverse effect on the visual corridor to Aloha Tower and the adverse effect on Mother Waldron Park. These two determinations were included in other portions of the SDEIS. (Hawaii Dept. of Land and Natural Resources)

Response: The Executive Summary has been revised in this FEIS.

Comment 12.5: The Moiliili Hongwanji and Moiliili Community Center should be added to the list of historic sites. (McCully/Moiliili Neighborhood Board No. 8)

Response: Neither of these structures qualifies for the National Register of Historic Places nor are they on the State's inventory.

Comment 12.6: It appears that the Table of Contents for Section 5.10, Historic and Archaeological Resources, of the SDEIS was mispagged. (U.S. Department of Navy)

Response: The FEIS Table of Contents has been revised.

### **7.5.13 Patronage and Cost Effectiveness**

#### **7.5.13.1 Forecasting Methodology**

**Comment 13.1:** The FEIS should list the following 1990 and 2005 data for each transportation district used in the trip tables: population, households, employment, retail and service employment, school age children, and hotel and resort condominium units. Most of this information is available in the Service and Patronage Forecasting Methodology. (City Council Member Morgado)

**Response:** The data are available in supporting documents to the FEIS, as noted. Tables 2.1 through 2.4 in the Service and Patronage Forecasting Methodology (March 1992) report provide summaries of Total Employment, Residential Households, Total Population, and Visitor Units for each transportation district. Visitor Units are the sum of hotel and resort condominiums. Total Employment includes retail and service employment. Projections of school age children are not available at the zonal or (therefore at the) district level.

**Comment 13.2:** The SDEIS indicates that the population and employment projections for 2005 are based on the State's series M-K projections. However, they are not the same forecasts. The FEIS and Service and Patronage Forecasting Methodology should clarify the agency making the projections used in the SDEIS and when the projections were made. If the projections were made prior to the national and State economic problems, they may be overestimated. (City Council Member Morgado)

**Response:** The projections used in this FEIS were, as indicated, an updated set of the Series M-K projections based upon the new 1990 Census data and State Department of Labor Statistics. These projections were developed in the fall of 1991. These projections reflect not only information available from the 1990 Census and recent labor statistics, but were developed shortly after the end of the Gulf War and in the midst of a recessionary period in the State, implying that the projections are the best currently available. Page 4 correctly states that the projections used in the FEIS were developed by the State of Hawaii (at the county level) and disaggregated below the county level by the City Department of General Planning.

**Comment 13.3:** The AA/DEIS used population for the growth factor in projecting home-based work trips and home-based other trips while the SDEIS used households. The use of households, rather than population, results in a substantially increased growth factor for home-based work trips and home-based other trips. (City Council Member Morgado)

**Response:** Application of growth factors to the 1991 On-Board Bus Survey represents the trip generation and trip distribution phases of the forecasting process, while the incremental logit technique is the modal choice component. In recent years, given the rather dramatic changes in household size and labor force participation rates, analysts have recognized that the household better represents the underlying unit of trip making behavior, rather than the more generalized indicator, population. In the development of future year trip tables, application of the production and attraction factors will never result in mathematically identical matrix totals. For the Home-Based Work trip purpose, the attraction total is used as the control total, while for Home-Based Other trips, the production total is used as the control. As a result, Home-Based Work trips which account for 36% of transit riders, are more sensitive to employment changes than household changes, and as indicated, the change in employment growth was the same in the AA/DEIS and this FEIS. The appropriate use of growth factor variables for each trip purpose was discussed at considerable length with FTA's Peer Group Review Panel. The panel supported and confirmed the use of households rather than population. It should also be noted that these growth factors apply to all alternatives examined. The differences among alternatives are therefore strictly a result of differences in the provision of service by each alternative. Further, it should be noted that decreases in population (i.e., decreases in household size) do not necessarily result in decreases in trip activity. In fact, households

with smaller household sizes but a larger number of employed residents will actually result in a higher level of trip making activity, particularly for the Home-Based Work and Non-Home Based trip purposes. This increasingly prevalent phenomenon further supports the choice of households rather than population.

Comment 13.4: The model assumes that the income and auto-ownership characteristics in 1991 will remain constant until 2005. That assumption may be incorrect. Transit riders have lower median income than all Oahu residents, according to the 1991 survey. Furthermore, a fairly substantial percentage of transit riders live in households which do not own autos. Thus, the rise in per capita income and, "consequently, auto ownership," is not favorable to transit ridership. (City Council Member Morgado)

Response: The assumption made in this FEIS, given the absence of household income and auto ownership projections, is that the relative proportion of households by auto ownership level will remain constant. The model uses the proportion of riders in each auto-ownership level (i.e., 0, 1, and 2+) to reflect differential behavioral response to service level and cost changes. The Transportation Impacts Results Report (July 1992) describes a sensitivity analysis of transit ridership to changes in auto ownership. This analysis found that the elasticity of the auto ownership variable ranges from 0.2 to 0.9, depending on the distribution of the growth in auto ownership across socio-economic strata.

Comment 13.5: No data appears to have been collected on trip generation rates per household. The 1991 survey does not request the information in the questionnaire distributed. Nor does it appear that a separate survey was taken during the PE/FEIS phase on trip generation rates of Oahu's households. (City Council Member Morgado)

Response: The use of households as the production variable in the Home-Based Work and Home-Based Other trip purposes does not assume any change in the trip-making rate per household in the future, but rather that the rate remains constant by auto ownership level. If a special Home-Interview Survey had been conducted it would not have provided any useful information beyond that available from the On-Board Rider Survey (in the base year). However, given the likely increases in income and auto ownership as outlined in Comment 13.4 above, overall person trip making levels may be underestimated.

Comment 13.6: The growth factor used in the SDEIS for home-based school trip production is based on population change. Numbers of school-age children would be a more appropriate factor. The statewide growth rate of school age children from 1990 to 2005 is estimated to be 7.3% while the projected Oahu's population growth rate is 11%. (City Council Member Morgado)

Response: The 7.3% growth in school age children cited in your letter is from the statewide M-K series projections. The projections apply at the statewide level and only for residents of the State. It is not known whether school age children per household varies by County, but on Oahu, a substantial number of school trips are made by University students who are not residents of the State. As indicated earlier, however, use of the population variable simply assumes that the number of school age children per capita remains constant over time. Although the statewide growth rate may be slower than that for population, it seems likely that in the growth areas of Oahu, the increase maybe greater than the constant rate assumed.

Comment 13.7: Pages 36 and 91 of the Service and Patronage Forecasting Methodology discusses network bus speeds. This discussion should be inserted into the FEIS and supplemented by specification of the estimated peak period bus speeds and running times through the Downtown links under each alternative. (City Council Member Morgado)

Response: The discussion of bus speeds is included in the Service and Patronage Forecasting Methodology (March 1992), as noted, and further discussion is included in the Transportation Impacts Results Report (July 1992). The bulk of the information has not been included in this FEIS. It was

decided that the importance of the information in decision-making did not warrant the inclusion of additional voluminous information in this FEIS.

Comment 13.8: Page 34 of the Service and Patronage Forecasting Methodology states that auto travel time is not considered in the patronage forecasting process. Transit patronage depends on many factors, including auto travel time because as auto travel time increases, transit riding becomes more attractive. However, the methodology assumes that future traffic congestion will result in increased bus travel time. Increasing bus travel time, while maintaining auto travel time, creates a bias against transit patronage under the TSM Alternative. (City Council Member Morgado)

Response: As noted, if degraded travel times for highway travelers were assumed, higher transit ridership forecasts could be expected, for all alternatives. If it could be reasonably assumed that highway travel times for all vehicles would remain unchanged, then assuming a decrease in speeds for buses only would adversely affect an all-bus alternative more than a bus-rail alternative. However, this is not the case. It is most likely that peak-period highway travel times for all vehicles will, on the average, decline by 2005. However, the unreliability of the regional highway travel modelling procedure does not allow this to be taken into account, resulting in a probable underestimation of transit riders for all alternatives. See Section 1.3 of the Transportation Impacts Results Report (July 1992).

Comment 13.9: Table 3.14 of the Service and Patronage Forecasting Methodology presents the validation of the forecasting model. The validation indicates that the model overestimates total transit patronage by 4.8%. The combination of the model's overestimation and high growth factors applied to suburban communities may result in over-projection of transit riders under all alternatives. No discussion is provided regarding whether the model was re-calibrated as a result of the validation. (City Council Member Morgado)

Response: As this question correctly states, boardings were slightly overestimated in the trip assignment (i.e. validation analysis). However, it is linked trips, rather than unlinked trips (or boardings) which are the basis for all the cost-effectiveness calculations (and the model was able to match accurately these totals as shown in Tables 3.9 through 3.13 of the Service and Patronage Forecasting Methodology (March 1992)). Although boardings are slightly overestimated, it also has no effect upon revenue since transfers are free. Some of the differences displayed in Table 3.14 are simply a function of the large number of alternative routing options available to transit riders. As a result, the model may incorrectly distribute riders among competing routes, but the total number of boardings is within less than 5.0% of the actual observed total. The model was calibrated to the actual number of linked trips (see Tables 3.9 through 3.13). The assignment of these trips to the network results in the comparisons shown in Table 3.14. Given the above discussion of significant opportunities for alternative routing, the final percent error of less than 5% is considered more than acceptable. The visitor trip calibration referenced was a linked trip comparison. The linked trip comparison obtained in Tables 3.9 through 3.13 was also in the less than 1% range.

Comment 13.10: The Service and Patronage Forecasting Methodology indicates that the direct generation model was used, instead of the incremental logit model, to estimate non-home based trips for the fixed-guideway alternative. The number of non-home based trips under the direct generation model and the number of "replaced" non-home based trips under the incremental logit model should be specified. (City Council Member Morgado)

Response: Estimates from the direct generation model "replaced" the estimates from the incremental logit model in the sense that the direct generation model was not used as an additive estimate. Particular care was taken in the application of the model to ensure that duplication did not occur.

Comment 13.11: Given statements made on page 3-24 of the 1989 Service and Patronage Forecasting Methodology issued with the AA/DEIS, induced non-home based trips under a direct generation model should also be calculated for the TSM Alternative. (City Council Member Morgado)

Response: The reference in the 1989 Service and Patronage Forecasting Methodology is to a unique provision of bus service that is highly visible and reflects service characteristics very similar to a rail system. The important implication here is that a fixed guideway system (including a busway) may attract induced non-home based ridership. While exclusive transit lanes improve the operational efficiency of the expanded bus system, they are not similar in service or characteristic to the service referenced nor to a grade-separated busway. The FTA Peer Review Panel also considered this issue and agreed that the direct generation model should only be applied to the amended LPA.

Comment 13.12: We question the reliability of the ridership projection. Why did OMPO use data from 1981 to estimate current ridership projections rather than extrapolating that data to accommodate changing assumptions? (Environmental Center)

Response: The ridership projections presented in the SDEIS and this FEIS were not prepared by OMPO nor did they use a 1981 base. The forecasts utilized 1991 transit data.

#### 7.5.13.2 Patronage

Comment 13.13: How can the transit ridership, with the Waikiki line eliminated and the Downtown area being served by a Nimitz Highway alignment, result in increases in rail ridership, total ridership, and fixed guideway trips to and from downtown when compared to the ridership forecasts presented in the AA/DEIS? In the Downtown area, most passengers would need to transfer an additional time to get to their destination. In addition, is it realistic to assume that tourists going from Waikiki to the Ala Moana Shopping Center would use the rapid transit system since they would only ride the system to the first stop (assuming that the tourists are shuttled from Waikiki to Kalakaua/Kapiolani Station)? The SDEIS indicates that future population and employment growth would be faster than previously anticipated. However, the State Economist has said that these projections are probably too high and that future ridership estimates may need to be revised downward. (League of Women Voters)

Response: The patronage forecasts for all transit alternatives in this FEIS are higher than comparable forecasts in the AA/DEIS. Increases for the alternatives range from 20% to 30%. Factors that led to the ridership increases include: the 1991 On-Board Bus Survey which added 10% to the baseline transit ridership; a revised survey structure which provided more useful data concerning trip purpose and mode of access; stratification of the transit market by auto ownership level; validation of the direct generation model for forecasting non-home based trip making on fixed-guideway transit systems; compilation of the 1991 Departing Oahu Visitor Survey to forecast changes in frequency and mode shares of visitor trips caused by changes in transit service; and the optimization of bus routing best to serve the transit riders for all alternatives.

The revised population and employment growth projections include the effects of growth that occurred between 1985 (the baseline year for the AA/DEIS forecasts) and 1990 (the FEIS baseline year). This growth amounted to a 16% increase in total employment and 3% increase in population from 1985 to 1990. The AA/DEIS used projections of 32% for total employment and 18% for population from 1985 to 2005. The revised projections used in the FEIS assume that total employment will grow by 16%, and population will grow by 11% between 1990 and 2005. These data show that growth has been faster than the State had predicted in 1985, but the revised projections assume that this growth will slow to an annual growth rate that is smaller than was projected in 1985. The SDEIS clearly stated the above explanation. The proposed alignment along Nimitz highway, with stations at Nimitz/Smith and Nimitz/Fort, provides convenient walk access to much of the downtown business district. Those passengers with destinations

beyond convenient walk access would transfer to a shuttle bus. Section 4.1.1 and Table 4.3 of the FEIS discuss this and show that there is a time savings for both walkers and shuttle bus riders when compared with existing service. Tourists traveling from Waikiki to Ala Moana Center would use the shuttles in Waikiki that are discussed in Section 2.2.2.1 and shown in Figure 2.7 of the FEIS. Each shuttle route provides access to Ala Moana Center Station and all but one route provides access to both Ala Moana Center Station and Kalakaua/Kapiolani Station.

Comment 13.14: How can Honolulu expect to have ridership of about 188 per 1,000 population when larger cities now have ridership in the range between about 10 and 26 per 1,000 population? (League of Women Voters)

Response: The 1991 On-Board Bus Survey indicates that Honolulu's current transit system (TheBus) carries over 240 daily riders per 1000 population. The patronage forecasts indicate that, systemwide, ridership will rise to 340 per 1000 population with the fixed-guideway alternative, 58% of whom will use the rapid transit system. The large existing ridership is the key factor that justifies the ridership projections in Honolulu.

Comment 13.15: The SDEIS indicates that bus ridership increased 9% over the last 5 years. The SDEIS should state that the ridership data used were estimates from two different surveys in 1986 and 1991 which are unrelated. The City's 1991 Short Range Transit Plan Update (SRTPU) shows no increase in ridership. The SDEIS also points to increased bus revenues between 1984 and 1990 as an indicator of increasing ridership. It fails to state that a fare increase occurred in 1985 which caused a one-year increase in fares collected and a decline afterwards. The SDEIS and SRTPU should be reconciled. (Committee on Sensible Transit)

Response: While the questions asked in the 1986 and 1991 on-board bus surveys were not the same, the sample sizes were similar and the sampling techniques used were identical or similar. Ridership figures in the SRTPU are calculated using a formula which was developed in 1982 and is dependent upon fare revenue based on the conversion factors developed in 1982. The relationship between fare revenue and ridership, however, can fluctuate with variations in pass usage. Given the current fare structure, it is necessary to perform on-board ridership counts to validate the ridership estimates derived from the fare revenue.

Comment 13.16: The TSM Alternative employs the use of 95% additional buses over the No-Build Alternative, and the SDEIS indicates that ridership would increase only 9.8%. If this 95% increase were to lead to only a 29% increase in bus riders it would result in more riders for the TSM Alternative alone than bus and rail combined. The City needs to re-examine this issue. (Committee on Sensible Transit)

Response: A large number of the additional buses used in the TSM Alternative are required to meet the design standards of the vehicles, in regards to passenger load levels. While the No-Build Alternative allows for crush loading levels of over 90 passengers per bus, levels which were observed during the 1991 On-Board Bus Survey, the TSM Alternative and the amended LPA require that vehicles not exceed the design standard of 2.7 square feet of standing space per standing passenger. This design standard is equivalent to a maximum load of 69 passengers per bus. As can be seen on Table 2.3 of the FEIS, without the differential loading standards, the differences in fleet between the TSM and No-Build Alternatives would be only 44%. As a result of adding the additional buses to the highway network in the TSM, some areas would become so congested that bus operating speeds would not be maintained. The most notable areas where this would occur in the TSM Alternative are in the Central Business District (CBD) and around Ala Moana Center.

The mere act of adding more buses to the transit system is not sufficient to produce higher ridership totals. The additional vehicles must provide a perceived benefit, in the form of an improved level of

service, to attract more ridership. Since the majority of the Island is already served by a reasonable level of transit service, the total travel time savings that can be achieved by increasing the number of buses in service is relatively small. Only with the addition of a grade-separated facility can travel time savings of a large enough magnitude be realized so that a significant number of commuters will switch from their automobiles to transit.

Comment 13.17: The UH evaluation, An Evaluation of the Honolulu Rapid Transit Development Projects Alternatives Analysis and Draft Environmental Impact Statement, discusses the use of supportive public policies such as pricing, regulatory and traffic control measures intended to discourage automobile use. The City should specify its intentions regarding future implementation after the system is built. (City Council Member Morgado)

Response: The use of supportive public policies such as pricing and other regulatory and traffic control measures intended to discourage automobile use would increase transit ridership in the TSM and amended LPA Alternatives. FTA urges the City to pursue such strategies as a complement to the amended LPA. The City is undertaking a study which will examine various strategies to discourage automobile use.

Comment 13.18: The On-Board Bus Survey Final Report (March 1992) should discuss whether the passenger survey methodology conforms to scientific sampling procedures, whether the response date is acceptable for modeling purposes and whether the percentage of incomplete surveys is indicative of a well-prepared questionnaire and acceptable for expansion into total trips. (City Council Member Morgado)

Response: The development of the 1991 On-Board Bus Survey does conform to accepted standards and scientific sampling procedures. While it is true that a response to the survey was entirely dependent upon the willingness of the person being surveyed, as long as an acceptable statistical confidence level can be maintained, the survey will be valid. Typically, a survey of this type has a level-of-confidence target of plus or minus 5% error at the 95% confidence level. These percentages indicate that 95 times out of 100, the true answer for an aggregate description of the bus riders trips and characteristics would be within plus or minus 5%. The precision of the 1991 On-Board Bus Survey is summarized in Table 6 of the Task 3.1 On-Board Bus Survey Final Report (March 1992) (page 24). This table shows that, for the average weekday system ridership, the survey achieved plus or minus 1% error at the 95% confidence level.

Before a survey response can be used for purposes of modeling, the survey has to be screened to ensure that the data items needed to develop the transit trip tables are available. These items are the trip purpose from and trip purpose to, the mode of access and egress, origin and destination zone, and auto ownership category. The confidence levels specified in Table 6 of the Task 3.1 On-Board Bus Survey Final Report (March 1992) were created with survey responses that were screened for this information. Therefore, the survey was statistically valid for purposes of transit trip table development and travel demand modeling.

Comment 13.19: The explanation on the method of calculating linked trips in the On-Board Bus Survey Final Report (March 1992) is insufficient. Returned questionnaires with contradictory responses for question 11, regarding the number of buses used, and questions 5 and 10, regarding the access/egress mode to or from the sampled bus trip, should be invalidated. (City Council Member Morgado)

Response: The linked trip factor for each survey observation was calculated by using the response to the mode of access and mode of egress question (questions 5 and 10, respectively). If a respondent's mode of access and mode of egress did not involve a transfer, then the linked trip factor was 1. If a respondent's mode of access involved a transfer, and the mode of egress did not involve a transfer, or

vice versa, then the linked trip factor was 2. If the respondent's mode of access and egress both involved transfers, then the linked trip factor was 3. The final factoring step for the on-board survey expansion entailed devising the total expansion factor calculated for each strata (by route, sub-route, direction, and time) by the linked trip factor which results in transit trips. Page 20 of the Task 3.1 On-Board Bus Survey Final Report (March 1992) provides a more detailed explanation of the linked trip factor calculation procedure than the explanation provided on page 41.

For purposes of transit trip table development, the response to Question 11 of the survey questionnaire, which asked respondents about the number of buses used during the trip, was not required. The most reliable and acceptable method for developing the linked trip factor is by using the mode of access and mode of egress response. All survey responses were screened for the validity of these two responses prior to trip table development.

Comment 13.20: Page 18 of the On-Board Bus Survey Final Report explains the application of the expansion factors to the survey responses. I have used a simplified expansion factor which results in about 5% less boardings than calculated in the 1991 survey. (City Council Member Morgado)

Response: The 1991 On-Board Bus Survey Final Report (March 1992) expanded each sample observation by route, sub-route, direction, and time period (referred to individually as a stratum) and this resulted in a wide variation of expansion factors by each stratum. This variation was caused by the differences in ridership among routes and the statistical fact that sample sizes need not increase linearly to provide the same level of precision for increasing sizes of the population. For example, a route that carries 5,000 daily riders requires a sample of 357 riders, or 7%, while a route that carries 100 daily riders requires a sample of 80 riders, or 80%. More bus trips for the second route would need to be surveyed as compared to the first route to ensure statistical validity.

The use of the simplified expansion factors applied at the route type level, as was done in the example calculation by the commenter, tends to mask the variability of expansion factors that result from a typical transit on-board survey expansion. If one were to follow the same method used in the comment and to try to represent the 1991 systemwide ridership by developing a total expansion factor using the total number of surveys distributed, the total number of buses surveyed, and the total buses operated, the following calculations would result:

Total Surveys Distributed	45,576
Total Bus Trips Sampled	842
Expansion Factor	54,128
Total Bus Trips in Service	3,591
Total Boardings after expansion	194,375

The above example produces an underestimate of the 1991 daily boardings even greater than the commenter's calculations, and illustrates that the application of an oversimplified expansion factor will not achieve the same number of boardings as would result from the application of a more detailed expansion factor.

Comment 13.21: The reasons for the higher percentage of linked trips as a percentage of unlinked trips under the 1991 survey vs. the 1986 survey should be discussed in the On-Board Bus Survey Final Report. That report should also provide additional explanation on the method of calculating linked trips. (City Council Member Morgado)

Response: The 1991 survey apparently observed a slightly lower transfer rate than the 1986 survey. However, the mode of access and egress question, which was used to calculate the transfer rate, was absent from the 1986 On-Board Bus Survey questionnaire. Therefore, the actual number of transfers was not known, and had to be estimated. The 1991 On-Board Bus Survey did ask the mode of access and egress question, and could provide a reliable estimate of the number of transfers. Therefore, the transfer



rates that result from the 1986 and 1991 On-Board Bus Survey cannot be compared. Page 20 of the On-Board Bus Survey Final Report (March 1992) provides a more detailed explanation of the linked trip factor calculation procedure.

Comment 13.22: Table 8 of the On-Board Bus Survey Final Report indicates that Downtown and Waikiki are the destinations with the higher percentage of total trips and peak period work trips. The amended LPA, with a fixed guideway at the edge of downtown and no line through Waikiki, is not conducive to present transit ridership characteristics for a number of reasons. (City Council Member Morgado)

Response: The ridership forecasts for the amended LPA and other alternatives, which take into account the characteristics noted, are presented in Section 4.1.2 of this FEIS. Updated estimates of future bus characteristics are presented in the Transportation Impacts Results Report (July 1992). The impact of service changes between present and the amended LPA are explicitly incorporated in the travel forecasts summarized in Section 4.1.2 of this FEIS.

While the statistics quoted in the commenter's letter are correct to existing transit ridership patterns, these characteristics are effectual rather than causal in nature. The present dense transit system and dense development patterns within the Primary Urban Center of Honolulu are conducive to short walk trips to transit. The majority of major transit destinations in the Primary Urban Center are also well served by multiple transit routes (e.g. Downtown, Ala Moana Center, Waikiki, etc.) and the route structure and proximity of parallel routes are also a factor in the low amount of transfer activity. Although the amended LPA will not directly link Waikiki and Downtown with a fixed-guideway facility, the high frequency of service (2 minute headways for rail) and speed offered by the fixed-guideway will still offer travel time savings over a bus for trips occurring between Waikiki and Downtown, even with a transfer.

Comment 13.23: There would be a reduction of service on the major urban trunk routes through the King Street/Beretania Street/Hotel Street/School Street corridor which could have a detrimental impact on transit ridership. The FEIS should discuss the impact of transit ridership from the substantially reduced urban trunk route bus service through that corridor and between Kaimuki and Pearl Harbor. (City Council Member Morgado)

Response: The comparison summarized in the commenter's letter relates existing service levels for Routes 1 and 2 and compares these to projected service levels (daily revenue hours and miles) for routes that appear to be similar, specifically Routes 8, 20, and 23A. This is not a fair comparison of transit service levels. The implementation of the amended LPA, which is within the King Street/Beretania Street/Hotel Street/School Street Corridor, does not serve merely to decrease or eliminate the existing major trunk routes within the Primary Urban Center, but replaces or augments these routes with fixed-guideway service within the corridor. However, it is important to note that Routes 1 and 2 are not completely eliminated from the amended LPA background network, as the background network is designed to provide an optimal level of transit service without forcing transfers to the fixed-guideway facility from the bus routes.

Comment 13.24: The FEIS should include trip tables showing work and total transit trips for each alternative and the delta between the amended LPA and the TSM Alternative. (City Council Member Morgado)

Response: The data requested are available in the Transportation Impacts Results Report (July 1992). Trip Tables by purpose (i.e., Work, Non-Work, Non-Home Based, and Visitor) and time period (i.e., peak and off-peak) for all the alternatives and for the difference among alternatives are contained in the report. The magnitude of these data compilations is too large to include in the FEIS or its appendices.

Comment 13.25: The SDEIS shows a wide disparity between revenue vehicle miles and transit patronage in comparing the TSM Alternative to existing service and the No-Build Alternative. Revenue vehicle miles are reflective of the amount of service available to transit users and is independent of bus speed decreases. Logic indicates that there should not be such a wide difference. (City Council Member Morgado)

Response: The supposition inherent in this question is that ridership should increase proportionally with the increase in vehicle miles of service. In practice, a number of reasons exist why this result is not achievable. In many existing and developed corridors on Oahu the ability to attract additional riders is constrained by the number of buses which can physically operate on the existing street system. In rapidly developing areas (i.e., Ewa) where a substantial amount of the increased service is provided, the level of service productivity cannot parallel that of fully developed areas, and more (miles of) service is required to serve those areas adequately. It must be expected that as transit systems mature and service is expanded to outlying, rapidly growing areas, the cost-efficiency of that component of the system will decrease. Further, as can be seen in Table 4.1 in this FEIS, the elimination of disparate loading standards between the TSM and No-Build Alternatives would noticeably reduce the differences in Annual Revenue Vehicles Miles and allow for a more understandable comparison of the alternatives.

Comment 13.26: Page 4-14 of the SDEIS indicates that the Kaaahi Station to Nimitz/Smith Station link would carry the highest one-direction peak-hour ridership. Ridership along this segment is forecast to be 8,550 for the amended LPA with a corresponding two-way peak-hour volume of 11,820. The 8,550 pphpd is higher than the stated initial system capacity of 7,500 pphpd. Discussion should be included on whether the higher volume requires exercise of the vehicle purchase option under the System Contract. (City Council Member Morgado)

Response: At this time, there is no intent to exercise the vehicle purchase options under the System Contract. Once the system is optimized, a decision will be made whether more vehicles will be required. Optimization will occur during final design. It involves operating simulations of the vehicles to see how long they take to travel between both ends of the line and is a function of such factors as the train operating speed, track grades and curve radii. The tests are done to optimize the engineering design to allow the system to operate in the most efficient manner possible.

Comment 13.27: Transit trips to Downtown and Kakaako should be segregated as follows: The number of transit trips within Downtown only; the number of transit trips within Kakaako only; and the number of transit trips between Downtown and Kakaako. Also, the total number of person trips to Downtown and Kakaako should be provided so mode shares may be determined. (City Council Member Morgado)

Response: The summarized values in Table 4.6 of the FEIS represent all trip origins to these selected destinations. District level interchange tables are contained in detail in the Transportation Impacts Results Report (July 1992) and would be too voluminous to include in Chapter 4.0.

One of the main advantages of the incremental logit model, discussed in the Service and Patronage Forecasting Methodology (March 1992) is that it does not rely upon a synthetic estimate of person trip movements. Rather it bases the change in ridership levels upon the change in service level provision. As a result, it is not possible to compute an exact estimate of the modal share.

Comment 13.28: Table 4.7 of the SDEIS indicates that the fixed guideway alternative would not provide better service to Waianae than the TSM Alternative. This is in contrast with the text on page 4-10. (City Council Member Morgado)

Response: See revised Table 4.7 of this FEIS.

Comment 13.29: Table 4.8 should include, as a subset for the amended LPA, the number and share of fixed guideway trips. (City Council Member Morgado)

Response: The ridership value of 187,400 per day is the number of unlinked or boardings on the fixed-guideway system. Given the possibility that a rider could have used a bus to gain access and/or egress from the fixed-guideway system, it is not possible to compute the number of linked fixed-guideway trips or their modal share.

Comment 13.30: Table 4.8 should include the total person trips upon which transit mode shares are calculated. (City Council Member Morgado)

Response: The modal shares are calculated by dividing the number of daily total transit trips by 3,126,000 daily person trips, which includes 3,036,000 person trips by Oahu residents and 90,000 person trips by visitors to the island based on estimates available in the Hali 2005 reports.

Comment 13.31: Page 4-10 of the SDEIS should have included peak, base, and off-peak period trips for all alternatives. Total person trips during the peak, base, and off-peak periods should also be included. (City Council Member Morgado)

Response: Data available in the Transportation Impacts Results Report (July 1992) are for the peak periods (a.m. plus p.m.) and for the remainder of the day, referred to as off-peak (which includes the "base" period).

Comment 13.32: The discussion of trips by purpose should specify that non-home based trips account for the largest difference between the amended LPA and expanded bus alternative. The discussion is important because it suggests that the amended LPA's major benefit results from non-home-based trips, rather than home-based work trips by commuters. (City Council Member Morgado)

Response: The difference in trip making for the amended LPA and the TSM Alternative in both the Home-Based Work and Non-Home Based trip categories are very comparable. Those two trip purposes each account for about 40% of the difference in transit ridership between the two alternatives. It must be noted that Home-Based Work trips comprise 150% more trips in the amended LPA than Non-Home Based. To make the statement that Non-Home Based trips are more important the Home-Based Work trips would not be accurate.

Comment 13.33: The total number of person trips for each purpose should be provided so mode shares may be determined. (City Council Member Morgado)

Response: See response to Comment 13.27.

Comment 13.34: The amended LPA produces less or only slightly more transit trips to Downtown/Kakaako from several suburban districts. (City Council Member Morgado)

Response: As noted, the amended LPA offers less relative advantages versus the TSM Alternative for trips to Downtown, which the TSM Alternative serves with direct express service on HOV facilities at substantially higher speeds than at present. However, the implication suggested by this comment is that the amended LPA does not have any substantial impact on ridership is not supported, given that the difference in total ridership is in excess of 46,000 riders per day. A more appropriate comparative analysis would be to examine the entire district level trip table rather than concentrating on a few selected interchanges from which to draw such conclusions. These trip tables are available in the Transportation Impacts Results Report (July 1992).

Comment 13.35: The FEIS should provide the following information: The number of non-home-based trips with a link on the fixed guideway and a trip table of non-home-based trips. (City Council Member Morgado)

Response: These data are available in the Transportation Impacts Results Report (July 1992). This report contains a trip table summarizing the number of distribution of Non-Home Based transit trips using the rail system.

Comment 13.36: An explicit statement should be added that the fixed guideway will serve only 59.4% percent of the total daily transit trips. The other 60.6% [sic] will be transit trips only on the bus. (City Council Member Morgado)

Response: A statement concerning the percentage of transit trips that would use the fixed guideway is included in Section 4.1.1 of this FEIS.

Comment 13.37: In the "Price and Financial Evaluation of Proposals", supplemental information presented to the City Council, the total transit trips for the amended LPA was reported as 280,500. Of the total, approximately 50% are identified as fixed guideway trips. The SDEIS indicates that percentage to be 59.4%. Why the difference? (City Council Member Morgado)

Response: The ridership figures used in the SDEIS and this FEIS are based upon the final population and economic projections and the completed and calibrated model system. The 280,500 ridership figure was an initial, preliminary estimate based upon information available in November of 1991. Refer to Comment 13.13 and Chapter 4.0 for an explanation of the differences.

Comment 13.38: The UH Evaluation discusses an industry standard for minimum line-haul ridership to be at least 12,000 one-way hourly passengers during the peak hour at maximum load point to justify a 10 to 15 mile guideway rail investment. The amended LPA's highest volume would be 8,550 pphpd; therefore, the amended LPA may not be justified. (City Council Member Morgado)

Response: The quoted "industry standard" is based on a 1964 report which does not reflect the new rail projects developed in North America in the past 30 years. A better way to evaluate the justification for a project is by comparing benefits with costs. The cost-effectiveness evaluation in Chapter 6.0 serves this purpose.

Comment 13.39 Two trip tables were submitted to the City Council. One table indicated a total of 280,968 transit trips, inclusive of "rail induced non-home based" trips. The other indicated a total of 255,768 transit trips, excluding such rail induced trips. The difference, which represents rail induced non-home based trips, is 25,200. Please explain why there is a difference in the 25,200 rail induced non-home based trips calculated from the trips tables and the 16,800 new transit trips discussed in the SDEIS. (City Council Member Morgado)

Response: At the time the trip tables were submitted to City Council the patronage forecasting model was still in the process of being calibrated. However, new data were available that allowed the production of preliminary ridership estimates. These estimates were arrived at by using the AA/DEIS model results as a base, and adjustments were made using the newly available data. These new data included the results from the 1991 On-Board Bus Survey, which showed a 10% increase in transit trips over the 1986 patronage, and the revised land use projections based on the 1990 census data. The trip tables provided to City Council were the results of this effort to produce a "reasonable" estimate of the cumulative effects of the new data.

The label of "rail induced non-home based" was used as a matter of convenience until the model was fully developed and calibrated. The proper description of the trip table provided to the City Council, setting forth a total of 280,968 transit trips, would be "including non-home based rapid transit trips with all modes of access to rail." The trip table setting forth a total of 255,768 transit trips would be "excluding non-home based rapid transit trips with all modes of access to rail." At that time, we could not identify how many trips were truly "rail induced." The figure 25,200 represents the total daily non-home based transit trips with all modes of access from the direct generation submodel.

The patronage forecasts in the SDEIS are the output of the completed and fully calibrated model. The current total daily non-home based transit trips from the direct generation submodel is 26,100 for walk access only as compared to the previous 25,200 estimate for all modes of access. The model now allows us to identify the number of "rail induced" trips that are a part of the total non-home based transit trips. The "rail induced" trips have been revised since the SDEIS and they are now 19,000 instead of 16,800, which are derived from the difference between the direct generation submodel and the I-logit model trip tables.

Comment 13.40: A comparison of annual revenue vehicle miles and daily transit trips for the No-Build and TSM alternatives between the AA/DEIS and the SDEIS shows that the disparity in annual revenue vehicle miles and daily transit trips for the AA/DEIS is much less than the differences in the SDEIS. This indicates a harsher treatment of the TSM Alternative in the SDEIS than in the AA/DEIS. (City Council Member Morgado)

Response: Given the improvements in the data base (i.e., On-Board and Visitor surveys), forecasting mechanisms, and the update to the population and economic forecasts based upon recent 1990 Census and Labor Statistic information, it becomes very difficult to separate and quantify the underlying reasons for differences between the AA/DEIS and SDEIS. The differences cited are less based upon the design and specification of the alternatives, than they are probably a function of the new survey and economic data.

Comparisons involving the No-Build Alternative are further complicated by the fact that the No-Build Alternative definition was constrained in the peak period to the existing peak bus pull-out, 412 vehicles. Due to changes in the forecast distribution of population/households and employment between the AA/DEIS and the SDEIS and this FEIS, the average trip length for a No-Build Alternative peak period trip has changed from about 9.9 miles in the AA/DEIS to about 7.1 miles in this FEIS. This allows for considerably more efficient use of the 412 peak buses in this FEIS forecast. As a consequence, the No-Build Alternative in this FEIS carries essentially the entire 2005 base level of peak period transit demand while the AA/DEIS No-Build Alternative could only accommodate about 80% of the peak period base demand. This recapturing of demand that would otherwise be "left at the curb" allows the No-Build Alternative in this FEIS to have considerable growth in transit trips with little growth in vehicle miles.

Comment 13.41: The number of peak buses for the TSM Alternative changes from 831 in the AA/DEIS to 803 in the SDEIS. (City Council Member Morgado)

Response: The peak bus number for this FEIS, shown on Table 4.1, is 831.

Comment 13.42: A comparison of transit trips by alternative between the SDEIS and AA/DEIS shows that the TSM Alternative has the least absolute and percentage increases for trips to Downtown and Kakaako. The comparison also shows that the TSM Alternative has the largest absolute and percentage decreases of trips to Ala Moana Center. (City Council Member Morgado)

Response: As noted in the response to Comment 13.40, the variety of differences between the AA/DEIS and SDEIS assumptions make it difficult to separate and quantify the underlying reasons for differences

between the trip forecasts. Comparisons involving the No-Build Alternative are complicated by the capacity issue discussed above. Differences may be attributable to a re-orientation between the AA/DEIS and SDEIS of forecast population and employment growth into areas more effectively served by rapid transit.

Comment 13.43: A comparison of Home-Based Work trips by alternative between the SDEIS and AA/DEIS shows that the TSM Alternative has the least absolute and percentage increases of Home-Based Work trips. (City Council Member Morgado)

Response: The responses to Comments 13.40 and 13.42 are relevant. It should also be noted that the AA/DEIS was based on the 1986 survey which categorized approximately 46% of transit trips as work trips while the 1991 survey, the base for the SDEIS and FEIS forecasts, had about 36% of transit trips classified as work trips. Thus the AA/DEIS forecasts had proportionately more work trips than the SDEIS and FEIS forecasts.

Comment 13.44: A comparison of resident non-work trips by alternative between the SDEIS and AA/DEIS shows that the TSM Alternative has the least absolute and percentage increases of resident non-work trips. (City Council Member Morgado)

Response: See response to previous comment.

Comment 13.45: The explanation for Table 4.10, appearing on page 4-10, ends by stating "...total trips on the fixed guideway system would be about 187,400 per day" due to each trip to and from being represented twice. How does this figure relate to the 315,400 daily transit trips in Table 4.8? (Leeward Oahu Transportation Management Association)

Response: A "daily transit trip" is a one-way trip made by transit. It is a "linked trip." For example, a trip in which a patron walks to a bus stop, catches a feeder bus to a rapid transit station, rides the rapid transit to a destination station, and then catches a shuttle bus to a final destination would be counted as one transit trip. The 187,400 number in the SDEIS (the comparable number in the FEIS is 185,220) would be one-way trips of which at least part of a "linked trip" was made on the rapid transit system. The number in Table 4.8 represents a total of 315,400 daily, linked, one-way transit trips. (The comparable figure in the FEIS is 321,300.) This figure includes all modes of transit, bus and rail. It is larger than the 187,400 because some transit trips only involve buses, no segment of the trip is made on the rapid transit.

### 7.5.13.3 Transit Travel Times

Comment 13.46: Transit travel times are understated. For example, the City shows a 10-minute reduction in transit travel time between Ewa and Downtown. However, 8 minutes of the decline is derived from a reduction in the time allowed to wait for the bus and the other two minutes a reduction in the walk to work. The transit time is the same. (Committee on Sensible Transit)

Response: A revised Table 4.3 is included in this FEIS. Examination of the table (for West Loch to Downtown) shows that the "in-vehicle" transit time is 38 minutes for the amended LPA compared to 43 minutes under existing conditions. "Out-of-vehicle" time (walk and wait) add up to 16 minutes in 2005 for the amended LPA and 20 minutes in 1991 under existing conditions. The total unweighted transit time is 54 minutes for the amended LPA and 63 minutes under existing conditions. The weighted transit travel time between these two zones will be 65 minutes in the amended LPA compared to 78 minutes in 1991. See Transportation Impacts Results Report (July 1992). In no case can these values be regarded as being "the same".

Comment 13.47: The reason for the 5-minute bus-wait time for the TSM Alternative vs. the 2-minute bus-wait time for the amended LPA for transit travel times between Ewa and Downtown in Table 4.3 should be explained. (City Council Member Morgado)

Response: A revised Table 4.3 is included in this FEIS, which shows a similar phenomenon. This can be explained as follows. Similar numbers of buses may travel through an Ewa neighborhood in both the amended LPA and the TSM Alternative without yielding the same average wait time. In the TSM Alternative these buses could provide service to Pearl Harbor, Downtown (local and express), Waikiki, UH and other destinations. The TSM rider to Downtown would wait for a Downtown destined bus (in this case, an express bus). In the amended LPA, though, these same routes will all serve Waiawa Station (where most will be terminated) and so the rider on the amended LPA going to Downtown just waits for the first bus that comes by. On the other hand, the rider on amended LPA has to transfer and wait for rail (which has a 100-second headway), while the TSM rider does not.

Comment 13.48: Table 4.2 should be expanded to display the transit travel times from Mililani to Downtown and windward Oahu to Downtown. Notes should be added to Table 4.2 identifying exact origin and destination locations. Table 4.3 should compare the travel time components of a fixed guideway rider who must transfer to a shuttle bus to reach a destination and of an express bus rider under the TSM Alternative who need not transfer to reach the same destination. (City Council Member Morgado)

Response: Tables 4.2 and 4.3 are revised in this FEIS and show the examples suggested. More precise definitions of origin and destination locations include Pearl City - Komo Mai Drive and Hoolehua Street, Palolo Valley - Palolo Fire Station, Kaneohe - Windward Mall, Hawaii Kai - Hawaii Kai Recreation Center, Waianae - Waianae Elementary School, Millilani - Millilani District Park, Waipahu - Jack Hall Housing, and Kapolei - Kapolei Town Center.

Comment 13.49: The amended LPA has a 1-minute walk to destination after leaving the fixed guideway station. The number of transit riders having destinations within a 1-minute walk of fixed guideway stations should be specified to place the table in proper perspective. (City Council Member Morgado)

Response: Table 4.10 shows station volumes by mode of access. The walk trips of the Nimitz/Smith and Nimitz/Fort Stations reflect the number of Downtown destinations that can be reached on foot more quickly than by shuttle bus. Note that the example in revised Table 4.3 (West Loch to Fort and Merchant Streets) shows a 2-minute walk to destination.

#### **7.5.13.4 Cost Effectiveness**

Comment 13.50: Section 6.3 concerns the cost-effectiveness analysis. The section should include a discussion of the cost effectiveness threshold. The possible consequences of exceeding the threshold should also be discussed. (City Council Member Morgado)

Response: FTA is no longer applying a cost-effectiveness threshold in its evaluation of new start projects. Cost-effectiveness indices are one of the factors included in FTA's rating of new start proposals that are competing for Section 3 funds. The ratings attempt to identify those projects that are most worthy of discretionary Federal funds.

Comment 13.51: Table 4.4 indicates a travel time savings of \$2 per hour for non-work trips and \$4 per hour for work trips. These figures appear to be based on Federal guidelines and are probably greater for Honolulu. (Environmental Center)

**Response:** You are correct, the values used in the table are mandated by the FTA as the values of time in 1984. The point of using the same values for transit projects all across the country is to standardize the approach for calculation of the cost effectiveness index so that projects from various parts of the country can be compared (though note response to previous comment). It is likely that values for Honolulu are greater.

**Comment 13.52:** Our analysis shows that when allowance is made for elimination of the Waikiki line and the substitution of an aerial segment along Nimitz, for a Hotel Street subway, proposed in the original LPA in the AA/DEIS, comparable construction costs have increased about 87% between the AA/DEIS and the SDEIS. If the 1992 costs (in the SDEIS) were related to the 1990 ridership estimates in the AA/DEIS, the result would be a CEI far above the permissible Federal maximum. However, the SDEIS increases ridership proportionately, resulting in an essentially unchanged CEI from the AA/DEIS. This does not make sense. (League of Women Voters)

**Response:** As you indicated, the project has changed substantially since the AA/DEIS. Some changes have led to cost increases and others have reduced project costs. Since the AA/DEIS was published, the City has received a firm price proposal from the System Contractor and has completed additional engineering and cost estimates. All of these factors have contributed to the definition and cost of the project as it now stands. Without seeing your calculations, it is not possible to respond to your estimate of an 87% increase in construction cost. Making allowance for the items you mentioned, the cost increase is far less than 87%. Chapter 4.0 of the SDEIS and this FEIS describe the changes that have been made in the patronage forecasting procedures. Additional detail can be found in the Service and Patronage Forecasting Methodology (March 1992) and the Transportation Impacts Results Report (July 1992). Applying the methodology produced the results in this FEIS, including the revised CEI.

#### **7.5.14 Energy**

**Comment 14.1:** The SDEIS should quantify the fuel savings regarding rail transit. The energy required during construction should also be quantified. (Committee on Sensible Transit, City Council Member Morgado)

**Response:** Section 5.9 of this FEIS provides general information on these issues. Regarding fuel savings of rapid transit, there are too many variables to accurately predict fuel usage. Future bus mileage is unknown due to expected changes in bus technology mandated by recent amendments to the Clean Air Act. Automobile fuel mileage will likely continue to improve in the future; however, a specific fuel usage per gallon figure for the entire fleet of automobiles in the year 2005 would be difficult to forecast.

**Comment 14.2:** The FEIS should provide data regarding the diesel fuel requirements of all alternatives. (City Council Member Morgado)

**Response:** As stated in the previous comment, there are too many variables to accurately predict specific fuel usage for each alternative. Future bus mileage is unknown due to expected changes in bus technology as a result of the amendments to the Clean Air Act. However, it should be noted that diesel fuel usage is proportional to bus vehicle miles traveled (VMT) as shown in Table 4.14 of this FEIS.

**Comment 14.3:** The FEIS should include a statement that the auto fuel consumption difference between the amended LPA and the TSM Alternative are minor. (City Council Member Morgado)

**Response:** Both the SDEIS and this FEIS state that the auto fuel consumption for the amended LPA and TSM Alternative would decrease by minor amounts (1 to 2%) relative to the No-Build Alternative. The statement in the FEIS is clear as written.



Comment 14.4: The energy savings analysis oversimplifies the relationship of saved gasoline consumption by equating it to diverted riders. Light rail is actually six times more efficient than automobiles according to Renaissance of Rail Transit in America (June 1991). (Environmental Center)

Response: The energy calculation in this FEIS is simplified. On a per passenger basis, rail is generally much more energy efficient than the automobile. The difference in energy efficiency between automobiles and rail depends, of course, on how fully loaded the rail vehicles are and the mode of travel previously used by railriders.

#### **7.5.15 Economic Impacts**

Comment 15.1: The FEIS should assess the impact of the tax surcharge on one or more of the following: 1) small businesses which do not qualify for a tax credit; 2) the surcharge's regressivity and impact on residents, especially those with low incomes and social equity; and 3) the impact on the State budget from the annual revenue loss due to the surcharge tax credit. (City Council Member Morgado, Environmental Center)

Response: 1) The City's tax impact analyses assume that 100% of the increase in costs to small business will be passed on to consumers in the form of slightly higher prices. While these slightly higher prices would reduce demand, this would be more than offset by the increased business activity stimulated by the project. The City's economic impact analyses indicate the following impacts on business sales in sectors populated by small- and medium-sized businesses during the five-year construction period (net of the effects of the GET surcharge and the State tax credit):

<u>Small and Medium-sized Business Sectors</u>	<u>5-year net increase in Business sales (millions in 1991 \$)</u>
Retail Trade	\$130
Wholesale Trade	66
Eating/Drinking Establishments	93
Finance and Insurance	114
Health/Professional Services	154

2) With the revised State tax credit which has been enacted by the State of Hawaii, the City's tax impact analysis indicates that the GET surcharge/State tax credit is progressive with respect to income as follows:

<u>Family Expanded Income Class</u>	<u>GET Surcharge Net of State Tax Credit as a Percent of Income</u>
\$20,000 to \$30,000	0.10%
\$30,000 to \$50,000	0.16%
\$50,000 to \$100,000	0.18%
Over \$100,000	0.23%

The modeling results for family incomes under \$20,000 must be treated cautiously and are not believed to be policy-significant because it is estimated that these families spend much more than they earn. This result occurs because certain income is not included in the income computation [i.e. non-monetary

transfer payments (food stamps) and payments directly to a service provider (Medicare and Medicaid)] and for other related reasons.

3) The City's analysis indicates that construction of the HRT Project generates increased State tax revenues in two ways. First, expenditures on construction activities generate net GET revenues of about \$129 million (in 1991 \$) over the ten-year period of the GET surcharge. Second, the net personal incomes generated add to the tax base for the state personal income tax, which is projected to increase about \$60 million (in 1991 \$) over the ten-year period of the GET surcharge. The total projected tax revenue generated by the HRT Project is \$195 million (in 1991 \$). The State's contribution through 10 years of tax credits and a \$50 million appropriation in FY 1993 is equivalent to about \$383 million (in 1991 \$). These tax revenues, therefore, pay for nearly 50% of the State's share of project funding. In other words, the economic activity generated by the Project provides for a broadened tax base, which allows the HRT construction project to partially pay for itself.

Comment 15.2: An analysis of the income tax credit should be conducted and included in the FEIS. According to the State administration, the surcharge income tax credit is expected to result in a State revenue loss of \$50 million annually. An analysis should be included in the FEIS on the real burden per resident from the combination of the surcharge and tax expenditure due to the credit. (City Council Member Morgado)

Response: Results of the City's tax impact analyses indicate that the net incremental annual burden of the GET surcharge per person is as follows:

<u>Family Expanded Income Class</u>	<u>Net Annual Burden of GET Surcharge (per person)</u>
\$20,000 to \$30,000	\$ 11
\$30,000 to \$50,000	21
\$50,000 to \$100,000	41
Over \$100,000	140

The above results are net of the State tax credit which will total \$43.9 million for Oahu resident taxpayers in FY 1994 and is paid for by the General Fund. To the extent that residents (as opposed to visitors/nonresidents, resident and nonresident businesses and other parties) pay for the State General Fund, the average as opposed to the incremental burden of the GET surcharge will be proportionally higher. Also refer to the response to Comment 15.1 in this section.

Comment 15.3: The EIS should include more information regarding the statement on page 5-18 of the SDEIS, "...there may be a reduction in jobs from other sectors of the economy due to construction of the rapid transit system." (City Council Member Morgado, Committee on Sensible Transit)

Response: The construction of the rapid transit system, per se, will not cause a reduction of jobs in the economy. However, the City's analysis indicates that the one-half percent GET surcharge will, of itself, lessen employment of its ten-year duration by about 6,500 person-years of work. This will be more than offset by an increase in employment caused by rapid transit of more than 35,500 person-years of work over this period.

Comment 15.4: The economic benefits from the fixed guideway construction should be compared with the benefits from expenditure of \$1.3 billion (in year-of-expenditure dollars) for rental housing construction or school repair. (City Council Member Morgado)

Response: The economic benefits of the rapid transit project are significantly influenced by the fact that about half of the money spent will come from non-local sources, Federal transportation funding assistance and excise tax surcharge revenues generated by visitor and non-resident expenditures. The excise tax surcharge is not available for use on rental housing construction or school repair nor are Federal transportation funds available for those purposes. Thus the net economic benefits of expending \$1.3 billion on rental housing construction or school repair would be much smaller than the net economic benefits of the rapid transit project, assuming that the rental housing and school construction programs would be funded from existing local tax sources.

Comment 15.5: We find no analysis in the SDEIS of the impact on the ability of the State and City to fund other public facilities and services (education, health, housing, sewerage, water, streets, welfare, etc.), nor of the approximately \$160 million annual increase in annualized capital and O&M costs shown for rail over and above comparable TSM Alternative costs. The State is facing \$350 million less in state revenues this year than anticipated. The annual income tax credit to be paid for 17 years at \$53 million (or more) per year represents a loss in State income of at least \$900 million. (League of Women Voters)

Response: Capital funding for the amended LPA comes from new funds (Federal Section 3 and 0.5% GET surcharge) so no impact is expected on the ability of the State or City to fund other programs. In comparison to the TSM Alternative, the amended LPA will cost \$5.1 million less per year to operate. The income tax credit would be in place for the duration of the excise tax surcharge, not 17 years. Also see response to Comment 15.1.

Comment 15.6: What will be the impact of a tourist tax on the employment and incomes of local residents? (Environmental Center)

Response: As noted in Section 5.1.5 of this FEIS, the net impact over 10 years is expected to be an increase of 23,850 jobs and a \$1.1 billion (1991 \$) increase in personal income.

Comment 15.7: To what extent does this fixed rail project foreclose the future options of lower cost, more flexible means of meeting Oahu's transportation needs, and the option of using the proposed excise revenues for the pressing need to upgrade current sewage lines and treatment facilities, parks and recreation projects, or reducing the burden of existing taxes? On what basis is rapid transit decidedly more beneficial than these other needs? Alternative projects may better serve the community. (Environmental Center)

Response: The rapid transit project will not foreclose future options but will provide a backbone of transit that will focus future options on serving other than the main line-haul market in the PUC. The excise tax revenues are not available to the City to upgrade sewer lines and treatment facilities or implement parks and recreation projects. The purpose of the EIS is to assess the impacts of the proposed project and not to discuss its merits relative to other projects. However, the EIS is a tool for decision-makers to use to determine whether the project should be built.

Comment 15.8: Can the use of rail transit increase State productivity due to decreased transit times? (Environmental Center)

Response: The amended LPA will result in travel time savings for many transit users. People will make varying uses of that savings in time. In some cases it may result some degree of increased productivity.

Comment 15.9: What percent of the 0.5% increase in excise tax and state general fund allocations is expected to burden the resident consumer? To what extent is it possible that resident consumers may take on an even greater tax burden than presently projected to pay for the actual costs of transportation? (Environmental Center)

Response: The distribution and burden of the 0.5% General Excise and Use Tax (GET) surcharge is estimated as follows:

35.9% Visitors and non-residents

38.0% State General Fund in the form of a state tax credit

26.1% Residents

100.0%

This distribution is the maximum burden upon residents because it assumes that 100% of the incremental costs to businesses will be passed on to consumers in the form of slightly higher prices. The 1993 State General Fund appropriation will burden residents according to the FY 1993 distribution of income to the State General Fund.

The capital costs of the HRT Project have been more firmly established than is typical for a transit project in the PE/FEIS stage because of the turnkey contract with its fixed unit prices (subject only to adjustment according to stated inflation indices). Hence, a greater tax burden caused by increased capital costs for the currently defined HRT Project is improbable.

The O&M costs of the City's transit program are established by the City Council when it adopts the service plan and establishes the fare policy. According to the PE/FEIS studies, the difference in annual O&M cost between the amended LPA and TSM Alternative is relatively small and would not pose any significantly greater tax burden on residents. The final determination of the incremental tax burden, if any, to support O&M will be made by the City Council when it adopts the service plan and the fare policy.

#### **7.5.16 Miscellaneous**

Comment 16.1: A Civil Defense siren should be installed at the Waiawa Station, and a siren simulator should be installed in a 24-hour manned office that can disseminate information to riders in the trains and stations. (Hawaii Department of Defense)

Response: The rapid transit system will have a sophisticated communication system capable of voice communication between its Central Control Center and all stations, trains, maintenance personnel and Honolulu emergency services (police, fire and medical). This communication will be achieved through wayside public address systems, emergency telephones and radios. The Central Control Center will be staffed during all operating and maintenance hours. All system failures and emergency alarms will be annunciated to Central Control. Central Control will be capable of activating all emergency subsystems throughout the entire system and will have a back-up emergency power supply system. The installation of sirens at the Waiawa Station site as an additional warning/communication component could be incorporated in the final design of the system. The City will ask the Fire/Life Safety Committee for the rapid transit system to evaluate this during final design.

Comment 16.2: We recommend the FEIS present and commit to pollution prevention and conservation measures such as use of low-flow toilets, establishing a material recycling program at the maintenance facility, and using energy-efficient lighting systems. (U.S. Environmental Protection Agency)

Response: The City is committed to conservation measures as a matter of general policy. Specific measures of the type listed will be considered.

Comment 16.3: Sections S.3.2.1 and 2.2.1.1 should summarize the comparative environmental impacts of "No-Build" and the proposed action. (Environmental Center)

Response: A comparison of the impacts of the No-Build Alternative and the amended LPA are provided in Section S.3.2 of this FEIS.

Comment 16.4: The SDEIS does not comply with the State of Hawaii's environmental laws as described by Chapter 200 of Title 11 EIS Rules. Specifically, the SDEIS inadequately describes cumulative impacts and mitigative strategies in the context of the State's Rules and entirely omits discussion of unresolved issues and compatibility with land use plans and policies. The EIS also inadequately discusses or entirely omits disclosure of the interrelationships and cumulative environmental impacts of the proposed action and other related projects that may stimulate or induce secondary effects; local short-term uses of humanity's environment and the maintenance and enhancement of long-term productivity; the extent to which the proposed action forecloses future options and narrows the range of beneficial uses of the environment; and irreversible and irretrievable commitment of resources and the extent to which this project irreversibly curtails the range of potential uses. (Environmental Center)

Response: The AA/DEIS and SDEIS were prepared to comply with Title 11, Chapter 200, EIS Rules. Chapter 5.0 of both documents describe the cumulative impacts and mitigation measures proposed. A discussion of unresolved issues is included in the Executive Summaries of the AA/DEIS and this FEIS. The compatibility of the amended LPA with land use plans and policies is discussed in Section 5.1.2.3 of the SDEIS. The interrelationships and cumulative environmental impacts of the proposed rapid transit system and other related projects that may stimulate or induce secondary effects are covered in Section 5.1 of the AA/DEIS, the SDEIS, and this FEIS. Section S.3 summarizes the local short-term uses of humanity's environment and the maintenance and enhancement of long-term productivity that were discussed in Chapters 4.0 and 5.0 of the previous environmental documents and this FEIS. The description of the fixed guideway system in Chapter 2.0 of the SDEIS and this FEIS presents the extent to which future options are foreclosed and the narrowing of the range of beneficial uses of the environment. Section S.3.2.3 of the SDEIS summarized the irreversible and irretrievable commitment of resources and the extent to which the amended LPA irreversibly curtails the range of potential uses. Also note that this FEIS has more specific mitigation commitments than appeared in either the AA/DEIS or SDEIS.

Comment 16.5: Negligible reductions in traffic, air quality and energy impacts would result with implementation of a rail system when compared to a less expensive TSM Alternative. Why build a rail system? (City Council Member Morgado)

Response: This FEIS presents an assessment of the environmental and energy impacts of construction of a fixed guideway system. The FEIS indicates that there would be a small, but positive, reduction in air emissions and fuel consumption as compared with the TSM Alternative. In addition, traffic congestion would be less severe with implementation of the rail system. The decrease in impacts with the rail system is due to fewer buses and automobiles operating on the streets. Other benefits, such as increased mobility, the opportunity to focus development, increased reliability, and higher levels of service and convenience are also possible with operation of a rail system.

Comment 16.6: Some proponents contend that the amended LPA will produce substantial air quality benefits; however, the analysis in the SDEIS does not support this statement. The FEIS should explicitly

state that the amended LPA will not result in substantial air quality benefits. (City Council Member Morgado)

Response: Section 5.5.1 of both the AA/DEIS and this FEIS indicate that there would be a slight (1 to 3%) reduction in emissions when compared to the No-Build Alternative.

Comment 16.7: The FEIS should acknowledge that major amendments to the Federal Clean Air Act (CAA) have been enacted, and should demonstrate that the proposed project would fully adhere to the provisions of the Act. (U.S. Environmental Protection Agency)

Response: This FEIS has been revised to reflect the comment.

Comment 16.8: The FEIS should define the length of time that shuttle-buses would be idling at the Ala Moana Center and Kalakaua/Kapiolani Stations (see page 5-33 of the SDEIS) and discuss the potential for bus queuing which could exacerbate CO emissions. Estimated CO emissions should be provided. Sections 202(f) and 219 of the amended CAA for new Urban Bus Standards which may be applicable to the shuttle-bus services being proposed in the SDEIS should be considered in terms of overall project decision-making. (U.S. Environmental Protection Agency)

Response: For the bus stop on the mauka side of Kapiolani, Ewa of Kalakaua, in the year 2005 morning peak hour there will be 36 buses dwelling an average of 113 seconds and an additional 14 buses dwelling an average of 35 seconds, with an average maximum queue of 3 buses. In the afternoon peak hour there will be 36 buses dwelling an average of 96 seconds and an additional 14 buses dwelling an average of 23 seconds, with an average maximum queue of 2 buses. For the bus stop on the makai side of Kapiolani, Ewa of Kalakaua, in the morning peak hour there will be 36 buses dwelling an average of 138 seconds and an additional 14 buses dwelling an average of 28 seconds, with an average maximum queue of 3 buses. In the afternoon peak hour there will be 36 buses dwelling an average of 165 seconds and an additional 14 buses dwelling an average of 40 seconds, with an average maximum queue of 3 buses. At the bus stop on the makai side of Kona Street, Koko Head of Keeaumoku, in the morning peak hour there will be 36 buses dwelling an average of 44 seconds, 12 buses dwelling an average of 30 seconds, and 6 buses dwelling an average of 10 seconds, with an average maximum queue of 2 buses. In the afternoon peak hour there will be 36 buses dwelling an average of 49 seconds, 12 buses dwelling an average of 39 seconds, and 8 buses dwelling an average of 10 seconds, with an average maximum queue of 2 buses.

It is not expected that the number of buses described above will exacerbate CO emissions in the horizon year of 2005. In comparison to the automobile, buses are not large producers of CO. In addition, all of the buses in the horizon year will meet the New Urban Bus Standards. CO emissions are provided in Table 5.3 of this FEIS. For the year 2005, the table shows that CO emissions for buses would be 303 annual tons for the No-Build Alternative and 283 annual tons for the amended LPA. The 2005 emissions of CO for buses will be 30-40% less than the 1995 emissions, reflecting the less polluting transit vehicles. Note that all of the bus stops at the Ala Moana Center and Kalakaua/Kapiolani Stations will be located in open areas. Therefore, bus exhaust fumes will disperse and will not accumulate.

Comment 16.9: We suggest that the air quality analysis provide more information on the particulate pollution from diesel fuel. (Environmental Center)

Response: The 1990 amendments to the Clean Air Act require the gradual replacement of diesel-fueled buses by less polluting technologies. Therefore, the particulate emissions from buses will decrease in the future. It would be difficult to further quantify the extent of the decrease because this would depend on the type of technology selected to replace the existing diesel buses and the anticipated time frame for purchase of the new buses.

Comment 16.10: What are the comparative impacts between the alternatives with regard to automobile passenger exposure to in-vehicle pollution? The rapid transit alternative should cause a much greater reduction of such pollution compared to the TSM Alternative. (Environmental Center)

Response: It is true that the amended LPA would result in a reduction of in-vehicle pollution as compared to the other alternatives since some people would stop driving their cars and would use transit instead.

Comment 16.11: Increased noise and air pollution from increased bus traffic associated with the amended LPA will increase noise and air pollution levels in the neighborhood. (McCully/Moiliili Neighborhood Board No. 8)

Response: See the response to Comment 18.14 in Section 7.4 and Section 5.6.5 of this FEIS.

Comment 16.12: How does the EIS reconcile and prioritize the differing intentions and applicability of this project to the following: FTA guidelines for transit planning and preparing EISs; the Council on Environmental Quality's regulations for implementing NEPA; and the State of Hawaii's rules for preparing EISs? For instance, our reviewers have expressed concern over the cost effectiveness index, which may satisfy federal reviewers but is inadequate or inappropriate for the purposes of our review. (Environmental Center)

Response: The EIS is a multi-purpose document. It is written to satisfy local, state, and federal requirements for environmental documentation. It is also a decision document. It contains information for both local and federal decision makers concerning the viability of various transit alternatives. Because it supports both local and federal decision-making, it contains a wide variety of information. Some information, like the cost effectiveness index is important for federal decision-makers but may not be important to local citizens and officials. Likewise, the EIS contains much information supportive of a local decision about a preferred alternative that may not be of such importance to the federal decision.

Comment 16.13: Table 5.3 displays air quality emissions. Please explain why the TSM Alternative scores better than rail in 2000 and rail scores better than TSM in 2005. Why are the amounts of emissions in all but two pollutants lower in 2000 than in 1995? Since carbon dioxide is a major greenhouse gas released by motor vehicles, why is it not mentioned in this section? (Leeward Oahu Transportation Management Association)

Response: The important numbers in the table are the results for 2005. In 2000, the TSM Alternative has slightly better results than the fixed guideway alternative because the rapid transit system has not reached its full patronage potential. A staged implementation of both rapid transit and supporting bus service occurs with the fixed guideway alternative. With the TSM Alternative, full service is achieved prior to 2000 with corresponding improvements to air quality. The reduction in pollutants between 1995 and 2000 is due, in large part, to stricter federal emissions standards on motor vehicles. Carbon dioxide is not analyzed because it is not a regulated pollutant by either the state or the federal government.

Comment 16.14: The Waiawa maintenance facility and storage yard will be in the vicinity of the State Land Use Agricultural District. We suggest that our office be contacted during the detailed planning for this facility to clarify the location of the district boundaries. (Hawaii Land Use Commission)

Response: Further liaison with the Hawaii Land Use Commission will be undertaken regarding the district boundaries.

Comment 16.15: The Waiawa facilities should be designed keeping in mind that the Air Force has a fuel valve station and associated piping located in the former Navy Ewa Drum Storage Site. (U.S. Department of the Navy)

Response: Appropriate coordination will be undertaken to address the issue.

Comment 16.16: The SDEIS indicates that the Waiawa Station is proposed as a "retained cut" station. Please define "retained cut", describe the amount of cut necessary, and indicate what (if any) effect this might have on any subsurface contaminants at that site. (U.S. Environmental Protection Agency)

Response: A "retained cut" is the use of a retaining wall to support earthwork once the "cut" material has been removed. It is anticipated that there will be approximately 15,000 cubic yards of excavation at the Waiawa Station site. The retained cut would not affect subsurface pollutants at the site by contributing to the contamination. However, site investigations to characterize the nature and extent of any residual contamination at the site are continuing. If areas to be excavated contain contaminated material, all applicable standards and regulations will be followed during the excavation, handling, and disposal of this material. Appropriate procedures will also be designed not to contribute to the migration of any remaining contamination. The selection of specific procedures will depend on the nature and extent of the remaining contamination, if any.

Comment 16.17: The FEIS should identify the materials (and wastes, if applicable) that might be stored in the "hazardous materials room" at the maintenance and storage facility which is depicted in Figure 2.14 of the SDEIS. Please provide information on the construction of the facility (in accordance with the Resource Conservation and Recovery Act) and discuss the need for this room. RCRA requires hazardous waste generators to certify that they have taken steps to reduce volume of hazardous waste generated. (U.S. Environmental Protection Agency)

Response: The hazardous material room will temporarily store hazardous materials which require disposal. These materials include paint, thinners, old batteries, and used oil. The room is needed as a precautionary measure only. The construction will meet all codes and regulations regarding hazardous materials rooms. Steps will be undertaken, in accordance with RCRA, to reduce the volume of hazardous waste generated.

Comment 16.18: Please revise the narrative in the first paragraph of page 5-21 to clarify that the Sewage Treatment Plant is on City property and is not part of the Navy Ewa Drum Storage Site. (U.S. Department of the Navy)

Response: The narrative has been revised. The STP is City property.

Comment 16.19: The FEIS should include details of any preliminary findings regarding the Navy's investigation of a gasoline spill at the Navy Ewa Drum Storage Site. The FEIS should indicate when the final results will be available and discuss options available to the rapid transit program proponents should additional and/or extensive contamination be discovered. Should additional remediation be necessary, the FEIS should describe what measures will be taken to ensure that the existing contamination is not mobilized or exacerbated by the activities of the proposed use. (U.S. Environmental Protection Agency)

Response: Site investigations at the Navy Ewa Drum Storage Site are continuing. Remedial actions and proper procedures to be followed during construction will be developed based on the results of those studies. Section 2840 of the National Defense Authorization Act for Fiscal Years 1992 and 1993 authorizes the proposed Navy Ewa Drum Storage Site land exchange. This authorization directs the Secretary of the Navy to carry out any remedial actions with respect to the hazardous substances located on the Navy Ewa Drum Storage Site that are necessary to protect human health and the environment. Specific options for remediation depend on a number of site-specific details that are still being investigated. Results will be shared with agencies having jurisdiction, and the action plan will be developed in consultation with those agencies. Applicable standards and procedures will be followed at all times.



Comment 16.20: The FEIS should indicate the party responsible for removal and treatment of hazardous waste from the Ewa Drum Storage Site if discovered after transfer from the Navy to the City. (City Council Member Morgado)

Response: The Navy is responsible for removal and treatment of hazardous materials, regardless of the timing.

Comment 16.21: The SDEIS indicates that several underground storage tanks (USTs) may be located in the area of Halekauwila Street. The FEIS should provide additional information regarding the location, contents, and status of any tanks and associated piping. The FEIS should acknowledge that remediation may be necessary if tanks have released harmful materials into the environment. We recommend that the project proponent undertake an expedited investigation to determine the status of these tanks since removal, abandonment and, if necessary, remediation can be costly. (US Environmental Protection Agency)

Response: A study has been initiated to identify more precisely the location of USTs and piping in the project area. The City is well aware of the potential cost and schedule impacts of remediation associated with the removal of USTs. The investigation will be expedited.

Comment 16.22: The SDEIS indicates that hazardous waste studies would be conducted during later design phases which apparently will follow the Council's approval of the full funding agreement. Hazardous waste information, however, should be available prior to the Council's final approval of the project. (City Council Member Morgado)

Response: Additional studies are underway to refine further expected occurrence of hazardous waste. The results will be made available to the City Council.

Comment 16.23: My comments should be presented in their entirety in the FEIS. (City Council Member Morgado)

Response: As discussed in Section 7.3, because of the numerous comments received on the AA/DEIS and the SDEIS, it would be difficult to include each person's comments in their entirety. Therefore, the comments were summarized and paraphrased both to reduce redundancy and to reduce the volume of paper required for this document. Every effort was made to accurately convey the content of all comments and testimony received. Note that the Public and Agency Comments (July 1992) published as a separate document, presents copies of all comments in entirety during the public comment periods for the AA/DEIS and SDEIS. This document is available for review at the Office of Rapid Transit.

Comment 16.24: We were unable to locate any comparisons between the baseline safety impacts and the TSM and amended LPA. The FEIS should state that light rail has a much lower fatality rate than the other alternatives. A study, Renaissance of Rail Transit in America, June 1991, indicates that for metropolitan areas, the fatality rate is 6.4 per million people traveling in autos and 0.7 per million for passengers traveling by rail transit. (Environmental Center)

Response: EISs do not usually address safety issues. However, as the commenter noted, travel by rail has been shown to be statistically safer than travel by automobile.

Comment 16.25: We never received a copy of the SDEIS through the appropriate channels. We request that additional time be made available for us to review the SDEIS. (Ala Moana Center)

Response: Public notification of the availability of the SDEIS for review is discussed in Section 7.1. The notification included an announcement in the Federal Register. A public hearing on the SDEIS was also

announced in two local newspapers. Copies of the SDEIS were available for review at the Office of Rapid Transit, State Main Library, all regional libraries, and all branch libraries on Oahu. This FEIS addresses all of the comments received from Ala Moana Center as of July 10, 1992. The City is committed to continuing to work with Ala Moana Center to resolve potential conflicts.

Comment 16.26: Pursuant to Section 11-200-17(n), Hawaii Administrative Rules, please include a summary of unresolved issues and either a discussion of how such issues will be resolved prior to commencement of the action, or what overriding reasons there are for proceeding without resolving the problems. (Office of Environmental Quality Control)

Response: Section S.7 of the Executive Summary of this FEIS provides this information.

Comment 16.27: We believe that comments should be solicited from the appropriate Disabled American Veterans (DAV) Chapter which may be affected by the alignment. (Hawaii Department of Land and Natural Resources)

Response: The City will coordinate with the DAV concerning acquisition of a part of its property.

## LIST OF COMMENTERS ON THE SDEIS

Comments were written unless noted as oral testimony in the following list.

### FEDERAL AGENCIES

Advisory Council on Historic Preservation, Claudia Nissley, Director, Western Office of Project Review - Historic Sites and Parkland 12.1.

Department of Agriculture, Soil Conservation Service, Warren M. Lee, State Conservationist - No comment.

Department of the Air Force, Lt. Col. Donald J. Meister, Director of Civil Engineering - Community and Social Concerns 5.26.

Department of the Army, Ray H. Jyo, P.E., Acting Director of Engineering - Hydrology/Water Quality 9.9 - 9.12, 9.14.

Department of the Navy, Office of the Chief of Naval Operations, Captain B.J. O'Connell, Assistant for Planning and Real Estate, Shore Activities Division - No comment.

Department of the Navy, W.K. Liu, Assistant Pearl Harbor Base Civil Engineer - Station Design 2.1 - 2.3; Land Use 4.3 - 4.6; Hydrology 9.4 - 9.6; Historic Sites and Parklands 12.2, 12.3, 12.6; Miscellaneous 16.15, 16.18.

Environmental Protection Agency, Deanna Wieman, Director, Office of External Affairs - Traffic 3.26, 3.27; Hydrology 9.7, 9.8; Construction 10.1 - 10.3; Miscellaneous 16.2, 16.7, 16.8, 16.16, 16.17, 16.19, 16.21.

### STATE AGENCIES

#### Hawaii

Department of Budget and Finance, Hawaii Housing Finance and Development Corp., Joseph Conant, Executive Director - Community and Social Concerns 5.6, 5.7.

Department of Business, Economic Development & Tourism, Land Use Commission, Esther Ueda, Executive Officer - Land Use 4.2; Hydrology 9.1; Miscellaneous 16.14.

Department of Defense, Office of the Adjutant General, Lt. Col. Jerry M. Matsuda, Contracting and Engineering Officer - Miscellaneous 16.1.

Department of Defense, Office of the Director of Civil Defense, Roy C. Price, Sr., Vice Director of Civil Defense - Miscellaneous 16.1.

Department of Education, Charles T. Toguchi, Superintendent - Noise 7.2.

Department of Health, John C. Lewin, M.D., Director of Health - No comment.

Department of Human Services, Winona E. Rubin, Director - No comment.

Department of Land and Natural Resources, William W. Paty, Chairperson, Board of Land and Natural Resources - Aesthetics 6.5; Hydrology 9.2, 9.3; Historic Sites and Parklands 12.4; Miscellaneous 16.27.

Hawaii Community Development Authority, Michael Scarfone, Executive Director - Traffic 3.34; Land Use 4.10; Community and Social Concerns 5.24, 5.25.

Office of Environmental Quality Control, Brian J.J. Choy, Director - Miscellaneous 16.26.

Office of State Planning, Harold S. Masumoto, Director and Rex D. Johnson, Director, Department of Transportation - Alternatives 1.4, 1.10; Station Design 2.4, 2.5; Traffic 3.18, 3.19, 3.21, 3.23; Land Use 4.8, 4.9; Aesthetics 6.6; Financial 11.15, 11.16, 11.17.

University of Hawaii at Manoa, Environmental Center, John T. Harrison, Ph.D., Environmental Coordinator - Alternatives 1.9, 1.13; Traffic 3.15, 3.17; Community and Social Concerns 5.16, 5.19; Aesthetics 6.6; Financial 11.14, 11.22; Patronage 13.12, 13.51; Energy 14.4; Economic 15.1, 15.6 - 15.9; Miscellaneous 16.3, 16.4, 16.9, 16.10, 16.12, 16.24.

Waikiki Convention Center Authority, Alan S. Hayashi - Land Use 4.1.

#### **LOCAL AGENCIES**

Board of Water Supply, Kazu Hayashida, Manager and Chief Engineer - Hydrology 10.4.

Building Department, Herbert K. Muraoka, Director and Building Superintendent - No comment.

Department of General Planning, Benjamin B. Lee, Chief Planning Officer - Supports rapid transit.

Department of Parks and Recreation, Walter M. Ozawa, Director - Ecosystems 8.1.

Fire Department, Lionel E. Camara, Fire Chief - No comment.

Arnold Morgado, Jr., City Council, Chair (oral and written testimony) - Alternatives 1.1 -1.3, 1.5 - 1.7, 1.12; Traffic 3.1, 3.2, 3.4, 3.5, 3.7 - 3.14, 3.24, 3.25, 3.28, 3.29; Land Use 4.7; Community and Social Concerns 5.2 - 5.5; Aesthetics 6.3, 6.4; Financial 11.1 - 11.13, 11.17, 11.20, 11.21, 11.23 - 11.34; Historic Sites and Parklands 12.3; Patronage 13.1 -13.11, 13.17 - 13.44, 13.47 - 13.50; Energy 14.1 - 14.3; Economic 15.1, 15.2, 15.3, 15.4; Miscellaneous 16.5, 16.6, 16.20, 16.22, 16.23.

Police Department, Chester E. Hughes, Assistant Chief of Police Support Services Bureau - No comment.

#### **CIVIC ORGANIZATIONS AND BUSINESSES**

Ala Moana Center, General Growth Management of Hawaii, Inc., Dwight L. Yoshimura, Administrative Director - Traffic 3.6, 3.30; Community and Social Concerns 5.8 - 5.14; Construction 10.5, 10.6; Miscellaneous 16.25.

Committee on Sensible Transit, Cliff Slater, Chair (oral and written testimony) - Opposes rapid transit. Traffic 3.1, 3.3; Aesthetics 6.1; Financial 11.17, 11.33; Patronage 13.15, 13.16, 13.46; Energy 14.1; Economic 15.3.

Honolulu Taxpayers for Traffic Solutions, Lex Brodie - Supports Nimitz Highway alignment. Alternatives 1.8.

Kuliouou/Kalani Iki Neighborhood Board No. 2, Lynda Starr, Transportation Chairman (oral testimony) - Noise 7.1.

League of Women Voters, Arlene Kim Ellis, President, and Astrid Monson, Chair, Planning and Zoning (oral and written testimony) - Opposes rapid transit. Financial 11.18, 11.19, 11.35; Patronage 13.13, 13.14, 13.52; Economic 15.5.

Leeward Oahu Transportation Management Association, Darrlyn T. Bunda, Executive Director - Traffic 3.16; Patronage 13.45; Miscellaneous 16.13.

Manoa Neighborhood Board No. 7, John T. McLaren, Chairperson - Community and Social Concerns 5.18.

McCully/Moiliili Neighborhood Board No. 8, Charles McClure, Chairperson - Traffic 3.20, 3.22, 3.31, 3.32, 3.33; Community and Social Concerns 5.15, 5.17, 5.20 - 5.23; Aesthetics 6.7, 6.8; Hydrology/Water Quality 9.13; Construction 10.7, 10.8; Historic Sites and Parklands 12.5; Miscellaneous 16.11.

Outdoor Circle, Betty Crocker, President - Opposes rapid transit. Aesthetics 6.2; Ecosystems 8.2.

Stryker Weiner Associates, Inc., Sharon Weiner - Supports Nimitz Highway alignment. Alternatives 1.8.

Tim Chow, Planning Consultant, Willard T. Chow, Ph.D. - Community and Social Concerns 5.1.

Waikiki Neighborhood Board No. 9, Anita Benfatti, Chair (oral testimony) - Opposes rapid transit.

Waikiki Residents Association, Georgia Miller, President (oral testimony) - Opposes rapid transit. Alternatives 1.11.

#### **CITIZENS**

Cindie Byers - Supports Nimitz Highway alignment. Alternatives 1.8.

Robert Cowan (oral testimony) - Opposes rapid transit. Alternatives 1.11.

Nicolette Nye - Supports Nimitz Highway alignment. Alternatives 1.8.

Jerry Souza (oral testimony) - Opposes rapid transit. Traffic 3.1.

Neal Yokota - Supports Nimitz Highway alignment. Alternatives 1.8.

Sally Youngblood (oral testimony) - Opposes rapid transit.



## Appendices

**APPENDIX A**  
**COORDINATION AND CONSULTATION**

## APPENDIX A COORDINATION AND CONSULTATION

### A.1 PUBLIC INVOLVEMENT

Active public involvement is critical to the success of any project with significant impact on the community. The process should ensure that critical community concerns and technical issues are identified early in the study and addressed in the engineering, environmental, economic, and financial analyses, so the alternatives and ultimately the locally preferred alternative effectively respond to community needs and preferences and satisfy local, State, and federal environmental clearance requirements.

#### A.1.1 Public Involvement Program

The public involvement program for the Honolulu Rapid Transit Program has consisted of five different elements. These include:

- Project sponsors
- Community participation
- Scoping meetings and public hearings
- Public information program
- Public involvement program.

A description of each follows.

#### A.1.2 Project Sponsors

The local project sponsor, the City and County of Honolulu Department of Transportation Services, has agreed to participate financially, technically, and at a policy level in the Honolulu Rapid Transit Program. At the federal level, the U.S. Department of Transportation, Federal Transit Administration is the prime participant in the study. In addition, a local Policy Review Committee was formed during the AA/DEIS phase which continues to meet monthly to discuss and provide input on key policy matters relating to the project. The committee is comprised of representatives from the City and County of Honolulu as well as the State of Hawaii and Federal agencies listed below:

City and County of Honolulu  
Managing Director  
Department of Transportation Services  
Finance Department  
Budget Department  
Department of General Planning  
Department of Land Utilization  
Department of Public Works  
Department of Housing and Community Development  
City Council

State of Hawaii  
Office of State Planning  
Department of Business, Economic Development and Tourism  
Department of Budget and Finance  
Department of Transportation (DOT)  
Hawaii Community Development Authority (HCDA)



Federal  
Federal Highway Administration (FHWA)

Others  
Oahu Metropolitan Planning Organization (OMPO)  
Honolulu Public Transit Authority (HPTA)  
General Engineering Consultant (GEC)

#### **A.1.3 Community Participation**

To facilitate the community participation, a list of individuals, agencies, and organizations has been developed which includes all who had indicated an interest in transportation planning during previous public information efforts. Project information and response forms have been mailed to these entities following public meetings and workshops in order to solicit comments and recommendations.

#### **A.1.4 Scoping Meetings and Public Hearings**

Formal scoping meetings were held on March 2, 4, and 5, 1987. The meetings were announced, in accordance with the Council on Environmental Quality Regulations, in the Federal Register, in local publications, and to all persons and organizations on the project mailing list. A summary report including meeting minutes, significant findings and comments, and a list of attendees was prepared and distributed. This report is available for review from the Office of Rapid Transit.

Subsequent to public information meetings on May 2 and 3, 1990, the following formal public hearings on the AA/DEIS were held in accordance with federal regulations:

State Capitol Auditorium	May 8, 1990
Aliamano Intermediate School	May 9, 1990

In order to solicit citizen and agency suggestions for the Locally Preferred Alternative (LPA), the City Council held the following public hearings:

Castle High School	July 10, 1990
Honolulu Hale	July 11, 1990
Waipahu High School	July 12, 1990
Kalani High School	July 16, 1990

As part of the City Council deliberative process to authorize the Mayor to enter into a Development Agreement with the state, a formal City Council public hearing was also held on October 16, 1991 at City Council Chambers in downtown Honolulu.

*On April 23, 1992 a formal public hearing was held on the SDEIS in accordance with federal regulations.*

#### **A.1.5 Public Information Program**

During the AA/DEIS phase, the public information program was established to educate the community on factors related to transportation planning. Subsequent to the selection of the LPA and the technology, the focus of the program shifted to include providing information specific to these two decisions.

The public information program is distinguished from the rest of the public involvement program in that its activities are designed primarily to inform the public and not necessarily to elicit interaction. The information program included the following briefings for the news media, informational meetings,

presentations to individual community and professional associations and educational institutions, and public forums:

Workshops

Rapid Transit Community Issues Workshop July 13, 17, and 18, 1989  
August 1-2, 1989

Orientation/Workshop for Mayor's Neighborhood Board Representatives April 12, 1991

City Council Rapid Transit Orientation/Workshop May 24 and June 4, 1990

Informational Meetings

Washington Intermediate School May 2, 1990

Aliamanu Intermediate School May 3, 1990

State House Committee on Transportation February 6, 1991

Upon vendor selection of the Oahu Transit Group, public informational meetings were held across Oahu at the following locations:

Kalani High School October 1, 1991  
King Intermediate School October 8, 1991  
Waipahu Intermediate School October 9, 1991  
Mililani Uka Elementary School October 14, 1991  
Roosevelt High School October 15, 1991

In addition, a series of presentations to individual community and professional associations and educational institutions was conducted over a 2½ year period between July 1989 and November 1991. There were approximately 200 presentations given to organizations such as the Oahu Metropolitan Planning Organization (OMPO) Citizen Advisory Committee, Neighborhood Boards, Lions Clubs, Rotary Clubs, high school students, University of Hawaii organizations, and the League of Women Voters.

**A.1.6 Public Involvement**

Public involvement was structured to permit both active, continuous participation and informal dialogues to ensure a maximum exchange of information and concerns. Community Working Groups were established in each of the several communities in the proposed corridors as part of the scoping process. Existing transportation committees of the Neighborhood Boards were invited to constitute the nucleus of each Community Working Group. The groups provided data regarding their geographical area based upon their knowledge of their individual community transportation needs and environmental concerns. This information was used to develop the criteria by which the final study alternatives were chosen and developed.

Following completion and FTA acceptance of the Detailed Definition of Alternatives report in April 1989, a public workshop was held for participants from the Community Working Groups. The purpose of this meeting was to report to the community on the status and progress of the Honolulu Rapid Transit Program and the AA/DEIS.

Community Issues Study Committees were formed during the technical evaluation portion of the study. Participants on the committees reviewed the technical findings of the study team and provided comments and suggestions. The purpose of these committees was to include the public in the decision process through a defined and recognized effort.

#### A.1.6.1 Schedule of Community Coordination Activities

A schedule of all community coordination activities is presented by element in Table A.1.

Table A.1 Honolulu Rapid Transit Program Community Coordination Activities	
Activity	Date
Scoping Meetings	March 1987
Public Workshops	July - August 1989
AA/DEIS Public Hearings	May 8 and 9, 1990
City Council Public Hearings on LPA	July 10, 11, 12 and 16, 1990
Presentations to: Community Group Private Sector	Ongoing Ongoing
Local Elected Officials	Ongoing
Public Meetings	May 1989 May 2 and 3, 1990
Joint City Council Public Meetings	October 1, 8, 9 14 and 15, 1991
SDEIS Public Hearing	April 23, 1992

#### A.1.6.2 Community Concern

Comments have been received from individuals, agencies, and organizations throughout the study process. These have been documented in five reports: Summary Report of the Scoping Process; Summary of the May 6, 1989, Public Meeting; Summary of the Community Issues Workshops; Locally Preferred Alternative Report; and Public and Agency comments; *and this Final Environmental Impact Statement.*

## **A.2 AGENCY COORDINATION**

### **A.2.1 Scoping**

The details and results of the scoping process for this project are summarized in a separate report available for review at the Office of Rapid Transit. A Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) on Transit Improvements in the City and County of Honolulu, Hawaii, appeared in the Federal Register, Vol. 52, No. 28 (Wednesday, February 11, 1987). An EIS Preparation Notice was prepared and distributed in October 1988. Agency concerns raised during the EIS preparation process included:

- Access to Pearl Harbor
- Loss of parking
- Noise
- Groundwater quality at Navy Ewa Drum Storage Site
- Historic resources
- Keehi Lagoon fishing bait resource
- Special Districts
- Energy consumption
- Identification of government approvals and permits
- Public housing projects
- Air quality
- Traffic/proximity effects at Aliamanu Schools
- Consistency with Waterfront Redevelopment plans
- Service to low and moderate income neighborhoods
- Visual impacts
- Possible utility conflicts.

### **A.2.2 Coordination During Study Process**

Extensive agency coordination and consultation has continued throughout the study process, with the following functions:

- (1) Data collection/identification of resources;
- (2) Compliance with regulatory requirements; and
- (3) Review of and input to analysis results.

The following summarizes agencies consulted and the topic/concern of discussion.

<u>AGENCY</u>	<u>TOPIC</u>
City Department of General Planning (DGP)	Land use
State Historic Preservation Officer (SHPO)	Historic and Archaeological resources
University of Hawaii	Coordination with UH planning
U.S. Soil Conservation Service (SCS)	Farmlands, soil, and Farmlands Protection Policy Act (FPPA) coordination

Agencies consulted (continued)

<u>AGENCY</u>	<u>TOPIC</u>
State Department of Land and Natural Resources (DLNR)	Ecosystems, water resources, historic resources
State Department of Agriculture	Farmlands and soils
U.S. Geological Survey (USGS)	Hydrology, water quality, wetlands, groundwater
National Marine Fisheries Service (NMFS)	Section 7 Coordination, wetlands
U.S. Army Corps. of Engineers (COE)	Section 404 permit, wetlands
U.S. Fish and Wildlife Service (USFWS)	Section 7 Coordination, wetlands, water quality, ecosystems, sole source aquifer, natural resources
U.S. Coast Guard (USCG)	Navigation, permit
Hawaii Community Development Authority (HCDA)	Land use
Aloha Tower Development Corporation	Aloha Tower Development
State Department of Health	Sole source aquifer, natural resources
City Board of Water Supply	Sole source aquifer, natural resources
U.S. Department of the Navy	Navy Ewa Drum Storage Site, Pearl Harbor
National Park Service	Arizona Memorial

### **A.3 ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE**

*A listing of those organizations and agencies consulted during the environmental impact statement preparation notice comment period is contained in Appendix A of the Alternatives Analysis and Draft Environmental Impact Statement for the Honolulu Rapid Transit Development Project (AA/DEIS) (March 1990). Also included are copies of the comment letters received and the responses to those letters.*

*Copies of the AA/DEIS are available at the Office of Rapid Transit, Office of Environmental Quality Control, Legislative Reference Bureau Library, Municipal Reference and Records Center, University of Hawaii Hamilton Library, State Main and Regional Libraries.*

**A.4 SECTION 4(f) CORRESPONDENCE - DEPARTMENT OF INTERIOR**



# United States Department of the Interior

OFFICE OF THE SECRETARY  
Washington, D.C. 20240



ER 92/0259

JUL 17 1992

Mr. Donald Emerson  
Chief, Planning Analysis and  
Support Division  
Federal Transit Administration  
400 Seventh Street, S.W.  
Washington, DC 20590

Dear Mr. Emerson:

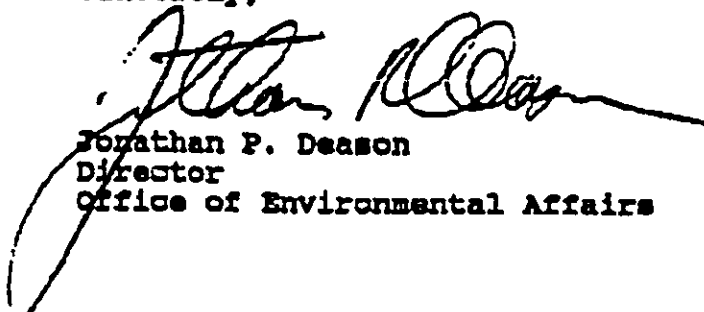
This responds to your request for the Department of the Interior's comments on the Section 4(f) documentation for Honolulu Rapid Transit Program, Honolulu County, Hawaii.

If the Amended Locally Preferred Alternative is selected, we would concur that there are no feasible and prudent alternatives to the use of land from Keeshi Lagoon Beach Park, Aloha Stadium, the historic Pearl Harbor Naval Base (Arizona Memorial, Makalapa Gate), and the OR&L Station Property. We would also concur that all possible planning to minimize harm to the involved Section 4(f) resources has been addressed in the documentation.

Consequently, the Department of the Interior has no objection to Section 4(f) approval of the project by the Federal Transit Administration.

We appreciate the coordination you have undertaken with the National Park Service on this project. Thank you for the opportunity to provide these comments.

Sincerely,

  
Jonathan P. Deason  
Director  
Office of Environmental Affairs

cc: (see next page)



Mr. Donald Emerson

-2-

cc: Mr. Joseph M. Magaldi, Jr.  
Director  
Department of Transportation Services  
City and County of Honolulu  
Honolulu Municipal Building  
650 South King Street  
Honolulu, Hawaii 96813

Mr. Robert Hom  
Program Manager  
Federal Transit Administration  
211 Main Street, Room 1160  
San Francisco, California 94105

**A.5 SECTION 106 MEMORANDUM OF AGREEMENT**

H:\70002\0028 rpt

MEMORANDUM OF AGREEMENT  
BY AND AMONG THE FEDERAL TRANSIT ADMINISTRATION,  
THE HAWAII STATE HISTORIC PRESERVATION OFFICER,  
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION  
REGARDING HISTORIC PROPERTIES AFFECTED BY THE  
CONSTRUCTION OF THE HONOLULU RAPID TRANSIT PROGRAM

WHEREAS, the Federal Transit Administration (FTA) has determined that the Honolulu Rapid Transit Program will have an effect upon properties included on or eligible for inclusion in the National Register of Historic Places and has consulted with the Hawaii State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (Council) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); and

WHEREAS, the Department of Transportation Services of the City and County of Honolulu (City) participated in the consultation and has been invited to concur in this Memorandum of Agreement;

NOW, THEREFORE, FTA, SHPO, and the Council agree that the Undertaking, if funded partially or wholly by monies from FTA shall be implemented in accordance with the following stipulations in order to take into account the effect of the Honolulu Rapid Transit Program on historic resources in the project corridor as identified in the Honolulu Rapid Transit Program Section 106 Documentation (May 1992).

STIPULATIONS

FTA will ensure that the following measures are carried out:

I. Chinatown Historic District

A. The City will develop the project design and specifications for construction in the Chinatown Historic District in consultation with the SHPO and will submit the plans to the SHPO and the Council for concurrence.

B. The City will landscape the portion of the project in the Chinatown Historic District in accordance with the landscaping plan designed in consultation with and approved by the SHPO to reduce the impacts of the project on the Chinatown Historic District.

C. The City will protect structures in the Chinatown Historic District against damage during construction in accordance with sound construction practices to be developed and reviewed with the SHPO.

D. The City will incorporate an interpretative display relating to the Chinatown Historic District into the Nimitz/Smith Station.

E. Prior to the construction of the Honolulu Rapid Transit project, the City will contact the National Park Service (NPS) regional office Historic American Building Survey/Historic American Engineering Record (HABS/HAER) to determine what level and kind of recordation is appropriate for the Chinatown Historic District. The City will complete all documentation which must be accepted by HABS/HAER prior to construction in the Chinatown Historic District, and will provide copies of this documentation to the SHPO and appropriate local archives designated by the SHPO.

## II. Dillingham Transportation Building

A. The City will develop the project design and specifications for construction in the immediate vicinity of the Dillingham Transportation Building in consultation with the SHPO and will submit the plans to the SHPO and the Council for concurrence.

B. The City will landscape the portion of the project in the immediate vicinity of the Dillingham Transportation Building in accordance with a landscaping plan designed in consultation with and approved by the SHPO to reduce the impacts of the project on the Dillingham Transportation Building.

C. The City will protect the Dillingham Transportation Building against damage during construction in accordance with sound construction practices to be developed and reviewed with the SHPO.

D. Prior to the construction of the Honolulu Rapid Transit project, the City will contact NPS regional office HABS/HAER to determine what level and kind of recordation is appropriate for the Dillingham Transportation Building. The City will complete all documentation which must be accepted by HABS/HAER prior to construction adjacent to the Dillingham Transportation Building, and will provide copies of this documentation to the SHPO and appropriate local archives designated by the SHPO.

III. Aloha Tower

A. The City will develop the project design and specifications for construction in the immediate vicinity of the Aloha Tower in consultation with the SHPO and will submit the plans to the SHPO and the Council for concurrence.

B. The City will landscape the portion of the project in the Fort Street Mall view corridor in accordance with a landscaping plan designed in consultation with and approved by the SHPO to reduce the impacts of the project on Aloha Tower.

C. Prior to the construction of the Honolulu Rapid Transit project, the City will contact NPS regional office HABS/HAER to determine what level and kind of recordation is appropriate for the Aloha Tower. The City will complete all documentation which must be accepted by HABS/HAER prior to construction adjacent to the Aloha Tower, and will provide copies of this documentation to the SHPO and appropriate local archives designated by the SHPO.

IV. Mother Waldron Park

A. The City will develop the project design and specifications for construction adjacent to Mother Waldron Park in consultation with the SHPO and will submit the plans to the SHPO and the Council for concurrence.

B. The City will landscape the portion of the project in the immediate vicinity of Mother Waldron Park in accordance with a landscaping plan designed in consultation with and approved by the SHPO to reduce the impacts of the project on Mother Waldron Park.

C. The City will protect Mother Waldron Park against damage during construction in accordance with sound construction practices to be developed and reviewed with the SHPO.

D. Prior to the construction of the Honolulu Rapid Transit project, the City will contact NPS regional office HABS/HAER to determine what level and kind of recordation is appropriate for Mother Waldron Park. The City will complete all documentation which must be accepted by HABS/HAER prior to construction adjacent to Mother Waldron Park, and will provide copies of this documentation to the SHPO and appropriate local archives designated by the SHPO.

V. Archaeological Sites

Beginning with Final Design, Archaeological Identification and Treatment Plans will be developed and implemented to guide the identification of archaeological sites that will be affected by the Honolulu Rapid Transit Program (H RTP), and their proper treatment.

A. FTA and the City shall ensure that all archaeological investigations carried out pursuant to this Agreement are conducted by individuals who meet the appropriate qualifications contained in the Secretary of the Interior's Standards for Archaeology Professional Qualifications as described in 36 CFR Part 61.

B. The City will develop Archaeological Identification and Treatment Plans in consultation with the SHPO. The plans shall be consistent with the *Secretary of Interior's Standards and Guidelines for Archaeological Documentation* (48 FR 44734-34) and take into account the Council's publication, *Treatment of Archaeological Properties* (Advisory Council on Historic Preservation, [1980]), subject to any revisions the Council may make in the publication prior to completion of the Archaeological Identification and Treatment Plans. The Identification Plan will ensure that all significant historic sites affected by the H RTP are identified so that they can be properly treated. Two treatment plans will guide the treatment of fishponds and human burials, since these types of historic sites are likely to be encountered. The treatment of other types of historic sites will be guided by treatment plans developed on a case-by-case basis. The treatment plans shall specify at a minimum:

(1) the research questions to be addressed through data recovery, with an explanation of their relevance and importance;

(2) the methods to be used, with an explanation of their relevance to the research questions;

(3) the proposed disposition of recovered materials and records;

(4) a proposed schedule for the submission of progress reports to the SHPO and the Council; and

(5) the proposed method for communicating the information recovered to the public.

C. The City will submit the Archaeological Identification and Treatment Plans to the SHPO and the Council for a thirty (30) day review. Unless the SHPO or the Council object within thirty (30) days after the receipt of the Plan, the City will implement the Plan.

D. The City will ensure all records resulting from the data recovery project are curated by an institution acceptable to the SHPO in accordance with 36 CFR Part 79 and that all materials resulting from the data recovery are maintained by such institution in accordance with 36 CFR Part 79 until their analysis is complete and they are returned to their owner, provided, however, that the human remains and grave-associated artifacts will be disposed of as outlined in the section of the Archaeological Identification and Treatment Plan on burials. The burial plan will comply with the State burial law (Chapter 6E - 43 Hawaii Revised Statutes) and Stipulation VI and the burial plan will be prepared in consultation with the Burial Council.

E. The City will ensure that information resulting from the archaeological data recovery is provided to the SHPO in a form acceptable for review and that the SHPO's comments are incorporated into the report. The final report will be submitted to the SHPO for inclusion in the State historic properties inventory.

F. The City will ensure that all final archaeologist's reports resulting from actions pursuant to this agreement are provided to the SHPO, the Office of Hawaiian Affairs (OHA), FTA, the National Park Service and the National Technical Information Service (NTIS) of the Department of Commerce, as required by the Archaeological Identification and Treatment Plans. The City shall ensure that all reports are responsive to contemporary standards and to the Department of Interior's *Format Standards for Final Reports of Data Recovery Program* (42 FR 5377-79).

#### VI. Human Remains

If human remains are encountered on federal lands the City will consult with Native Hawaiians, or other appropriate groups, to determine treatment and disposition measures consistent with applicable federal laws (such as the Native American Graves Protection and Repatriation Act [23 U.S.C. 3002]). If human remains are encountered on state or private lands, the city will ensure that they are treated according to appropriate state laws.

VII. Dispute Resolution

Should the SHPO or the Council object within thirty (30) days to any reports, plans, specifications, or other documentation provided for review pursuant to this Agreement, the City will consult further with the objecting party to resolve the objection. If the City determines that the objection cannot be resolved, the City shall notify FTA and will forward all documentation relevant to the dispute to the Council. Within thirty (30) days after receipt of all pertinent documentation, the Council will either: 1) provide FTA with recommendations, which FTA will take into account in reaching a final decision regarding the dispute; or 2) notify FTA that it will comment pursuant to 36 CFR 800.6(b) and proceed to comment. Any recommendation or comment provided by the Council will be understood to pertain only to the subject of dispute, and FTA's responsibility to ensure completion of all actions required under this Agreement that are not the subject of dispute will remain unchanged.

VIII. Public Objections

At any time during the implementation of the measures stipulated in this Agreement, should an objection to any such measures be raised by a member of the public, the City shall take the objection into account and consult as needed with the objecting party, the SHPO, or the Council if necessary to resolve the objection. If the dispute cannot be resolved, the City will comply with Stipulation VII.

- IX. Failure to carry out the terms of this Agreement requires that FTA again request the Council's comments in accordance with 36 CFR part 800. If FTA cannot carry out the terms of the Agreement, FTA will not take or sanction any action or make an irreversible commitment that would result in an adverse effect with respect to National Register or eligible properties covered by the Agreement or would foreclose the Council's consideration of modifications or alternatives that could avoid or mitigate the adverse effect on the properties until the commenting process has been completed.
- X. Any party to this Agreement may request that it be amended, whereupon the parties will consult in accordance with 36 CFR 800.5(e)5 to consider such amendment.
- XI. Any party to this Agreement may terminate it by providing thirty (30) days' notice to the other parties, provided that the parties will consult during the period prior to termination to seek agreement on amendments or other actions that would avoid termination.



XII. The Council and the SHPO may monitor activities carried out pursuant to this Agreement, and the Council will review such activities if so requested. FTA and the City will cooperate with the Council and the SHPO in carrying out their monitoring and review activities.

XIII. Within ninety (90) days after carrying out the terms of this Agreement, the City shall provide a written report to all signatories to the Agreement on the actions to fulfill the terms of the Agreement.

Execution of this Memorandum of Agreement evidences that FTA has afforded the Council a reasonable opportunity to comment on the Honolulu Rapid Transit Program and its effects on historic properties and that FTA has taken into account the effects of their undertaking on historic properties.

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By: *Robert Bush*  
Robert Bush, Executive Director

Date: 7/14/92

FEDERAL TRANSIT ADMINISTRATION

By: *Louis F. Mraz, Jr.*  
Louis F. Mraz, Jr., Western Area Director

Date: 7-8-92

HAWAII STATE HISTORIC PRESERVATION OFFICER

By: *William W. Paty*  
William W. Paty

Date: JUL 8 1992

CONCUR:

CITY AND COUNTY OF HONOLULU, DEPARTMENT OF TRANSPORTATION SERVICES

By: *Joseph M. Magaldi, Jr.*  
Joseph M. Magaldi, Jr., Director

Date: JUL 8 1992

**APPENDIX B**  
**TRACK PLAN AND PROFILE DRAWINGS**

**APPENDIX B  
TRACK PLAN AND PROFILE DRAWINGS**

The Track Plan and Profile Drawings for Appendix B have been issued under a separate cover.

**APPENDIX C  
PUBLIC AND AGENCY COMMENTS**

**APPENDIX C  
PUBLIC AND AGENCY COMMENTS**

The Public and Agency Comments for Appendix C are available at the Department of Transportation Services, Office of Rapid Transit.



**Glossary**  
**Acronyms**  
**Bibliography**  
**List of Preparers**  
**FEIS Recipients**

**GLOSSARY**



## GLOSSARY

### **Access Time**

The time required to walk or drive from the origin of the trip (for example, from home) to a (boarding) transit stop, plus the waiting time based on the frequency of transit service, the transfer time and the walking or driving time from the transit (deboarding) stop to the destination. For auto trips, it is the time required to walk to and from parking places, and delays within parking facilities, if any.

### **Annualized Capital Cost**

A one time capital cost converted into an annual value which incorporates both the depreciation on the capital item and the foregone interest on the money invested in the project.

### **Arterial Roadway**

A roadway with partial control of access, with some intersections at-grade and intended to move high volumes of traffic over long distances at high speed.

### **Articulated Vehicle**

A vehicle which is jointed in a fashion which allows passenger access through the joint. Allows longer vehicles to turn at a shorter radius.

### **At-Grade**

On the ground surface or that surface at which highest pedestrian and vehicular traffic occurs.

### **AVG Ride Time**

Average time spent by passengers during riding only.

### **AVG Speed**

The average velocity of a vehicle from stop or station to stop or station (begins with door opening and ends with door opening).

### **AVG Wait Time**

Average time spent by passengers in the station (or stop) in waiting for service.

### **Below-Grade**

Placed below the ground surface as with a subway.

**Boarding Trips**

Number of trips boarding (entering) transit vehicles, regardless of whether the trip involved a transfer from another transit vehicle. Equivalent to unlinked trips. A fare may or may not be collected for each boarding trip, depending on whether a transfer is used.

**Bus Lane**

A lane of a road or street specifically designated for buses (may or may not be exclusive).

**Capital Costs**

Nonrecurring costs required to construct transit systems, including costs of right-of-way, facilities, rolling stock, power distribution, and the associated administrative and design costs, and financing charges during construction.

**Car Pool**

A group of passengers and drivers organized to utilize one automobile on a regular basis, riding together, for the same trip purpose (generally the work trip).

**Central Business District (CBD)**

The single business and commercial region which dominates the financial life of an urban region and may also contain a very substantial portion of the specialty commercial activity.

**Consist**

A make up of transit vehicles forming a train (e.g. 2, 4, 6, etc.)

**Contra Flow**

Vehicles are operated against the normal traffic flow.

**Crush Load**

The maximum physical capacity of a rail vehicle under overloaded conditions; about 1.5 square feet of gross floor area per passenger.

**Curb Lane**

A road or street lane adjacent to the curb at its side.

**dBA.**

Abbreviation for decibels of sound pressure as read on the "A" scale.

**Demand-Activated or Demand-Responsive**

Transportation responsive to a request for service. This may appear in the form of demand scheduling or an on-demand service request.

**Design Load**

Maximum design weight of a vehicle or structure including its payload.

**Destination Station or Stop**

The optional station or stop for a particular trip to leave the transit system.

**Distribution**

The process of letting passengers off at a number of different locations.

**Elevated Guideway**

A guideway which is positioned above the normal activity level (e.g. elevated over a street).

**Emission Control**

Method by which emissions are governed in an effort to minimize the amount of pollutants and/or noise emitted.

**Emissions**

Particulate, gaseous, noise or electro-magnetic by-products of the transit system or vehicle.

**End Terminal**

A transit station located at the end of a transit line.

**Energy Consumption (Empty)**

The energy consumed by a transit vehicle under normal operation with no passengers or cargo carried.

**Energy Consumption (Full)**

The energy consumed by a transit vehicle under normal operation carrying its design load (i.e. design capacity and not crush capacity).

**Envelope**

Definition of the vertical and horizontal space required for both the transit vehicle and/or the guideway.

**Ewa**

Geographical area in the southwest corner of Oahu. Used to indicate direction pointing to this area.

**Exclusive Way (Dedicated)**

A guideway or roadway to be used only for a certain classification of vehicles.

**Express Service**

Transit service where a very limited number of stops are made en route.

**Fare**

The authorized amount (cash or token) paid or valid transfer, pass, etc., presented for a transit ride.

**Fare Box**

A device that accepts and in some cases registers coins and tokens used by passengers as payment for rides.

**Fare Structure**

The methodology of determining the fare which a passenger pays for service.

**Feeder Service**

Local transit service which feeds some other (usually faster and at higher capacity) transit service.

**Frequency, Vehicle**

Time rate of vehicle arrivals at a station or stop or along a transit line.

**Grade-Separated**

Crossing lines of traffic vertically separated from each other and do not share a common intersection.

**Guideway**

Specifically designed way traversed by transit vehicles constrained to the way.

**Headway**

The time interval between identical points on successive vehicles passing the same point along the way.

**Heavy Rail Transit**

Rail transit mode characterized by exclusive grade-separated operation (aerial or subway in many cases) and higher average operating speeds and passenger capacities. Usually heavy rail involves a higher degree of automation and central control than does light rail.

**HOV**

High Occupancy Vehicle. Typically includes carpools with two or more people, vanpools, and buses.

**Integration with Other Modes**

Method by which a transit system interfaces with other modes of transportation.

**Interchange**

The system of interconnecting ramps between two or more intersecting roadways or guideways which are grade-separated.

**Kiss & Ride Facility**

The transfer point of an intermodal trip where a chauffeured passenger is dropped off and changes to the transit mode.

**Koko Head**

Geographical area in the southeast corner of Oahu. Used to indicate direction pointing to this area.

**Light Rail Transit**

Transit mode characterized by its ability to operate in both at-grade and/or grade-separated environment, and usually operating in smaller trains consisting of 2, 4, or 6 vehicles.

**Line Haul**

A transit system which offers service along a line or corridor.

**Line Mile**

Unduplicated miles of rail line, regardless of the number of tracks.

**Link**

A representative portion of a transportation network which joins two modes.

**Linked Trips**

Total passenger (fare-paying) trips. Linked trips exclude transfers; consequently, the number of linked trips must always be less than (or equal to) the number of unlinked (boarding) trips.

**Local Service**

A type of operation involving frequent stops and consequent low speeds, the purpose of which is to deliver and pick up transit passengers as close to their destinations or origins as possible.

**Makai**

Hawaiian terminology meaning direction pointing to the ocean.

**Mauka**

Hawaiian terminology meaning direction pointing to the mountains.

**Minimum Turn Radius**

Generally assumed to be the minimum horizontal turn radius.

**Modal Split**

The proportioning of trips between travel modes.

**Mode**

A particular form or method of travel.

**Monorail**

A guideway where vertical vehicle support and lateral guidance is provided by a single track or rail.

**Network**

A system of real or hypothetical interconnecting links that form the configuration of transit routes and stops which constitute the total system.

**Off-Peak**

Those periods of the day where demand for transit service is not at a maximum.

**On-Demand**

Transit service rendered upon the specific demand of a passenger.

**One-Way Volume**

The uni-directional volume of vehicles or passengers.

**Operating Costs**

Recurring costs incurred in operating transit systems, including wages and salaries, maintenance of facilities and equipment, fuel, supplies, employee benefits, insurance, taxes, and other administrative costs. Amortization of facilities and equipment is not included.

**Operating Revenue**

The gross income from operation of the transit system including fares, charter income, concessions, advertising, etc. Does not include interest from securities, non-recurring income from sale of capital assets, etc.

**Park-and-Ride Facility**

The transfer point of an intermodal trip where the driver of an automobile parks his automobile and changes to the transit mode.

**Patronage**

The number of person-trips carried by a transit system over a specified time period.

**Peak Hour**

The hour of the day in which the maximum demand for service is experienced.

**Peak Period**

A specified time period for which the volume of traffic is greater than that during other similar periods (i.e., peak hour, peak 5 minutes, etc.).

**Person-Trip**

A trip made by a person by any travel mode.

**Revenue Service**

The time during which a transit vehicle is in service and available to passengers for transportation. This term also applies to revenue car-miles and to revenue car-hours. The time during which a vehicle is not available is deadheading time.

**Right-of-Way**

The corridor (horizontal and vertical space) occupied by the transportation way.

**Route**

The course followed by a transit vehicle as a part of the transit system.

**Route Miles**

The length of a route measured in miles between its end points.

**Terminal**

The terminating point of transportation routes of one or more modes with transfer facilities and, often, amenities for passenger convenience.

**Terminal Time**

The part of the total travel time required to gain access to the principal travel mode or the time spent in reaching the destination after departing the principal travel mode.

**Theoretical Headway**

The headway at which two successive vehicles may operate along a section of way where merging does not occur.

**Total Travel Time**

The total elapsed time between trip beginning and end, including travel, terminal and waiting time.

**Transfer**

The portion of a trip between two connecting transit routes, both of which are used for completion of the trip.

**Transfer Time**

The elapsed trip time required to effect a change of mode or to transfer between routes of the same mode.

**Transit**

A transportation system principally for moving people in an urban area and made available to the public usually through paying a fare.

**Travel Time**

The time required to travel between two points, not including terminal or waiting time.

**Trip**

The one-way movement of one person between his origin and his destination, including the walk to and from the means of transportation.

**Trips, Home-Based**

Trips having either origin or destination at the home.

**Trips, Non-Home Based**

Trips having neither origin or destination at the home.

**Vehicle Design Life**

The lifetime for which a vehicle is designed, after which replacement can be considered.

**Vehicles Supported Below**

The vehicles ride over the top of the guideway.



**ACRONYMS**

## ACRONYMS

3-C	-	cooperative, comprehensive, and continuing
AA/DEIS	-	Alternative Analysis/Draft Environmental Impact Statement
ACHP	-	Advisory Council on Historic Preservation
ADA	-	Americans with Disabilities Act
APTA	-	American Public Transit Association
ATDC	-	Aloha Tower Development Corporation
BAFO	-	Best and Final Offer
BMP	-	Best Management Programs
CBD	-	Central Business District
CEI	-	Cost-Effectiveness Index
CERCLA	-	Comprehensive Environmental Response Compensation and Liability Act
CERCLIS	-	Comprehensive Environmental Response, Compensation, and Liability Information Systems
CNEL	-	Community Noise Equivalent Levels
CO	-	Carbon Monoxide
CZM	-	Coastal Zone Management
DAV	-	Disabled American Veterans
dBA	-	Decibels on A-weighted scale
DLNR	-	Department of Land and Natural Resources
DP	-	Development Plan
DPA	-	Development Plan Area
DTS	-	Department of Transportation Services
EPA	-	Environmental Protection Agency
FEMA	-	Federal Emergency Management Agency
FHWA	-	Federal Highway Administration
FIRM	-	Flood Insurance Rate Maps
FTA	-	Federal Transit Administration
GEC	-	General Engineering Consultant
GET	-	General Excise and Use Tax
HABS/HAER	-	Historic American Building Survey/Historic American Engineering Record
HART	-	Honolulu Area Rapid Transit
HCDA	-	Hawaii Community Development Authority
HDOH	-	Honolulu Department of Health
HDTA	-	Honolulu Public Transit Authority
HFDC	-	Housing Finance and Development Corp.
HOV	-	High Occupancy Vehicle
HRS	-	Hawaii Revised Statutes
HRTTP	-	Honolulu Rapid Transit Program
HUD	-	Housing and Urban Development
HVAC	-	heating, ventilating and air-conditioning
ISTEA	-	Intermodal Surface Transportation and Efficiency Act
Leq	-	equivalent sound level
LPA	-	Locally Preferred Alternative

LUO	-	Land Use Ordinance
MOA	-	Memorandum of Agreement
MOS	-	Minimum Operable Segments
MSHD	-	Merchant Street Historic District
NAAQS	-	National Ambient Air Quality Standards
NEPA	-	National Environmental Policy Act
NO <sub>2</sub>	-	nitrogen dioxide
NPDES	-	National Pollutant Discharge Elimination System
NPS	-	National Park Service
NR	-	National Register
NTIS	-	National Technical Information Services
NTP	-	Notice to Proceed
O&M	-	operating and maintenance
O <sub>3</sub>	-	Ozone
OCCC	-	Oahu Community Correctional Center
OEQC	-	Office of Environmental Quality Control
OHA	-	Office of Hawaiian Affairs
OMPO	-	Oahu Metropolitan Planning Organization
ORT	-	Office of Rapid Transit
OTG	-	Oahu Transit Group
OTS	-	Oahu Transit Services, Inc.
Pb	-	Lead
PE/FEIS	-	Preliminary Engineering/Final Environmental Impact Statement
PEEP	-	Preliminary Engineering and Evaluation Program
PEP	-	Private Enterprise Participation
PM	-	Particulate Matter
pph	-	persons per household
PSD	-	Preservation of Significant Deterioration
PUC	-	Primary Urban Center
RCRA	-	Resource Conservation and Recovery Act
RCRIS	-	Resource Conservation and Recovery Information Systems
RFP	-	Request for Proposal
RPP	-	Residential Parking Permit
SAR	-	Source Assessment Report
SCIF	-	Special Compartmented Information Facility
SDEIS	-	Supplemental Draft Environmental Impact Statement
SDLNR	-	State Department of Land and Natural Resources
SDOH	-	State Department of Health
SHPO	-	State Historic Preservation Officer
SLB	-	Salt Lake Boulevard
SMA	-	Special Management Area
SMP	-	Source Management Programs
SO <sub>2</sub>	-	Sulfur Dioxide
SOBA	-	Southern Oahu Basal Aquifer
STP	-	sewage treatment plant
TDM	-	Transportation Demand Management
TMK	-	tax map key
TPSS	-	traction power substation
TRIS	-	Toxic Release Inventory System
TSM	-	Transportation System Management
TSP	-	Total Suspended Particulates
UMTA	-	Urban Mass Transportation Administration

USDOJ  
USDOT  
UST  
VMT  
WQLS

-  
-  
-  
-  
-

U.S. Department of the Interior  
U.S. Department of Transportation  
underground storage tanks  
vehicle miles traveled  
Water Quality Limited Segments

**BIBLIOGRAPHY**

## BIBLIOGRAPHY

### HONOLULU RAPID TRANSIT PROGRAM REPORTS\*

#### FINAL ENVIRONMENTAL IMPACT STATEMENT TECHNICAL REPORTS

Oahu Visitors Travel Survey Final Report	January 1992
On-Board Bus Survey Final Report	March 1992
Service and Patronage Forecasting Methodology	March 1992
Report on the Findings of a White Tern ( <i>Gygis alba</i> ) Survey Along Portions of the Proposed Route for the Honolulu Rapid Transit	April 1992
Phase II Environmental Site Assessment, Ewa Junction Navy Drum Site, Areas 1, 2, and 4	May 1992
Economic and Financial Impacts of the Honolulu Rapid Transit Project	June 1992
Hazardous Waste Technical Memorandum	June 1992
Transportation Impacts Results Report	July 1992
Displacement and Relocation Technical Memorandum	July 1992
Section 106 Documentation	July 1992
Section 4(f) Documentation	July 1992
Public and Agency Comments	July 1992

<b>SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT</b>	March 1992
--	------------

<b>CITY/STATE TRANSIT DEVELOPMENT AGREEMENT</b>	November 1991
---	---------------

#### SYSTEM DESIGN, SUPPLY, CONSTRUCTION, AND OPERATION AND MAINTENANCE CONTRACT DOCUMENTS

General Contract and the Memorandum of Agreement Relating to the General Contract	October 3, 1991
General Provisions	November 1, 1990 (as conformed through Addendum 8, May 3, 1991)
Operations and Maintenance Provisions	November 1, 1990 (as conformed through Addendum 12, August 20, 1991)
Special Provisions	November 1, 1990 (as conformed through Addendum 12, August 20, 1991)

\* Copies of these reports are available for review at the Department of Transportation Services, Office of Rapid Transit, 711 Kapiolani Boulevard, Honolulu, Hawaii.

Technical Provisions	November 1, 1990 (as conformed through Addendum 12, August 20, 1991)
Request for Best and Final Offers	August 7, 1991 (as conformed through Addendum 12, August 20, 1991)
Request for Proposals	November 1, 1990 (as conformed through Addendum 12, August 20, 1991)
Oahu Transit Group Best and Final Offer	September 3, 1991
<b>SELECTION COMMITTEE REPORT</b>	October 2, 1991
<b>EVALUATION OF PROPOSALS - EXECUTIVE SUMMARY</b>	September 1991
<b>ALTERNATIVES ANALYSIS AND DRAFT ENVIRONMENTAL IMPACT STATEMENT</b>	March 1990
<b>ALTERNATIVES ANALYSIS TECHNICAL REPORTS</b>	
Capital Cost Methodology	March 1988
Botanical Survey of Alternative Alignments	May 1988
Operations and Maintenance Cost Methodology	May 1988
Archaeological Study of Alternative Corridors	November 1988
Revised Public Involvement Program	April 1989
Technical Supplement to Operations and Maintenance Cost Methodology	April 1989
Technical Supplement to Capital Cost Methodology	May 1989
Evaluation Methodology	May 1989
Environmental Impacts Interim Report	July 1989
Historic Site Inventory Report	August 1989
Air Quality Impact Report	September 1989
Noise and Vibration Study	September 1989
Service and Patronage Forecasting Methodology	December 1989
Updated Environmental Baseline Report	December 1989
Final Definition of Alternatives	December 1989
Operations and Maintenance Cost Results Report	December 1989
Capital Cost Results Report	December 1989
Transportation Impacts Results Report	February 1990

## OTHER DOCUMENTS

Code of Federal Regulations. Title 40, Protection of Environment, Part 50, National Primary and Secondary Ambient Air Quality Standards.

Code of Federal Regulations. Title 49, Transportation, Part 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs

City and County of Honolulu, Department of General Planning. Development Plan Status Review, Volume II, Social, Economic and Environmental Conditions for Future Development, September 1988.

\_\_\_\_\_. Department of General Planning. General Plan. 1977 (as amended).

\_\_\_\_\_. Department of General Planning. Development Plan Status Review. Volume I Status: Fiscal Year 1990. September 1, 1990.

\_\_\_\_\_. Department of General Planning. Development Plan Status Review. Volume II Documentation: Fiscal Year 1991. September 1991.

\_\_\_\_\_. Department of General Planning. Development Plan Land Use Map. 1987.

\_\_\_\_\_. Department of Land Utilization. Land Use Ordinance No. 86-96, as amended by Ordinance No. 89-52. April 18, 1989.

\_\_\_\_\_. Department of Parks and Recreation. Index of Oahu Parks and Facilities. 1988.

\_\_\_\_\_. Department of Traffic, Mass Transit Division. Honolulu Rapid Transit System, Preliminary Engineering Evaluation Program, Final Report. Prepared by Daniel Mann Johnson & Mendenhall, December 1972.

\_\_\_\_\_. Department of Traffic, Mass Transit Division. Evaluation of Alternative Transportation Systems for the Pearl City-Hawaii Kai Corridor. Prepared by Alan M. Voorhees & Associates, Inc., March 1973.

\_\_\_\_\_. Department of Transportation Services. Honolulu Rapid Transit System, Preliminary Engineering and Evaluation Program, Phase II, Final Report. Prepared by Daniel Mann Johnson & Mendenhall, November 1976.

\_\_\_\_\_. Department of Transportation Services. Short Range Transit Plan Update, Technical Report. July 1984.

\_\_\_\_\_. Department of Transportation Services. Short Range Transit Plan Update, Technical Report. December 1985.

\_\_\_\_\_. Department of Transportation Services. Short Range Transit Plan Update, Fiscal Year 1987, Technical Report. December 1986.

\_\_\_\_\_. Department of Transportation Services. Short Range Transit Plan, Fiscal Year 1988, Technical Report. February 1988.

\_\_\_\_\_. Department of Transportation Services. Short Range Transit Plan Update, Fiscal Year 1990, Technical Report. March 1989.



\_\_\_\_\_. Department of Transportation Services. Short Range Transit Plan Update, Fiscal Year 1992, Technical Report. May 1991.

\_\_\_\_\_. Department of Transportation Services. Short Range Transit Plan Update, Fiscal Year 1993, Technical Report. April 1992 (Draft).

\_\_\_\_\_. Department of Transportation Services. Honolulu Parking Management Study Executive Summary and Final Report. Prepared by Alan M. Voorhees & Associates, May 1981.

Department of Transportation Act of 1966, Section 4(f). 49 U.S.C. 1653 (f).

Federal Emergency Management Agency, National Flood Insurance Program. Flood Insurance Rate Maps. 1990.

Fifteenth Legislature, State of Hawaii. Act 183. Relating to Transportation.

\_\_\_\_\_. Act 184. Relating to Taxation.

Fosberg, F.R. and D. Herbst. Rare and Endangered Species of Hawaiian Vascular Plants. Allertonia 1(1): 1-72, 1975.

Hawaii Business Directory. 1990/1991.

Herbst, D. Status of Endangered Hawaiian Plants. Hawaiian Botanical Society Newsletter 26(2): 44-45, 1987.

Library of Congress, Congressional Research Service. A Legislative History of the Clean Air Amendments of 1970, Volume 1, p. 411. January 1974.

Morrow, J.W. Air Quality Impact Analysis: Kaka'ako Redevelopment District Plan. July 1984.

National Historic Preservation Act of 1960. Section 106. 16 U.S.C. 470(f).

Nokes, W.A. and P.E. Benson. Development of Worst Case Meteorology Criteria. FHWA/CA/TL-85/14, Office of Transportation Laboratory, CALTRANS, November 1985.

Oahu Metropolitan Planning Organization. Hali 2000 Alternatives Analysis Study for the Oahu Long-Range Transportation Plan Update. Prepared by Wilbur Smith and Associates, June 1984.

\_\_\_\_\_. The Oahu Regional Transportation Plan. June 1991.

\_\_\_\_\_. Oahu Model Update Study Final Report, Volume 1. Prepared by Schimpler Corradino Associates, December 1982.

Patterson, R.M., et al. Validation Study of an Approach for Evaluating the Impact of a Shopping Center on Ambient Carbon Monoxide Concentrations. EPA-450/3-74-059, August 1974.

Seinfeld, John H. Air Pollution: Physical and Chemical Fundamentals. Page 69, McGraw-Hill Book Company, 1975.

State of Hawaii. State of Hawaii Air Pollution Control Implementation Plan. January 28, 1972 (as amended).

- \_\_\_\_\_, Department of Business and Economic Development, Research and Economic Analysis Division. Envision Hawaii - Population and Economic Projections for the State of Hawaii to 2010 (Series M-K). November 1988.
- \_\_\_\_\_, Department of Business and Economic Development, Research and Economic Analysis Division. Envision Hawaii -- Statistical and Economic Report -- 4th Quarter. 1988.
- \_\_\_\_\_, Department of Business and Economic Development, Research and Economic Analysis Division. The State of Hawaii Data Book: A Statistical Abstract. 1991.
- \_\_\_\_\_, Department of Land and Natural Resources. Register of Historic Places.
- \_\_\_\_\_, Department of Planning and Economic Development, Hawaii Coastal Zone Management Program. An Application Guide to State Permits and Approvals for Land and Water Use and Development. Prepared for the Office of Ocean and Coastal Resource Management National Oceanic and Atmospheric Administration, United States Department of Commerce, June 1986.
- \_\_\_\_\_, Department of Planning and Economic Development. Hawaii State Plan Policy Council, The Hawaii State Plan (Revised), Chapter 226, Hawaii Revised Statutes, as Amended. 1986.
- \_\_\_\_\_, Department of Transportation, Harbors Division. Hawaii Administrative Rules - Shore Waters and Shores. November 1981, revised May 1986.
- \_\_\_\_\_, Department of Transportation, Land Transportation Facilities Division. Bikeplan Hawaii - A State of Hawaii Master Plan. March 1977.
- \_\_\_\_\_, Department of Transportation. Traffic Summary, Island of Oahu. 1986.
- \_\_\_\_\_, Hydrological Advisory Committee. Recommendation for Ground Water Use Regulations, Circular C80, Division of Water and Land Development, Department of Land and Natural Resources, 1980.
- \_\_\_\_\_, Office of State Planning. Honolulu Waterfront Master Plan - Final Report, Executive Summary. October 1989.
- State of Hawaii. Title II, Administrative Rules, Chapter 59, "Ambient Air Quality Standards". As amended, April 1986.
- \_\_\_\_\_, Title II, Administrative Rules, Chapter 60, "Air Pollution Control". April 1986.
- State of Hawaii and City and County of Honolulu. Oahu Transportation Study. 1967.
- Thornwaite, C. W. Climates of North America According to a New Classification. Geog. Rev. 21:633-655; 1931.
- Transportation Research Board. Special Report 209 Highway Capacity Manual. 1985.
- U.S. Bureau of the Census. Census of the Population: 1980, "General Social and Economic Characteristics." Issued June 1983.
- \_\_\_\_\_, Bureau of the Census. Census of the Population: 1990, "Selected Population and Housing Characteristics."

- United States Congress. Clean Air Act Amendments of 1977 (P.L. 95-95) Section 109, National Ambient Air Quality Standards. August 1977.
- \_\_\_\_\_, Clean Air Act Amendments of 1977 (P.L.95-95) Section 110, Implementation Plans. August 1977.
- \_\_\_\_\_, Intermodal Surface Transportation Efficiency Act of 1991. P.L. 102-240.
- U.S. Department of Agriculture, Soil Conservation Service in cooperation with the University of Hawaii Agricultural Experiment Station. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. Issued August 1972.
- U.S. Department of Agriculture, Soil Conservation Service. "Highly Erodible Land Classes." June 1987.
- \_\_\_\_\_, "Soil Survey Map Units That Meet the Soil Requirements for Prime Agricultural Land." August 1980.
- \_\_\_\_\_, "Hydric Soil Map Unit List, Island of Oahu," April 1989.
- U.S. Department of the Air Force, Pacific Air Forces, Directorate of Engineering & Services. Comprehensive Plan - Future Land Use Plan, Hickam Air Force Base, Oahu, Hawaii. October 30, 1988.
- U.S. Department of the Army, Fort Shafter Army Base, Oahu, Hawaii. Fort Shafter Installation Master Plan. 1985.
- U.S. Department of Housing and Urban Development, and State of Hawaii, Community Development Authority. Kakaako Community Development District Plan - A Final Supplemental Environmental Impact Statement. May 1985.
- U.S. Department of the Interior, Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; Review of Plant Taxa for Listing as Endangered or Threatened Species; Notice of Review. Federal Register 50(188): 39526-39527 plus p. 57, table. 1985.
- \_\_\_\_\_, National Park Service. National Register of Historic Places.
- U.S. Department of the Navy, Pacific Division, Naval Facilities Engineering Command, Facilities Planning Department. Pearl Harbor Naval Complex Master Plan. February 1984.
- U.S. Department of Transportation. Report on Funding Levels and Allocations of Funds, Report to the Secretary of Transportation to the United States Congress. May 1991.
- U.S. Department of Transportation, Urban Mass Transportation Administration. Final Environmental Impact Statement and 4(f) Statement - Rail Rapid Transit Project. Prepared by the City and County of Honolulu, February 1982.
- \_\_\_\_\_, Procedures and Technical Methods for Transit Project Planning.
- U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, AP-42, Third Edition with Supplements 1-15. January 1984.

- \_\_\_\_\_. EPA Determination on the Petition to Designate the Groundwater Resources of the Pearl Harbor and Related Areas a Sole Source of Drinking Water, Under Section 1424(e) of the Safe Drinking Water Act. 1987.
- \_\_\_\_\_. Guidelines for Air Quality Maintenance Planning and Analysis, Volume 9: Evaluating Indirect Sources, EPA-450/4-75-001. January 1975.
- \_\_\_\_\_. Guidelines for Air Quality Maintenance Planning and Analysis, Volume 9 (Revised): Evaluating Indirect Sources, EPA-450/4-78-001. January 1978.
- \_\_\_\_\_. Guidelines for Air Quality Maintenance Planning and Analysis: Indirect Sources, Volume 9 (Revised), EPA-450/4-78-001. September 1978.
- \_\_\_\_\_. Guideline on Air Quality Models (Revised), EPA-450/2-78-027R. July 1986.
- \_\_\_\_\_. National Ambient Air Quality Standards for Hydrocarbons: Final Rulemaking. Federal Register, Volume 48, No. 3, p. 628. January 1983.
- \_\_\_\_\_. National Ambient Air Quality Standards for Photochemical Oxidants: Final Rulemaking. Federal Register, Volume 44, No. 28, p. 8202. February 8, 1979.
- \_\_\_\_\_. Revisions to National Ambient Air Quality Standards for Particulate Matter. Federal Register, Volume 52, p. 2463. July 1, 1987.
- \_\_\_\_\_. Rules and Regulations. Federal Register, Volume 51, No. 219, pp. 83-84. November 13, 1986.
- \_\_\_\_\_. User's Guide to MOBILE-3 (Mobile Source Emissions Model). EPA-460/3-84-002. June 1984.
- \_\_\_\_\_. Workbook of Atmospheric Dispersion Estimates. AP-26 (Sixth Edition). 1973.

**LIST OF PREPARERS**

## LIST OF PREPARERS

### PUBLIC AGENCIES

FTA. Federal agency responsible for FEIS. Key personnel include:

#### Washington, D.C

Donald J. Emerson, Chief, Planning Analysis and Support Division, Office of Planning  
- Master of Urban Affairs; Virginia Tech  
- B.S., Civil Engineering; Tufts University

Ron Jensen-Fisher, Analyst, Office of Planning  
- M.S., Civil Engineering; University of Washington  
- B.S., Physics; Rose Polytechnic Institute

Edward Thomas, Chief, Capital Development Division, Office of Mobility Enhancement  
- M.S., Transportation Planning; Columbia University  
- B.S., Geography; University of Maryland

Anthony J. Ossi, Environmental Protection Specialist, Office of Planning  
- B.A.; Rutgers University

#### San Francisco

Robert E. Hom, Program Manager, Office of Program Management, Region IX  
- M.B.A.; San Francisco State University  
- M.S.C.E., Engineering; University of California, Berkeley, Institute of Traffic and Transportation Engineering  
- B.S., Civil Engineering; University of California, Berkeley  
- Professional Engineer in California

#### Denver

Louis F. Mraz, Jr., Western Area Director  
- M.S., Engineering; University of California, Berkeley  
- B.S., Civil Engineering; University of Connecticut  
- Professional Engineer in Connecticut

City and County of Honolulu Honolulu, Hawaii. Local agency for project. Key personnel include:

#### Office of the Managing Director

Jeremy Harris, Managing Director, City and County of Honolulu  
- B.S., B.A., University of California, Irvine

City and County of Honolulu (continued)

Department of Transportation Services

Joseph M. Magaldi, Jr., Director, Department of Transportation Services  
- M.B.A., Pepperdine University  
- B.A., University of Hawaii

Amar Sappal, Deputy Director, Department of Transportation Services  
- B.S.C.E., University of London  
- Professional Engineer in Hawaii

Frank Doyle, Manager and Chief Engineer, Honolulu Rapid Transit Program  
- M.S., University of Hawaii  
- B.S., Pennsylvania Military College  
- Professional Engineer in Hawaii and New Jersey

\*Robert Sumitomo, Quality Assurance Manager, Honolulu Rapid Transit Program  
- B.S.C.E., University of Hawaii  
- Professional Engineer in Hawaii

Marvin Char, Engineering Manager, Honolulu Rapid Transit Program  
- B.S.C.E., University of Hawaii  
- Professional Engineer in Hawaii

Kenneth Hamayasu, Planning Manager, Honolulu Rapid Transit Program  
- B.S.C.E., University of Hawaii  
- Professional Engineer in Hawaii

Thomas Palmatier, Head, Transit Planning and Forecast Section, Honolulu Rapid Transit Program  
- B.S., Computer Science, American University

Gregory Hee, Head, Architecture and Urban Design Section, Honolulu Rapid Transit Program  
- M.Arch., University of Washington  
- B.A.E.D., University of Washington  
- Licensed Architect in Hawaii

Phyllis Kurio, Transportation Planner, Honolulu Rapid Transit Program  
- B.A., University of Hawaii

Faith Miyamoto, Planner, Environmental, Honolulu Rapid Transit Program  
- M.S., University of Hawaii  
- B.A., University of California, Berkeley

Tienni Fang, Electrical Engineer, Honolulu Rapid Transit Program  
- Ph.D., University of Minnesota  
- M.S., University of Minnesota  
- B.S., National Taiwan University  
- Professional Engineer in Hawaii

\*Michael Choy, Civil Engineer, Honolulu Rapid Transit Program  
- B.S.C.E., Seattle University

---

\* Individual no longer employed by agency/firm.

\* Diane Borchardt, Planner, Environmental, Honolulu Rapid Transit Program  
- M.A., University of Hawaii  
- M.U.R.P., University of Hawaii

Kenneth Banao, Planner, Honolulu Rapid Transit Program  
- B.B.A., University of Hawaii

Bruce Nagao, Planner, Environmental, Honolulu Rapid Transit Program  
- B.F.A., University of Hawaii

Lori Nagasako, Planner, Honolulu Rapid Transit Program  
- B.S., University of Hawaii

Joyce Shoji, Planner, Honolulu Rapid Transit Program  
- B.Arch., University of Hawaii

Department of General Planning

Steven C. K. Young, Chief, Planning Information Branch  
- S.M., Massachusetts Institute of Technology

Elizabeth Chinn, Planner  
- M.S., City Planning, San Diego State University

**CONSULTANT (SDEIS and PE/FEIS)**

**ICF Kaiser Engineers, Inc.** General Engineering Consultant. Key personnel include:

Mack Riddle, Project Director  
- GEC Project Director  
- Ph.D., Civil Engineering, Oklahoma State University  
- M.S., Civil Engineering, Oklahoma State University  
- B.S., Civil Engineering, The Citadel

Stephen Beard, Vice President  
- Co-Manager, Planning  
- M.S., Transportation Planning, Florida State University  
- B.S., Aviation Management, Auburn University

Allen Parker, Principal Architect  
- Manager, Station Architecture and Urban Design  
- M.Arch., Architecture, University of Minnesota  
- B.Arch., Architecture, University of Pennsylvania

Jerri Horst, Senior Planner  
- Environmental Planning Documentation  
- M.A., Environmental Planning, Governor State University  
- B.S., Natural Resources Management, University of Arizona

---

\* Individual no longer employed by agency/firm.



Charles McCaleb, Senior Technical Editor

- Manager, Technical Reports and Graphics
- M.A., Sociology, San Jose State University
- B.A., English, Dartmouth College

\*Ginny Baldwin, Senior Technical Editor

- Manager, Technical Reports and Graphics
- B.A., English, University of California, Berkeley

Leon Kantola, Project Control Manager

- Manager, Project Control
- B.S., Electrical Engineering, University of the Pacific

\*Jim Short, Project Control Manager

- Manager, Project Control
- Undergraduate Study, Humboldt State University

James Dunn, Engineering Manager

- Manager, Engineering
- B.S., Civil Engineering, University of Santa Clara, 1969

Greg Roessel (Computer Visualizations)

#### **SUBCONSULTANTS (Under ICF Kaiser Engineers, Inc.)**

Barton-Aschman Associates (Patronage Forecasting and Travel Survey)

William Davidson

Eric Bierce

George Naylor

Kaku Associates (Traffic/Travel Demand)

Dick Kaku

Tom Gaul

Lea + Elliott (System Coordinator and Systems Engineering)

Charles Elms

Parsons Brinckerhoff Quade & Douglas, Inc. (Environmental Planning)

Mark Scheibe, Assistant Vice President, Professional Associate

- Manager, System Contractor Evaluation and Transportation Planning
- M.S., Transportation Engineering, Northwestern University
- B.S., Civil Engineering, University of Santa Clara
- Professional Engineer in Oklahoma, California, Washington, New Mexico, Arizona, Alaska, Oregon and Texas

Susan Killen, Supervising Environmental Planner

- Co-Manager, Planning
- Graduate Studies, Urban Planning, Antioch University
- M.Ed., Education, Central Washington State University
- B.A., Art/Education, Seattle University

---

\* Individual no longer employed by agency/firm.

David Atkin  
Jim Ryan  
Lisa Nungesser  
Deneitra Green  
Kim Haynes  
Marjorie Press  
Kay Stone  
Zung Truong  
Miles Arakaki  
Randall Malaluan  
Rose Mesa

KPMG Peat Marwick (Financial Planning)  
Raymond Ellis

Public Financial Management, Inc. (Financial Planning)  
Benjamin J. Darche

Tudor Engineering Company (Engineering Management and Structural and Geotechnical Engineering)

\*Richard Mayes, Vice President, Tudor Engineering Company

- *Manager of Engineering*
- M.S., Structural Engineering, University of California
- B.S., Structural Engineering, University of Texas

\*Peter Fedun

#### **CONSULTANT (FEIS)**

ARI Engineering

Andrew Kanen, Environmental and Joint Development Planning, Honolulu Rapid Transit Program

- M.S., Civil Engineering, Georgia Institute of Technology
- B.S., Civil Engineering, University of Toronto
- Professional Engineer in New Hampshire and Ontario, Canada

---

\* Individual no longer employed by agency/firm.

**LIST OF FEIS RECIPIENTS**

## LIST OF FEIS RECIPIENTS

### Federal Agencies

Advisory Council on Historic Preservation  
U. S. Environmental Protection Agency, Region IX Regional Administrator  
and Office of Federal Activities  
U. S. Department of Agriculture, Soil Conservation Service  
U. S. Department of Commerce, National Marine Fisheries Service, Western  
Pacific Program Office  
U. S. Air Force, 15 ABW/DE  
U. S. Army Pacific Headquarters  
U. S. Army Corps of Engineers  
U. S. Pacific Command, Commander-in Chief  
U. S. Department of Housing and Urban Development  
U. S. Department of the Interior, Office of Environmental Project Review  
U. S. Fish and Wildlife Service, Office of Environmental Services  
U. S. Coast Guard, 14th Coast Guard District  
U. S. Geological Survey, Hawaii District  
Federal Aviation Administration, Western-Pacific Region  
Federal Emergency Management Agency, Region IX  
Federal Highway Administration, Division Administrator  
Naval Base Pearl Harbor  
Chief of Naval Operations  
General Services Administration  
National Park Service

### State Agencies

Governor, State of Hawaii  
Lieutenant Governor, State of Hawaii  
Department of Accounting and General Services  
Department of Agriculture  
Department of Defense  
Department of Education  
State Librarian  
Department of Health  
Department of Land and Natural Resources  
Office of State Planning  
Department of Corrections  
Department of Human Services  
Office of Environmental Quality Control  
Department of Transportation  
Hawaii Community Development Authority  
Aloha Stadium Authority  
Office of Hawaiian Affairs  
Waikiki Convention Center Authority  
Hawaii Housing Authority

### **State Agencies (continued)**

Housing Finance and Development Corporation  
Department of Business, Economic Development and Tourism  
Land Use Commission  
University of Hawaii  
    Environmental Center  
    Water Resources Research Center  
    Hawaii Natural Energy Institute  
    Vice President for Finance and Operations  
    Office of the Chancellor-Community College

### **City Agencies**

Board of Water Supply  
Building Department  
Department of Finance  
Department of Housing and Community Development  
Department of General Planning  
Department of Land Utilization  
Department of Parks and Recreation  
Department of Public Works  
Fire Department  
Police Department

### **Congressional Representatives**

The Honorable Daniel K. Inouye  
The Honorable Daniel K. Akaka  
The Honorable Patsy T. Mink  
The Honorable Neil Abercrombie

### **State Senators**

The Honorable James Aki  
The Honorable Russell Blair  
The Honorable Anthony K. U. Chang  
The Honorable Steve Cobb  
The Honorable Mike Crozier  
The Honorable Lehua Fernandes-Salling  
The Honorable Mary George  
The Honorable Gerald T. Hagino  
The Honorable Milton Holt  
The Honorable Donna R. Ikeda  
The Honorable Bertrand Kobayashi  
The Honorable Ann Kobayashi  
The Honorable Stanley T. Koki  
The Honorable Andrew Levin  
The Honorable Richard Matsuura  
The Honorable Mike McCartney

The Honorable Mary-Jane McMurdo  
The Honorable Randy Iwase  
The Honorable Norman Mizuguchi  
The Honorable Dennis M. Nakasato  
The Honorable Rick Reed  
The Honorable Malama Solomon  
The Honorable Eloise Y. Tungpalan  
The Honorable Richard S. H. Wong  
The Honorable Mamoru Yamasaki

#### **State House of Representatives**

The Honorable Emilio S. Alcon  
The Honorable Annelie Amaral  
The Honorable Whitney Anderson  
The Honorable David Morihara  
The Honorable Peter K. Apo  
The Honorable Dennis A. Arakaki  
The Honorable Rosalyn Baker  
The Honorable Reb Bellinger  
The Honorable Robert Bunda  
The Honorable Cynthia Thielen  
The Honorable Romy M. Cachola  
The Honorable Jackie Young  
The Honorable Jerry Chang  
The Honorable Julie R. Duldulao  
The Honorable Carol Fukunaga  
The Honorable David M. Hagino  
The Honorable Clarice Y. Hashimoto  
The Honorable Duke Bainum  
The Honorable Jane Tatibouet  
The Honorable Kenneth T. Hiraki  
The Honorable Gene Ward  
The Honorable Mazie Hirono  
The Honorable Herbert J. Honda  
The Honorable Karen K. Horita  
The Honorable Marshall K. Ige  
The Honorable David Y. Ige  
The Honorable Les Ihara  
The Honorable Virginia Isbell  
The Honorable Ezra Kanoho  
The Honorable Bertha Kawakami  
The Honorable Daniel J. Kihano  
The Honorable Samuel S. H. Lee  
The Honorable Alexander Santiago  
The Honorable Suzanne Chun  
The Honorable Barbara Marumoto  
The Honorable Wayne Metcalf  
The Honorable Mike O'Kieffe  
The Honorable Tom Okamura  
The Honorable Paul T. Oshiro

The Honorable Henry H. Peters  
The Honorable Calvin K. Y. Say  
The Honorable James T. Shon  
The Honorable Joseph M. Souki  
The Honorable David Stegmaier  
The Honorable Harvey S. Tajiri  
The Honorable Dwight Y. Takamine  
The Honorable Rod Tam  
The Honorable Brian T. Taniguchi  
The Honorable Terrance Tom  
The Honorable Edward K. Thompson III  
The Honorable Noboru Yonamine

#### **City Council**

The Honorable Arnold Morgado, Jr.  
The Honorable Andy Mirikitani  
The Honorable John DeSoto  
The Honorable Leigh-Wai Doo  
The Honorable Gary Gill  
The Honorable Rene Mansho  
The Honorable Steve Holmes  
The Honorable Donna Mercado Kim  
The Honorable John Henry Felix

#### **Neighborhood Boards**

Hawaii Kai Neighborhood Board No. 1  
Kuliouou/Kalani Iki Neighborhood Board No. 2  
Waialae/Kahala Neighborhood Board No. 3  
Kaimuki Neighborhood Board No. 4  
Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board No. 5  
Palolo Neighborhood Board No. 6  
Manoa Neighborhood Board No. 7  
McCully/Moiliili Neighborhood Board No. 8  
Waikiki Neighborhood Board No. 9  
Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10  
Ala Moana/Kakaako Neighborhood Board No. 11  
Nuuanu/Punchbowl Neighborhood Board No. 12  
Downtown Neighborhood Board No. 13  
Liliha/Kapalama Neighborhood No. 14  
Kalihi Palama Neighborhood Board No. 15  
Kalihi Valley Neighborhood Board No. 16  
Aliamanu/Salt Lake/Foster Village Neighborhood Board No. 18  
Aiea Neighborhood Board No. 20  
Pearl City Neighborhood Board No. 21  
Waipahu Neighborhood Board No. 22  
Ewa Neighborhood Board No. 23  
Waianae Coast Neighborhood Board No. 24  
Mililani/Waipio/Melemanu Neighborhood Board No. 25  
Wahiawa Neighborhood Board No. 26

North Shore Neighborhood Board No 27  
Koolauloa Neighborhood Board No. 28  
Kahaluu Neighborhood Board No. 29  
Kaneohe Neighborhood Board No. 30  
Kailua Neighborhood Board No. 31  
Waimanalo Neighborhood Board No. 32

#### **News Media**

Honolulu Advertiser  
Honolulu Star-Bulletin  
Sun Press

#### **Libraries**

University of Hawaii Hamilton Library, Hawaiian Collection  
Legislative Reference Bureau  
State Archives  
DBED Library  
Municipal Reference and Records Center  
State Main Library  
Kaimuki Regional Library  
Kaneohe Regional Library  
Pearl City Regional Library  
Hilo Regional Library  
Wailuku Regional Library  
Lihue Regional Library  
Aiea Library  
Aina Haina Library  
Ewa Beach Community-School Library  
Hawaii Kai Library  
Kahuku Community-School Library  
Kailua Library  
Kalihi-Palama Library  
Liliha Library  
Manoa Library  
McCully-Moiliili Library  
Mililani Library  
Wahiawa Library  
Waialua Library  
Waianae Library  
Waikiki-Kapahulu Library  
Waimanalo Community-School Library  
Waipahu Library

#### **Miscellaneous**

Oahu Metropolitan Planning Organization  
Hawaiian Electric Co., Inc.  
Hawaiian Telephone Co.  
Oceanic Cablevision



Pacific Resources, Inc.  
American Lung Association  
Chevron USA, Inc.  
Downtown Improvement Association  
Historic Hawaii Foundation  
Hawaii's Thousand Friends  
The Outdoor Circle  
Pearl City Shopping Center  
Pearlridge Center  
Kamehameha Schools/Bishop Estate  
League of Women Voters  
Life of the Land  
Chamber of Commerce of Hawaii  
Sierra Club, Hawaii Chapter  
Hawaii Transportation Association  
Conservation Council for Hawaii  
Kakaako Improvement Association  
Waikiki Improvement Association  
Common Cause/Hawaii  
First Development, Inc.  
Gem of Hawaii Inc.  
Ala Moana Center  
Construction Industry Legislative Organization  
Downtown Business Council  
Hawaii Society, AIA  
Kalihi-Palama Community Council  
Victoria Ward, Ltd.  
Waikiki Residents Association  
Hawaii Visitors Bureau  
Committee on Sensible Transit  
Charley's Taxi  
Leeward Oahu Transportation Management Association  
Honolulu Taxpayers for Traffic Solutions

